V. Protocols for co-enquiry research

Background
One of the principal aims of COMBIOSERVE was to develop a set of practical, adaptable and replicable tools for implementing co-enquiry as a preferred approach when carrying out research on the effectiveness of community-based natural resource management. The Co-enquiry Research Protocols (CRPs) presented in this section are comprehensive tools for researchers to explore and adapt to different realities all over Latin America and beyond. CRPs were developed both for carrying out biodiversity monitoring and social science research.

Monitoring of biodiversity and community-based management of natural resources:

(1) **Community-based plant monitoring.** This protocol provides an adaptable research protocol for the implementation of a co-enquiry methodological approach for plant monitoring for community-based natural resource management.

(2) **Community-based fauna monitoring.** This protocol provides an adaptable research protocol for the implementation of a co-enquiry methodological approach for elements of wildlife monitoring for community-based natural resource management.

(3) **Community-based river monitoring.** This succinct protocol provides an adaptable research protocol for the implementation of a co-enquiry methodological approach for elements of river monitoring for community-based natural resource management.

(4) **Community-based reforestation monitoring.** This succinct protocol provides an adaptable research protocol for the implementation of a co-enquiry methodological approach for elements of reforestation monitoring for community-based natural resource management.

Social science research on socio-environmental change:

(5) **Basic social science research methods in co-enquiry: workshops, semi-structured interviews, oral histories, focus groups and participatory mapping:** This protocol provides an adaptable research protocol for the implementation of a co-enquiry methodological approach for elements of social science research in the context of community-based natural resource management.

(6) **Innovative approaches: the System Operator of TRIZ-OSTM and problematising dialogues** This protocol provides an adaptable research protocol for the implementation of a co-enquiry methodological approach for exploring current realities and change in community contexts.

The protocols on river and reforestation monitoring were developed in the Pilon Lajas fieldsite and therefore represent the requirements and processes developed in Tsimae communities. All other protocols were developed in the Chinantla field-site; as such, the protocols were developed with Chinantec community researchers to respond to their communities’ necessities and interests. Nevertheless, communities, CSOs and research institutions operating at other COMBIOSERVE fieldsites provided significant input into
the design of the methodological process. Although the CRPs were developed within specific social, political, cultural and environmental conditions, the approaches provided can be adapted to a variety of different conditions.

These CRPs were developed in order to provide tools for implementing a co-enquiry approach in the assessment of community-based management of biocultural diversity. Their ultimate aim is to act as tools for adaptive management, with an emphasis on community priorities and aspirations for their community-conserved areas and natural resource management systems.

It is expected they will help researchers and communities in many different contexts work together to empower communities to manage their biocultural diversity autonomously, effectively, and adaptively. The protocol is aimed at researchers or research facilitators wishing to adopt a co-enquiry approach in their work with communities. It might also be a source of information for community leaders who wish to engage in co-enquiry with research institutions.

Chapters II and III provide a literature review and the theoretical context and framework for co-enquiry as well as practical guidance for establishing and maintaining a co-enquiry process.

**Designing a co-enquiry research process: key concepts**

The approach enshrined in these CRPs is one that seeks to carry out interactive participatory research – called co-enquiry – that places the research process in the hands of the community (see Table of Typologies of participation in Annex 3). Some central concepts upon which the Chinantla co-enquiry processes were built are:

1. The community hosting the research (hereafter ‘host community’) collectively decide upon a research need and seek support of the external researchers, whose role is to act as research facilitators (hereafter ‘facilitators’);
2. Through a locally appropriate and/or democratic process, the host community elects a team of community researchers. Together, facilitators and community researchers constitute the research team;
3. Community researchers, in continuous collaboration and communication with community decision-making bodies, are the primary leaders of the research process, including the development of research questions; assessment, adaptation and implementation of methods in the field; data analysis; and dissemination of the results;
4. Facilitators provide training, technical guidance and financial support for community researchers and the community at large;
5. Given communities’ changing research needs and lack of formal education, conventional scientific research methodologies can often provide useful starting points for developing co-enquiry approaches to answering their questions.

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1 Please refer to Chapter III for further information and guidance regarding the election of community researchers
2 We have chosen the term ‘conventional’ because we believe that indigenous modes of knowledge are also scientific, even though they are not conventional.
However, the co-enquiry framing ensures that these methodologies are questioned, analysed and adapted to local contexts.

6. The Code of Ethics of the International Society for Ethnobiology (ISE; see Annex 1) is used as the primary reference for ethical research (for both social and natural sciences), although co-enquiry seeks to go beyond these high standards;

7. In line with the Code of Ethics of the ISE, communities and community researchers can, at any moment during the research cycle, request that the research process be adapted, modified, re-framed, or even suspended;

8. The process for developing a complete CRP – that provides methodological tools and adaptations for tackling every element of the research cycle – is inherently long (taking up to 2 years), especially in the context of communities who have a low level of formal education.

9. Given that this protocol aims to be adaptable, the authors provide throughout – in the shape of yellow-shaded boxes entitled ‘Adaptations’ – examples of adaptations implemented in the social context of Chinantec and Tsimane’ communities. It is hoped that this will give readers ideas for adaptation in the social context they are working in.

Developing a co-enquiry methodology

Global Diversity Foundation, the primary institution responsible for developing the protocols and this Methods Manual, has a long-term reciprocal and collaborative relationship with community researchers and community members in the Chinantla. This has enabled us to develop, in collaboration with community researchers, a locally tailored co-enquiry methodology. Chapters II and III cover the theoretical and practical aspects of developing such a methodology. In the case of the Tsimane’ communities, where CRPs on reforestation monitoring and fishing monitoring were developed, a full co-enquiry approach was difficult to develop due to the lack of formal education among community researchers. Therefore, some aspects of these latter CRPs, rather than representing a full co-enquiry approach, were developed using a collaborative approach led by an external researcher.

Ideally, and usually after many years of practice and reflection, co-enquiry encourages community researchers to develop sui generis research methods or to identify traditional methods that help to answer their research questions, in practice conventional social science research are used as a basis for the development of community-based approaches and adaptations. In the Chinantla context, researchers preferred learning conventional science methods that they question, test and adapt to their own realities, abilities and research questions. This highly productive work of adapting conventional methods to a co-enquiry approach is a necessary part of our collaborative work in COMBIOSERVE: as such, the Chinantec research teams adapted a selection of the methods proposed by two project research institutions (UAB for the CRP on Basic Social Science research methods and INECOL for the CRPs on biodiversity monitoring), and developed others that they felt would be useful, especially for CRP on Innovative approaches.

Over the course of 6 years of ethnographic, co-enquiry and community planning fieldwork with GDF, Chinantla community researchers have developed numerous research questions that are based on their local research needs and aspirations. The specific research questions included in this protocol are those Chinantec research
questions that coincide with the objectives of COMBIOSERVE research. It is particularly important that the whole community develop research questions together, as this integrates the co-enquiry process into community decision-making processes rather than isolating it as a parallel process that is only fully known to the team of community researchers. The protocol for developing co-enquiry research questions is described in Chapter III.

**Developing a research calendar**

Each co-enquiry situation requires the development of a locally appropriate research calendar that closely respects the environmental, productive, economic and cultural calendars of the host community. The calendar must be developed with the full participation of the host community prior to beginning the research so as to avoid delays and inconvenient overlaps with important community dates. It is suggested that the research calendar be developed during a community-wide half-day session. It is important to work at all levels of decision-making – community researchers, local authorities, and the community as a whole – as each grouping has particular knowledge of environmental, social or political events that may benefit or affect the work. The research calendars depend on the methods used, therefore each protocol follows its own specific calendar.
Monitoring of biodiversity and community-based management of natural resources

**Plant monitoring co-enquiry protocol**

The community-based plant monitoring protocol is designed to aid in the process of biodiversity monitoring for assessing the effectiveness of community-based natural resource management. Its ultimate aim is to act as a tool for adaptive management, with an emphasis on community priorities and aspirations for their community-conserved areas. It is designed in such a way that following training, community researchers are able to implement the monitoring process autonomously and take locally-relevant conservation decisions given the results of their monitoring activities. Through its emphasis on community-led investigation and regular data collection, the protocol is also designed to be adaptable and flexible given changes in community needs and environmental conditions.

The objectives were designed by the community research team, with the support of facilitators, using basic questions that address the realm of plants within a given community:

<table>
<thead>
<tr>
<th>A. What are we talking about?</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. What are the plants that we have?</td>
</tr>
<tr>
<td>C. What are the landscape units or identified ecosystems we live in?</td>
</tr>
<tr>
<td>D. What do we want to know?</td>
</tr>
<tr>
<td>E. How do we answer our questions?</td>
</tr>
<tr>
<td>F. How do we analyse our results?</td>
</tr>
<tr>
<td>G. How our results are useful for community decision-making processes?</td>
</tr>
</tbody>
</table>

The following objectives and related activities were developed in the Chinantla context, and are therefore based on local needs and aspirations. Yet, as the method development was based on the above broad questions, these structure provided can easily be adapted by other facilitators in different contexts. The *Mutual Learning and Community Research Protocol* provides a detailed description of how to set objectives and research questions and how to develop a co-enquiry research protocol.

**A. What are we talking about?**

Any cultural domain (a set of items that are, in an obvious sense, of the same type) can be understood differently depending on the cultural context. Scientists may define the cultural domain “plants” based on the organism’s morphological, metabolic or genetic characteristics, yet lay people, who often lump green organisms together, may include fungi, lichens and green algae in the same “plants” domain. Given these differences in cultural domain, it is important to base plant monitoring activities on a solid understanding of what the research team are talking about, especially in the context of an intercultural group (made up of external facilitators and community members).
Objective A.1 To define the cultural domain of plants among research participants

B. What plants do we have?
Once a common idea of “plants” is defined, the research team proceeds to identify plants the community have in their territory, and to classify them in any possible and locally relevant category, a process that helps to refine the research.

Objective B.1 To establish plant inventories.
B.1.1. Conduct a literature review on local plant studies;
B.1.2. Train community researchers in the creation and use of plant inventories;
B.1.3. Train community researchers in botanical collection;
B.1.4. Create digital herbaria useful in local environmental conditions;
B.1.5. Complement the inventories through the creation of a complementary photographic register.

C. What landscape units do we live in?
The description of landscape units in a territory or a region is often directly based on the plant species composition of certain areas, in conjunction with plant accessibility, land use, and so on. It is important to understand the distribution of such environmental units in order to better understand how to gather information, the potential relevance of this information for conservation decision-making processes, the logistical implications of conducting research in each unit, the use of plant resources in each unity, etc.

Objective C.1 To gather basic information on local landscape units.
C.1.1. To identify natural and anthropogenic landscape units according to local ethnoclassification and scientific classifications.
C.1.2. To identify the main species and plant groups that characterise each of the identified landscape units.

D. What do we want to know?
Once the basic information about what plants there are (plant inventories) and where they are (landscape units), the research team decides what they want to know about local plants. The range of possible questions can be very broad. The overarching research questions of Chinantec communities have been developed over the course of 6 years of ethnographic, co-enquiry and community planning fieldwork, and are based on their local research needs and aspirations. The specific research questions included in this protocol are those emerging from Chinantla community members and were formulated during the application of this protocol (see specifically Methods Group 3). It is particularly important that research questions are developed by the community as a whole as much as possible, as this integrates the co-enquiry process into community decision-making processes rather than isolating it as a parallel process that is only fully
known to the team of community researchers. The protocol for developing co-enquiry research questions is covered in detail in Chapter III and Methods Group 3.

**Objective D.1 To determine the specific questions related to local plants and vegetation to be answered through a process of co-enquiry.**

**Task D1.1** Train community researchers to develop their own research questions

**E. How do we answer our questions?**

Once specific questions are posed, the research team elaborates a methodology for answering them. This stage involves the process of methods application, design and/or adaptation, and external academics and local researchers play an important role in it. Following our case study’s internal process for developing these co-enquiry methods, the research team proposed a set of research activities to compare floral composition and vegetation characterisation of swidden fallow fields (*acahuales* in Spanish) at different ages – from a few years old to over 50 years old. The age difference allows to compare *acahuales* at different successional stages, which may constitute secondary vegetation or even be very close to a “natural” forest. With this comparison the team planned to answer the locally defined question of how and how much the swidden fallow field contribute to the conservation of local biodiversity. This question is very relevant to the participant communities as they base most of their productive and subsistence activities in the continuum of *acahual* successional stages that can be identified by externals as different landscape units.
Objective E.1 Train community researchers in techniques for the study of floral composition and vegetation characterisation.

E.1.1 Reinforce local skills in botanical collection;
E.1.2 Train community researchers in basic botanical morphology;
E.1.3 Train community researchers in sampling, using previously defined techniques.

Objective E.2 Carry out collaborative research on the floral composition of local vegetation categories.

E.2.1. Carry out initial reconnaissance fieldtrips with community researchers;
E.2.2. Carry out collaborative comparative vegetation studies to generate information on acahuales, primary forests and conservation – for example, comparing young fallow swidden plots to secondary forests; comparing lowland vegetation and highland vegetation; comparing secondary forest with primary forest;
E.2.3. Establish plant inventories for each landscape unit under study;
E.2.4. Identify the presence or absence of plant species that are important for conservation in each of the distinct vegetation categories as baselines for community-based conservation actions;
E.2.5. Carry out studies on plant communities.

Objective E.3 To integrate the plant information into a Community Geographical Information System.

E.3.1. Georeference each material or data collection in a database to be integrated with the community maps; information on local categories of vegetation and examples of useful plants will be given particular attention;
E.3.2. Integrate the information in thematic community maps – both paper and digital.

F. How do we analyse our results?

The co-enquiry process must include the analysis of results in order to collectively make sense of the field data, reach synthesised results and draw conclusions that can be useful for decision-making processes.

For facilitators who are used to carrying out conventional research, it may be difficult to relinquish cherished systems for analysis, particularly those that require computer skills or complex statistics. Nevertheless, the process of simplifying and decoding procedures for data analysis can be an interesting and enlightening personal challenge for researchers. Therefore, the proposals for data analysis recommended here are the very basic creation of lists, additions, and making simple table and graphics through which the local research team can be introduced to quantitative data analysis. We are considering here local research teams who have a low level of formal education.

Even if the analysis is simple, it can take time and effort to be rigorous and to process considerable amount of field data. Therefore, it is very important that the facilitator is
prepared and communicates to the rest of the research team that the quantitative analysis may be laborious and time-consuming, but that is a needed step to give sense to all the fieldwork, find specific results and have useful information for decision-making.

G. How can we use our results in community decision-making processes?
The protocol for implementing a community-led workshop on results analysis in the context of community decision-making is included below, in the CRP on Basic Social Science research methods.

Methodologies

In this section, we describe the sequence of workshops, trainings, and ad-hoc CR support sessions to carry out the co-enquiry process in the Chinantla. The process of adaptation and training in specific methods undertaken in the Chinantla is described in the subsequent sections. For each training session described here and further below, it is important that a selected local research team that is committed to following the training and conducting subsequent field practice is in place. The local team must be informed well in advance regarding the dates and length of the training session, which must coincide with a previously established research calendar.

<table>
<thead>
<tr>
<th>Methods group 1. Definition of the cultural domain of plants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addresses Objective A.1 To define the cultural domain of plants among research participants</td>
</tr>
</tbody>
</table>

Structured Dialogue

There exist simple yet systematic techniques to delimit a cultural domain, such as free listing. However, the authors of this COMBIOSERVE protocol suggest that when talking about broad domains such as plants, animals, soils, etc. these can be initially described through qualitative techniques such as participant observation, interviews and focus groups. Participant observation is the basis for any participatory research, and the method is implemented by facilitators and community researchers alike (Please refer to Chapter III for more details on the method).

Participant observation requires the research team to participate in community life and general activities (subsistence, celebrations, social and even political events), and, through conversations, observation and embodied learning, gain knowledge regarding the research question, which in this case is the words, elements and limits that shape the local plant domain. The advantage of this technique within a co-enquiry process is that community researchers have been de facto observers of the local natural and social environment their entire life! Therefore, they have good – sometimes exceptional – knowledge concerning local cultural domains.
Once the research team has gained a general understanding of the plant domain, a focus group is organised to share ideas, words and limits of the domain. The limits are very important, as the research team need to determine whether some ‘unexpected’ organisms are included in the local plant domain or not – e.g. fungi, lichens and green algae.

Session Objectives
To identify the local cultural domain for plants, specifically the limits of the domain.

Facilitators
The focus group should be led by a external or local team member with abilities to lead a group discussion.

Participants
Local research team and any other community member interested in biodiversity and plants.

Expected results
At the end of the session, the participants will have a clear understanding of their cultural domain for plants, including its limits.

General thematic content
a) What is a plant, and what is not a plant, for us in the Chinantla?
   b) How does the research team categorise plants in the Chinantla?

Learning experiences
• Theoretical revision of cultural domains;
• Structured group dialogue;
• Drawing consensus conclusions.

Session development
It is suggested the training session be organised as follows:

Figure 1: Gathering basic information on the cultural domain of plants

I. Introduction
The facilitator will provide the group with an introduction that covers (i) the purpose of the workshop, (ii) themes tackled by the workshop and how they will be addressed, (iii) length of the session, (iv) structure of the session, (v) outcomes of the session, etc.

II. Theoretical revision
The facilitator explains the concept of a cultural domain.

III. Dialogue (focus group)
The co-enquiry format for implementing the focus group method has been developed as part of the CRP on Basic Social Science research methods (p.183-227). Should the
research team decide to carry out a conventional focus group (i.e. not using the co-enquiry method), the facilitator can lead the process according to simple, known formats.

The group elects a facilitator and a note-taker. The facilitator mediates a discussion between the participants about:

- What does the local plant cultural domain include;
- What does it exclude;
- What are the elements taking into account locally to categorise and classify plants.

The note-taker must take detailed note of all the discussion.

IV. Group conclusions
Besides the notes taken by the note-taker, important points of this dialogue will be registered in a table on a flip chart paper. At the end, the note-taker will complement the table, and a consensus conclusion will be drawn. This information is useful as basic information about the natural resources and will be used in future research techniques.

**Example of the work plan**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Introduction</td>
<td>Day 1 - 15 minutes, AM.</td>
</tr>
<tr>
<td>II. Theoretical revision</td>
<td>Day 1 - 1 hour, AM.</td>
</tr>
<tr>
<td>III. Focus group</td>
<td>Day 1 - 3 hours, AM.</td>
</tr>
<tr>
<td>IV. Conclusions</td>
<td>Day 1 - ½ hour, AM.</td>
</tr>
</tbody>
</table>

**Equipment and materials**
- Notebooks
- Pencils or pens
- Flip chart paper, cardboard
- Consultation books about local or regional plant diversity.

**Methods group 2. Ethnoclassification of local landscape units**

**Addresses Objective C.1 To gather basic information on local landscape units**

**Focus group**
In a similar process to that implemented for the plant cultural domain (Objective A.1), qualitative techniques, such as participant observation and focus groups, constitute a first approach to determining local landscape units. See Methods group 1 (above) for background information on participant observation.

Furthermore, eliciting local ethnoclassification helps us to comprehend more deeply local concepts and understanding of landscapes, providing language elements, local
characterisation components and varied knowledge, which will be used in the elaboration and adaptation of the subsequent monitoring methods. Ethnoclassification exercises help the research team understanding how people categorise a determined group of different objects. In this workshop, we propose to conduct one of the very basic tools to learn about ethnoclassification: dialogue. There are nevertheless more specialised and complex methods to study ethnoclassification, not only for landscapes, but for plants, animals and any other living or non-living element. For more methodological information on ethnoclassification see Martin (1995), Puri and Vogl (2005), and Santos Fita and Costa Neto (2009). For the purpose of this protocol, the authors limit their proposal to landscape ethnoclassification as it is the most related to the process research questions, but please also refer to the CRP on Fauna Monitoring for specific examples for the application of other ethnoclassification methods.

Objectives

1. To identify natural and anthropogenic landscape units according to local ethnoclassification and scientific classifications.
2. To identify the main species and plant groups that characterise each of the identified landscape units.

Facilitators

The focus group should be led by a external or local team member with abilities to lead a group discussion.

Participants

Local research team and any other community member interested in biodiversity and landscapes.

Expected results

At the end of the session, the participants will (i) recall and have a common understanding of local landscape-related concepts; (ii) know how to delimit a landscape unit; and (iii) identify landscape units present in the local territory and/or region.

General thematic content

a) What is a landscape?
b) What is a landscape unit?
c) What local landscape units is the research team working in?

Learning experiences

• Theoretical presentation for themes a) – b)
• Group dialogue for c)

Session development

It is suggested the training session be organised as follows:

I. Introduction  →  II. Theoretical revision  →  III. Dialogue

Figure 2: Gathering basic information on landscape units for plant monitoring
I. Introduction
The facilitator will provide the group with an introduction that covers (i) the purpose of the workshop, (ii) themes tackled by the workshop and how they will be addressed, (iii) length of the session, (iv) structure of the session, (v) outcomes of the session, etc.

II. Theoretical revision
The facilitator gives an overview of the concepts of landscape and landscape units, providing an academic definition of these.

III. Dialogue (focus group)
The co-enquiry format for implementing the focus group method has been developed as part of the CRP on Basic Social Science research methods (p.183-227). Should the research team decide to carry out a conventional focus group (i.e. not using the co-enquiry method), the facilitator can lead the process according to known formats.

The group elects a facilitator and a note-taker. Drawing on the definitions of landscapes and landscape units discussed above, the facilitator mediates a discussion between the participants about:

- The landscape units present in the community's territory, according to local definitions;
- Their characteristics;
- The differences and similarities between them;
- The plant groups, species and/or ethnospecies present in each unit;
- The animal species and/or ethnospecies present in each unit;
- Contrast local landscape units with those defined by academics.

The note-taker must take detailed note of all the discussion. And a synthesis of the results will be registered in a table on a flip chart paper. At the end, the note-taker will complement the table, and a consensus conclusion will be drawn. This information is useful as basic information about the natural resources and will be used in future research techniques.
Adaptations

In the Chinantla, the facilitators used images to support the process of ethnoclassification. They then showed the community researchers 8 images that illustrate issues connected to their territory (for instance of a swidden plot, forest, wild animal, river, surveillance, archaeological remains, etc.). The facilitators gave the participants time to observe the images, after which we launched the dialogue to elicit a common understanding of the terms ‘landscape’ and ‘landscape unit’ using questions such as “What do these images mean together?”, “What are they telling us?”, etc.

We found that it was important to have clear instructions regarding time limits and the amounts of images to be used for the ethnoclassification process, as, effectively, too much time and too many images tended to create confusion. Our conclusion was that the exercise of image selection should not last more than 10 minutes, and that its success would depend on the clarity of the images used and on the active participation of community researchers in the process.

It is also important to settle language issues (mainly: translations of key terms) prior to the beginning of the exercise, as these issues could result in the extension of time frames. The facilitator is encouraged to take note, prior to the workshop, of relevant local language plant names and plant classification systems. With appropriate previous coordination, the exercise should not last more than 30-45 minutes.

Example of the work plan

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<td>C. Focus group</td>
<td>Day 1 - 3 hours, AM.</td>
</tr>
</tbody>
</table>

Equipment and materials

- Notebooks
- Pencils or pens
- Flip chart paper, cardboard
- Consultation books about local or regional ecosystems and landscapes.

Methods group 3. Workshop to determine research questions

Addresses objective D.1. To determine the specific questions related to local plants and vegetation that will be answered through a process of co-enquiry

Training and analysis workshop

This workshop tackles the overall research process: its broader goal is for community researchers to understand basic (and conventional) research cycle. For the purposes of this protocol, the authors of this COMBIOSERVE protocol adapted the process to plants and vegetation research and monitoring, however it can be used as a basis for any other research objective.
Workshop objectives

- To share with community researchers the basic elements of the research cycle, by comparing them with daily processes;
- To determine specific questions related to local plants and vegetation to be answered through a process of co-enquiry.

Facilitators

This workshop should be facilitated by an external or local team member with abilities to lead a group discussion and with expertise in research processes.

Participants

- Local research team and any other community member interested in plant diversity and general research.
- Special attention must be given to integrate different social groups of the community into the workshop, such as women, young people and elders, as they can provide different views of the needs and local realities.

Expected results

At the end of the session, the participants will (i) be acquainted with a research cycle and its steps; (ii) recognise general research processes they implement in their daily lives to answer questions; (iii) have a general picture of the local needs and context regarding natural resources management; and (iv) have defined overarching research questions to be answered through a co-enquiry process.

General thematic content

a) Finding a common language for research.
b) The research cycle
c) Mapping natural resources uses, opportunities and conflicts
d) Selection of research themes
e) Selection of research questions

Learning experiences

- Theoretical presentation and dialogue for a) and b)
- Making maps for c)
- Information systematisation and focus group for d) and e)

Session development

It is suggested the training session be organised as follows:
I. Introduction
The facilitator will provide the group with an introduction that covers (i) the purpose of the workshop, (ii) themes tackled by the workshop and how they will be addressed, (iii) length of the session, (iv) structure of the session, (v) outcomes of the session, etc.

II. Theoretical revision
In this section, two theoretical issues will be addressed:

1. A common language for the research process
2. The research cycle

Language is important tool to reach a common understanding of a research process. Often external academics are used to freely deploying scientific and technical language without taking into account that most local people may not understand it. This section is not aimed at teaching or transferring the scientific and technical words to the community researchers, but rather at reaching a common understanding, between facilitators and community researchers, of how to name particular processes, objects, tools, approaches, etc.

For the purposes of this protocol, the authors of this COMBIOSERVE protocol propose to determine a common language for the overarching domains of natural resource management, the effectiveness of community conservation and plants in general. For each one of these, the facilitator promotes an exchange of ideas: dialogue is encouraged to analyse the differences between the external and the local definitions.

The team’s work to define mutually understood concepts will continue throughout the workshop, as and when needed.

The proposed terms for discussion are:

- Co-enquiry
- Research
- Conservation
- Biodiversity
• Vegetation
• Monitoring

The facilitator must be aware that some words may have a stronger political load and therefore may need more time to be defined.

As a first result of this exercise, the team should adapt the language used during the rest of the plan research process to the one that was commonly defined.

III. Dialogue and methodological reflection
Assuming that most of the local participants have no previous experience with the scientific method and/or the research cycle, in this section a presentation and explanation of both concepts is provided. The facilitator then promotes a dialogue about the previous experience of the participants with these concepts and associated processes, even if participants do not know the terminology. Questions posed include: Have they ever used these processes in daily life? Are these research processes useful to solve local problems? How? What other steps do the research team usually follow and how can we complement the conventional action research cycle?

IV. Creating a basic map for mapping natural resources, their uses, opportunities and conflicts
The creation of an initial, general, mind map of the resources, their uses, opportunities and conflicts found in the territory, will generate:

• A preliminary picture of the natural resource conditions;
• A landscape level analysis of natural resource management in the community territory;
• Criteria that may be useful to measure the success of the plant management practices and strategies.

To begin with, participants will be asked to draw a map of their territory on white flipchart paper. The map should have basic geographical elements such as the community boundaries, main water bodies, main mountains or hills, the urban area, main roads, and landscape units (see Methods group 2).

Once the map is created, the group will proceed with the common definition of:

• Territory
• Territorial use
• Landscape (taken from Methods group 2)
• Landscape unit (taken from Methods group 2)
• Land change
• Conflict
• Opportunity

Subsequently, using the map as the main tool to generate information and with the support of the facilitator, the group discusses:
• Natural resources found in each landscape unit
• General uses of those resources
• Conflicts related to those resources
• Opportunities related to those resources

Two map layers will be created using 2 sheets of tracing paper. Resources and their uses are identified on the first layer; conflicts and opportunities on the second. When identifying conflicts and opportunities, special attention must be given to external and internal initiatives and projects that are present in, or relate to, each landscape unit. On each sheet, marks, labels, signs and icons can be drawn to identify the different elements.

Upon completion of the map, a table like the one below will be drawn on a flipchart page. For each landscape unit, the information about resources, uses, conflicts and opportunities will be registered.

Table 1: Example of an information table about natural resources, their uses, conflicts and opportunities

<table>
<thead>
<tr>
<th>LANDSCAPE UNIT</th>
<th>Resources</th>
<th>Uses</th>
<th>Conflicts/opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest</td>
<td>Wood</td>
<td>House and furniture building</td>
<td>Illegal logging</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Payments for Environmental Services</td>
</tr>
<tr>
<td></td>
<td>Firewood</td>
<td>Cooking and heating</td>
<td>Ensuring an adequate supply of firewood for the community</td>
</tr>
<tr>
<td></td>
<td>Animals</td>
<td>Food</td>
<td>Formal management units</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lack of information about populations</td>
</tr>
<tr>
<td></td>
<td>Acahual (Swidden fallow fields / secondary vegetation)</td>
<td>Animals</td>
<td>Food</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Hunting restrictions</td>
</tr>
<tr>
<td></td>
<td>Coffee plantation</td>
<td>Coffee</td>
<td>Sale</td>
</tr>
<tr>
<td></td>
<td>Fruits</td>
<td>Food</td>
<td>Alternative to junk food</td>
</tr>
<tr>
<td>Agricultural zone</td>
<td>Soils</td>
<td>Milpa cultivation</td>
<td>Lack of information on how to improve productivity</td>
</tr>
</tbody>
</table>

V. Defining research themes.
The above table promotes reflection and helps in the choosing of locally relevant and interesting themes for co-enquiry. For this selection, the following three stages are proposed:

A. Dialogue about the synthesis table, briefly reviewing the main concepts and their relation with the basic map.
B. Identification and writing down a list of broad questions that the team wants to answer.
C. Prioritizing the research themes (broad questions). This can be done by voting on the different themes.

**Adaptations**

In order to carry out this aspect of the process, in the Chinantla, the facilitators carried out a *diálogo problematizador* (problematising dialogue) and *intercambio de saberes* (knowledge exchange), which aims to cover all aspects of community relationships with their environment. Using images illustrating the themes of hunting, food, community control, care for the territory, tradition, etc. helped to launch a group dialogue aimed at pinpointing key themes for community research (some of which were not immediately relevant to the present protocol but were used for other protocols).

This dialogue must be given ample time and cannot be rushed; in this way participants feel they can speak freely, clarify and engage in fruitful discussion when opinions diverge, and come to an optimum consensus.

It may be the case that participants don’t at first understand the utility of this dialogue; it is the facilitator’s role to remind participants of why they wished to carry out the research in the first place, perhaps by reminding the community research team of other interventions that were non-participatory or imposed, and that the community was unhappy about. The GDF team found it useful to regularly return to the reasons why the communities had chosen to engage in research work, as in those reasons community researchers were able to find renewed enthusiasm for the work. In this sense, engaging in problematising dialogues throughout the research process is suggested.

VI. Defining research questions

This section constitutes the fine-tuning of the broad research themes. Following the thematic prioritization exercise carried out, the first three most important themes will be selected. For each theme the facilitator will guide the identification of a series of very specific research questions. The group will begin the dialogue about what kind of information is needed to answer those questions, the feasibility to address them, the need of specialists, etc. The questions will determine the subsequent steps and community researcher training programme.
Adaptations

Over the course of GDF’s experience in the Chinantla, the authors of this COMBIOSERVE protocol have learned that many people from rural communities tend to react rapidly to phenomena they observe – which is an advantage when one depends exclusively on the (eminently uncontrollable) natural environment for one’s survival.

This rapid reaction and swift movement towards solution-seeking sometimes was counterproductive in those methodological sessions that required deep reflection and highly participatory dialogue, such as the one in which research questions are developed. Indeed, it is a well known fact that the pre-requisite for successful research processes solid, internally coherent, and precise research questions. When it arose during the research question-development session that some individuals wished to rush the process, the GDF facilitator adopted more of a role of moderator, meaning that more strict rules for the dialogue were used. For example, participants who tended to be quieter were specifically encouraged to take the time to express their opinions, and the dialogue was not considered concluded until all participants arrived at consensus regarding the final research questions.

Each research team will develop their own appropriate rhythm for these discussions, and this can vary as long as it allows for full participation of all members present, complete discussion of the points raised and the airing of constructive criticism.

VII. Tasks

Based on the research themes and questions, the team defines the subsequent steps required to answer those questions, as well as the tasks and calendar of activities required to implement those steps over the subsequent months of research.

Example of a work plan

<table>
<thead>
<tr>
<th>Activity</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Introduction</td>
<td>Day 1. 15 minutes, AM.</td>
</tr>
<tr>
<td>II. Theoretical revision</td>
<td>Day 1. 1 hour, AM.</td>
</tr>
<tr>
<td>III. Methodological reflection</td>
<td>Day 1. 2 hours, AM.</td>
</tr>
<tr>
<td>IV. Creating a basic map for mapping natural resources, uses, opportunities and conflicts</td>
<td>Day 1. 1 hour, AM.</td>
</tr>
<tr>
<td></td>
<td>- Drawing the mind map</td>
</tr>
<tr>
<td></td>
<td>Day 1. 1 hour, PM.</td>
</tr>
<tr>
<td></td>
<td>- Concepts definition</td>
</tr>
<tr>
<td></td>
<td>Day 1. 2 hour, PM.</td>
</tr>
<tr>
<td></td>
<td>- Drawing map layers</td>
</tr>
<tr>
<td></td>
<td>Day 2. 1 hour, AM.</td>
</tr>
<tr>
<td></td>
<td>- Synthesis of information in a table.</td>
</tr>
<tr>
<td>V. Defining research themes</td>
<td>Day 2. 1 hour, AM.</td>
</tr>
<tr>
<td>VI. Defining research questions</td>
<td>Day 2. 2 hour, AM.</td>
</tr>
<tr>
<td>VII. Tasks</td>
<td>Day 2. 2 hour, AM.</td>
</tr>
</tbody>
</table>

Equipment and materials

- Notebooks
- Pencils or pens
• Flip chart paper, cardboard
• Tracing paper sheets
• Colours
• Marker pens
• Educational material to illustrate the action-research cycle
• Projector

Methods group 4. Creation of plant inventories

Addresses objective B.1 To establish plant inventories.

4.1 Literature review
As with conventional research approaches, it is necessary to ground practical co-enquiry research in a solid literature review. In the case of plant inventories, having a literature review helps to determine existing knowledge regarding the diversity of plants or vegetation structure in the region or in similar ecological areas. This process provides the team with a basis upon which to develop their ideas, to determine gaps in the knowledge and to reflect on how existing information relates to local issues and needs. In the present case study, the Chinantla research team looked for botanical and ethnobotanical plant inventories carried out in the biocultural region of the Chinantla, in the state of Oaxaca and in other regions of Mexico where cloud forests and tropical forests are present. The amount of information drawn on for the literature review will vary depending on how well-studied a region or an ecosystem is. While in this case study the authors of this COMBIOSERVE protocol were unable to carry out a collaborative literature review, we suggest practitioners adapt the following suggested process for implementing such a literature review.

Session objective
The research team (facilitators and community researchers) to have a good knowledge of previous studies and works relevant to their research topic and fieldsite

Facilitators
This workshop should be facilitated by an external or local team member with abilities to lead a group discussion and with some basic expertise in developing literature reviews.

Participants
Community researchers and any community member interested in what has been published regarding their resources and/or region.

Expected results
A locally relevant review of existing literature on plant diversity, vegetation structure and general ecology of the region.

General thematic content
a) Doing a literature search
b) Reading, summarising and discerning appropriate literature for the research at hand
Learning experiences

- Publications as a source of useful information
- The importance of discernment when reading from varied sources
- Building a collaborative literature review

Session development

It is suggested the training session be organised as follows:

Figure 4: Framework for training community researchers in the production of literature reviews

I. Introduction
The facilitator provides the group with an introduction that covers (i) the purpose of the workshop, (ii) themes tackled by the workshop and how they will be addressed, (iii) length of the session, (iv) structure of the session, (v) outcomes of the session, etc.

II. Theoretical background
The facilitator explains the importance of a literature review in the context of biodiversity research, for example by demonstrating an important finding that scientists have made and that informs the community’s current use of plants or other resources. The facilitator then explains what a literature review is (a critical assessment of how previous research relates to the present research process) and describes the process for creating one. While the community researchers will briefly learn how to do a literature search (online, libraries, etc.), it is unlikely that they will have easy access to scientific literature. Here it is suggested that the research team determine a mutually agreed process for the facilitator to share relevant literature with the community researchers as and when it emerges or is discovered.

III. What does the literature say?
Based on the brief theoretical overview, the facilitator presents summaries of specific and locally-relevant publications on the research topic and region (these will have been searched for and summarised by the facilitator prior to the session). The group discusses the validity (or not) of the results and arguments made in each main publication, in terms of:

- whether they think the results/arguments are accurate given their knowledge of local diversity, ecology, etc.
- whether they think the body of data/arguments are relevant to answer their own research questions.
- how they think the information can be used in their research process

Responses are written up in a table format on a flipchart page. The following format is suggested, although research teams are encouraged to develop their own mode of systematising the literature.

Table 2: Matrix for systematising literature
It may be that some publications focus more on results while others develop more structured arguments, so it may be that some of the table's boxes remain empty.

IV. Building a locally-relevant literature review
Given that an academic literature review is unnecessary in a community context, the authors of this COMBIOSERVE protocol suggest that a locally-relevant one be built, using a simple spreadsheet computer programme and based on the information contained in the flipchart:

Table 3: Matrix for building a locally-relevant literature review

<table>
<thead>
<tr>
<th>Publication</th>
<th>Summary</th>
<th>Results</th>
<th>Argument</th>
<th>Relevance</th>
<th>Accuracy</th>
<th>How will it be used?</th>
</tr>
</thead>
</table>

Example of a work plan

<table>
<thead>
<tr>
<th>Activity</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workshop preparation</td>
<td>At least 1 month before the workshop</td>
</tr>
<tr>
<td></td>
<td>- the facilitator does the reading, chooses the most appropriate literature (no more than 5 main publications) and prepares summaries of the publications for discussion in the workshop</td>
</tr>
<tr>
<td>I. Introduction</td>
<td>Day 1. 15 minutes, AM.</td>
</tr>
<tr>
<td>II. Theoretical revision</td>
<td>Day 1. 30 minutes, AM.</td>
</tr>
<tr>
<td>III. Review of the available literature</td>
<td>Day 1. 3 hours, AM.</td>
</tr>
<tr>
<td></td>
<td>- presentation of the available literature by the facilitator</td>
</tr>
<tr>
<td></td>
<td>- discussion surrounding its validity and relevance for the research at hand</td>
</tr>
<tr>
<td>IV. Building a relevant literature review</td>
<td>Day 1. 2 hours, PM.</td>
</tr>
<tr>
<td></td>
<td>- building and completing of a literature review spreadsheet – each community researcher helps input the data for at least one publication</td>
</tr>
</tbody>
</table>

4.2 Training community researchers in the creation and use of plant inventories

Training session

Session objective
To share and review with community researchers the concept and use of plant inventories as well as to create local floristic inventories.
Facilitators
This workshop must be facilitated by an external or local team member knowledgeable on botany and with expertise on floristic studies and inventories.

Participants
Local research team and any other community member interested in plant diversity.

Expected results
At the end of the session, the participants will:

(i) Understand the concept of inventory and floristic inventory;
(ii) Understand the uses of floristic inventories;
(iii) Have reflected on the possible local uses of floristic inventories and how they relate to their current research questions and needs;
(iv) Have a theoretical understanding of the different methods to conduct plant inventories;
(v) Have reviewed available plant inventories for the region.

General thematic content
a) Concepts of inventory and floristic inventory.
b) Uses of floristic inventories.
c) Methods to create floristic inventories.

Learning experiences
• Theoretical presentation for themes a) – c)
• Focus group for reflection on b)
• Team work for revision of available floristic inventories.

Session development
It is suggested the training session be organised as follows:

Figure 5: Framework for training community researchers in the creation and use of plant inventories

I. Introduction
The facilitator will provide the group with an introduction that covers (i) the purpose of the workshop, (ii) themes tackled by the workshop and how they will be addressed, (iii) length of the session, (iv) structure of the session, (v) outcomes of the session, etc.

II. Theoretical revision
In group, the facilitator will present:
• Concepts of inventory and floristic inventory.
• The uses that academics and other professionals give to floristic inventories.
III. Review of available inventories
Prior to the session, the facilitator searches for academic or local inventories produced for the community, region, state or places with similar vegetation. Printed copies are taken to the group. (For efficiency, this process can be done simultaneously with the literature review for method 4.1). Subsequently, either the entire team or a series of sub-teams read the inventories. The facilitator highlights the objectives of the inventories, and the parameters and methods used to create them.

The facilitator promotes a dialogue about how these inventories (or this type of inventory) can be useful locally. How do they relate to their current research questions? How do they relate to local needs regarding resource management, conservation, or agricultural production?

IV. Methods revision
Integrated with the previous section, this section will focus in the methods for the production of inventories, taking the available inventories as initial examples of the process. Several questions and points must be reviewed, such as: do these inventories use scientific or common names? How have the authors compiled the list of plants? Did they ask local people and/or carry out field collections? How did they implement field collections? The facilitator takes the time necessary to explain the methods used by the authors of the inventories under scrutiny.

V. Methods reflection
Integrated with the methods revision, a reflection on the feasibility and implications of the methods will be conducted. Some of the themes to talk about are:

- Is that possible to conduct X or Y method locally? What would the team need for each of them?
- What are the implications of using scientific names vs. local names?
- What is the objective and use of the inventories? How can the local research team control the access to the information contained in the inventory? Is that control needed?
- The results of this dialogue will provide inputs to future decision-making on the objective and management of all information and collected material.

VI. Tasks
Once available inventories and their methods have been reviewed, some questions must be answered:

- Is there any need to produce local plant inventories?
- What kind of inventories do the team wish to produce?
- Which plants groups do the team wish to include?
- Which methods will they use?
- What training does the team need to implement the selected methods?
- How will the team get organised to conduct such inventories?
In the following workshop protocol “Training community researchers in botanical collection”, we propose to produce ethnobotanical inventories based on local botanical collections that can be later enriched with scientific names and supplementary photographic material.

VII. Methodological reflection
While developing the inventories and applying the selected methods, a periodical methodological reflection is necessary to check that the method is working and to resolve any problems, obstacles or challenges that the team may be encountering. For each case a solution is provided: either the team adapts to the pre-defined method, or the method is adapted to the team and other local realities/needs. If the team decides to adapt the method rather than the team process, they are encouraged to reflect on how changing the method may affect the final result.

VIII. Results analysis
Once an inventory is produced, the team analyses the results. The analysis can be made at different levels, depending on our research questions. For example, answering questions of how many species did the team found, how many families are reported in the revisited studies, what is the value for each specie, etc. In order to make the process of analysis efficient, the inventory results can be organised by species in a simple paper or computer-based spreadsheet including plant family, gender, species, common name and use.

IX. Methodological reflection
After the process is completed, the facilitator promotes another revision of the methods used, this time including the methods to analyse the results. The following themes are suggested for group discussion:

1. Do the methods provided the expected results?
2. Does the results analysis provide the answer to our original research questions?
3. What information is missing?
4. How can the result analysis be improved?

Example of a work plan

<table>
<thead>
<tr>
<th>Activity</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workshop preparation</td>
<td>At least 2 weeks before the workshop</td>
</tr>
<tr>
<td>I. Introduction</td>
<td>Day 1. 15 minutes, AM.</td>
</tr>
<tr>
<td>II. Theoretical revision</td>
<td>Day 1. 45 minutes, AM.</td>
</tr>
<tr>
<td>III. Review of available inventories</td>
<td>Day 1. 2 hours, AM.</td>
</tr>
<tr>
<td>IV. Methods revision</td>
<td>Day 1. 1 hour, AM.</td>
</tr>
<tr>
<td>V. Methods reflection</td>
<td>Day 1. 1 hour, AM. Integrated with IV.</td>
</tr>
<tr>
<td>VI. Tasks</td>
<td>Day 1. 1 hour, PM.</td>
</tr>
<tr>
<td></td>
<td>- Definition of needs</td>
</tr>
<tr>
<td></td>
<td>- Definition and distribution of tasks</td>
</tr>
<tr>
<td></td>
<td>Following weeks: completion of defined tasks.</td>
</tr>
<tr>
<td>VII. Methodological reflection</td>
<td>Following weeks.</td>
</tr>
<tr>
<td>VIII. Results analysis</td>
<td>After finishing the set tasks.</td>
</tr>
</tbody>
</table>
IX. Methodological reflection

After finishing the set tasks.

Equipment and materials

- Available plant inventories for the region, state or regions with similar vegetation
- Notebook
- Pencils or pens

4.3 Train community researchers in botanical collection

Community workshop

Workshop objectives

(i) To train local researchers to carry out research on plant diversity, through botanical collections.
(ii) To build community researchers capacities with the skills required for the study of floristic composition and characterization of the vegetation.
(iii) To train community researchers in botanical collection.
(iv) To train community researchers in basic botanical morphology.
(v) To generate data and products during the workshop, and the subsequent practices that are part of the community heritage.
(vi) To have useful data and products for communication regarding local biodiversity and for decision-making processes about natural resources management, conservation and agricultural production.

Facilitators

This workshop must be facilitated by an external or local team member knowledgeable on botany and with expertise in botanic collections. Further information on plant collection methods can be found in Bridson and Forman 1998, Lot y Chiang 1986, or any other herbarium manual.

Participants

Local research team and any other community member interested in plant diversity.

Expected results

At the end of the workshop, the participants will have acquired (i) basic skills for collection of botanical specimens; (ii) basic knowledge in botanical morphology that support the recognition and identification of plants according to both local and scientific classification systems; (iii) technical capacities to study the floristic diversity in agricultural, conservation and other resource management projects.

General thematic content

a) Features and utility of the botanical collection.
b) Features and utility of a herbarium.
c) Specific techniques of botanical collection.
d) Basic morphological botanical elements.
e) Plant pressing.
f) Basic techniques for drying plants.
Learning experiences

- Group study for the theoretical presentation and methodological reflection for themes a) and b).
- Theoretical and practical presentation in the field for themes c) – g).
- Plant collection hands-on practice around the community in trails previously identified and chosen by workshop participants. The collections will comprise plants from a variety of habitats (from mosses to trees, including herbs, vines, etc.) with the objective of examining the possible variations in the collection, pressing and mounting processes that are adapted to the different plant forms. Plant pressing, labelling and voucher mounting will be practised.

Session development

It is suggested the workshop be organised as follows:

I. Introduction
The facilitator will provide the group with an introduction that covers (i) the purpose of the workshop, (ii) themes tackled by the workshop and how they will be addressed, (iii) length of the session, (iv) structure of the session, (v) outcomes of the session, etc.

II. Theoretical presentation
Using the information gathered during the literature review as support material, the facilitator will lead a theoretical introduction and a dialogue about the methodological, practical and political aspects of:

- The concept and use of a botanical collection;
- The concept and use of an herbarium;
- Differences between academic and community herbaria. For example, the need of the scientific name for the former; the different types of information that each of them contain;
- The different techniques for plant collection;
- Botanical morphology;
- The importance of morphological recognition in plants, relating it with local and scientific systems for species identification. Prints of different kind of roots, flowers, leaves, etc. can be used to learn and reflect on which plant parts are more useful for local plant recognition.

III. Methodological reflection
Integrated to the previous theoretical revision, a dialogue about the plant collection as a way of gathering information. This will be conducted through a two-way (facilitator <-> community research team) questions-and-answers session. Some important points to reflect on are:

(i) Scientific identification, its usefulness and implications;
(ii) The goal and use of collected material;
(iii) From these two points some decisions can be made regarding the goal and management of information and collected material.

Other themes for the dialogue can be: a) what is community researchers’ opinion regarding cutting plants and drying them out to obtain information; b) the use given to the collected plants information in academic and community herbaria; and c) what is the importance that the training and proposed activities for the research team and the community at large, and so on.

Given the social, cultural and political importance of these issues, it is important to provide time for in depth exploration of these questions, and the development of mutually acceptable answers for all of the questions that arise from the team.

IV. Technical training (theoretical and practical)
- Knowing the collection material
- Specific techniques for plant collection
- Basic botanic morphological elements
- Plant pressing techniques
- Filling collection cards
- Plant drying techniques

V. Tasks
Tasks will be planned to practice and strengthen the acquired skills. In order to generate relevant information for a community these tasks must be planned according to research questions and local information needs. As a basic proposal, collections can be carried out to produce an ethnobotanical inventory of one or two categories of local useful plants. The information collected during these activities will belong to the community and will be used for further analysis and use in decision-making processes. The community research team can choose how to distribute the tasks required for this element of the work.

VI. Methodological reflection
While developing the inventories and applying the selected methods, a periodical methodological reflection is necessary to check that the method is working and to resolve any problems, obstacles or challenges that the team may be encountering. For each case a solution is provided: either the team adapts to the pre-defined method, or the method is adapted to the team and other local realities/needs. If the team decides to adapt the method rather than the team process, they are encouraged to reflect on how changing the method may affect the final result.
VII. Results analysis

Once the collections are finished, the team analyses the results. The quality of the data will depend on the efficiency of the training and close follow-up of the community researchers' field practice by the facilitator. Data analysis can be carried out at different levels and will depend on what information is being gathered in the collections and what how the team wants to use that information for furthering their knowledge. In all cases, starting with a paper or computer-based spreadsheet that organises the information by species and includes the information gathered (i.e. plant family, gender, species, common name, use, life form, locality, etc.) will give order to the data and ensure an easier and more efficient analysis process. Subsequently, specific questions can be generated and answered. For example, if the proposal above is followed and collections are carried out to produce an ethnobotanical inventory of, let's say, species used for firewood, the analysis can include variables such as the number of species, the localities where they were found, the species most frequently found, the represented botanical families, among others.

Example of a work plan.

This work plan should be adapted to local conditions and realities.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workshop preparation</td>
<td>A minimum of 2 weeks before the workshop</td>
</tr>
<tr>
<td>I. Introduction</td>
<td>Day 1. 30 minutes, AM</td>
</tr>
<tr>
<td>II. Theoretical revision</td>
<td>Day 1. 1 hour, AM</td>
</tr>
<tr>
<td></td>
<td>- Definition and use of a botanical collection</td>
</tr>
<tr>
<td></td>
<td>- Definition and use of the herbarium</td>
</tr>
<tr>
<td></td>
<td>- Differences between an academic herbarium and a community herbarium</td>
</tr>
<tr>
<td></td>
<td>- Plant collection techniques</td>
</tr>
<tr>
<td></td>
<td>Day 1. 1 hour, AM</td>
</tr>
<tr>
<td></td>
<td>- Botanical morphology</td>
</tr>
<tr>
<td></td>
<td>- Morphological examination of the plants using local and</td>
</tr>
<tr>
<td></td>
<td>scientific systems of recognition</td>
</tr>
<tr>
<td>III. Methodological reflection</td>
<td>Day 1. 1 hour, AM. Integrated with previous theoretical revision.</td>
</tr>
<tr>
<td>IV. Technical training</td>
<td>Day 1. 2 hours, PM</td>
</tr>
<tr>
<td></td>
<td>- Collection material</td>
</tr>
<tr>
<td></td>
<td>- Field practice planning</td>
</tr>
<tr>
<td></td>
<td>Day 2. 3 hours, AM</td>
</tr>
<tr>
<td></td>
<td>- Choosing a sampling site.</td>
</tr>
<tr>
<td></td>
<td>- <em>In situ</em> presentation of collection techniques</td>
</tr>
<tr>
<td></td>
<td>- Observation of morphological elements</td>
</tr>
<tr>
<td></td>
<td>- Filling collection cards</td>
</tr>
<tr>
<td></td>
<td>Day 2. 2 hours, PM</td>
</tr>
<tr>
<td></td>
<td>- Filling of collection cards</td>
</tr>
<tr>
<td></td>
<td>- Plant pressing techniques</td>
</tr>
</tbody>
</table>
### Plant drying techniques

**Day 3. 3 hours, AM**
- Choosing a sampling site.
- *In situ* presentation of collection techniques
- Observation of morphological elements
- Filling collection cards

**Day 3. 2 hours, PM**
- Filling of collection cards
- Plant pressing techniques
- Plant drying techniques

### Tasks

<table>
<thead>
<tr>
<th>Day 4.</th>
<th>AM.</th>
</tr>
</thead>
<tbody>
<tr>
<td>V. Tasks</td>
<td>Planning and organisation of future tasks</td>
</tr>
</tbody>
</table>

### Methodological reflection

<table>
<thead>
<tr>
<th>Day 4.</th>
<th>AM.</th>
</tr>
</thead>
<tbody>
<tr>
<td>VI. Methodological reflection</td>
<td>Integrated to the practical work of the previous session</td>
</tr>
</tbody>
</table>

### Analysis of results

<table>
<thead>
<tr>
<th>When the collections are finished.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-3 days. 4 hours per day.</td>
</tr>
</tbody>
</table>

### Material and equipment

#### Material for the collection
- Garden scissors
- Machete
- Pole vaulting with scissors at the end of the rod
- Big and thick plastic bags
- Transparent bags
- Botanical press
- Sheets of newspaper
- Three-layer corrugated cardboard
- Botanical press belts
- Thick leather gloves (for prickly plants)

#### Material for data record
- Stickers
- Hang tags
- Notebook (Report card)
- Pencils and permanent black ink pens

#### Complementary equipment
- GPS or altimeter and compass
- Photographic camera
- Stereoscope
- Magnifiers with lights or without it
- Petri dishes
- Binoculars

#### Additional material for the facilitator
- Books and Manuals of Botanical collection.
- Plasticized didactic cards of plant morphology.
4.4 Creation of a digital herbarium

**Training workshop**

*Session objective*
Establishing and maintaining a community herbarium requires considerable input of energy and time, both of which are scarce in rural communities. Given the high level of humidity in many sub-tropical or tropical environments and the presence of a great diversity of pests, the herbarium must be housed in an appropriate building and constantly maintained (requiring staff time and electricity at the very least). Nevertheless, a local herbarium is an excellent way to keep a physical record and result of the inventories and plant collection work; it can also serve as an educational tool to share with children and adults about the local plants; and herbaria provide a register of the species and varieties found in the community that can be useful for resource management, conservation and agricultural projects.

Through this workshop the authors of this COMBIOSERVE protocol seek to overcome the disadvantages and challenges of establishing an herbarium, while ensuring the community benefits from its multiple uses. To do so, the authors propose to create a digital herbarium with photos of collected vouchers, filed alongside their attendant information that can be printed and maintained by the community.

The workshop will provide participants with the basic techniques for labelling and mounting dry and pressed voucher specimens, as well as photography techniques for dry specimens.

**Facilitators**
The workshop must be guided by the external or local team member who facilitated the plant collection workshop and is knowledgeable in voucher mounting. Additionally the facilitator must have expertise in photography; alternatively the workshop can be led by two facilitators with different abilities.

**Participants**
Local research team and any other community member interested in plant diversity.

**Expected results**
At the end of the session, the participants will have (i) the capacity to produce an accurate register of botanical collections; (ii) produced a digital herbarium that is useful given local weather/pest conditions; (iii) the skills to mount and photograph voucher specimens; and (iv) the skills to manage photographic files in the computer.

**General thematic content**
- a) Importance of an information register and accurate labelling; basic contents of a voucher specimen label.
- b) Labelling dry and pressed voucher specimens.
- c) Mounting plant vouchers; differences between temporal and permanent pressing mounting.
- d) Photography of mounted vouchers.
- e) Creating a computer photographic data base.
- f) Printing and laminating photographs.
Learning experiences
- Theoretical presentation for a)
- Guided practice for b) - e)

Session development
It is suggested the training session be organised as follows:

I. Introduction
The facilitator will provide the group with an introduction that covers (i) the purpose of the workshop, (ii) themes tackled by the workshop and how they will be addressed, (iii) length of the session, (iv) structure of the session, (v) outcomes of the session, etc.

II. Hands-on practice in voucher labelling
- The facilitator will provide some information about the importance of information registers and labelling.
- The basic content of a voucher specimen label will be addressed. Examples of labels will be shown to the team. The label that best suit local needs and the project characteristics will be selected; participants to evaluate whether any further information field should be added.
- Hands-on practice to compile labels for all the previously collected specimens.

III. Hands-on practice in voucher mounting
Working with the dried voucher specimens collected in the previous methods group, the facilitator will show the team:
- How to mount plant specimens.
- Exemplify with photographs of mounted vouchers.
- The differences for mounting different plant forms and plant groups.

IV. Hands-on practice in photography of mounted vouchers
Working with the specimens that were mounted and labelled, the facilitator will guide their photographic registration. The facilitator will provide guidance on all the details needed to obtain a high quality photo, such as use of tripod, light and exposure requirements, digital camera settings, subject and framing, etc.

V. Hands-on practice for creating a computer database
Given the importance of the information register for the production of a high quality photographic collection and because the herbarium database is to be used as an educational and decision-making tool, the facilitator leads the participants as they:

- study example of databases used in other herbaria;
- decide what fields of information will be used in their particular case;
- practice data entry;
- learn how to use an spreadsheet to retrieve particular information from the database.

VI. Printing and laminating photographs

Integrated with the methods revision, a reflection on the feasibility and implications of the methods will be conducted. Some of the themes to talk about are:

- Is it possible to conduct X or Y method locally? What would the team need for each of them?
- What are the implication of making a scientific names vs. an ethnobotanical inventory?
- What is the destiny and use of the inventories? How to control the access to such information? Is that control needed?
- The results of this dialogue will provide inputs to future decision-making on the use and management of information and collected material.

Example of a work plan

<table>
<thead>
<tr>
<th>Activity</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Introduction</td>
<td>Day 1. 15 minutes, AM.</td>
</tr>
<tr>
<td>II. Voucher labelling practice</td>
<td>Day 1. 45 minutes, AM.</td>
</tr>
<tr>
<td>III. Voucher mounting practice</td>
<td>Day 1. 1 hour, AM.</td>
</tr>
<tr>
<td>IV. Photography of mounted vouchers</td>
<td>Day 1. 2 hours, AM.</td>
</tr>
<tr>
<td>V. Creating a computer database</td>
<td>Day 1. 2 hours, AM.</td>
</tr>
<tr>
<td>VI. Printing and laminating photos</td>
<td>Day 1. 1 hour, PM.</td>
</tr>
</tbody>
</table>

Equipment and materials

1. flip chart paper;
2. previously collected plant vouchers;
3. white cardboard cut to herbarium standard measures;
4. examples of herbarium labels;
5. printed herbarium labels with basic information;
6. markers;
7. pens;
8. examples of photographs of dry vouchers;
9. adhesive tape;
10. white glue;
11. digital camera;
12. tripod;
13. computer;
14. Examples of herbarium databases.
4.5 Creation of a complementary photographic register

**Training workshop**

**Workshop objectives**

- Train community researchers in basic photography techniques so as to obtain a photographic register of live specimens that will complement the plant inventories and/or the digital herbarium.
- Provide conceptual and practical training on nature photography, as a way of communicating and reflecting on the issues surrounding environment, livelihoods and community.

**Facilitators**

The training workshop is led by a professional photographer trained in participatory approaches.

**Participants**

Local research team and any other community member interested in plant diversity and photography.

**Expected results**

At the end of the session, the participants will have (i) acquired photography techniques to make photographic registers of live plants and to take photographs of natural features in general; (ii) the technical abilities to use photography for plant monitoring purposes; and (iii) established a preliminary photographic collection.

**General thematic content**

- a) The camera and its parts;
- b) Basic technical aspects of photography;
- c) Advanced photography functions used in nature photography;
- d) Photography in-field practice;
- e) Managing digital images;

**Learning experiences**

- Theoretical presentation for themes a) – c)
- Hands-on and one-on-one practice tuition for b) – f)

**Session development**

It is suggested the training session be organised as follows:

**Figure 8: Framework for training community researchers in (plant) photography**
I. Introduction
The facilitator will provide the group with an introduction that covers (i) the purpose of the workshop, (ii) themes tackled by the workshop and how they will be addressed, (iii) length of the session, (iv) structure of the session, (v) outcomes of the session, etc.

II. Theoretical revision
In a group, and depending the level of photography knowledge that the group has, the facilitator will discuss:

(i) Optical principles for photography;
(ii) Parts of the camera;
(iii) The role of the photographer, how to take a ‘good’ photo, observing the subject, etc.;
(iv) Basic technical aspects of photography: frames, composition, colour, light, etc.
(v) Advanced photography functions used in nature photography: macro, underwater photography, etc.

III. Field practice
In a group, several settings and natural elements will be identified to practice taking photographs. Based on the theoretical knowledge previously acquired, the facilitator will guide hands-on practice and will provide one-on-one practice tuition on the following:

- Landscape photography;
- Taking photos of complete trees, shrubs, herbs, vines, and other minor plant forms;
- Taking photos of the reproductive organs of the plant, flowers, fruits and seeds;
- Taking photos to other plant organs that help with plant identification according to local parameters, such as roots and leaves.

IV. Methodological reflection
In a group, the facilitator leads a revision of the methods used. Given that the camera is a technical tool, methods for its use cannot be completely adapted. However, the group can analyse and discuss the uses of the camera, the difficulties and challenges that they faced, as well as on other uses that photography can offer them, particularly as community researchers. As photography is both a technical and an artistic tool, the facilitator may lead this discussion with the purpose of fomenting participants' creativity.

V. Digital image management practice
The facilitator will guide practical work and will provide one-on-one practice tuition on:

- Transferring images to the computer;
- Labelling and organisation of photographs taken;
- Management and viewing of digital images.

VI. Image edition practice
The facilitator will guide hands-on practice and will provide one-on-one practice tuition on the basic aspects of image edition, using the best option among available software (probably opensource).
VII. Tasks
Once the community researchers have learned the different photography techniques, the facilitator gives them homework (self-organised practice). Practice is an important component of photography training, and the photos taken can start complementing the inventories and digital herbarium. The facilitator and the team will organise the tasks and schedule to complete these items.

VIII. Results analysis
Following implementation of the agreed tasks, the facilitator will lead a guided sharing, review and discussion of the photographs taken. An evaluation will be carried out to assess which techniques were best understood and what technical weaknesses remain in the team of photographers. Photographs will also be evaluated in terms of usefulness for the inventories and for other educational, artistic or dissemination objectives.

Example of a work plan

<table>
<thead>
<tr>
<th>Activity</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Introduction</td>
<td>Day 1. 15 minutes, AM.</td>
</tr>
<tr>
<td>B. Theoretical revision</td>
<td>Day 1. 2 hours, AM.</td>
</tr>
<tr>
<td>C. Field practice</td>
<td>Day 1. 2 hours, AM. Day 1. 2 hours, PM.</td>
</tr>
<tr>
<td>D. Methodological reflection</td>
<td>Day 2. 1 hour, AM.</td>
</tr>
<tr>
<td>E. Digital image management practice</td>
<td>Day 2. 2 hour, AM.</td>
</tr>
<tr>
<td>F. Image edition practice</td>
<td>Day 2. 2 hour, AM.</td>
</tr>
<tr>
<td>G. Tasks</td>
<td>Day 2, 1 hour, PM. Definition of tasks. Following weeks: completion of agreed tasks.</td>
</tr>
<tr>
<td>H. Results analysis</td>
<td>Following completion of the set tasks.</td>
</tr>
</tbody>
</table>

Equipment and materials
- Digital cameras (enough for the team of community researchers and other interested community members)
- Memory cards
- External hard disks
- Computers
- Notebooks
- Pencils or pens
- Flip chart paper, cardboard
- Projector

Methods group 6. Study of floral composition and vegetation characteristics for local landscape units
Addresses objectives:

E.1 Train community researchers in techniques for the study of floral composition and vegetation characterisation

E.2 Carry out collaborative research on floral composition of local vegetation categories

Training workshop for floral composition and vegetation characterisation

Workshop objectives

(i) Train community researchers in sampling, using previously defined techniques;
(ii) Reinforce local skills in botanical collection;
(iii) Carry out collaborative comparative vegetation studies to generate information on acahuales (secondary forests), forests and conservation;
(iv) Establish plant inventories for each landscape unit under study;
(v) Identify the presence or absence of plant species that are important for conservation in each of the distinct vegetation categories as baselines for community-based conservation.

Facilitators

The training workshop is led by an external or internal team member with expertise in vegetation studies.

Participants

Local research team and any other community member interested in vegetation and conservation issues.

Expected results

At the end of the workshop, the participants will have:

(i) Acquired the basic skills to carry out botanical sampling to characterise a plant community, using the Gentry method.
(ii) Acquired the basic skills to carry out botanical sampling of botanical families Rubiaceae, Melastomataceae and Asteraceae, as representative and indicator families of tropical vegetation.
(iii) Reflected on the usefulness of these methods to improve their knowledge of their forests and acahuales.
(iv) Technical skills to carry out studies on floristic diversity in the frame of agricultural and resource management initiatives.

General thematic content

a) Gentry method for the study of woody species in plant communities.
b) Method for the study of families Rubiaceae, Melastomataceae and Asteraceae.
c) Reinforcement of botanical collection and pressing techniques.

Learning experiences

• Group study for theoretical presentation and methodological reflection for a) and b)
• Sampling and collection practice in specific plots for a) - c)
• Hands-on practice in pressing and drying botanical vouchers for a) - c)

Session development
It is suggested the training session be organised as follows:

I. Introduction
The facilitator will provide the group with an introduction that covers (i) the purpose of the workshop, (ii) themes tackled by the workshop and how they will be addressed, (iii) length of the session, (iv) structure of the session, (v) outcomes of the session, etc.

II. Theoretical presentation
The facilitator will present the theory on the methodological and practical aspects of the following:
• The concept of plant community
• The basic mechanism of biological sampling to know a plant community: what is a transect, why the research team repeats the sample, etc.
• The Gentry method for the study of woody plants.
• The method for the study of plant families: Rubiaceae, Melastomataceae and Asteraceae. Why are these families and their characteristics chosen for botanical sampling?

Adaptations
The formal ecological method for non-woody plants concentrates on the families Rubiaceae and Melastomataceae, however, given that the Asteraceae family is very important in the Chinantla, the authors of this COMBIOSERVE protocol included it in the method. We suggest that such adaptations be carried out under other ecological conditions if necessary.

III. Methodological reflection
In conjunction with the previous theoretical revision, the group will reflect on the methods described. This will be done through a questions and answer session between the facilitator and the research team. Some important themes to reflect on are:
• Data collection to get to know the landscape as a unit.
• The objective and use of collected information.
• The importance that the training and proposed activities have for the research team and for the community in general.

IV. Technical training
• The Gentry method for the study of woody plants in plant communities is to be taught to community researchers. (See Annex 5 for a full explanation of the method)
• The method for Rubiaceae, Melastomataceae and Asteraceae families is to be taught to community researchers. (See Annex 6 for a full explanation of the method)

Adaptations
The GDF team used images to explain the different methods for studying vegetation.

When explaining the different methods, the GDF team found it very useful to make clear distinctions in the components of a given methods system and its functions. This helped to ensure workshop participants understood the basis of the methods discussed, and was useful in resolving the doubts that arose regarding the process.

It was also important to explain the full reasoning that supports the choice of transect size for each method, and why the transects are divided into different parts. It was also useful to take a couple of hours prior to the workshop to draw the transects and their components, so as to have material ready for discussion during the workshop.

Clear explanations of the methods allowed the participants to actively distribute tasks among the team according to people's abilities and needs, resulting in an organised, efficient, and successful field experience.

V. Tasks
• Tasks are planned to practice and strengthen the acquired skills.
• In order to generate relevant information for a community these tasks must be planned with an experimental design to: a) Carry out collaborative comparative vegetation studies to generate comparable information on specific landscape units (in the present case the research team studied acahuales); b) Establish plant inventories for each landscape unit under study; and c) Identify the presence or absence of plant species that are important for conservation in each of the distinct vegetation categories as baselines for community-based conservation.
• The information collected during these activities will belong to the community and will be used for further analysis and use in decision-making processes.

VI. Methodological reflection
During the course of the workshop and field practice, the facilitator will guide a reflection about the collection methods, and the group will examine challenges and opportunities found during the practice, with a view to comparing these methods with local practice. This will be conducted through a two way (facilitator <> community researchers) question-and-answer session. For example, some of the questions that can be asked are:
• What do you think about collecting information on acahuales for future decision making?
• What difficulties do you find in the application of the methods?
• Is this information appropriate to share with community youth? Or with outsiders?

Given the social, cultural and political importance of these issues, it is important to provide time for in depth exploration of these questions, and the development of mutually acceptable answers for all of the questions that arise from the team.

Adaptations

Transects
Each community researcher should choose the task that is most appropriate to their abilities, knowledge and preferences. For example, some may be more at ease with heavy physical labour such as opening gaps in the vegetation, whereas those who can read and/or write should be responsible for note-taking. It may be relevant to have regular role changes, but the GDF team found it more efficient and more acceptable to the community research team to stay in the same roles throughout the process.

The total number of transects the community research team decided to carry out was 3 per study area (acahual). All of these can be done within one day with a 9am start, a 2pm finish, and a half hour rest in the middle of the day. Rather than collect every single plant within a transect, the community research team decided to collect one specimen of each species found to facilitate the plant pressing process and avoided community researcher fatigue. If individuals of the same species were found repeatedly throughout the transect, the location of each individual was noted in the field notebook.

Pressing the collected plant specimens
In contrast to the transect element of fieldwork (where each participant chose a task according to their ability and preference) the GDF team found that it was important to ensure that all participants worked together on the ‘office-based’ tasks of pressing plants, compiling labels, organising the botanical specimens, filling in the computer database, etc. Having all community researchers work together on these tasks alleviated the boredom that could otherwise set in during this more sedentary phase of the research. It also was essential so that all community researchers fully grasped the time requirements for the process and the importance of order, structure and concentration to successfully complete the work.

Ideally one whole day would be destined for the ‘office-based’ phase of the process, but if the community research team is busy with other important personal or agricultural activities, the process can be separated into two half days. Time for rest during activities is important during this more cerebral phase of the work, as lack of concentration can result in sequential and time-consuming errors.

VII. Results analysis
The analysis of the results is carried out once field practice is completed, in accordance with the research calendar. The quality of the data depends on the efficiency of the training and close follow-up of the community researchers’ field practice by the facilitator. Given the detail of the analysis proposal for methods group, it is presented as another workshop. Please see Methods Group 6 below.
### Example of a work plan

<table>
<thead>
<tr>
<th>Activity</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workshop preparation</td>
<td>At least 2 weeks before the workshop</td>
</tr>
<tr>
<td>A. Introduction</td>
<td>Day 1, 15 minutes, PM.</td>
</tr>
<tr>
<td>B. Theoretical presentation</td>
<td>Day 1. 45 minutes, PM. Gentry Method</td>
</tr>
<tr>
<td></td>
<td>Day 1. 45 minutes, PM. Method for the study of selected plant families.</td>
</tr>
<tr>
<td>C. Methodological reflection</td>
<td>Day 1. 1 hour, PM. Integrated to the previous theoretical presentation.</td>
</tr>
<tr>
<td>D. Technical training</td>
<td>Day 1. 30 minutes, PM.</td>
</tr>
<tr>
<td></td>
<td>• Joint planning with research team to select sampling field sites for</td>
</tr>
<tr>
<td></td>
<td>the following day and throughout the year.</td>
</tr>
<tr>
<td></td>
<td>Day 2. All AM and part of the PM.</td>
</tr>
<tr>
<td></td>
<td>• <em>In situ</em> explanation of sampling techniques.</td>
</tr>
<tr>
<td></td>
<td>• Data collection.</td>
</tr>
<tr>
<td></td>
<td>• Botanical voucher collection.</td>
</tr>
<tr>
<td></td>
<td>• Filling information cards and formats.</td>
</tr>
<tr>
<td></td>
<td>Day 2. 2 hours, PM.</td>
</tr>
<tr>
<td></td>
<td>• Practice of plant pressing techniques.</td>
</tr>
<tr>
<td></td>
<td>• Practice of plant drying techniques.</td>
</tr>
<tr>
<td></td>
<td>Day 3. All AM and part of the PM.</td>
</tr>
<tr>
<td></td>
<td>• <em>In situ</em> explanation of sampling techniques.</td>
</tr>
<tr>
<td></td>
<td>• Data collection.</td>
</tr>
<tr>
<td></td>
<td>• Botanical voucher collection.</td>
</tr>
<tr>
<td></td>
<td>• Filling information cards and formats.</td>
</tr>
<tr>
<td></td>
<td>Day 3. 2 hours, PM.</td>
</tr>
<tr>
<td></td>
<td>• Practice of plant pressing techniques.</td>
</tr>
<tr>
<td></td>
<td>• Practice of plant drying techniques.</td>
</tr>
<tr>
<td></td>
<td>Day 4. 3 hours, AM.</td>
</tr>
<tr>
<td></td>
<td>• Talk to local experts to identify ethnospecies.</td>
</tr>
<tr>
<td>E. Tasks</td>
<td>Day 4. 3 hours, PM. Sampling work in different field plots.</td>
</tr>
<tr>
<td>F. Methodological reflection</td>
<td>Day 4. 3 hours, PM. Integrated with the work planning.</td>
</tr>
<tr>
<td>G. Results analysis</td>
<td>To programme according to the field practice progress and work</td>
</tr>
<tr>
<td></td>
<td>organisation.</td>
</tr>
</tbody>
</table>

### Equipment and materials

<table>
<thead>
<tr>
<th>Collection material</th>
<th>Data registration materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Garden scissors</td>
<td>Stickers</td>
</tr>
<tr>
<td>Machete</td>
<td>Hang tags</td>
</tr>
<tr>
<td>Pole vaulting with scissors at the end of the</td>
<td>Report card</td>
</tr>
<tr>
<td>rod</td>
<td>Pencils and</td>
</tr>
<tr>
<td>Transparent plastic bags (30 x 40 cm)</td>
<td>permanent black ink pens</td>
</tr>
</tbody>
</table>
Large, thick plastic bags or sacks
Botanical press
Sheets of newspaper
Three-layer corrugated cardboard
Botanical press belts
Thick leather gloves (for prickly plants)

**Measuring equipment**
- Dressmaker's tape measure
- 25 meters rope, marked at intervals of 5 meter
- Raffia

<table>
<thead>
<tr>
<th>Data registration forms</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Additional equipment</strong></td>
</tr>
<tr>
<td>GPS</td>
</tr>
<tr>
<td>Photographic camera</td>
</tr>
<tr>
<td>Magnifiers with lights or without it</td>
</tr>
<tr>
<td>Petri dishes</td>
</tr>
<tr>
<td>Binoculars</td>
</tr>
</tbody>
</table>

**Methods group 6. Data systematisation and results analysis for studies of floral composition and vegetation characterisation of local landscape units**

**Addresses research question F: How do we analyse our results?**

**Workshop objectives**
This session aims to establish a co-enquiry framework for data systematisation and results analysis as part of the study of floral composition and vegetation characterisation for local landscape units.

**Facilitators**
This workshop should be facilitated by an external or local team member with abilities to lead a group discussion and with expertise in vegetation research processes.

**Participants**
Local research team that participated in the research process to study local floral composition and vegetation characterisation of local landscape units.

**Expected results**
At the end of the session, the participants will (i) know how to systematise their quantitative data; (ii) understand the steps required to analyse their data; and (iii) know how to draw conclusions based on their data analysis process.

**General thematic content**
- a) Systematising data sets
- b) Analysing quantitative data
- c) Drawing conclusions

**Learning experiences**
- Theoretical presentation, with exercises and examples, for a) and b)
- Data processing and analysis for a) and b)
- Dialogue and discussion for b) and c)

**Session development**
It is suggested the training session be organised as follows:
I. Introduction
The facilitator will provide the group with an introduction that covers (i) the purpose of the workshop, (ii) themes tackled by the workshop and how they will be addressed, (iii) length of the session, (iv) structure of the session, (v) outcomes of the session, etc.

II. Theoretical revision
Before discussing conventional scientific data analysis systems, the facilitator leads the group through a discussion of the possible modes of systematising quantitative data. In a co-enquiry setting, the conventional scientific processes for analysing and processing quantitative data (calculations with a high number of data, statistics, etc.) may be too time-consuming or complex for community researchers. In the Chinantla experience, the group used a combination of simple tables and graphics with two (maximum three) variables for the systematisation and analysis process. It is clear that some of the resulting analysis may lose some depth and complexity, yet it is also a system that is much more appropriate to community-based and co-enquiry processes.

III. Revision of information basis
Before proceeding to the analysis, the team recalls all the general data available and the questions that want to answer. In the Chinantla case, 18 acahuales were studied, each one with three transects to study general floristic composition and nine plots (3 per transect) to study the Rubiaceae, Melastomataceae and Asteraceae families (RUMEAS). All the data has to be available in paper (physical data sheets) or in a computer data-base. The general question was how and how much the acahuales contribute to the conservation of local biodiversity.

IV. General analysis of transects
1. If a short term study is conducted, it is likely that no scientific determination will be available for most of the plants. Scientific determination requires an expert of the region’s vegetation to be available during the fieldwork or to send voucher specimens to institutional herbaria, where considerable time has to be allocated for botanical determination. Therefore, the first adaptation for the analysis is working with ethnospecies, that is the plant organisms identified as different by the communities, named with local language or lingua franca.
2. The data of the three transects of each acahual are to be integrated in one list. That is, the team will produce only one list of floristic richness for each acahual. In this way, the team can work with one sample per acahual.
3. For the purposes of analysis, this list and selected information can be captured in
a simple table like Table 6. The research team will draw the table in a flipchart paper to make the analysis visible to all, creating one table per acahual.

4. In the table, and based on the field data, the team will register with a mark how many times an ethnospecies is repeated. This will provide information on species abundance.

5. The team will then identify the life forms for each of the ethnospecies. This information can be used later to study the structure of the acahual under study.

Table 4: Example of a table for general analysis of transects

<table>
<thead>
<tr>
<th>Acahual number</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>15 years</td>
</tr>
<tr>
<td>Altitude</td>
<td>950 masl</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ethnospecies</th>
<th>Abundance</th>
<th>Life form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethnospecies 1</td>
<td>III</td>
<td>Tree</td>
</tr>
<tr>
<td>Ethnospecies 2</td>
<td>I</td>
<td>Shrub</td>
</tr>
<tr>
<td>Ethnospecies 3</td>
<td>III</td>
<td>Vine</td>
</tr>
<tr>
<td>Ethnospecies 4</td>
<td>I</td>
<td>Vine</td>
</tr>
<tr>
<td>Ethnospecies 5</td>
<td>II</td>
<td>Vine</td>
</tr>
<tr>
<td>Ethnospecies 6</td>
<td>III</td>
<td>Tree</td>
</tr>
<tr>
<td>Ethnospecies 7</td>
<td>II</td>
<td>Tree</td>
</tr>
</tbody>
</table>

a) To analyse the ethnospecies presence and their abundance in the acahuals according to acahuals’ age, make another table in a flipchart paper that includes the floristic list of all the ethnospecies found in all the acahuals, and compares with all the acahuals grouped by age categories. These categories should be defined locally, according to the characteristics of different ages. For example, in the Chinantla case we can group acahuals from 1 to 5, 6 to 10, 11 to 15 year old, etc. To synthesise the presence and abundance of species in acahuals, review the tables of each acahual prepared previously (Table 6). The presence of any ethnospecies in each of the acahual group is identified with a mark, and the mark is repeated for each time the species was found in an acahual. Note that each age group can include information from several acahual tables (Table 7) as there may be several acahuals that belong to the same age group. See the following example.

Table 5: Example of a table where the presence and abundance of ethnospecies in acahual age groups can be registered

<table>
<thead>
<tr>
<th>Acahuals age groups (years old)</th>
<th>Ethnospecies 1</th>
<th>Ethnospecies 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 5</td>
<td>I, I, I, I</td>
<td>I, I, I, I, I, I, I</td>
</tr>
<tr>
<td>11 to 15</td>
<td>I, I, I</td>
<td>I, I, I, I, I, I, I</td>
</tr>
<tr>
<td>36 to 40</td>
<td>I, I, I, I, I</td>
<td>I, I, I, I, I, I, I</td>
</tr>
</tbody>
</table>

45
The reading and further analysis of this simple table provides information of richness (how many different) and abundance (how frequent) of each species according to the age of the acahual, that is, according to the time that the secondary vegetation started growing after the field was placed in fallow. To visualise this information separately, additional lists can be prepared of a) ethnospecies per acahual age group (richness); and b) frequency of ethnospecies in each acahual age group (abundance), which will allow the team to understand how the vegetation composition changes through time. This information is also useful to understand the plant biodiversity within and between age groups, to draw conclusions about what kind of species are those growing in the younger acahuales, and what species remain in the older ones.

A similar process can be conducted using ethnospecies in relation to acahual altitude e to find out about which species grow at lower altitude acahuales, and which ones at higher altitude acahuales.

b) To visualise the vegetation structure of the acahuales of different ages, and based on the general acahual tables prepared previously (Table 7), a simple graph can be created. The research team will group all the acahual tables according to age group, count the number of trees, shrubs and vines of each acahual age group, and prepare a graph like the following one (Fig.11)
V. Analysis of RUMEAS plots

1. This analysis also uses ethnospecies as the botanical information available for short-term studies. If possible, the research team should work with scientific species.

2. The research team will integrate in one list the data on floristic richness of the three transects of each acahual. This way, the team can work with one sample per acahual.

3. For abundance data, the team will integrate data of the three plots of each transect, and register how many times each ethnospecies is repeated.

4. For the purposes of analysis, the integrated floristic list and the abundance data can be captured in a table like Table 8. The team will register with a mark how many times an ethnospecies is repeated per transect, identifying the life forms for each of the ethnospecies. The team will then draw the table in a flipchart paper to make the analysis visible to all, making one table per acahual.

Table 6: example of a table used for the general analysis of RUMEAS plots (T1= Transect 1; T2 = Transect 2 ; T3 = Transect 3)

<table>
<thead>
<tr>
<th>Acahual number</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>15 years</td>
</tr>
<tr>
<td>Altitude</td>
<td>950 masl</td>
</tr>
<tr>
<td>Family</td>
<td>Ethnospecies</td>
</tr>
<tr>
<td>Asteraceae</td>
<td>Ethnospecies 3</td>
</tr>
<tr>
<td></td>
<td>Ethnospecies 5</td>
</tr>
</tbody>
</table>

Figure 11: Example of a simple graph to visualise vegetation structure by counting the number of different life forms present in an acahual age group.
<table>
<thead>
<tr>
<th>Ethnospecies</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Herb</td>
</tr>
<tr>
<td>11</td>
<td>Shrub</td>
</tr>
<tr>
<td>14</td>
<td>Herb</td>
</tr>
<tr>
<td>1</td>
<td>Tree</td>
</tr>
<tr>
<td>2</td>
<td>Shrub</td>
</tr>
<tr>
<td>7</td>
<td>Herb</td>
</tr>
<tr>
<td>9</td>
<td>Vine</td>
</tr>
<tr>
<td>12</td>
<td>Shrub</td>
</tr>
<tr>
<td>4</td>
<td>Herb</td>
</tr>
<tr>
<td>8</td>
<td>Herb</td>
</tr>
<tr>
<td>10</td>
<td>Tree</td>
</tr>
<tr>
<td>13</td>
<td>Shrub</td>
</tr>
<tr>
<td>15</td>
<td>Herb</td>
</tr>
</tbody>
</table>

6. To analyse the distribution and abundance of ethnospecies belonging to the RUMEAS families according to the acahual age group, the same process can be followed as in the general transects. The team will create another table in a flipchart paper that includes the floristic list of all the ethnospecies found in all the acahuales, and compares with all the acahuales age categories. To synthesise the presence and abundance of species in acahuales, the team will review the tables of each acahual prepared previously (Fig. 11). Note that each age group can include information from several general acahual tables as there may be several acahuales that belong to the same age group (Fig. 11).

The reading and further analysis of this table provides information of richness (how many different) and abundance (how frequent) of each species according to the age of the acahual. To visualise this information separately, additional lists can be prepared of (a) ethnospecies per acahual age group (richness); and (b) frequency of ethnospecies in each acahual age group (abundance), which will allow the team to understand how the vegetation composition changes through time. This information is also useful to understand the plant biodiversity within and between age groups, to make conclusions about what kind of species are those growing in the younger acahuales, and what species remain in the older ones.

A similar process can be conducted using ethnospecies in relation to acahual altitude to find out about which species grow at lower altitude acahuales, and which ones at higher altitude acahuales.

VI. Distributing the analysis work and assigning tasks
Given that the elaboration of the tables and graphics presented above can be tedious and time-consuming, once some first tables have been prepared, the research team can assign tasks and distribute the work among its members.
It is suggested that one or two brief day-long follow-up workshops are scheduled in order to (i) ensure that the systematisation and analysis process is understood and underway, (ii) answer queries and resolve problems, and (iii) explore the need for further/different questions or methods.

VII. Drawing conclusions
After finishing all the analysis tables, lists and counts, the team can draw conclusions based on the empirical data. The conclusions may be very obvious for the team after having managed all the field data in detail, but if these are not so obvious, the facilitator will help the team to elaborate conclusions by guiding the results revision and asking questions.

Following this first step, a second matrix can be used to examine whether the conclusions drawn help to answer the original research questions (Table 9). This matrix also allows for further questions to emerge, allowing the group to refine their research and interview questions prior to field-based practice.

Table 7: Data-research question comparison matrix

<table>
<thead>
<tr>
<th>Results</th>
<th>Overarching questions</th>
<th>Did we answer our questions?</th>
<th>If yes, how?</th>
<th>If no, how?</th>
<th>What other questions do I have?</th>
</tr>
</thead>
</table>

This process can also be visualised as in Figure 12:

Figure 12: Have we answered our research questions?
Adaptations
In the Chinantla, a further dialogue was set up to evaluate:

− What the results are telling the research team?
− How can the research team argue our points using the data and results?
− How can the research team link the results to community plans or aspirations?
− How can the research team explain our data and results to outside actors? E.g. to another community? A government? An NGO?

The local team discussed that the results are providing information on biological richness and the kind of forests. The *acahuales* are different, don't have the same species, and their characteristics for cultivation are different too. These characteristics allow to take management decisions. The graphical products such as tables and charts allow to visualise the data more easily and to communicate to outside actors the empirical results.

**Example of a work plan**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Introduction</td>
<td>Day 1. 15 minutes, AM.</td>
</tr>
<tr>
<td>II. Theoretical revision</td>
<td>Day 1. 30 minutes, AM</td>
</tr>
<tr>
<td>III. Revision of information basis</td>
<td>Day 1. 30 minutes, AM</td>
</tr>
<tr>
<td>IV. General analysis of transects</td>
<td>Day 1. 3-4 hours, AM and PM</td>
</tr>
<tr>
<td>V. Analysis of RUMEAS plots</td>
<td>Day 2. 3-4 hours, AM</td>
</tr>
<tr>
<td>VI. Distributing the analysis work and assigning tasks</td>
<td>Day 2. 30 minutes, AM</td>
</tr>
<tr>
<td>VI. Follow up workshops</td>
<td>Day 3 and 4. 4 hours each, AM</td>
</tr>
<tr>
<td>VII. Drawing conclusions</td>
<td>Day 5. 4 hours, AM</td>
</tr>
</tbody>
</table>

**Equipment and materials**
- All the physical data sheets and computer data bases from the data collecting period.
- Pencils or pens and A4 paper
- Flip chart paper
- Marker pens
- Projector and computer, if available

**Methods group 7. Integrate the information generated through the above actions into community maps**

Addresses objective E.3. To integrate the plant information into Community Geographical Information Systems.
E.3.1. Georeference each material or data collection in a database to be integrated with the community maps; information on local categories of vegetation and examples of useful plants will be given particular attention;

E.3.2. Integrate the information in thematic community maps – both paper and digital.

*The co-enquiry methods for this mapping component are described below (p.216-227).*
Fauna monitoring co-enquiry protocol

The protocol for community-based research on fauna monitoring is designed as a key tool in the process of assessing the effectiveness of community-based natural resource management. It is intended (i) to help communities assessing local fauna diversity and populations of important species, (ii) to help communities evaluating the effects that hunting practices have on the species populations, and (iii) engage in a process of collective reflection on their current needs regarding regional fauna, how these are satisfied following the current resources management and use, and what strategies they can use in case current management had to be adapted. Thus, its ultimate aim is to act as a tool for adaptive management, with an emphasis on community priorities and aspirations for their community-conserved areas and natural resource management systems.

The methods described in the protocol help build the capacities of community researchers to lead community processes of research on these issues. It is designed in such a way that following training, community researchers are able to both implement a fauna monitoring process autonomously, and help and empower their communities in their decision-making processes.

Ideally, and usually after many years of practice and reflection, co-enquiry encourages community researchers to develop *sui generis* research methods or to identify traditional methods that help to answer their research questions, in practice conventional social science research are used as a basis for the development of community-based approaches and adaptations. In the Chinantla context, researchers preferred to be taught conventional science methods that they question, test and adapt to their own realities, abilities and research questions. This highly productive work of adapting conventional methods to a co-enquiry approach is a necessary part of our collaborative work in COMBIOSERVE: as such, the Chinantec research teams adapted a selection of the methods proposed by INECOL on participatory biodiversity monitoring, also developing others they felt useful.

The overarching research questions of Chinantec communities have been developed over the course of 6 years of ethnographic, co-enquiry and community planning fieldwork, and are based on their local research needs and aspirations. The specific research questions included in this protocol are those Chinantec research questions that coincide with the project’s objectives related to biodiversity monitoring. It is particularly important that research questions are developed by the community as a whole, as this integrates the co-enquiry process into community decision-making processes rather than isolating it as a parallel process that is only fully known to the team of community researchers. The protocol for developing co-enquiry research questions is described in the Grounding Workshop on p.131-7.

The research questions developed in Chinantla communities were very varied. These included:
a) Questions for which they already have full or partial answers based on their experience and traditional knowledge:

• What animals live in our territory?
• What species of birds inhabit our territory?
• What do these animals eat?
• How do these animals move?
• What are their reproductive seasons?
• Are they harmful to agricultural production?
• Are they edible?
• Where do the animals live and where are the populations concentrated?

b) Questions for which the community desired more information which existing literature can complement:

• What animals live in our territory?
• What species of birds inhabit our territory?
• What do these animals eat?
• What are their reproductive seasons?

c) Questions that require empirical data to be answered and therefore require a research methodology to be tested and adapted. For the purposes of this protocol, we have selected the latter questions, plus a general question related to literature review, as follows.

A. What animal species do we want to focus on?
B. What information can existing literature provide to complement our traditional knowledge?
C. How many individuals of the species selected live in our territories?
D. Where do the animals live and where are the populations concentrated?
E. How many animals can we hunt each year without affecting the populations for future hunting?

The subsequent section provides (i) an explanation of the importance of each of these research questions, (ii) the research objective related to the research question, and (iii) the tasks required to answer the question.

A. What animal species do we want to focus on?

In tropical regions of the world such as southeast Mexico, where the Chinantla is located, animal species can comprise thousands of different forms, from microorganisms, arthropods, amphibians, reptiles, birds and mammals. Any wildlife monitoring process, especially one directed by a local and small research team, must focus on a reduced number of species in order to find relevant and sound information, whilst avoiding
potentially unmanageable datasets for processing and analysis. Therefore, this first question aims to focus the community's attention on an small group of wildlife species, using local parameters and values of selection; these can be based in cultural, economic, nutritional and environmental characteristics, among others, that the local community considers important for them.

**Objective A. To identify and characterise local animals and select the most important species for monitoring based on local values, parameters and needs.**

Task A.1. Train community researchers in fauna ethnoclassification exercises as a way to put in a graphical and explicit way their organisation of wildlife.

Task A.2. Identify the main animal species and associated values through dialogue.

**B. What information can existing literature provide to complement our traditional knowledge?**

As mentioned above, for several of the original questions, members of the community research team and/or the community at large knew partial answers but wished to gain more information. These questions are: What animals live in our territory? What species of birds inhabit our territory? What do these animals eat? What are their reproductive seasons? In the Chinantla region, several academic institutions and non-governmental organisations have conducted wildlife studies in the past decades, but the communities have not been able to easily access to their results. On the other hand, there exist studies that provide the biological history of many species communities are interested in, although these do not provide regionally-specific information. Discovering the scientific literature on the animals they are interested in benefits the community researchers and the community as a whole, as they acquire new knowledge and are empowered through their appropriation of information generated in the region by other actors.

**Objective B. To find and study the information and knowledge generated in the region by other actors in order to complement local traditional knowledge about wildlife.**

Task B.1. Establish a literature review of the regional wildlife as well as information about the biological history of the species.

Task B.2. Collectively review the information provided by the external studies and contrast it with local traditional knowledge.

**C. How many individuals of the species selected live in our territories?**

The size of each species population is a crucial parameter to be used to various ends. For example, communities want to know population sizes in order to understand the results of community-based natural resource management and conservation initiatives (community-based conservation evaluation) on wildlife populations. They also would like to establish a base-line of populations status and trends in order to determine local harvest limits. Both in San Pedro and Nopalera, the teams chose to focus on six species
of local importance due to their cultural and nutritional characteristics: Tepezcuintle (*Cuniculus paca*), Temazate Deer (*Mazama temama*), Great Curassow (*Crax rubra*), Wild Boar (*Pecari tajacu*), Armadillo (*Dasypus novemcinctus mexicanus*), and Pheasant of Highland Guan (*Penelopina nigra*).

<table>
<thead>
<tr>
<th><strong>Objective C.</strong> To study the population size of locally important wildlife species.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task C.1. Train community researchers in wildlife monitoring methods for obtaining quantitative information on animal populations of selected species.</td>
</tr>
</tbody>
</table>

**D. Where do the animals live and where are the populations concentrated?**

Understanding population distribution, including with a temporal dimension, helps communities to understand the landscape units these populations prefer to spend time in, and where to look for more stable populations for hunting purposes.

<table>
<thead>
<tr>
<th><strong>Objective D.</strong> To better understand the population distribution of selected species in community territories.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task D.1. Train community researchers in focus group methods to recover and systematise local ecological knowledge about animal population distribution in the territory.</td>
</tr>
<tr>
<td>Task D.2. Train community researchers in wildlife monitoring methods for obtaining quantitative information on animal populations of selected species.</td>
</tr>
</tbody>
</table>

**E. How many animals can we hunt each year without affecting the populations for future hunting?**

In the Chinantec communities where this work is being carried out, hunting is or was essential for livelihoods. It is also an important part of the local culture, particularly in terms of hunting practices, knowledge about game and environment, the belief system in which the hunting is embedded, and family nutrition. There are about 32 game species that were or are hunted mainly for food, but also for medicine or handicrafts (Ibarra *et al* 2011). Nevertheless, in 2004 the hunting practices where either self-prohibited (San Pedro) or self-regulated (Nopalera), with the aim to respect formal community conservation requirements, which follow the (limited use/prohibition) approaches of conventional conservation. However, in the Chinantla case, restrictions established on hunting are not based on population studies; moreover, information about hunting or harvest limits are not available. Therefore, carrying out locally-specific research on the harvest limits of selected species will provide valuable information for making local decisions that favour sustainable hunting.

In order to answer this question, the information obtained in objectives C and D has to be compiled. The team must also examine the factors that influence, limit or affect
animal populations; for example if there has been a drought, a disease or plague, a flood, etc. The research team can thus integrate the limiting factors over time to ensure that the hunting management approach adopted is adaptive. Furthermore, the study of spatial population distribution has to include a temporal dimension; that is, how the animals use the different landscape units over the course of the year.

**Objective E. To estimate the impact of hunting on preferred wildlife species populations.**

Task E.1. Train community researchers in hunting monitoring methods for obtaining quantitative information on animal populations of preferred species and catch per unit effort.

Task E.2. Train community researchers in information analysis to determine the harvest limits of preferred species.

**Sessions**

In this section, we describe the sequence of workshops, trainings, and ad-hoc CR support sessions required to carry out the co-enquiry process in the Chinantla. The process of adaptation and training in specific methods undertaken in the Chinantla is described in the subsequent sections. For each training session described here and further below, it is important that a selected local research team that is committed to following the training and conducting subsequent field practice is in place. The local team must be informed well in advance regarding the dates and length of the training session, which must coincide with a previously established research calendar.

In the Chinantla case, for the whole research cycle, the research team organised 4 semi-formal workshops, with several work sessions in between for systematisation and question-and-answer.

**I. Grounding workshop**

This is a 1-day workshop that addresses the first evaluation and the first approximation to the community’s research questions.

This workshop is carried out with CRs and any other interested community member according to the following schedule:

<table>
<thead>
<tr>
<th>Day 1</th>
<th>Grounding Work sessions (Methods group 0)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&gt; Theoretical and practical</td>
</tr>
</tbody>
</table>

**II. Knowledge dialogue and ethnoclassification workshop**

This is a 2-day workshop addressing the first two questions:

**D. What animal species do we want to focus on?**
E. What information can existing literature provide to complement our traditional knowledge?

This workshop is carried out with CRs according to the following schedule:

<table>
<thead>
<tr>
<th>Day 1</th>
<th>Training in fauna ethnoclassification (Methods group 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&gt; Theoretical and practical</td>
</tr>
<tr>
<td></td>
<td>Identifying the main animal species and their associated values.</td>
</tr>
<tr>
<td></td>
<td>&gt; Theoretical and practical</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Day 2</th>
<th>Training in literature review regarding the regional wildlife (Methods group 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&gt; Theoretical and practical</td>
</tr>
<tr>
<td></td>
<td>Collectively review the information provided by the external studies and contrast it with local traditional knowledge.</td>
</tr>
<tr>
<td></td>
<td>&gt; Practical</td>
</tr>
</tbody>
</table>

### III. Workshop on monitoring of selected fauna

This is a 6-day workshop addressing the following questions:

F. How many individuals of the species selected live in our territories?
G. Where do the animals live and where are the populations concentrated?

This workshop is carried out with CRs according to the following schedule:

<table>
<thead>
<tr>
<th>Day 1</th>
<th>Training in selected fauna monitoring – visual monitoring (Methods group 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&gt; Theoretical and practical</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Day 2</th>
<th>Training in selected fauna monitoring – visual monitoring (Methods group 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&gt; Practical</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Day 3</th>
<th>Training in selected fauna monitoring – visual monitoring (Methods group 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&gt; Practical: Methods adaptation and revision. Assignation of practical tasks for the subsequent months</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Day 4</th>
<th>Training in selected fauna monitoring – track monitoring (Methods group 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&gt; Theoretical and practical</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Day 5</th>
<th>Training in selected fauna monitoring – track monitoring (Methods group 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&gt; Practical</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Day 6</th>
<th>Training in selected fauna monitoring – track monitoring (Methods group 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&gt; Practical: Methods adaptation and revision. Assignation of practical tasks for the subsequent month.</td>
</tr>
</tbody>
</table>

The CRs are provided with tasks to carry out over the course of the subsequent 6-12 months (depending on the research calendar developed), throughout which a continuous support is provided by facilitators for the monitoring and systematisation process. The group also decided upon a field research schedule. It is important that the facilitator encourage the research team to meet regularly throughout this period to catch up, air ideas, help each other out, think about obstacles and opportunities, and define questions they may have for the facilitator.
IV. Workshop on hunting monitoring

This is a 3-day workshop addressing the last question:

H. How many animals can we hunt each year without affecting the populations for future hunting?

This workshop is carried out with CRs according to the following schedule:

<table>
<thead>
<tr>
<th>Day 1</th>
<th>Training on local hunting monitoring (Methods group 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&gt; Theoretical and practical</td>
</tr>
<tr>
<td>Day 2</td>
<td>Training on local hunting monitoring (Methods group 3)</td>
</tr>
<tr>
<td></td>
<td>&gt; Practical</td>
</tr>
<tr>
<td>Day 3</td>
<td>Training on local hunting monitoring (Methods group 3)</td>
</tr>
<tr>
<td></td>
<td>&gt; Practical: Methods adaptation and revision. Assignation of practical tasks for the subsequent months.</td>
</tr>
</tbody>
</table>

The CRs are provided with tasks to carry out over the course of the subsequent 6-12 months (depending on the research calendar developed), throughout which a continuous support is given by the facilitators for the monitoring and systematisation process. It is important that the facilitator encourage the research team to meet regularly throughout this period to catch up, air ideas, help each other out, think about obstacles and opportunities, and define questions they may have for the facilitator.

Methodologies

**Methods Group 0. Grounding work sessions**

Addresses all objectives: these work sessions are necessary for the implementation of all the methods subsequently discussed.

The Grounding work sessions act as introductory work, during which overall research questions are defined and fauna monitoring methods are introduced.

**Participant observation**

Before applying concrete methods for studying any natural resource, a general diagnosis is necessary: this is usually carried out using qualitative techniques such as participant observation and open interviews. Participant observation is the basis for any participatory research, and the method is implemented by facilitators and community researchers alike (see p.33). Participant observation requires the research team to participate in community life and general activities (subsistence, celebrations, social and even political events), and, through conversations, observation and embodied learning, gain knowledge regarding the research question, which in this case is the words, elements and limits that shape the local fauna domain. The advantage of this technique within a co-enquiry process is that community researchers have been *de facto* observers of the local natural and social environment their entire life! Therefore, they have good – sometimes exceptional – knowledge concerning local cultural domains.
Grounding workshop

Once the research team has gained a general understanding of the local fauna and the issues around it, a focus group with the community research team is organised to share ideas, words and limits of what to include or not in the local understanding of ‘animal domain’; and more specifically to start generating research questions regarding fauna issues. Limits are very important, as we need to determine whether some animals are of higher relevance, and others are irrelevant following local parameters and possibilities for biological monitoring.

This workshop also tackles the overall research process: its broader goal is for community researchers to understand basic (and conventional) research cycle. For the purposes of this protocol, we adapted the process to wildlife research and monitoring, however it can be used as a basis for any other research objective.

Session objectives

- To identify the animals or animals groups of interest to communities and that can be subject to monitoring and further research;
- To determine broad questions related to fauna monitoring;
- To share with community researchers the basic elements of fauna-focused research using a co-enquiry approach.

Facilitators

This workshop should be facilitated by an external or local team member with abilities to lead a group discussion and with expertise in participatory research and biological monitoring.

Participants

The community research team and any other community member interested in local fauna.

Expected results

At the end of the session, the participants will (i) be acquainted with the action-research cycle and its steps; (ii) be able to broadly identify the animals or animals groups that can be subject to monitoring and further research; (iii) have a general picture of the local needs and context regarding wildlife use and management; and (iv) have defined fauna-related general research themes or overarching questions.

General thematic content

- Finding a common language for research
- The action-research cycle (see Chapter III for related literature).
- Biological research and fauna monitoring
- Selection of animals or animals groups for further study.
- Selection of research themes

Learning experiences

- Theoretical presentation and dialogue for a) – c)
- Dialogue and reflection for d) and e)

Session development

It is suggested the training session be organised as follows:
I. Introduction
The facilitator will provide the group with an introduction that covers (i) the purpose of the workshop, (ii) themes tackled by the workshop and how they will be addressed, (iii) length of the session, (iv) structure of the session, (v) outcomes of the session, etc.

II. Theoretical revision
In this section, three key concepts will be addressed:

- A common language for the research process
- The action research cycle and fauna-related research

A common language for the research process

Language is important tool to reach a common understanding of a research process. Often external academics are used to freely deploying scientific and technical language without taking into account that most local people may not understand it. This section is not aimed at teaching or transferring the scientific and technical words to the community researchers, but rather at reaching a common understanding, between facilitators and community researchers, of how to name particular processes, objects, tools, approaches, etc.

For the purposes of this protocol, the research team proposed to determine a common language for the overarching domains of natural science research, monitoring, and wildlife. For each one of these, the facilitator promotes an exchange of ideas: dialogue is encouraged to analyse the differences between the external and the local definitions. The team’s work to define mutually understood concepts will continue throughout the workshop, as and when needed.

The proposed terms for discussion are:

1. Co-enquiry
2. Natural science research
3. Monitoring
4. Conservation

Adaptations
Throughout the workshop, a useful technique for ensuring that all participants have understood the concepts, themes and questions under discussion is to ask one of them to explain it to the others in the local language. This technique very rapidly reveals whether the participants have understood the concepts or not, even if the facilitator does not understand the local language.
5. Wildlife
6. Animals
7. Hunting
8. Any other locally important concept

The facilitator must be aware that some words may have a stronger political load and therefore may need more time to be defined. As a first result of this exercise, the team should adapt the language used during the rest of the plan research process to the one that was commonly defined.

The action research cycle
Assuming that most of the local participants have no previous experience with wildlife monitoring methods and/or the action-research cycle, in this section a presentation and explanation of both concepts is provided. A simple schema for the action research cycle using co-enquiry is provided in Figure 2.

![Figure 2: Simple schema for the action research cycle using co-enquiry.]

In order to explain this cycle it is useful to have local examples. In the case of the Chinantla the problem of rats in the corn fields was used as a local problem. Using the above action research cycle, community researchers developed a series of questions regarding the issue, and explored processes for answering those questions. The action research cycle with the example is provided in Figure 3.
This first round of questioning led to the conclusion that if there were 60 rats found over the 3 weeks of monitoring, it would be too much and the decision to trap them would be made. Sometimes, rather than a direct solution, another question appears based on the findings for the previous question: for this reason it is an action research cycle. Facilitators are encouraged to think creatively about what kinds of local problems may help community researchers think through the research cycle.

III. Identifying research themes
As is the case with other natural resources, the identification of research themes can be conducted through the development of an initial, general, mind map of the resources, their uses, opportunities and conflicts found in the territory. This kind of map will generate:

- A preliminary picture of the wildlife conditions;
- A landscape level analysis of wildlife management in the community territory;
- Criteria that may be useful to measure the success of the fauna management practices and strategies.

To begin with, participants will be asked to draw a map of their territory on white flipchart paper. The map should have basic geographical elements such as the community boundaries, main water bodies, main mountains or hills, the urban area, main roads, and landscape units (see Methods group 2).

Subsequently, using the map as the main tool to generate information, with the support of the facilitator, the group discusses:
- Wildlife found in each landscape unit
- General uses of the different animal species or groups
- Conflicts related to those species or animal groups
- Opportunities related to those species or animal groups

Two map layers will be created using 2 sheets of tracing paper. Resources and their uses are identified on the first layer; conflicts and opportunities on the second. When identifying conflicts and opportunities, special attention must be given to external and internal initiatives and projects that are present in, or relate to, each landscape unit. On each sheet, marks, labels, signs and icons can be drawn to identify the different elements.

Upon completion of the map, a table like the one below will be drawn on a flipchart page. For each landscape unit, the information about resources, uses, conflicts and opportunities will be registered.

Table 8: Example of information table about resources, uses, conflicts and opportunities

<table>
<thead>
<tr>
<th>LANDSCAPE UNIT</th>
<th>Wildlife species or groups</th>
<th>Uses</th>
<th>Conflicts/opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest</td>
<td>Cats, Birds</td>
<td>Conservation, Food</td>
<td>Jaguars can kill cattle or dogs, Hunting restrictions, Good source of food</td>
</tr>
<tr>
<td>Acahual (secondary forest)</td>
<td>Deer</td>
<td>Food, Game</td>
<td>Lack of information about populations, and therefore we don’t really know if we are affecting the populations when we hunt, Hunting restrictions</td>
</tr>
<tr>
<td>Coffee plantation</td>
<td>Birds</td>
<td>Food</td>
<td>Hunting restrictions, Good source of food</td>
</tr>
<tr>
<td>Agricultural zone</td>
<td>Tepezcuintle</td>
<td>Food, Game</td>
<td>Lack of information about populations, Hunting restrictions</td>
</tr>
</tbody>
</table>

Table 2 promotes reflection and helps in the choosing of locally relevant and interesting themes for co-enquiry. To do so, three steps are suggested:

- Dialogue about the synthesis table.
- Identification and writing down a list of broad questions that the team wants to answer.
- Prioritizing the research themes (broad questions). This can be done simply by voting on the different themes.

IV. Connecting research questions to methods

Based on the research themes defined, the group discusses what kind of data is required to answer the question, the feasibility of the research question, whether the research question can be answered by the CRs alone (or whether they need specialists), etc. The results of this discussion can be easily visualised using a table such as Table 3. Based on this discussion, the facilitator will guide the group discussion on the available methods
for producing the data required. Here the facilitator’s expertise on the ‘pros and cons’ of different methods for achieving different types of data will be essential.

Table 9: Linking research questions to proposed methods

<table>
<thead>
<tr>
<th>Research questions</th>
<th>Information required (what kind?)</th>
<th>Methods proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>What animals live in our territory?</td>
<td>Numerical and descriptive</td>
<td>Different observation methods</td>
</tr>
<tr>
<td>What do these animals eat?</td>
<td>Descriptive</td>
<td>Interviews with people who have knowledge on the different species, Literature review</td>
</tr>
<tr>
<td>How many animals can we hunt each year without affecting the populations for future hunting?</td>
<td>Numerical</td>
<td>Monitoring</td>
</tr>
</tbody>
</table>

At this stage, rather than explain in depth what each research method is and does, the facilitator simply gives a broad outline of the approaches and the kinds of results they yield, noting that subsequent workshops will be dedicated to explaining and learning about these methods.

This is a useful moment at which to conclude, with the facilitator taking the opportunity to recapitulate on the day’s work and to ensure that most participants have understood the concepts and outcomes of the workshop.

Example of a work plan

<table>
<thead>
<tr>
<th>Activity</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Introduction</td>
<td>Day 1. 15 minutes, AM.</td>
</tr>
<tr>
<td>II. Theoretical revision</td>
<td>Day 1. 1 hours, AM</td>
</tr>
<tr>
<td>III. Defining research themes</td>
<td>Day 1. 3 hour, AM.</td>
</tr>
<tr>
<td>IV. Connecting research questions to methods</td>
<td>Day 1. 1 hour, PM</td>
</tr>
</tbody>
</table>

Equipment and materials

- Notebooks, pencils and pens
- Flip chart paper and marker pens
- Educational material to illustrate the action-research cycle
- Tracing paper sheets
- Colours
Methods group 1. Knowledge dialogue and ethnoclassification

Addresses

Objective A. To identify and characterise local animals and select the most important species following local values, parameters and needs.

Objective B. To find and study the information and knowledge generated in the region by other actors in order to complement local traditional knowledge about wildlife.

In this section, three methods are described: 1) ethnoclassification, 2) problematising dialogue and 3) literature review, all of these related to local fauna. In the Chinantec experience, we integrated the three methods in one knowledge dialogue workshop – informed by the grounding work sessions – using the following structure.

Workshop on ethnoclassification and knowledge dialogue

Session objectives
The general objective of the workshop is to train community researchers in highlighting and organising existing information about local wildlife through a knowledge dialogue that includes local ecological knowledge and available academic information about selected species.

Specific objectives:
• To train community researchers in ethnoclassification and literature review methods;
• To understand and make explicit the local categorization of representative wildlife.
• To generate a dialogue about local fauna that provides baseline information for subsequent monitoring work;
• To provide complementary technical information that answers community questions about local wildlife;
• To fine-tune local research questions about fauna in order to select those that will be answered through the monitoring process.

Facilitators
This workshop should be facilitated by an external or local team member with abilities to lead a group discussion and with practice in conducting ethnoclassification, literature reviews and problematising dialogue.

Participants
• Local research team and any other community member interested in the dialogue about local fauna.
• Special attention must be given to integrate different social groups of the community into the workshop, such as women, young people and elders, as they can provide different views of the needs and local realities.
• A special invitation should be made to local hunters.
Expected results
At the end of the session, the participants will have (i) acquired local and external information that provides a basis to answer local questions and deal with local fauna-related issue; (ii) made explicit the local categorisation of relevant fauna, (iii) acquired abilities to study local classifications of any object or living being, with special attention to wildlife; and (iv) identified the most important animals based on local values that will be subject of further monitoring.

General thematic content
a) What is ethnoclassification?
b) Identification of relevant fauna-related issues
c) Literature review – knowledge exchange
d) Fine-tuning research questions

Learning experiences
- Theoretical presentations for a)
- Practical exercises for a) – d)
- Focus groups for dialogue and analysis for a) – d)
- Graphic or power point presentations for c)

Session development
In this experience, the training session was organised as follows:

I. Introduction
The facilitator will provide the group with an introduction that covers (i) the purpose of the workshop, (ii) themes tackled by the workshop and how they will be addressed, (iii) length of the session, (iv) structure of the session, (v) outcomes of the session, how this session is part of the broader programme of monitoring or natural resources management.

II. Ethnoclassification theory and practice
Ethnoclassification exercises serve to learn how people classify a determined group of objects or elements. In this case, fauna ethnoclassification exercises are proposed; in the case of this monitoring process, the concept of ’fauna’ includes mammals, birds, reptiles, amphibians, fishes and insects that have local cultural and economic importance. These exercises will provide language elements, local characterisation components and knowledge about local fauna, which will be used in the elaboration and adaptation of the subsequent monitoring methods. Ethnoclassification also allows community researchers to adjust and adapt the language and concepts while carrying out the literature review.
and knowledge dialogue (For more methodological information on ethnoclassification see Martin 1995, Vogl and Puri 2005, Santos Fita and Costa Neto 2009).

For the purposes of this workshop, the facilitator explains what ethnoclassification is, using examples from the daily lives of the community. This is a dialogue session in which the facilitator asks the participants to talk about instances in their own lives in which they group different objects or living organisms according to their characteristics. It is useful to ask participants to translate the concept into their own language in order to ensure a basic understanding.

We chose pile sorting as a simple but powerful method to understand local categorisations. The facilitator explains the method and asks the participants to conduct an exercise to learn it. Please see Annex 7 for a full explanation of the method.

III. Methodological reflection
Once the exercise is finished, the questions that were elaborated during the Grounding workshop are recalled and the facilitator promotes a reflection on the method used. The group then brainstorms, through a dialogue process led by the facilitator, about the pile sorting method used. Some questions that can be asked are:

- To what extent does this method help to answer our research questions?
- To what extent does the ethnoclassification exercise implemented reflect the community classification of local fauna?
- What other ways can be used to elicit local classifications?
- What other kind of data emerged through the exercise, besides local fauna classification?
- What may be the use of this kind of information?
- Should we validate and refine our results with community elders and other local experts?

IV. Problematising dialogue
Problematising dialogue allows participants to engage in a deeper reflection, further awaken interest, renew their commitment to the monitoring process, and provide further elements regarding the local relevance of the work. To conduct this dialogue, we use the methodological tool of ‘Generator themes’ (Freire 1975), which are key work themes around which a deep dialogue can be developed; the dialogue from there may turn to many other subjects that are important for the group. The generator themes proposed to start the problematising dialogue are: hunting, food and nutrition, community self-control, formal conservation, territory care, tradition.

Often, an object may be used to launch and facilitate a problematising dialogue using generator themes. This object may simply be a card on which the theme is written, but preference is given to one or more images related to it, as these tend to catalyse the dialogue more rapidly and concretely. From there, the conversation develops according to the group's interests. The facilitator must be very attentive to identify these interests, pose key questions and guide the dialogue to deepen the themes. During the whole process one person has to take note of all that is said during the dialogue in order to highlight the most important points in a synthesis at the end of the workshop.
V. Literature review and knowledge exchange
As with conventional research approaches, it is necessary to ground practical co-enquiry research in a solid literature review. In the case of fauna monitoring, having a literature review helps to determine existing knowledge regarding the diversity of animals in the region and to know more about the natural history of the species of interest, which will provide data on feeding patterns, reproduction, etc. The literature review process trains the team on the concept of publications as a source of information, and provides the team with a basis upon which to develop their ideas, determine gaps in their knowledge and reflect on how existing information relates to local issues and needs.

For the present case study, we looked for fauna inventories carried out in the biocultural region of the Chinantla and in the state of Oaxaca, and for the natural history of three species of greatest interest: Tepezcuintle (*Cuniculus paca*), Temazate Deer (*Mazama temama*) and Great Curassow (*Crax rubra*), which had been identified in the grounding workshop (Methods group 0). The amount of information drawn on for the literature review will vary depending on how well-studied a region or an ecosystem is.

In order to carry out a knowledge exchange, the information found in the academic literature has to be compared with local ecological knowledge. Thus, the problematising dialogue must continue in this section in order to promote discussion, highlight any discrepancies between published scientific literature and local knowledge, and examine the possible reasons for such discrepancies. Please see Annex 8 for a full explanation of the process.

VI. Fine-tuning of research questions
Following the literature review and the knowledge exchange between published scientific knowledge with traditional ecological knowledge, the research questions are revisited for fine-tuning. These may be adapted or modified according to new available information. The aim is to choose two concrete research questions that can be answered through field monitoring methods and processes, within the period of one year more or less (time may vary considerably, but one year is a standard period on which biological processes and populations trends can be grasped). Once the refined questions are chosen, the research team may choose to adapt a conventional scientific approach to carry out the research. However, depending on the team’s experience, community researchers may also develop *sui generis* research methods or identify traditional methods to answer their questions. The methods groups presented in subsequent sections resulted from the process described.

*Example of a work plan*

<table>
<thead>
<tr>
<th>Activity</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Introduction</td>
<td>Day 1. 15 minutes, AM.</td>
</tr>
<tr>
<td>II. Ethnoclassification theory and practice</td>
<td>Day 1. 2 1/2 hours, AM</td>
</tr>
<tr>
<td>III. Methodological reflection</td>
<td>Day 1. 1/2 hour, AM</td>
</tr>
<tr>
<td>IV. Literature review and knowledge exchange</td>
<td>Day 2. 4 hours, AM</td>
</tr>
<tr>
<td>V. Fine-tuning of research questions</td>
<td>Day 2. 1 hour, PM.</td>
</tr>
</tbody>
</table>
Equipment and materials
- Notebooks
- Pencils or pens
- Flip chart paper
- Marker pens
- Photography sets for ethnoclassification exercises
- Adhesive labels
- White cards
- Photographs or drawings of generator themes
- Graphic, audiovisual or Powerpoint presentations for the literature review.
- Projector

Methods group 1. Training in selected fauna monitoring methods

Addresses

Objective C. To study the population size of locally important wildlife species.

Objective D. To better understand the distribution of the populations of selected species on the community territory.

Objective E. To estimate the impact of hunting on preferred wildlife species populations.

Visual monitoring
(Adapted from Ayala and Noss, 2000.)

The visual monitoring method enables the gathering of information about animal diversity and proportional species abundance. It also enables initial exploration regarding the population distribution of selected species.

Session objectives
Community researchers are able to carry out a visual monitoring process of the most common species of mammals and birds in their territory. They are also able to record animals observed during daily productive activities of farmers and hunters, as a way to evaluate the proportional abundance or three species of cultural and economic interest: Tepezcuintle (*Cuniculus paca*), Temazate Deer (*Mazama temama*), Great Curassow (*Crax rubra*).

Facilitators
The monitoring training should be led by an external or local team member with knowledge and experience in fauna monitoring.

Participants
- Local research team and any other community member interested in learning how to monitor local wildlife species.
• A particular invitation should be make to local hunters, with special attention to young people.

**Expected results**
At the end of the session, the participants will understand the method of visual fauna monitoring and have acquired basic abilities to apply the method and adapt it to local conditions.

**General thematic content**
- a) Fauna monitoring
- b) Visual monitoring

**Learning experiences**
- Theoretical presentation
- Practical exercises and group dialogue
- Focus groups for reflection and analysis

**Session development**
It is suggested the training session be organised as follows:

![Figure 17: Framework for training community researchers in the visual monitoring method](image)

I. Introduction
The facilitator will provide the group with an introduction that covers (i) the purpose of the workshop, (ii) themes tackled by the workshop and how they will be addressed, (iii) length of the session, (iv) structure of the session, (v) outcomes of the session, etc.

II. Theoretical presentation of the method
The facilitator provides the theoretical background on visual monitoring and describes the practical steps for field implementation, taking note of them on a blackboard or flipchart page (see next section for detailed description of these steps):

- Establishment of observation sites.
- Fields walks
- Data register

III. Visual monitoring practice
In order to fully understand and learn the method of visual monitoring, practice is essential. This practice can take the following shape:

(i) Determination of watching places.

**Adaptations**
The establishment of observation sites works on the assumption that the members of the research team are knowledgeable and familiar with their community territory, its landscape units, and the animals that live in there. Chinantec community researchers are milpa and coffee farmers and hunters that work and walk continuously through the territory. If this is not the case, interviews to other community experts can be carried out, using the same questions, in order to determine the most favourable observation sites.
The first step is to have a group discussion to understand where animals or animal tracks have been sighted during the present year; what kind of animals have been sighted; in which landscape units animals are most commonly sighted; etc. This information will be located on a community territory map. The map can be presented in a community-wide meeting for fine-tuning. The information generated during the grounding work sessions can provide valuable data for this step.

(ii) Field walks

Field walks to the observation sites identified can be organised according to the following:

- For mammals: Direct sightings in daily walks (from 8:00 to 13:00 hrs.)
- For birds: the fixed point method is used – every species seen or heard when stopped at fixed points every 250m are registered (walks from 6:00 to 11:00 hrs.).
- Concurrently, every time that the team members carry out a field walk for hunting, agricultural activities, firewood collection, road repair, etc., they are required to record any animal information they encounter.

(iii) Data register

- To organise and analyse the information, recording it on data sheets is essential. For that purpose, the research team has to prepare a data sheet package that is useful in local conditions, allowing them to take them to the field easily while preventing the paper used from getting wet. For example, clip boards and plastic envelopes can be used.
- The community research team must adapt the data register format to local requirements, in order to retrieve the most relevant information from the field walks. The following format was proposed by Chinantec community researchers for their use:

Adaptations

The map used to locate the observation sites is ideally established using participatory mapping processes. If this kind of maps is not available, a technical or official map can be used as a base map instead. Once local information is included to this formal map, it begins its transformation into a community map!
• Data registered in paper formats are written up digitally and stored in the computer on a weekly basis, and can be analysed every month.
• The summarised or analysed data should be presented to the community assembly every 3 to 6 months, depending on the research period, so that all community members can question or complement the findings.

<table>
<thead>
<tr>
<th>WILDLIFE VISUAL MONITORING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date: ______________________</td>
</tr>
<tr>
<td>Community __________________</td>
</tr>
<tr>
<td>Name in Chinantec __________________</td>
</tr>
<tr>
<td>Name in Spanish __________________</td>
</tr>
<tr>
<td>Vegetation type __________________</td>
</tr>
<tr>
<td>Animal seen in: milpa acahual forest river watershed urban area other: __________</td>
</tr>
<tr>
<td>What was the animal doing? ______</td>
</tr>
<tr>
<td>Animal seen: alone in group if in group, number of individuals:</td>
</tr>
<tr>
<td>Weather at the time of the sighting: sunny cloudy drizzly rainy other: ______</td>
</tr>
<tr>
<td>Coordinates:</td>
</tr>
<tr>
<td>Notes: __________________</td>
</tr>
<tr>
<td>__________________</td>
</tr>
<tr>
<td>Informant: __________________</td>
</tr>
</tbody>
</table>

Figure 18: data register for visual monitoring

IV. Methods adaptation and revision
Once the first methods practice has been carried out in the field, the facilitator encourages a discussion. The reflection can be done in a two-way questions and answers session (facilitator <> community research team). The following are some key questions that may be relevant for the discussion:

• Do you think that using this method the team can find out the population size of the species in the community territory?
• In what other ways may we learn how many animals are in the territory?
• What other data would be useful?
• What is the information gained through the visual monitoring practice useful for?
• What difficulties did we have during the field-based practice of the method?
• How can we solve these difficulties?
In addition to these suggested questions, the facilitator can draw on difficulties or opportunities that they observed during the field-based practice for further discussion during this session.

V. Task assignment
In order to have enough data for analysis and decision-making, it is suggested that this method is implemented for a whole calendar year. Having participated in the field-based practice, community researchers can work on a schedule for implementing the method throughout the year and may draw up a list of possible willing participants from the community to be invited to join in the effort.

Example of a work plan

<table>
<thead>
<tr>
<th>I. Introduction</th>
<th>Day 1. 30 minutes, AM.</th>
</tr>
</thead>
<tbody>
<tr>
<td>II. Theoretical presentation of the method</td>
<td>Day 1. 1 hr, AM.</td>
</tr>
<tr>
<td>III. Visual monitoring practice</td>
<td>Day 1. 4 hours, AM.</td>
</tr>
<tr>
<td></td>
<td>Day 2. 4 hours, AM.</td>
</tr>
<tr>
<td>IV. Methods adaptation and revision</td>
<td>Day 3. 2 hrs., AM</td>
</tr>
<tr>
<td>V. Task assignment</td>
<td>Day 3. 1 hr, AM.</td>
</tr>
</tbody>
</table>

Equipment and materials
- Photocopied data sheets
- Clip boards to support data sheets in the field
- Pencils or pens
- Plastic envelopes
- Flip chart paper
- Marker pens

Track monitoring

The track monitoring method is used to gather information about mammal population density and the population distribution of selected species.

Session objectives
Community researchers are able to carry out a track monitoring process of mammals in their territory. They are able to monitor selected mammals species using diverse tracks left by these animals – such as footprints, scat, marks in trees, and so on – as a way to evaluate their abundance and distribution.

Facilitators
The monitoring training should be led by a external or local team member with knowledge and experience of fauna monitoring.

Participants
- The community research team and any other community member interested in learning how to monitor local wildlife species.
A particular invitation should be made to local hunters, with special attention to young people.

**Expected results**
At the end of the session, the participants will understand the method of track monitoring and have acquired basic abilities to apply the method and adapt it to local conditions.

**General thematic content**
- Mammal monitoring
- Track monitoring

**Learning experiences**
- Theoretical presentation
- Practical exercises and group dialogue
- Focus groups for reflection and analysis

**Session development**
It is suggested the training session be organised as follows:

- I. Introduction
  - The facilitator will provide the group with an introduction that covers (i) the purpose of the workshop, (ii) themes tackled by the workshop and how they will be addressed, (iii) length of the session, (iv) structure of the session, (v) outcomes of the session, etc.

- II. Theoretical presentation of the method
  - The facilitator provides the theoretical background on track-based mammal monitoring and describes the practical steps required for field implementation, noting each of these on a board or a flipchart page (see next section for detailed description of these steps):
    - (i) Establishment of observation sites
    - (ii) Carrying out transects
    - (iii) Data register

- III. Track-based monitoring practice
  - In order to understand and learn the method, practice is essential, and can be carried out using the following steps:

- IV. Methods adaptation and revision

**Adaptations**
The proposal presented here uses the monitoring of two important species for the Chinantec communities: Tepezcuintle (*Cuniculus paca*) and Temazate Deer (*Mazama temama*). Both have very different habits, so a single protocol cannot be established for the monitoring of both of the species. Furthermore, the research team found it was even more difficult to try to adapt the same protocol to other species, as each has different habits and biological requirements.

Therefore, good animal monitoring design requires the research teams to take into consideration the biological characteristics and habits of each species of interest. The knowledge required to establish good observation sites, identify animal scat, and be well-versed in species-specific animal habits can be drawn from local ecological knowledge and from books, specialists, field guides, etc.
(i) Establishment of observation sites
The first step is to have a group discussion in order to select three monitoring sites, based on community researcher experience and knowledge. These are usually sites where individuals of the selected species have been seen or hunted more frequently. Complementing traditional ecological knowledge, the species' habitat preferences helps to select the best monitoring sites. For example, Chinantec community researchers agreed, through discussion, to select three sites based on the following characteristics:

- The two species of interest for Chinantec communities (Tepezcuintle and Temazate deer) like corn, therefore milpas (corn fields) that are found close to water bodies and with dense vegetation (because these species prefer to remain hidden) are good places to start track-based monitoring of these species;
- Other foods of interest for the Tepezcuintle are mangoes and zapote mamey (*Pouteria sapota*). So, areas near to orchards or trees are also likely to be good monitoring sites.
- Tepezcuintle burrows are built mainly on stony areas and covered by vegetation, and therefore are another location to seek out for track monitoring.

(ii) Carrying out transects
- First, the group establishes a transect\(^3\) of 1 km in each of the three selected sites. There must be a minimum distance of 1 km between transects. One transect per selected site is the minimum required; however, the more transects carried out, the more robust the data. Depending on the size of the community research team, CRs can be organised in pairs, each of which will carry out one transect. This will help to reduce 'noise' and make sightings more probable.
- On a monthly basis, community researchers must walk along the three transects to register the active burrows of the Tepezcuintle. Burrows are considered active when hairs or fresh footprints are present. When one is found, its coordinates are recorded using a hand-held GPS. In the case that footprints are found and these lead to a location that is outside of the transect, that location (often a burrow) must also be marked using a hand-held GPS.
- Every two months, community researchers must walk along the three transects to count Temazate scat. The best time of the year to do this is during the dry season. In order to count scat, at the outset of the monitoring process, CRs will establish circular plots of about 10m\(^2\) every 20m along the transect; they are to collect all the scat from each plot. Every two months they return to the plots and count the

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\(^3\) A transect is a path along which one counts and records occurrences of the phenomena of study. In the present case of a track-based monitoring in the Chinantla, it is a path through forest/milpa/fallow field, of 1km, along which all relevant animal tracks are counted and recorded.
Temazate scat (>5 pellets with the same characteristics is considered an individual scat) in each parcel.

(iii) Data register

- To organise and analyse the information, recording it on data sheets is essential. For that purpose, the research team has to prepare a data sheet package that is useful in local conditions, allowing them to take them to the field easily while preventing the paper used from getting wet. For example, clip boards and plastic envelopes can be used.
- The community research team must adapt the data register format to local requirements, in order to retrieve the most relevant information from the field walks. The following format was proposed by Chinantec community researchers for their use.

<table>
<thead>
<tr>
<th>WILDLIFE TRACK-BASED MONITORING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date: ___________________________</td>
</tr>
<tr>
<td>Community: ______________________</td>
</tr>
<tr>
<td>Transect number: __________________</td>
</tr>
<tr>
<td>Number of Tepezcuinle active burrows: __________________</td>
</tr>
<tr>
<td>Tepezcuinle active burrows</td>
</tr>
<tr>
<td>Burrow Number</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Figure 20: Data register format for track monitoring

- Data gathering can be organised to be implemented by individuals or sub-groups. Some individuals/subgroups carry out Temazate deer monitoring while others carry out Tepezcuinle monitoring.
- Data registered in paper formats are captured in the computer after each field trip.
- The summarised/analysed data should be presented to the community assembly every 3 to 6 months, depending of the research period so that community members are given the opportunity to question or complement the findings.

IV. Methods adaptation and revision

Once the first practice of the methods field application is complete, the facilitator encourages group reflection and discussion. The reflection can be done in a two-way
question and answer session (facilitator <> rest of the team). The following are some key questions that may be relevant for the discussion:

- Do you think that using this method the team can find out the population size of the species in the community territory?
- In what other ways may we learn how many animals are in the territory?
- What other data would be useful?
- What is the information gained through the visual monitoring practice useful for?
- What difficulties did we have during the field-based practice of the method?
- How can we solve these difficulties?

In addition to these suggested questions, the facilitator can draw on difficulties or opportunities that they observed during the field-based practice for further discussion during this session.

V. Task assignment
In order to have enough data for analysis and decision-making, it is suggested that this method is implemented for a whole calendar year. Having participated in the field-based practice, community researchers can work on a schedule for implementing the method throughout the year and may draw up a list of possible willing participants from the community to be invited to join in the effort.

Example of a work plan

<table>
<thead>
<tr>
<th>I. Introduction</th>
<th>Day 1. 30 mins, AM.</th>
</tr>
</thead>
<tbody>
<tr>
<td>II. Theoretical presentation of the method</td>
<td>Day 1. 1 hr, AM.</td>
</tr>
<tr>
<td>III. Traces monitoring practice</td>
<td>Day 1. 4 hours, AM.</td>
</tr>
<tr>
<td></td>
<td>Day 2. 4 hours, AM.</td>
</tr>
<tr>
<td>IV. Methods adaptation and revision</td>
<td>Day 3. 2 hrs., AM</td>
</tr>
<tr>
<td>V. Task assignment</td>
<td>Day 3. 1 hr, AM.</td>
</tr>
</tbody>
</table>

Equipment and materials

- Photocopied data sheets
- Clip boards to support data sheets in the field
- Pencils or pens
- Plastic envelopes
- Flip chart paper
- Marker pens
- Hand-held GPS

Hunting monitoring
(Adapted from Constantino et al 2008; Noss, Oetting and Cuéllar 2005; and Cuéllar, Noss and Arambiza 2004)

Hunting monitoring is used to estimate population status and trends, and is especially relevant in the case of preferred species. It is done by keeping a record of hunted animals in communities where hunting is an important livelihood strategy. It is also used to
estimate the impact that hunting practices have on those populations; it can provide useful data on preferred species, body mass and capture per unit effort.

This monitoring method can both be used as a complement to the visual and traces methods described before and carried out independently, in line with local research questions and needs.

Session objectives
Community researchers are able to carry out a monitoring process of community hunting. They are able to monitor the species density of game species through the record of hunting episodes and to estimate the impact of hunting on selected species.

Facilitators
The monitoring training should be led by an external or local team member with knowledge and experience on fauna and hunting monitoring.

Participants
- Local research team and any other community member interested in the learning how measure game species populations.
- A particular invitation should be made to local hunters, with special attention to young people.

Expected results
At the end of the session, the participants will understand the method of hunting monitoring and have acquired basic abilities to apply the method and adapt it to local conditions.

General thematic content
a) Why to monitor game animals?
b) How to conduct hunting monitoring

Learning experiences
- Theoretical presentation
- Practical exercises and group dialogue
- Focus groups for reflection and analysis

Session development
It is suggested the training session be organised as follows:

Figure 21: Framework for training community researchers in the hunting monitoring method

1. Introduction
The facilitator will provide the group with an introduction that covers (i) the purpose of the workshop, (ii) themes tackled by the workshop and how they will be addressed, (iii) length of the session, (iv) structure of the session, (v) outcomes of the session, etc.
II. Theoretical presentation of the method
The facilitator provides the theoretical background for hunting monitoring and describes the practical steps required to carry out field-based hunting monitoring, taking note of these steps on a board or a flipchart page (see next section for detailed description of these steps):

(i) Monitoring design
(ii) Carrying out interviews
(iii) Data register

III. Hunting monitoring practice
In order to understand and learn the method, practice is essential, and can be carried out using the following steps:

(i) Monitoring design
The first step in the process is to organise a group discussion about the local perception of animal populations of locally important species. The knowledge dialogue workshop may have already provided basic information. If the visual and track-based monitoring methods have already been carried out, they can provide considerable information regarding populations status. If no other method has been implemented prior, some useful questions for this purpose are:

- What animals do you think are more abundant, and where are they found?
- What animals do you think are less abundant?
- In which season are these species most abundant?
- Which are the reasons for their high or low abundance?

Based on the previous information, the research design is established by the whole research team. This design will include the kind of data they wish to register, the way in which they wish to register the data (i.e. interviews, self-monitoring, etc.) and frequency of interviews (which will be based in the local hunting frequency).

(ii) Carrying out interviews
In the Chinantla, interviews within families were chosen as the best way to gather information: community researchers carried out interviews each in their extended families. In this case, it resulted in older researchers monitoring what they and their sons are hunting, and the younger researchers monitor what their fathers and brothers are hunting. Each community researcher was responsible for interviewing between 2 and 5 nuclear families. To begin with, interviews are carried out on a weekly basis over the course of 6 months; depending on the results, this could be extended to one year.

(iii) Data register
- To organise and analyse the information, it is essential to record it in data sheets. The community research team must adapt the data register format to local requirements,
in order to retrieve the most relevant information. The following format was proposed by Chinantec community researchers for their use:

<table>
<thead>
<tr>
<th>HUNTING MONITORING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date:</td>
</tr>
<tr>
<td>Community:</td>
</tr>
<tr>
<td>Purpose of hunt:</td>
</tr>
<tr>
<td>Number of hunters:</td>
</tr>
<tr>
<td>Species hunted:</td>
</tr>
<tr>
<td>Individuals hunted:</td>
</tr>
<tr>
<td>Weight:</td>
</tr>
<tr>
<td>Gender:</td>
</tr>
<tr>
<td>Capture place:</td>
</tr>
<tr>
<td>Did you take dogs?:</td>
</tr>
<tr>
<td>How many?:</td>
</tr>
<tr>
<td>Distance to the town (walking hours):</td>
</tr>
<tr>
<td>Notes:</td>
</tr>
<tr>
<td>Informant:</td>
</tr>
</tbody>
</table>

Figure 22: Data register format for hunting monitoring

- Data registered in paper formats are transferred for storage on the computer on a weekly basis, and can be analysed every month.
- The summarised or analysed data should be presented to the community assembly every 3 to 6 months, depending on the research period, so that all community members are given the opportunity to question or complement the finding.

IV. Methods adaptation and revision

Similar to previous methods, once the first practice of the methods field application is complete, the facilitator encourages group reflection and discussion. The reflection can be done in a two-way question and answer session (facilitator <> rest of the team). The following are some key questions that may be relevant for the discussion:

- Do you think that using this method the team can find out the population size of the species in the community territory?
- In what other ways may we learn how many animals are in the territory?
- What other data would be useful?
- What is the information gained through the visual monitoring practice useful for?
- What difficulties did we have during the field-based practice of the method?
- How can we solve these difficulties?

**Adaptations:**

Both during the hunting monitoring practice and at the moment when data is to be analysed, it is important to relate the hunting data with socio-economic variables, such as human population density, total number of hunters in the community, presence of cattle, and other similar factors that can influence hunting practice or results. These data can be gathered through ethnographic and other social sciences methods such as semi-structured interviews, as described in defined in CRP#4.
What other information is necessary regarding hunted animals?

In addition to these suggested questions, the facilitator can draw on difficulties or opportunities that they observed during the field-based practice for further discussion during this session.

V. Task assignment

The hunting monitoring method is used to gather information about populations density and effects of hunting into the populations. In order to have enough data for analysis and decision-making, it is suggested that this method is implemented for a whole calendar year.

Example of a work plan

<table>
<thead>
<tr>
<th>I. Introduction</th>
<th>Day 1. 30 mins, AM.</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Day 1. 1 hr, AM.</td>
</tr>
<tr>
<td>III. Hunting monitoring practice</td>
<td>Day 1. 4 hours, AM.</td>
</tr>
<tr>
<td></td>
<td>Day 2. 4 hours, AM.</td>
</tr>
<tr>
<td>IV. Methods adaptation and revision</td>
<td>Day 3. 2 hrs., AM</td>
</tr>
<tr>
<td>V. Task assignment</td>
<td>Day 3. 1 hr, AM.</td>
</tr>
</tbody>
</table>

Equipment and materials

- Photocopied data sheets
- Clip boards to support data sheets in the field
- Pencils or pens
- Plastic envelopes
- Flip chart paper
- Marker pens

Adaptations:

For all the monitoring methods proposed here – Visual monitoring, Track monitoring and Hunting monitoring – and bearing in mind the ultimate aim of established a sustainable, adaptive hunting management practice, population size is not the only parameter to be used to determine the harvest limits, but rather an indicator. Effectively, in the context of adaptive management, which belongs to an ecosystem approach, the research team should assume that there are different factors that influence animal populations that the community (the wildlife managers) must take into account. The limiting factors that may affect population size, and consequently harvest limits, are varied: these can be environmental changes like a drought, a flood, a plague or other environmental diseases. It is very important therefore, that the research process identifies these factors and that the team discusses about a) how these may impact monitoring and b) the importance on a long-term monitoring to reach an adaptive management.

Similarly, for all the methods herein, research design must include a temporal dimension as well as a spatial one. That is, although the research team studies where the animals live, move and reproduce, all this can change during different seasons throughout the year. For example, animals gather in different areas of the territory depending on the season or other environmental factors (such as those mentioned in the previous paragraph). This should be taken into account in the sampling design, by including sampling practices throughout the year.
Reforestation monitoring co-enquiry protocol

These research questions were developed in discussion between the community research team and community members, with the support of an external facilitator. The phrasing was carefully chosen by the research team so as to be easily understood by everyone in the community.

A. What is reforestation?
B. Why reforest?
C. Which plants will be reforested?
D. How will the reforestation be monitored?
E. How will the results be analysed?
F. How will the community use the results, particularly for decision-making processes?
G. How will our results encourage children to participate and get involved in the reforestation programme?

A. What is reforestation?

It is important that the community researchers and the community themselves develop a common understanding of reforestation in the context of their environment and livelihoods. In order to do so, community researchers explore both scientific principles and reasons for reforestation, as well as indigenous ideas about reforestation. It is important that local values and objectives with regard to reforestation form the basis upon which the methods are developed.

**Objective A.1. To identify the local concept of reforestation**

Task A.1.1. Conduct a participatory literature review on reforestation
Task A.1.2. Train community researchers in interviewing techniques
Task A.1.3. Conduct interviews to explore the local understanding of reforestation

B. Why reforest?

Once the concept of reforestation is understood, community researchers lead a community-wide dialogue on the importance of and the reasons for carrying out reforestation. This will ensure that all community members have a shared understanding of the reasons for carrying out reforestation.

**Adaptation:** Due to the low level of formal education in the community, research activities were carried out as a joint effort between community researchers and the on-site external facilitator. In other cases it is expected that, following appropriate training and with support, the community research team can take charge of most of the research activities.
Objective B.1. To identify the motivations for reforestation at the community level

Task B.1.1. Train community researchers in leading group discussions in order to understand community motivations for reforestation.
Task B.1.2. Create a list with information of the motivations to reforest for the local community.

C. Which plants will be reforested?

Once the importance of, and motivations for, reforestation have been shared and understood, a process must be implemented to identify the most relevant species for the reforestation program. Qualitative methods, such as freelists or focus groups, can be used to identify the most relevant species based on their local biocultural relevance.

Objective C.1. To identify relevant species to be used for reforestation

Task C.1.1. Carry out a participatory literature review on the biodiversity of local species
Task C.1.2. Implement a focus group to identify the most culturally important species within the local context

D. How will the reforestation process be monitored?

Once all aspects of the program are defined, community researchers learn how to monitor activities and results in order to ensure the continuity and effectiveness of the reforestation process.

Objective D.1. To implement a process of data collection and monitoring

Task D.1.1. Carry out a participatory literature review on data collection
Task D.1.2. Train community researchers on participatory data collection
Task D.1.3. Create tables and/or a data sheet for documenting results

E. How will results be analyzed?

The process to analyze results must be participatory; it is important that community researchers in particular are able to independently analyze the results of their work and explain their conclusions to community members as well as visitors and other external actors.
Objective E.1. To analyze the results

Task E.1.1 In order to analyze results, an ongoing process of discussion and reflection among researchers and facilitators will allow community researchers to become comfortable with using the information gathered during the implementation of activities. Information to be monitored and analyzed during the process should include:
- Number of seed sown per date
- Total number of seeds sown
- Schedule of watering the seeds
- Number of seeds germinated
- Number of days until germination

At this stage, analysis of the results should be limited to the seeds that effectively germinated. Seed selection for the next cycle of reforestation should take seed germination rate into consideration.

F. How will the community use the results, particularly for decision-making processes?

After the first cycle of reforestation, the community should gather to reflect on the research process and discuss the potential uses of the results and any changes that should be made to the reforestation program before beginning the next cycle.

Objective F.1. Using the results for the community's benefit

Task F.1.1. Facilitator and community researchers lead discussions at the community level to dialogue about the use of results at the local level and to fine tune the reforestation program.

G. How will our results encourage children to participate and get involved in the reforestation program?

To insure long term continuity of the reforestation program, community researchers should develop a plan for engaging and involving children in all stages of the process.

Adaptation: The Tsimane' of San Luis Chico decided that the most important aspect of a reforestation program is to maintain a sustainable and diverse forest (how it used to be many years ago) for their children, therefore they discussed about encouraging children to get involved in the process and participate on the reforestation program. They decided that reforestation should be taught to them the importance of maintaining a healthy and diverse forest.
Objective G.1. To generate a plan to include children in the reforestation program

Task G.1.1. Support community researchers to design and implement workshops at the school
Task G.1.2. Support community researchers to implement field activities engaging children in each step of the reforestation program

Methodologies

Methods group 1. Qualitative methods: interviews, workshops and focus groups

Addresses objective A.1 To identify the local concept of reforestation; B.1 To identify the community’s motivations for reforestation; C.1. To identify relevant species to be used for reforestation

In order to explore the community’s understanding of what reforestation is, we recommend a process of interviewing followed by a workshop, which will ensure that the same information and knowledge is shared throughout the community. A focus group directed to people more involved with (or more knowledgeable about) the reforestation process should be lead to identify and determine the species to be utilized for reforestation.

Objectives

- Document how reforestation is understood at the local level
- Share basic information about reforestation with community members
- Identify species that are culturally important or relevant for reforestation

Facilitators

The interviews should be led by members of the community research team. The workshop and focus groups should be led by an external and/or local member of the research team with the ability to lead a group discussion.

Participants

- Interviews: Members of the Community Research Team and a facilitator
- Workshop: Members of the local research team and all people from the village (or as many as want or are able to participate)
- Focus groups: Members of the local research team, and people identified from the interviews and workshop who have more knowledge/experience and are more interested in reforestation.
**Expected results**

**For the interviews:**
A document gathering all information regarding the concept of reforestation as understood by community members, complemented with the scientific theory of reforestation to be presented to workshop participants.

**For the workshop:**
At the end of the session, all participants will have a shared understanding regarding the topic of research as explained by the community research team.

**For the focus groups:**
Members of the local research team will gather a list of species with cultural and biological importance to be used for the reforestation program.

**General thematic content**

**Interviews**
- Document what locals understand about reforestation
- Document the reasons for implementing a reforestation program
- Document local knowledge of uses for the species reforested
- Document local perception of the past presence of the species reforested

**Workshop**
- What is reforestation?
- How is reforestation understood in the local context?

**Focus group**
- What are the most relevant/important species in the local context?
- Which species are the best ones to use (based on local knowledge and experience of working with them) on the reforestation program?
- What are the local motivations to create a reforestation program?

**Session development**

**Interviews**
It is necessary to have a group of local people, previously elected by their own community, who are committed to work as researchers. This includes spending time for training and implementation of the reforestation program. They should be well informed in advance about the length of training and implementation of the methodologies.

It is suggested the training session be organised as follows:

1. **I. Introduction to interviewing**
The facilitator will present a package of theoretical information about interviews including i) introduction to interviews, ii) types of interviews available, iii) length of the session, and iv) outcomes of the session.
II. Discussion
The facilitator will lead a discussion about which type of interview is the most adequate for the program. Once the different types of interviews have been discussed, the group determines the most adequate type of interview for the local context. We recommend that special attention be paid to semi-structured or informal interviews, as they are more adaptable and manageable for community researchers with no formal education. The protocol for co-enquiry-framed Basic Social Science research methods (p.183-227) provides an in-depth process for training community researchers in the theoretical background of semi-structured interviews.

III. Question development and testing
The facilitator guides the development of questions for the interview. Given the importance of developing precise and easily understood questions for the interview, this element of the process requires adequate time for detailed explanations and discussions. The process of developing questions can be implemented through the following steps:

- Based on the objectives of the reforestation program, the facilitator leads a discussion on the possible questions that would ensure the group would obtain the necessary results to achieve these objectives. A list of questions should be drawn up and analyzed one at a time.
- Each question should be analysed in particular in its use of language: it is important the group focus on the local lexicon to make the questions accessible to each interviewer and the people to be interviewed.
- Once each question has been analysed, it must be tested to ensure they are appropriate and understood in the local context. To do this, the community research team test the questions among themselves.
- Once questions are tested, a brief discussion to reflect on the testing is required, as this also helps to re-order or re-phrase (if necessary) the questions to make sure the process of interviewing is more fluid, simple and non-invasive.

Adaptations:
In San Luis Chico, we made sure we analysed each word in each question, to make sure they were understood in the same way by all local researchers. After selecting the specific words to be used, and making sure they are clear, we reviewed the phrase (question) to make sure everyone understood it. We also translated the question into the local language. Only one of the local researchers was able to write and read in both Spanish and Tsimane’. He was in charge of writing the questions in Tsimane’ but all researchers participated on this process by making sure they were using the right words and phrasing to make the questions understandable in the local context. Every time it was possible, besides testing the questions between the local researchers, we tested them with other Tsimane’ visiting the village, or by visiting a neighbor village, to ensure we did not affect or "prepare” people from the village to know what to expect from the questions, or prepare what to answer when it was their turn to be interviewed.

IV. Final Discussion
The facilitator will lead a final discussion about the whole process, and encourage the implementation of the methodology. The results of the discussion should be copied and saved for future discussion and review of the interviews.
This discussion should be guided by the facilitator but lead by the community researchers; it aims to:

(i) Discuss and reflect on the process of developing and testing questions.
(ii) Discuss the best way to register the information gathered during the interviews (e.g. writing, digital recordings). This includes a brief discussion about where to store the information for future analysis and reference.

**Adaptation:** Given the lack of formal education of the local researchers, the group decided to use a digital recorder to record the interview process; this required further discussion and the implementation of a brief session on how to use a digital recorder. We also discussed the ethical implications of recording someone, and the importance of asking permission to do so, while respecting and acknowledging when people did not wish to be recorded. In these cases, we decided to carry out the interview and, when possible, meet immediately after (or as soon as possible) with the rest of the local research team, to record in writing the information gathered on the interview.

(iii) Dialogue about who will be responsible for carrying out the interviews.

**Adaptation:** The community research team decided that the team member who know how to read and write would be responsible for the interviewing process, and the other members would accompany the interviews, collaborating for the process.

(iv) Decide the number of interviews expected and a time frame for carrying out the interviews.

**Adaptation:** During this discussion it was decided to interview all people (above 16 years of age) who voluntarily decide to be part of the process.

The questions used for the interviews are:

1. *Porqué es importante hacer la reforestación con la Mara?* / Why it is important to reforest with Mahogany?
2. *Cómo era la Mara antes? (cuando eras niño)* / How was the Mahogany before? (when you were a child)
3. *Cuánto había?* / How much did there used to be?
4. *Para qué se usa la Mara?* / What can Mahogany be used for?

These questions are also to be used for the reforestation of Cedar and Oak trees, which will be incorporated in the reforestation process once Mahogany monitoring is well established.

**Workshop**

It is suggested the workshop be organised as follows:
I. Introduction
The facilitator briefly presents the topic of the workshop, its length and the expected results.

II. Theoretical revision
Members of the community research team present the results obtained during the interviewing process and on the local theory of reforestation.

III. Discussion
The facilitator will encourage a dialogue among participants to discuss the topic and gather more information regarding how reforestation is understood locally.

IV. Conclusions
Members of the community research team and the facilitator will present at the final conclusions.

Example of the work plan

<table>
<thead>
<tr>
<th>Activity</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Introduction</td>
<td>Day 1 - 15 minutes, AM.</td>
</tr>
<tr>
<td>B. Theoretical revision</td>
<td>Day 1 - ½ hour, AM.</td>
</tr>
<tr>
<td>C. Discussion</td>
<td>Day 1 - ½ hour, AM.</td>
</tr>
<tr>
<td>D. Conclusions</td>
<td>Day 1 - ½ hour, AM.</td>
</tr>
</tbody>
</table>

Focus group
This focus group is intended for the community researchers and community members who have experience in reforestation or that show particular interest on participating. It is recommended to have between 6-8 participants to ensure a manageable discussion.

Adaptation: We identified a couple of people that had previous reforestation experience. And they were the only ones participating along with the community researchers, two of which also had previous reforestation experience.

It is suggested that the session be organized as follows:
I. Introduction
The facilitator will introduce the reforestation program, the main objectives of the focus group, the dynamics of the work and the expected results.

The facilitator briefly presents the theory of reforestation as identified from a literature review, complemented with information of how reforestation is understood in the local context (information obtained from first interviews). If there is need for translation, the facilitator should work in tandem with a translator (ideally a member of the community research team).

II. Dialogue
The main objective of this dialogue is the creation of a guideline to follow during the implementation of the reforestation program.

The group will discuss:
- What are the most important/relevant plant species for the people of the village;
- Which of these species are the most viable for use in the reforestation program (based on local knowledge of the species and prior experience working with them);
- What are the local motivations for a reforestation program; and therefore
- Why do you want to reforest with this species?

III. Conclusions
Results of this dialogue can be written on a flip chart, and consensus about which species to be used in the reforestation program will be drawn. If consensus is not easy to reach, further dialogue and exploration of community members’ divergent opinions will be necessary.

*Example of the work plan*

<table>
<thead>
<tr>
<th>Activity</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Presentation of the reforestation program to be implemented</td>
<td>Day 1 - 15 minutes, AM.</td>
</tr>
<tr>
<td>B. Discussion of the most relevant/important species to be used in the program</td>
<td>Day 1 - 1 hour, AM.</td>
</tr>
<tr>
<td>D. Conclusions</td>
<td>Day 1 - 30 minutes, AM.</td>
</tr>
</tbody>
</table>

*Equipment and materials needed (for workshop and focus groups)*
- Notebooks
- Pencils or pens
- Markers
• Flip chart paper
• Consultation books

**Method 2. Implementing reforestation monitoring: data collection (focus groups)**

Addresses objective D.1. To implement a process of data collection and monitoring

**Objectives**
- To implement training sessions with the community researchers
- To create a format for data collection

**Facilitator**
An external researcher

**Participants**
Local community researchers

**Expected results**
Throughout the sessions it is expected to create a format for data collection elaborated by the participants to be used for data collection and monitoring.

**General thematic content**
- What is data collection and its importance in the context of reforestation
- How to collect all the data required

**Session development**
Work should be implemented utilizing focus group among the CRs. It is recommendable to plan at least a couple of sessions to be able to review the entire process and to create an effective data collection sheet.

It is suggested that the session be organized as follows:

I. Introduction
The facilitator will introduce the topic, explain the dynamics of the work, and expected results.

The introduction should include an explanation of the importance of collecting data, maintaining it accessible at all times, and that collected data should be easy to understand for everybody involved on the program, including community members. Therefore, the data collection process devised should be in a format that it is easy to understand and manage for all participants.

II. Development of the data collection sheet
The facilitator should encourage the participants to discuss and elaborate a data collection format that is easy to understand and effective, including all aspects of data intended to collect. For this, the facilitator could base the discussion on the protocol elaborated on the previous focus group, and follow some questions as:

- What information about the species would you like to register?
- What steps of the protocol elaborated (reforestation protocol) should be registered, and why?
- How do you think we can register them?
- What information you consider important to register to contribute on the continuity of the program?

Following the questions the group reaches an agreement regarding what should be registered and why. Based upon this decision, they work on creating a table to document all the data of interest.

### III. Conclusions

Throughout the sessions a data collection sheet should be created and reviewed to be use by the participants in the reforestation program.

Table 10: An example of the data collection sheet created with the Tsimane' villagers of Bolivia, including some data.

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th># of seeds sown</th>
<th># of seeds germinated</th>
<th># total seeds sown</th>
<th># days it took for germination</th>
</tr>
</thead>
<tbody>
<tr>
<td>09/25/13</td>
<td>X</td>
<td>260</td>
<td>260</td>
<td></td>
<td></td>
</tr>
<tr>
<td>09/26/13</td>
<td>X</td>
<td>88</td>
<td>348</td>
<td></td>
<td></td>
</tr>
<tr>
<td>09/27/13</td>
<td>X</td>
<td>132</td>
<td>480</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10/07/13</td>
<td>Very humid</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10/08/13</td>
<td>X</td>
<td>A number germinated that were sown on 09/25/13</td>
<td>13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10/11/13</td>
<td>X</td>
<td>More germinated from those sown on 09/25/13</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10/15/13</td>
<td>rain</td>
<td>Some sown on 09/26/13</td>
<td>19</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Method 3. Results analysis

Addresses objective E.1. To analyze the results

Objectives
To create a consensus regarding the significance of the results and of the importance of their analysis

Facilitator
An external researcher

Participants
Local community researchers

Expected results
At the end of the session participants will understand and be prepared to analyze the data collected during the reforestation program

General thematic content
• What is data analysis?
• What should be analyzed and why?

Session development
Work should be implemented in discussion sessions throughout the process of data collection, using the focus group approach (among community researchers)

It is suggested that the session be organized as follows:

I. Introduction
The facilitator will introduce the topic, explaining the importance and meaning of data analysis during a reforestation program, and expected results.

Adaptation: In the San Luis Chico context, we needed to explain the importance of analysing the data emerging from the entire process of reforestation (from sowing seeds to transplanting plants to the forest) in order to understand what was successful and what was not. An explanation of how data analysis works allowed us to investigate the effectiveness of
seeds and to examine how much time was spent on each activity. This enabled us to
demonstrate the work involved throughout the whole process, ensuring that community
members were aware of what to expect during a second cycle. The data analysis process also
helped participants understand what they should be paying more attention to: for instance,
they found that if fallen leaves covered the seeds that were sown, germination may not occur.
Therefore it was decided to install a net over the seeds to control this during the subsequent
cycle.

II. How to analyse data
Based on the discussion that emerged during the development of the data sheet (Method
2, above), CRs should be encouraged to engage in a discussion aiming to decide how to
analyze the results, focusing on the level of detail for the analysis.

The group should:

i. Review all data collected on the data sheets, to respond the question: What kind
   of results are expected from the reforestation programme?
ii. Discuss about which results should be analysed and why (i.e. Evaluate the
    number of seeds sown: how many germinated, and how long it took).
iii. Discuss how to analyse the data collected (i.e. Evaluate the time that takes the
    seedlings to reach a proper size, since germinated, to be replanted on the forest).
iv. Calculate effectiveness of germination from the number of seeds germinated from
    the total sowed to be able to plan for next season.

III. Conclusions
Results of the activity will be taken note of by the facilitator and use as a permanent tool
for discussion throughout the process of data collection. All analyses can be reviewed,
refined, and re-structured by the community researchers at any time when needed.

Method 4. Using the results of the research process (workshop)
Addresses objective F.1. Using the results for the community’s benefit; and G.1.
To generate a plan to include children in the reforestation program

Objectives
- To identify and document potential uses of the results
- To plan a program for engaging children

Facilitators
Community research team and a external advisor

Participants
Members of the community and authorities

Expected results
A the end of the session is expected to have a list of uses of the results and a plan for
children activities to insure their involvement on the reforestation program
**General thematic content**

- What are the possible uses for the results?
- What children activities are most appropriate?

**Session development**

The workshop should include when possible authorities, and all community members. Work should be led by CRs, who encourage dialogue among all participants.

It is suggested the session be organized as follows:

I. Introduction

The facilitators introduce the theme, making a detailed presentation of the reforestation program – particularly results, analysis and progress to date – explaining the importance of the continuity of the program to ensure its effectiveness. The facilitators explain that the continuity and effectiveness of a reforestation programme is based on its long-term nature, and therefore that it is important to involve community youth and children to maintain the programme in the future. The facilitators also explain the benefits of having a reforestation programme not only as a tool for forest conservation, but also as an educational tool for children to learn how to conserve and manage the forest. The facilitators then introduce the dynamics for the session, and expected results.

II. Dialogue and development of proposals

Once the workshop participants are acquainted with the up-to-date results and analyses emerging from the reforestation process, they can discuss the following questions: The group will discuss:

- What are the possible uses of the reforestation results?
- What activities should be adequate to implement with children in the local context?

The community research team should lead this discussion. It may be useful to have breakout discussions in small groups in order to explore each of these questions in depth. The participants can be separated into two groups each discussing one question; a spokesperson can then present the results of the discussions for further dialogue during a plenary session. The facilitator should take note of the responses from each group to lead this final dialogue, with a view to reaching an agreement on the most representative responses and the next steps for implementation.

III. Conclusions

The results of this activity should be taken note of by the facilitator on a flip chart. A two-fold plan should be drawn up regarding uses of the results and a strategy to engage children in the program. This plan should be led by the community researchers, in follow-up sessions and with the support of the facilitator; it should be drawn up to be implemented as an ongoing process.
Fishing monitoring co-enquiry protocol

The objective of the fishing monitoring protocol is to support communities to carry out their own monitoring of their river fishing activities. Community researchers and community members developed these research questions together, with the support of an external facilitator.

A. What is monitoring?
Knowledge and understanding of what is monitoring, and how can it be implemented is necessary to begin the process.

Objective A.1. To understand what monitoring is
Task A.1.1. Conduct a literature review on monitoring
Task A.1.2. Implement discussion sessions to discuss the meaning of monitoring

B. Why and for what should we carry out fishing monitoring?
Before planning activities, it is important to discuss and understand why monitoring the fishing activities is important at the local context, and how the local community will benefit from monitoring program.

Objective B.1. To identify the local importance of a fishing monitoring program
Task B.1.1. Document the motivations for a monitoring program
Task B.1.2. To document benefits envisioned by locals by the implementation of a fishing monitoring program

C. What fish should we monitor?
Once identified the motivations, benefits and importance of a fishing monitoring program, identification of the most locally relevant fish is needed to start the program.

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4 Given time constraints the final steps of this protocol were not fully implemented in the field; they are presented here as suggestions.
Objective C.1. To identify the most important/relevant fish to be monitored
Task C.1.1. Literature review of the fish in the region
Task C.1.2. Focus group to identify the most relevant fish in the local context

D. How will we carry out the monitoring?
Having identified the fishes to be monitored, it's time to understand and decide how to monitor the fishes and the fishing activities

Objective D.1. Elaboration of a guideline for the process of data collection
Task D.1.1. Discuss and elaborate a monitoring plan: how to collect the data and the frequency of data collection
Task D.1.2. Create a data sheet for data collection

E. How will we analyse our results?
Once monitoring is organized, a process of understanding how to analyze results should start during the first cycle of monitoring (six months or one year).

Objective E.1. To analyze the fishing monitoring results
Task E.1.1. Literature review
Task E.1.2. Analysis of results

F. How will our results be used by the community?
During the first cycle of the monitoring process (six months or one year), discussion within the community research team should be encouraged to discuss ways of using the results obtained, and other potential outputs (publications, etc.)

Objective F.1. To explore the usage of the monitoring within the community
Task F.1.1. Lead sessions of discussion to gather information about the potential outputs from the results and how the latter can be used – both in practice and in decision-making.

Methodologies

Methods group 1. Qualitative methods
Addresses objectives A.1. To understand what monitoring is; B.1. To identify the local importance of a fishing monitoring program; C.1. To identify the most important/relevant fish to be monitored and D.1. Elaboration of a guideline for the process of data collection

In order to have a common understanding of what monitoring is, how can it be done, and what the local importance of having a monitoring program is, we recommend that the work begin with an informative workshop, followed by focus groups based on discussion sessions.

Objectives
• To document what is understood locally as ‘monitoring’
• To share information about what is a monitoring programme and why it is important to carry one out
• To identify locally relevant fish to be monitored

Facilitators
For the workshop: This should be lead by a member of the community research team with the ability to manage a group, and with the support of an external researcher.
For the focus groups: Guided by an external researcher and carried out within the community research team, and other ones lead by community researchers and carried out with people from the village.

Participants
Workshops: Members of the community
Focus groups (a): Community researchers
Focus groups (b): Select members from the community who are more experienced on the topic (fishing), and/or have more interest

Expected results
i) For the workshop
At the end of the session is expected that the participants will have basic knowledge of the theory of monitoring, how is understood locally and why it is necessary to implement it in the community.
ii) For focus groups (a)
Sessions among the community researchers should end with a basic document about the concept of monitoring to be used during the implementation of the programme as well as its possible/expected goals.
iii) For focus groups (b)
Sessions of discussion should come up with a list of the fish most relevant, important or more common fish locally harvested, as these will be the ones used in the monitoring programme.

General thematic content
Workshop
• Document local understandings of monitoring
• Document local reasons for implementing a monitoring program
Focus group (a)
• Obtain a consensus about the concept of monitoring
• List the benefits and goals of a monitoring program at the local context
• Creation of a protocol of work to implement a fishing monitoring program
• Create a table for data collection

Focus group (b)
• Document local historic information about the fish population in the community
• Document changes identified through the years about the fishing activities

Session development

Workshop
Before starting, it is important to have selected a group of people from the community who are going to be the local researchers. This group should be aware of the time and work required to be able to carry out a monitoring programme, and that it is important to be very committed on participating on the research team to benefit their own community.

It is suggested that the session be organized as follows:

I. Introduction
The facilitator will present the workshop, explain details about timing, format, and expected results.

II. First discussion
The facilitator will invite participants to engage in a discussion about the concept of monitoring. The discussion should be facilitated in such a way as to ascertain that the concept of monitoring is well understood, and if there is a consensus among the villagers about the topic.
Possible questions to guide the discussion:
• What do you understand by monitoring?
• Has the fish population and diversity changed over the past 5-8 years?

Adaptation: During the workshop, it was clear that the term ‘monitoring’ was not understood by all community members: diverse perspectives emerged on the topic and the community research team used these perspectives to develop one unified concept. Therefore, in the context of the San Luis Chico fishing monitoring programme, monitoring is understood as “seeing and following a process for some time”.

III. Introduction to monitoring
The facilitator should make a brief presentation about the concept of monitoring based on literature reviews. The presentation should provide appropriate and understandable information to feed into the discussion, with the objective of obtaining an agreed and
clearly expressed concept of monitoring. The concept thus developed will be used for the implementation of the program.

IV. Second discussion
Once the idea of monitoring has been defined by the participants, the facilitator guides a dialogue about the main reasons and motivation of villagers to implement a fishing monitoring programme. Some questions useful to lead this discussion are:
- Why are you interested on monitoring fishing activities?
- How important is fishing for the community?
- How do you think it's possible to monitor the activities?
- Are you all willing to contribute on the program?

V. Conclusions
The facilitator should point out important topics from the discussions, and present the final conclusions (the monitoring concept to be adopted).

Adaptation: In San Luis Chico, the community agreed that the community researchers would be responsible for disseminating information and knowledge generated during the workshop and to respond to any specific queries community members may have. They would also be responsible for ensuring that all community members understood the purpose and process and to maintain consensus among the community regarding the fishing monitoring programme.

Example of the work plan

<table>
<thead>
<tr>
<th>Activity</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Introduction</td>
<td>Day 1 - 10 minutes, AM.</td>
</tr>
<tr>
<td>B. First discussion</td>
<td>Day 1 - ½ hour, AM.</td>
</tr>
<tr>
<td>C. Introduction to monitoring</td>
<td>Day 1 - ½ hour, AM.</td>
</tr>
<tr>
<td>D. Second discussion</td>
<td>Day 1 - ½ hour, AM.</td>
</tr>
<tr>
<td>E. Conclusions</td>
<td>Day 1 - 15 minutes, AM.</td>
</tr>
</tbody>
</table>

Focus groups

When working with community research teams, focus groups can be used both as a training platform and a space for discussion between participants about the complete process of monitoring. Focus groups should be carried out regularly to stimulate discussion and interaction between participants.

It is suggested that the session be organized as follows.
I. Introduction
The facilitator (external researcher) explains the dynamics, estimated time for work, and so on.

Following the structure proposed in this document, the first focus group (a) should focus on discussing the results obtained during the workshop with the community and to discuss the benefits and goals for the programme. The second focus group (b) should focus on the discussion and creation of a guideline (protocol) for the implementation of the monitoring programme and also the creation of a data collection format.

The facilitator makes a brief presentation of the results from the workshop, and, unless the community research team have questions they wish to launch for the discussion, the facilitator may suggest a few (see II. below). The participants should be motivated to engage in a dialogue and discussion to document historical information about fishing, and the changes observed through time.

For both activities, a brief introduction of monitoring examples and how to collect data is recommended to encourage discussion.

II. Discussion
Focus Group (a)
Some questions for the discussion among participants in the first focus group could be:

- What do you think about the ideas regarding monitoring proposed by community members? Do you agree/disagree?
- Based on the first question, what do you (as a group) think of monitoring?
- Why do you consider important to work on fishing monitoring?
- How would a fishing monitoring programme benefit your community?
- What do you expect to obtain from a monitoring program?

**Adaptation:** During the discussion the questions proposed here emerged; the group took the time to explain each question in detail. They reviewed the ideas surrounding monitoring that emerged during the workshop, and the discussion delivered the following objective for the fishing monitoring process: "To describe the process and activities for fishing and document/monitor them".

Continuing with the discussion, or in different sessions, it is necessary to create a protocol to be able to implement the programme and a table for data collection. The following table provides an example of the table of data collection developed with the Tsimane’ community of San Luis Chico.

**Table 11:** Fishing monitoring data collection table for use by fishers in the community

<table>
<thead>
<tr>
<th>Date</th>
<th>Name</th>
<th>Fishing dates</th>
<th>Number of fish of each kind (species)</th>
<th>Fishing method (line, net, arrow, etc.)</th>
<th>Time of fishing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day  1</td>
<td>Day 2</td>
<td>Day 3</td>
<td>Day 1</td>
<td>Day 2</td>
<td>Day 3</td>
</tr>
</tbody>
</table>
Adaptation: In San Luis Chico in Bolivia, the team carried out another two discussion sessions among community researchers. During the first session, they created a protocol to implement the fishing monitoring programme based on their shared traditional knowledge surrounding fishing activities. During the second discussion session, they developed a data collection table and decided to collect data three times per week by visiting all the village households.

Focus Group (b)
A dialogue is expected among participants, with the aim to gather information on the history of fishing practices and on fish diversity and richness in the region, as well as on the main changes in fishing and fish populations observed by locals over the years.

Questions to launch the dialogue include:
- Have fishing techniques changed through the years? In what way?
- Do you still fish as with the same frequency as when you were a child?
- When fishing, do you fish more or less than about 10 years ago?
- How is the fish population now compared to when you were a child?
- Can you still fish the same types of fish as when you were a child?

III. Conclusions
The facilitator presents a list of conclusions emerging from the discussion sessions. These conclusions should include the final versions of the concept of monitoring adopted by locals, the protocol to implement the monitoring programme and the data collection table.

Ideas: This fishing monitoring programme can also be used as a tool by Tsimane’ people to defend their rights to sustainable fishing for their own consumption.

Methods group 1. Analysis and use of results
Addresses objectives: E.1. To analyze the fishing monitoring results and F.1. Lead sessions of discussion to gather information about the potential outputs from the results, and all uses for the results.

Objectives
- Identify a method to analyze the results (Focus group (c))
- To document potential uses for the results (Focus group (d))

Facilitators
A community researcher capable of managing a group activity would ideally lead this focus group discussion. In this case, the external facilitator and one of the community researchers led the focus group together.
Participants
Focus group (c): Local community researchers
Focus group (d): Local community researchers and community members

Expected results
Focus group (c): A method to analyze results will be elaborated
Focus group (d): A document listing the possibilities for uses of the results from the fishing monitoring programme

General thematic content
Focus group (c)
- Discussion about which results are important for analysis
- Training sessions to learn about data analysis
- Analysis of results

Focus group (d)
- Discussion about potential uses for results
- List of potential uses of the results

Session development
Focus groups
Focus groups are intended to serve as a training platform as well as a space for discussion between participants to identify the most relevant results, and how to analyze them. Focus groups should be carried out regularly to stimulate discussion and interaction between participants.

It is suggested that the session be developed as follows:

I. Introduction
Facilitators should present the topics, time for work and expected results. This focus group should utilize the data collection table prepared for the monitoring program as a platform for work. All results already collected should be reviewed, and complemented as needed.

II. Discussion
Focus group (c)
Based on a discussion led by facilitator(s), the intention of this session is to come up with a plan pointing out which results should be analyzed and how. A detailed yet easy to follow approach is essential.

**Adaptation:** The San Luis Chico team decided to analyse the number of fish harvested per household per month and the number of fishing trips per household per month. In previous discussions regarding the fish species to feature in the programme, the community researchers decided to begin by analyzing only fish counts and number of fishing trips. However, they wished to being training activities to help them differentiate and identify different species of fish based on local knowledge, classifications and descriptions. Time limitations prevented us from carrying out this training for the present project.

**Focus group (d)**
The facilitator encourages a discussion to document the local views about potential uses of the fishing monitoring programme results.

**Adaptation:** In the case of San Luis Chico, the question used to start the discussion was: Why do you want a fishing monitoring programme and what do you think you will do with the results? The results were:
- We want a monitoring programme to find out how much we are actually fishing in order to demonstrate (in particular to the Pilon Lajas park rangers) that we do not overfish and that all our catch is for our own consumption
- We want to find out why there are times when fish are abundant and times when fish are scarce.

**III. Conclusions**
Conclusions adopted for each focus group should be documented and presented to all participants.

**Focus group (c)**
For this focus group, the conclusion includes brief presentation recapitulating the results expected and what each dataset to be analysed should look like.

**Focus group (d)**
For this focus group, the conclusion includes a list of uses for the results. These will help the community begin planning strategic approaches to present the results to the community and other actors.
Co-enquiry research on socio-environmental change

The protocols described in this sub-section were designed to share a co-enquiry approach to classic social science research methods as well as innovative approaches for working on the topic of change in the context of efforts to assess the effectiveness of community-based natural resource management.

These methods, applied in a co-enquiry process, are designed to help communities (i) Assess the livelihoods and environmental impacts (positive and negative) of their community-based natural resource management regimes, including external governance regimes; (ii) Engage in a process of collective reflection on their current livelihood and wellbeing conditions, how these may change in the future, and what strategies they can use to cope with or adapt to possible future changes; and (iii) Make better decisions to help provide for bioculturally sustainable livelihoods and territories into the future. Thus, its ultimate aim is to act as a tool for adaptive management, with an emphasis on community priorities and aspirations for their community-conserved areas and natural resource management systems.

In the case of all co-enquiry research processes, is important that the research questions are developed by the community as a whole (or developed by a group of community researchers and validated by the community in an assembly), as this integrates the co-enquiry process into community decision-making processes rather than isolating it as a parallel process that is only fully known to the team of community researchers. In the case of these protocols for social science research, the research questions were developed using the problematising dialogue process, discussed both above in Chapter II and below, in the protocol itself.

The research questions developed in Chinantla communities are:

A. What major changes (in land use, politics, society, the environment, etc) have occurred in the community in the past 20 years?

B. What is driving these changes?

C. How have these changes impacted our livelihoods and wellbeing?

D. What are we doing to deal with these new threats? How are we using the opportunities?

E. Given our previous analysis, what are the possible future scenarios for our livelihoods and wellbeing under changing conditions (environmental, social, political, etc)?

F. What can we learn from these results and how can we ensure our livelihoods, biocultural sustainability and wellbeing in the future?
The subsequent section provides (i) an explanation of the importance of each research question, (ii) the research objective related to the research question, and (iii) the tasks required to answer the question.

A. What changes have occurred in your community in the past 20 years?

In the Chinantla context, community conservation and Payments for Environmental Services (PES) are the most important changes in the context of community-based natural resource management, and are therefore of greatest interest to them for the purposes of this research. They are also indivisible, given that communities engaged with community conservation in order to obtain PES – in effect most community members refer to PES as ‘la conservación’ (conservation). However, given the broad nature of the guiding questions, the resulting protocol can easily be adapted to a diversity of contexts wherein communities seek to assess the social effectiveness of community-based natural resource management.

While it may be that the major changes the community has seen over the past 2 decades relate to land use, community-based conservation and PES, it is necessary to unpack the influence of all the factors that people describe as contributing to changes. For example, a determining factor in improved economic wellbeing may be household members’ migration to the US, which may be influenced by fluctuations in crop harvests or prices, which in turn may be influenced by changes in the climate, and so on. On the other hand, receiving cash through PES may be influencing patterns of migration to the US, which in turn may have an impact on agricultural production and/or what kind of food is consumed in the household. Here, what is important is to understand what community members perceive as the major changes.

**Objective A. To document the most important changes in community life according to its members.**

Task A.1 Train community researchers in semi-structured interview methods for obtaining qualitative information on individual’s perceptions of the changes occurring in their communities.

Task A.2 Train community researchers in oral history documentation as a way of obtaining qualitative information on the drivers of the principal changes in community life.

Task A.3 Train community researchers in participatory mapping of their biocultural territory with a view to bringing those maps into dialogue with existing historical land use and land use change maps.

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5 In the Chintantla, communities have been receiving payments for hydrological services since 2004. The receipt of these payments was presented to them as dependent on their certifying large portions of their territories as Voluntary Conserved Areas (VCAs). The two interventions are thus considered ‘the same thing’ by community members, who are increasingly unhappy with the restrictions placed on them – with significant livelihoods consequences – as a result of the VCA certification and the PES requirements. See Martin et al (2010) and Ibarra et al (2011) for more information on the Chinantla socio-environmental context.

6 The steps followed to reach this conclusion are described in detail in Chapter III, under the section ‘Assessment of research needs and core themes’
B. **What is driving these changes?**
Once the community has established what they agree the major changes in their community are, it is important to begin exploring what the drivers of these changes are. In practice, this question will be addressed in tandem with question A.

**Objective B. To document the drivers of these changes.**

Task B.1 Train community researchers in semi-structured interview methods for obtaining qualitative information on the drivers of the principal changes in community life.
Task B.2 Train community researchers in focus group methods for obtaining qualitative information on the drivers of the principal changes in community life.
Task B.3 Train community researchers to carry out a problematising dialogue process to analyse information from locally expert community members (specifically elders) on the changes they have witnessed over the past 20 years. The problematising dialogues will use the maps produced during Task A.3 as props.

C. **How have these changes impacted our livelihoods and wellbeing?**
Given the qualitative nature of our research programme, it is likely that some information on community members’ perceptions of how changes are related to wellbeing will have emerged under the previous question. However, for the purposes of this question, the research team sought to explore more specifically the current circumstances of community members.

**Objective C. To document current livelihoods and wellbeing status among community members and changes in this status over time.**

Task C.1 Train community researchers in semi-structured interview methods for obtaining qualitative information on individual’s current livelihood strategies, perception of their current wellbeing, and perception of the impact of the changes they identified previously on their livelihoods and wellbeing.
Task C.2 Train community researchers in participatory mapping of strengths, vulnerabilities, opportunities and threats.
Task C.3 Support community researchers to carry out a System Operator process for the systematic analysis of the consequences of changes for community livelihoods, wellbeing, and governance. The maps produced during Task C.2 will be used as props during these problematising dialogues.

D. **What are we doing to deal with these threats? How are we using these opportunities?**
Based on our understanding of the positive and negative impacts for livelihoods and wellbeing of community members, the research team sought to explore how they are coping and dealing with, or even taking advantage of these changes.

**Objective D. To document community members’ approaches to deal with impacts and utilize opportunities arising out of the changes their community is facing**

Task D.1 Train community researchers in semi-structured interviews to document community members’ approaches to deal with impacts on livelihoods and wellbeing, and use of opportunities arising out of community conservation, PES, and other changes that affect them.

Task D.2 Train community researchers to carry out a problematising dialogue process to discuss how the community deals with impacts and utilizes opportunities arising from the changes named in the previous exercises.

**Objective F. To explore possible trajectories of change under diverse future environmental, social, political and other scenarios**

Task F.1 Train community researchers to analyse the results of the mapping exercises and problematising dialogues, and to present these results in a clear and synthetic manner to their communities.

Task F.2 Support community researchers in carrying out a System Operator process in order to explore the possible future scenarios for community wellbeing under different governance regimes, and social, political and environmental conditions.

**E. Given our previous analysis, what are the possible future scenarios for our livelihoods and wellbeing under changing conditions (environmental, social, political, etc)?**

With the results of questions A-D in hand, the community can gather together for a workshop to reflect on these results and discuss their options for the future under different scenarios of governance and environmental change. In particular, this collective process includes a scenario-building exercise.

**F. What can we learn from these results and how can we ensure our livelihoods, biocultural sustainability and wellbeing in the future?**

It is important that the results and conclusions drawn regarding all the above questions are shared with the community as a whole, and that all are invited to participate in a dialogue and reflection on how they can be used to improve community decision-making.
Objective E. To support community efforts as members reflect on the connection between research results and community decision-making processes.

Task E.1 Train community members to lead a problematising dialogue process in order to reflect on the relationship between their current problems, the research results and future decision-making processes.

Task E.2 Train community researchers in leading a workshop-based community process of reflection on: (i) how community conservation, PES and other recent governance and land use changes impact their livelihoods and wellbeing, and (ii) how these research results can be used to improve community decision-making processes.
Basic social science research methods: semi-structured interviews and oral histories, focus groups and workshops, and participatory mapping

In this section, we cover in detail the various basic social science methods tested in a co-enquiry process in the Chinantla fieldsite: semi-structured interviews and oral histories, focus groups and workshops, and participatory mapping. In order to implement these social science research methods, we suggest the implementation of a one day ‘Grounding workshop’, which helps to ensure a common language is being spoken, introduces action research concepts, establishes the research questions, and introduces briefly the methods the research team will learn over the course of the process.

Grounding workshop

The Grounding workshop acts as an introductory workshop, during which overall research questions are defined and social science research methods are introduced.

This workshop tackles social science research processes as a whole. It discusses what social science research is and how it differs to natural science research, explaining in particular the importance of narratives, participant observation, triangulation, etc. It explains the difference between qualitative and quantitative research methods, data, and analysis, and how these can be both used together and compared.

Session objectives

• To share with community researchers the basic elements of social science research using a co-enquiry approach (see Chapters II and III for related literature);

• To determine specific questions related to livelihoods and wellbeing, and the impact of community conservation/PES in their community.

Facilitators

This workshop should be facilitated by an external or local team member with abilities to lead a group discussion and with expertise in social science research processes.

Adaptations

It is natural that within community research teams some members are more interested and active than others. This does not have to be a weakness, but can be taken advantage of. For instance, the more active individuals will naturally become ‘de facto’ leaders of the team. These team leaders are encouraged to take responsibility for a number of different elements of the research and for the integration of the more passive members of the team. It is important that the leaders identified have a strong desire to help their community and to participate actively in the research process, as they will inevitably invest more energy and time in it.

In the Chinantla, the de facto team leaders were the bilingual, literate individuals. They were happy to take the responsibility for note-taking, data systematisation and for engaging in the time-consuming process of translation and interpretation throughout the training process.

Should there be pre-existing conflicts within the group (which there often are), it is important to allow these to be aired and discussed prior to beginning work with a view to achieving an agreement to work together to carry out the research the community needs.
Participants
- Local research team and any other community member interested in livelihoods/wellbeing issues within the community
- Special attention must be given to integrate different social groups of the community into the workshop, such as women, young people and elders, as they can provide different views of the needs and local realities.

Expected results
At the end of the session, the participants will:

(i) Be acquainted with the action-research cycle and its steps;
(ii) Understand how a social science research process fits in with the action research cycle; Recognise general social science research processes they implement in their daily lives to answer questions;
(iii) Understand the meaning of qualitative versus quantitative methods and data, and how each is used.
(iv) Define specific research questions to be answered through a co-enquiry process.

General thematic content
- Finding a common language for research
- The action-research cycle (see Chapters II and III for related literature)
- Social science research and the importance of the researcher’s attitude
- Quantitative versus qualitative methods and data
- Selection of research themes and questions
- Description and discussion of proposed methods

Learning experiences
- Theoretical presentation and dialogue for a) – d)
- Dialogue and reflection for d) and e)
- Presentation and discussion for f)

Session development
It is suggested the training session be organised as follows:

Figure 23: Framework for determining research questions and associated methods

I. Introduction
The facilitator will provide the group with an introduction that covers (i) the purpose of the workshop, (ii) themes tackled by the workshop and how they will be addressed, (iii) length of the session, (iv) structure of the session, (v) outcomes of the session, etc.
II. Theoretical revision

In this section, three key concepts will be addressed:

- A common language for the research process
- The action research cycle and social science research (qualitative versus quantitative research)
- The basics of social science research

A common language for the research process

Language is an important tool to reach a common understanding of a research process. Often external academics are used to freely deploying scientific and technical language without taking into account that most local people may not understand it. This section is not aimed at teaching or transferring the scientific and technical words to the community researchers, but rather at reaching a common understanding, between facilitators and community researchers, of how to name particular processes, objects, tools, approaches, etc. For the purposes of this protocol, the research team proposed to determine a common language for the overarching domains of social science research, conservation, and livelihoods. For each one of these, the facilitator promotes an exchange of ideas: dialogue is encouraged to analyse the differences between the external and the local definitions. The team’s work to define mutually understood concepts will continue throughout the workshop, as and when needed.

The proposed terms for discussion are:

- Co-enquiry
- Social science research
- Conservation
- PES
- Livelihoods
- Wellbeing

The facilitator must be aware that some words may have a stronger political load and therefore may need more time to be defined. As a first result of this exercise, the team should adapt the language used during the rest of the plan research process to the one that was commonly defined.

The action research cycle
Assuming that most of the local participants have no previous experience with social science methods and/or the action-research cycle, in this section a presentation and explanation of both concepts is provided. A simple schema for the action research cycle using co-enquiry is provided in Figure 24.

![Figure 24: Schema for the action research cycle](image)

In order to explain this cycle it is useful to have local examples. In the case of the Chinantla the problem of rats in the corn fields was used as a local problem. Using the above action research cycle, community researchers developed a series of questions regarding the issue, and explored processes for answering those questions. The action research cycle with the example is provided in Figure 25.
This first round of questioning led to the conclusion that if there were 60 rats found over the 3 weeks of monitoring, it would be too much and the decision to trap them would be made. Sometimes, rather than a direct solution, another question appears based on the findings for the previous question: for this reason it is an action research cycle. Facilitators are encouraged to think creatively about what kinds of local problems may help community researchers think through the research cycle.

The basics of social science research
Having discussed what social science research means and the concept of action research, here the facilitator explains some of the important elements of social science research, including:

- Qualitative versus quantitative research

This section to be done with examples, and using a comparison table such as Table 14 if required.

Table 12: Comparison between qualitative and quantitative research approaches (see also Newing 2010)

<table>
<thead>
<tr>
<th></th>
<th>Qualitative research</th>
<th>Quantitative research</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Data</strong></td>
<td>Non-numerical data (commonly words or pictures)</td>
<td>Data as numbers (data easily convertible into numbers)</td>
</tr>
<tr>
<td><strong>Data collection</strong></td>
<td>Semi-structured interviews</td>
<td>Surveys</td>
</tr>
<tr>
<td></td>
<td>Focus groups</td>
<td>Questionnaires</td>
</tr>
<tr>
<td></td>
<td>Ethnography</td>
<td></td>
</tr>
<tr>
<td><strong>Data analysis</strong></td>
<td>Descriptive, exploratory, in depth.</td>
<td>Statistical (explains phenomena using</td>
</tr>
<tr>
<td></td>
<td>Critical analysis and construction of a</td>
<td></td>
</tr>
<tr>
<td>Easy example</td>
<td>narrative account</td>
<td>numbers/measures), data can be measured</td>
</tr>
<tr>
<td>--------------</td>
<td>------------------</td>
<td>--------------------------------------</td>
</tr>
<tr>
<td><strong>Strengths</strong></td>
<td>The people in the group are… (e.g. friendly, from different parts of the world, hard-working, etc).</td>
<td>The people in the group are… (e.g. X number of people, X men and X women, X parents, X finished high school, etc.)</td>
</tr>
<tr>
<td><strong>Weaknesses</strong></td>
<td>Describes the situation as people see it, full, in-depth understanding of nuances, differences, heterogeneity, underlying relationships. Gives us understanding of people’s personal experiences and reactions Qualitative research will allow us to understand what narratives (stories) people have about their life.</td>
<td>Can clearly present some forms of data that are useful for decision-making, or for following up. E.g. X% of people grow enough corn to feed themselves in a community.</td>
</tr>
<tr>
<td><strong>How is it going to help us with our research?</strong></td>
<td>It can help gain an in-depth understanding of people’s perceptions of their current situation, impacts and opportunities they are facing, how they respond, etc.</td>
<td>It can help determine information surrounding very specific quantifiable issues.</td>
</tr>
</tbody>
</table>

**Adaptations**

If participants are unlikely to understand this section on qualitative versus quantitative research, it can be left out. It can also be significantly simplified by using the examples to distinguish between research that seeks to “describe/tell how things are and how people think” and research that seeks to “measure things”.

The examples used must be relevant to the participants (i.e. be drawn from their everyday experiences). It is therefore important that the facilitators are well-prepared prior to the workshop as they must be informed of topics of interest of the community and how these can be used to exemplify the theoretical training.

- Flexibility, participation, and researcher attitude
The facilitator explains the importance of flexibility and of an open and mindful attitude on the part of the researchers for the success of their research. Amongst others, the facilitator underlines that the community members who are the subject of the research methods have a voice in how the method is carried out, what the questions are and how the results are written up. The community researchers are trained to take note of, and act on, the requests and suggestions of other community members. They are taught to build flexibility into their methodological approach, and of the value of being an excellent listener. They are taught not to bias results by giving their own opinions and/or answers during interviews and focus groups.

- Triangulation

The facilitator explains that given that everyone will have a different opinion and give it in their own specific way, it is important to triangulate information, by asking the same things to different people. This will ensure the elaboration of a more complete picture of the topic under investigation.

- Participant observation

Participant observation is the central method for social science research, and, in conventional research (particularly anthropological and sociological) it is a core component of the process by which researchers and communities get to know each other (see Barnard 2005 for an overview of the method). The principal tenet of participant observation is that outsiders participate in everyday life while observing social and cultural practices. The process informs a deep, and often embodied, understanding of cultural norms and social processes, which helps tonify relationships and lubricate the research. Participant observation requires researchers to spend some time simply working, talking, eating, drinking, sleeping, celebrating and, generally, sharing in everyday life with the community and its members, all the while taking mental note of how people (including the researcher him/herself) are acting, what they say to each other, how they engage with each other and outsiders (including the researchers), what makes them happy, angry, sad, fearful, how they move through their landscape, how and why they make choices, and so on. When key events or insights emerge, the researcher takes note of them and of any attendant learning experiences.

In the context of co-enquiry, the concept of participant observation has to be modified slightly, given that the researchers belong to the community in question. This belonging gives community researchers a significant advantage: they automatically participate in everyday life without having to make any additional efforts to do so. However, they will have to make the extra step of observing the social life of their community through new eyes. This method can be introduced to community research process very simply: the researchers can draw on specific aspects of their daily life, knowledge and experiences to inform the overall research process they are undertaking. They can observe themselves and their fellow community members as they go about their daily lives in light of the research questions that they have developed, taking mental, written or audio-recorded notes of connections and insights. These notes can then be discussed in dialogues with
the other community researchers during co-enquiry sessions, and can thus feed the more structured research processes.

III. Defining research themes and questions
In this case, the overarching research theme – livelihood impacts and benefits from community conservation/PES – as well as the overarching research questions mentioned above were defined previously by the communities. Given that the decision to carry out social science research will have emerged from previous discussions with community members about what research themes they are interested in, it is expected that the research team will have an incipient idea of what these themes are, yet definite themes and research questions may need to be developed, and a process for doing so is now described. It is fruitful at this point to cover, once again, the concept of research questions that was explained above during the discussion of the action research cycle.

Definition of the research questions can be carried out according to the following path:

<table>
<thead>
<tr>
<th></th>
<th>Division into 2 groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Group 1 is asked to brainstorm and write down, on a flipchart, the issues that arise for their community surrounding the terms ‘community conservation’ and ‘PES’, and how they understand them to be connected. Group 2 does the same for ‘livelihoods’ and ‘wellbeing’ (as defined in period B of the workshop), and how they understand them to be connected.</td>
</tr>
<tr>
<td>2</td>
<td>Back with the whole group, the facilitator promotes a discussion about the issues emerging from the 4 mind maps. Other participants complement mind maps they did not participate in. The group then finds connections between issues emerging in each mind map. The final flipchart page may look like a cross-crossed network of lines.</td>
</tr>
<tr>
<td>3</td>
<td>The connections made between these issues are then systematised and grouped thematically, and each thematic group will be the basis of the research themes, which then undergo further refinement through group discussion.</td>
</tr>
<tr>
<td>4</td>
<td>Based on the research themes defined (probably a total of 3), research questions are developed. Research questions can overlap more than 1 research theme, and there can be more than 1 research question per theme.</td>
</tr>
</tbody>
</table>
Adaptations
If the format appears too complex for the community research team or the local dynamics do not fit well in the above structure, this element can be led as a dynamic discussion, in which case the facilitator ought to have some broad questions for the workshop participants as a way of launching the discussion.

The questions we used to in the Chinantla was “What are the consequences of community conservation and PES for people’s wellbeing?”, with sub-questions to fuel discussions such as “Who is it for?”, “What is it for?”, “How does it affect me?”, “How does it benefit me?”, and “Why is it useful for me to know this?”

The themes of interest that emerge can be written up in list form on a flipchart page, and subsequently organised. The facilitator encourages participants to reflect on doubts they still may have regarding each research theme (e.g. using questions such as ‘What do we know about X?’, ‘What do we not know about X?’ and/or ‘What would we like to know about X?’). The research questions will emerge organically from this process and can be written down on a new flipchart page.

The facilitator is required to ensure that each participant fully understands and agrees with each emergent research question. It is also suggested to ‘test’ each research question individually by encouraging the participants to engage each question in the action research cycle previously described. Modifications to the research questions are made based on collective discussion.

IV. Connecting research questions to methods
Based on the research questions defined, the group discusses what kind of data is required to answer the question, the feasibility of the research question, whether the research question can be answered by the CRs alone (or whether they need specialists), etc. The results of this discussion can be easily visualised using a table such as Table 15.

Based on this discussion, the facilitator will guide the group discussion on the available methods for producing the data required. Here the facilitator’s expertise on the ‘pros and cons’ of different methods for achieving different types of data will be essential.

Table 13: Linking the research questions to proposed methods

<table>
<thead>
<tr>
<th>Research questions</th>
<th>Information required (what kind?)</th>
<th>Methods proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>How many rats are there in</td>
<td>Numerical</td>
<td>Counting rats through night-time monitoring</td>
</tr>
<tr>
<td>the corn fields?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>How did we live 20 years</td>
<td>Descriptive, detailed, stories</td>
<td>Semi-structured interviews</td>
</tr>
<tr>
<td>ago?</td>
<td></td>
<td>Oral histories</td>
</tr>
<tr>
<td>Etc.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

At this stage, rather than explain in depth what each research method is and does, the facilitator simply gives a broad outline of the approaches and the kinds of results they yield, noting that the subsequent days of the workshop will be dedicated to explaining and learning about these methods.
This is a useful moment at which to conclude, with the facilitator taking the opportunity to recapitulate on the day’s work and to ensure that most participants have understood the concepts and outcomes of the workshop.

**Adaptations**
As mentioned above, in the Chinantla we found that a very useful way of recapitulating on learning outcomes (throughout the workshop as well as at its conclusion), was to ask the participants to explain the concepts and outcomes to each other in their language (Chinanteco). Should doubts arise, the facilitator will take the time to explain again, in using different/easier terms and/or other examples.

**Example of a work plan**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Introduction</td>
<td>Day 1. 15 minutes, AM.</td>
</tr>
<tr>
<td>II. Theoretical revision</td>
<td>Day 1. 1 hours, AM</td>
</tr>
<tr>
<td>III. Defining research themes and questions</td>
<td>Day 1. 1 hour, AM.</td>
</tr>
<tr>
<td></td>
<td>- Small group brainstorm</td>
</tr>
<tr>
<td></td>
<td>Day 1. ½ hour, AM</td>
</tr>
<tr>
<td></td>
<td>- Making connections</td>
</tr>
<tr>
<td></td>
<td>Day 1. 1 hour, PM</td>
</tr>
<tr>
<td></td>
<td>- Thematic grouping of connections, emergence of research themes</td>
</tr>
<tr>
<td></td>
<td>Day 1. 1 hour, PM</td>
</tr>
<tr>
<td></td>
<td>- Research questions based on themes</td>
</tr>
<tr>
<td>IV. Connecting research questions to methods</td>
<td>Day 1. 1 hour, PM</td>
</tr>
</tbody>
</table>

**Equipment and materials**
- Notebooks, pencils and pens
- Flip chart paper and marker pens
- Educational material to illustrate the action-research cyc
### Semi-structured interviews and oral histories

**Addresses**

Objective A. Document local perceptions of community livelihoods and wellbeing prior to community conservation and Payments for Environmental Services.

Objective B. Document the most important changes in community life and the drivers of these changes.

Objective C. Document current livelihoods and wellbeing status among community members and changes in this status over time.

Objective D. Document community members’ approaches to deal with impacts and utilize opportunities arising out of the changes their community is facing.

### Semi-structured interviews

Semi-structured interviews are different from other forms of interview such as structured interviews or unstructured, conversation-style interviews. A structured interview has a set amount of questions that the interviewer must ask, without deviation; this type of interview can be likened to a spoken questionnaire. Conversely, when carrying out semi-structured interviews, while the interviewer has a set of a few broad topics s/he would like to discuss throughout the interview, s/he will be mindful to allow the interviewee to discuss issues that are clearly interesting and/or important to them, even if these issues do not fall into the originally established topics for discussion. Often the topics that are of particular interest to interviewees are to be taken as sources of important data. Semi-structured interviews differ from fully unstructured interviews in that the latter do not follow any particular theme, allowing the person interviewed to talk about whatever they desire. Such interviews can also be likened to loosely structured conversations. See Newing (2010) and Barnard (2005) for further information on the different modes of interview.

### Voices from the communities: interviewing elders

Pataxó community researchers from the COMBIOSERVE fieldsite of Southern Bahia noted that one of the great challenges for their co-enquiry research, particularly among the young community researchers, was the lack of trust of elders. With a long history of deception by anthropologists and of knowledge being given and nothing returned to the community, elders were sometimes reticent to talk to young community researchers, and in particular to discuss their traditional knowledge. This situation is not uncommon among communities who have been over ‘researched’ in the past. Slow, patient work is needed by young community researchers to overcome this entrenched mistrust; once trust is built, concerted efforts must be made to maintain it. Some communities may also address mistrust amongst elders by electing an elder, or at least an older person or someone with authority in the community, to be part of the research team.

**Session objectives**

The purpose of this workshop is to train community researchers in the semi-structured interview method, and in the design of an easy-to-use semi-structured interview for use by community researchers.
Facilitators

This workshop should be facilitated by an external or local team member with abilities to lead a group discussion and with expertise in conducting semi-structured interviews (for more methodological information on semi-structured interviews see Barnard 2008, Newing 2010).

Participants

- Local research team and any other community member interested in understanding livelihoods/wellbeing issues within their community.
- Special attention must be given to integrate different social groups of the community into the workshop, such as women, young people and elders, as they can provide different views of the needs and local realities.

Expected results

At the end of the session, the participants will know how to carry out a semi-structured interview and understand the purpose of semi-structured interviews, what ‘semi-structured’ means, and the do’s and don’ts of the method.

General thematic content

a) What are semi-structured interviews (vs structured interviews and informal chats)?

b) The rules of semi-structured interviewing

c) Note-taking

d) Developing interview questions

Learning experiences

- Theoretical presentation for a) – c)
- Practical exercises for a) – c)
- Dialogue and group reflection for d)

Session development

It is suggested the training session be organised as follows:

Figure 26: Framework for training community researchers in semi-structured interview methods

I. Introduction

The facilitator will provide the group with an introduction that covers (i) the purpose of the workshop, (ii) themes tackled by the workshop and how they will be addressed, (iii) length of the session, (iv) structure of the session, (v) outcomes of the session, etc.
II. Theoretical revision and short exercises
The facilitator explains what a semi-structured interview is, using examples from the daily lives of the community. This is a dialogue session in which the facilitator asks the participants to talk about instances in their own lives in which they use the question and answer method. It is useful to ask participants to translate the concept into their own language in order to ensure a basic understanding.

The facilitator then presents some of the rules surrounding semi-structured interviewing.

- *Types of question*

**Open questions:** questions that allow the interviewee to elaborate and to give details that the interviewer might not have thought of. They also prompt you to ask further follow-up questions. Most questions in the interview should be of this kind.

- E.g. “Tell me about the last time you went to town.” Posing a question this way will allow the interviewee to elaborate on when they went, why they went, what happened, etc. It also leaves room for obvious follow-up questions.

**Follow-up questions:** questions that seek to explore a topic further, based on the answers given to the first, open question.

- E.g. “What happened then?”, “Tell me more about X”, “Why did you make that decision?”, “What did you think of X?” and so on.

**Closed questions:** questions that have only one answer, and are useful only if very specific information is required.

- E.g. “When did you last go to town?” This only yields one piece of information, and if used unwisely can result in a topic of conversation ending.

**Emergent questions:** questions that follow up on themes of interest, even if they aren’t necessarily answering the original question.

- E.g. If to the question “Tell me about the last time you went to town” the interviewee's answer includes a topic that is not directly related to their time in town, but is interesting to the interviewer (e.g. they start talking about their time in school), an emergent question is a question that follows up on the non-connected topic (e.g. “Tell me more about your time in school.”)

**Adaptations**
It may be that using terms such as 'open questions' or 'emergent questions' is too theoretical for some community research teams. If so, the facilitator simply gives examples of questions that work better than others, and promotes a group discussion about their differences. This process may take longer than the more direct transfer of theoretical information, but the group's understanding of the importance of formulating good questions is likely to be deeper.
**Leading questions**: these are questions in which the interviewer ‘forces’ the interviewee to answer in a certain way, usually with either a yes or no answer. These questions are to be avoided as they may lead to bias.

- E.g. “Was your last time in town very difficult?”

- **Order of questions and interjections**

The facilitator explains the importance of ordering interview questions, and best practice approaches to do so.

- *Launching a theme*: Open questions
- *Following up on sub-themes*: Follow-up questions
- *Following up on new themes*: Emergent questions
- *Conclusion of the interview or to obtain specific information*: Closed questions
- *Interjections*: In order to encourage the interviewee to continue speaking or to elaborate on certain points, interjections are important. Examples are: “mmhmmm”, “I see”, “yes”, “and then?”, and so on. Nodding and smiling are also useful encouragements.

**Exercise**: with the example used previously to describe the types of questions, the facilitator carries out two interviews with participants: the first with the questions placed in an incorrect order and without interjections, and the second with the questions placed in the correct order and with appropriate interjections.

- **Being flexible, mindful and a good listener.**

The facilitator explains the importance of being flexible, mindful and a good listener.

For example, he or she may emphasise the importance of not ‘forcing’ someone to respond to a question if they do not appear to wish to. This is especially important for community researchers, as they are members of the community and therefore it is important that people feel they can withhold information if they wish to.

**Exercise**: the facilitator asks participants what topics might be awkward for them to ask their community’s members about, in the context of interviews about livelihoods, wellbeing, conservation and PSA. A brief discussion is held on how community researchers may tackle this awkwardness.

The facilitator may also discuss, amongst others, the importance of allowing people to talk even if they appear to be heading off theme, of not interrupting, and of listening very closely to interviewees’ answers in order to ask pertinent follow-up and emergent questions.

**Adaptations**

If there are only one or two community researchers who can write (as was the case in the Chinantla experience), this element of the workshop can be carried out exclusively with these participants at a later point in the day in order to avoid losing the interest of non-literate participants.
• **Taking notes and using recording devices**

The facilitator explains the value of note-taking, the importance of consistency, full notes, and memorable quotes; he or she emphasises that short or truncated notes without context will be useless, even to the researcher themselves. Notebooks must be kept in order with date and time, place, names, and page numbers. The facilitator shows an example of a well-maintained interview notebook.

The facilitator explains the use of a recording device, yet discusses the pitfalls of using recording devices: some people don’t want to be on record, or feel awkward if a recording device is put in front of them; some people may not answer fully or with ease when there is a recording device; and transcriptions are very time- and energy-consuming and require a computer and good typing skills. In addition, even if recording devices are used, interviewers must take notes, as audio recordings are often unreliable, difficult to use, and can be lost due to electronic/mechanical failure. These are all valid reasons for choosing not to use audio recording during interviews.

The golden rule therefore is: write it down, write it down, write it down.

**Exercise:** The facilitator interviews a participant for a few minutes: the group is asked to take notes and subsequently compare them. This will engage the group in a reflection on the importance of keeping excellent notes.

If the interview takes place in the local language, which are often more oral than written, it is likely the notes will be taken in the *lingua franca* (in the Chinantla case, Spanish). It is important that the notes taken contain full information.

**Exercise:** One participant interviews another participant in the local language for a few minutes, the group is asked to take notes in Spanish and subsequently compare them.

• **Dos and don’ts of semi-structured interviews: recapitulation and exercises**

This section of the workshop can be used as a recapitulation of the previous theoretical points. Using a flipchart, the facilitator asks participants to remind each other (based on the previous hour’s work) of the do’s and don’ts of semi-structured interviews. It is expected that the list will include:

- Leading questions
- Closed questions
- Being impatient
- Interrupting
- Giving your own opinion
- Suggesting answers

**Exercise:** In order to give context to these do’s and don’ts, the facilitator interviews
someone in the group, and asks the group to stop and correct them at any time they do a “don’t”. After that, they group is asked to appraise the interview for all of the do’s and don’ts and for their overall impression of the interview.

III. Defining the interview questions
The facilitator reminds the group of the research questions that were elaborated during the Grounding workshop. The group then brainstorms, through a dialogue process led by the facilitator and aided by a visual such as provided in Table 18, a series of ~3 interview questions that may help answer the main research questions. The interview questions can easily be tested during this session in order to refine them and ensure they are understandable.

**Adaptations**
If the group is too big, it subdivides into smaller groups, each to work on a specific research question. These smaller groups brainstorm a series of about 5 more specific research questions that will help answer the main research question. Back in the main workshop session, the group shares their questions; these are then discussed, ordered and set out as a protocol for use by the group. It is also suggested that the questions be translated into the local language as they are being discussed in order to ensure full understanding and appropriate formulation. This is especially true if there are monolingual members in the community research team.

In the Chinantla case, the community research team worked together to develop ‘formal’ interview questions in the Chinantec language. This helped to include the more passive members of the group into the discussion and allowed the whole team to formulate the most appropriate questions – questions that would be understood by as many different members of the community as possible. This process was catalytic in bringing together the newer generations (bilingual, literate) with the older ones (monolingual, non-literate), and in helping them establish a common language for work.

Table 14: Connecting interview questions to research questions

<table>
<thead>
<tr>
<th>Research question</th>
<th>Interview questions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

IV. Practical exercises
Using the interview questions, two volunteers (which can include the facilitator if necessary) come forward to interview each other sequentially. The rest of the group analyse their technique and highlight potential issues with question formulation. The facilitator leads a short discussion on the exercise.

Following this example, the participants are sent out to the community to carry out one or two interviews (depending on the time and interviewees available). A final plenary session is convened to discuss issues that have arisen, to deal with challenges and to refine the interview protocol if deemed necessary by the participants.
V. Task assignment
This session is used to discuss the schedule and implementation of the interviews during the subsequent fieldwork. It is also used to emphasise the importance of good note-taking, as it will be expected that the community research team have clean and usable notes by the time the Results analysis workshop takes place.

Adaptations
In the Chinantla experience, given that only one person was able to take notes, the community research team carried out practice interviews together. This had advantages as all participants had experienced the practice interviews together, leading to a rich discussion of the method. However it also had its drawbacks as some monolingual members of the group, who were apparently less interested in the research process, occasionally interrupted the interview. Solutions to such problems can be sought within the community research team. However, if the problem is not manageable at the level of the community research team, it must be worked out through community-wide decision-making processes in order to avoid the possibility of intra-team conflicts.

In the present case, they decided to continue with group-led interviews, but that the interviewer would be different for each interview, meaning that everyone had the opportunity to be the only one speaking and attention was focused on the interview. Moreover, it can be useful for the facilitator to support the team leaders by carrying out team dialogues through ‘cultural circles’ (see Chapter III, through which the team focus on how the themes of the interviews are related to their daily lives, to ignite their interest in pursuing the process. This process can be supported with audiovisual props such as photos, videos, etc.

The Chinantla community research team also reported that one of the more significant problems they encountered was that some of the people they interviewed had little interest in/knowledge of the themes of the interview. They found that carrying out such interviews was tiring both for the community research team and the interviewee. They therefore drew up a list of individuals within the community whom they knew would be interested both in the theme and in spending time discussing the topics.

In order to have an effective and relevant group dialogue, it is important to understand local terminology in order to ask the ‘right’ questions (that people can connect with) when launching the dialogue. For example, in the Chinantla, it was not relevant to ask questions such as “How did the interviews go?” as the concept of “interviews” was not immediately easy for all participants to grasp. Rather the facilitators asked “Was the work difficult?” given that they use the term ‘work’ for all forms of occupation. In these cases, leading questions can be very useful in generating dialogue as they are clearer and more direct than open questions; in this sense, they should not be avoided (conversely to the ‘rules’ of most social science research).

Example of a work plan

<table>
<thead>
<tr>
<th>Activity</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Introduction</td>
<td>Day 1. 15 minutes, AM.</td>
</tr>
<tr>
<td>II. Theoretical revision</td>
<td>Day 1. 1-2 hours, AM (this includes short exercises)</td>
</tr>
<tr>
<td>III. Defining interview questions</td>
<td>Day 1. 1 hour, AM</td>
</tr>
<tr>
<td>IV. Practical exercises</td>
<td>Day 1. ½ hour, PM.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>Two volunteers’ interview each other with an audience, wider group analysis</td>
</tr>
<tr>
<td></td>
<td>Day 1. 1 hour, AM.</td>
</tr>
<tr>
<td></td>
<td>Participants interview community members.</td>
</tr>
<tr>
<td></td>
<td>Day 1. 1 hour, PM.</td>
</tr>
<tr>
<td></td>
<td>Final group discussion, finalisation of the interview protocol, etc.</td>
</tr>
<tr>
<td>V. Task assignment</td>
<td>Day 1. ½ hour, PM.</td>
</tr>
</tbody>
</table>

**Equipment and materials**
- Notebooks
- Pencils or pens
- Flip chart paper
- Marker pens
- Projector

**Oral histories**
Oral histories are often used to obtain information on important changes that societies have undergone – especially in recent history. Oral histories are not intended to generate an objective picture of history, but rather one that is drawn by personal accounts. Through oral history, researchers can understand the events that have marked the community, which ones people think are most important or significant, why they occurred, and their consequences for individuals and the collective. Although the methodological approach is similar to that of the semi-structured interview, they are used more specifically to obtain systematic and in-depth historical information.

The structure of the oral history workshop follows very closely that of the semi-structured interview: if oral history is the only method required, the following workshop protocol can be used. However, if it is required as part of a larger bundle of methods, including semi-structured interviews, it is suggested that the facilitator include oral histories in the semi-structured interview workshop.

**Session objectives**
To train community researchers in the use of the oral history method for gaining an understanding of community histories and changes over time.

**Facilitators**
This workshop should be facilitated by an external or local team member with abilities to lead a group discussion and with expertise in conducting oral histories.

**Participants**
- Local research team and any other community member interested in understanding livelihoods/wellbeing issues within their community.
• Special attention must be given to integrate different social groups of the community into the workshop, such as women, young people and especially elders, as they can provide different views of the needs and local realities.

**Expected results**
At the end of the session, the participants will (i) understand the importance of oral histories; (ii) understand how oral histories can be used to answer research questions; and (iii) know how to implement a good oral history interview.

**General thematic content**
  a) The purpose and use of oral histories
  b) The rules of oral history interviewing (see Semi-structured interviews)
  c) Carrying out oral histories

**Learning experiences**
  • Theoretical presentation for a) and b)
  • Practical exercises for c)
  • Dialogue and group reflection for a) - c)

**Session development**
It is suggested the training session be organised as follows:

![Figure 27: Framework for training community researchers in the oral history method](image)

**I. Introduction**
The facilitator will provide the group with an introduction that covers (i) the purpose of the workshop, (ii) themes tackled by the workshop and how they will be addressed, (iii) length of the session, (iv) structure of the session, (v) outcomes of the session, etc.

**II. Theoretical revision**
The facilitator explains the oral history method: it is similar to the semi-structured interview method, although it may be even less structured and can take much longer (up to a few days in some cases). In order to explain the method, the facilitator uses examples from the daily life of community members.

**Exercise: the group discusses what they would do if they wanted to know what changes the community had undergone in the past 40 years. The discussion is most likely to lead to oral histories as a solution.**

The facilitator is invited to use the format of the theoretical session described above, including all of the do’s and don’ts (which are highly relevant in this context as well) and to adapt the short exercises to an oral history format.
The important element to highlight with oral histories is that there may be even fewer interjections or questions by the interviewer than in semi-structured interviews. The facilitator also provides some basic rules for the interviewer:

- To ask follow-up questions, if the interviewee stops their narrative or seems unsure about what to talk about next;
- To probe, if one particular element of the narrative requires more detail;
- To re-direct the oral history if the interviewee veers significantly off track;
- To allow the interviewee to tell their story unimpeded, no matter how long it takes; and
- To take excellent notes throughout the interview, no matter how long it takes.

III. Practical exercises
The facilitator demonstrates the beginning of an oral history interview with one of the participants, and asks the participants to intervene when (purposeful) errors are made. Participants then pair off and carry out hour long oral history interviews with each other. The facilitator circulates in order to help with queries or issues that arise.

IV. Group discussion
The facilitator leads a group discussion based on the practical exercise. Problems and challenges are aired and explored, and the group collectively seeks solutions. The group also discusses the relevance of the oral history method for answering the project research questions and decides who in the community may be an ideal subject for this type of research.

Example of a work plan

<table>
<thead>
<tr>
<th>Activity</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Introduction</td>
<td>Day 1. 15 minutes, AM.</td>
</tr>
<tr>
<td>II. Theoretical revision</td>
<td>Day 1. 2 hours, AM (this includes short exercises)</td>
</tr>
<tr>
<td>III. Practical exercises</td>
<td>Day 1. ½ hour, AM&lt;br&gt;Facilitator-led demonstration&lt;br&gt;Day 1, 2 hrs, AM and PM&lt;br&gt;In pairs, participants take turns to carry out oral history interviews with each other.</td>
</tr>
<tr>
<td>IV. Group discussion</td>
<td>Day 1. 1 hour, PM.&lt;br&gt;Group discussion,</td>
</tr>
</tbody>
</table>

Equipment and materials
- Notebooks
- Pencils or pens
- Flip chart paper
- Marker pens
Focus groups and leading community workshops

Addresses

Objective B. To document the most important changes in community life and the drivers of these changes.

Objective E. To support community efforts as members reflect on the connection between research results and community decision-making processes.

Focus Group
Focus groups are a form of qualitative research used to obtain information regarding perceptions, opinions, beliefs, and attitudes towards a particular issue, that emerge when interviewees communicate with each other. Questions are asked in an interactive group setting where participants are free to talk with other group members. Focus groups are more than mere group interviews: the interactions between participants are also important sources of data. Focus groups therefore require participants to talk to each other – by asking questions, exchanging anecdotes and commenting on each other’s experiences and points-of-view – rather than exclusively to the interviewer/facilitator. The method is particularly useful for exploring people's knowledge and experiences and can be used to examine not only what people think but how they think, why they think that way, and their way of relating to other people's experiences.

Session objectives
Community researchers are able to carry out focus groups for the purposes of co-enquiry research.

Facilitators
The focus group should be led by a external or local team member with abilities to lead a group discussion and who has expertise in leading focus groups.

Participants
Local research team and any other community members interested in the method.

Expected results
At the end of the session, the participants will know how to implement a focus group and understand the pros, cons and specific uses of the focus group method.

General thematic content
a) Focus groups as a social science research method
b) How to organise and implement a focus group

Learning experiences
• Theoretical presentation for themes a)
• Practical exercises and group dialogue for b)

Session development
It is suggested the training session be organised as follows:
I. Introduction
The facilitator will provide the group with an introduction that covers (i) the purpose of the workshop, (ii) themes tackled by the workshop and how they will be addressed, (iii) length of the session, (iv) structure of the session, (v) outcomes of the session, etc.

II. Theoretical revision
The facilitator provides the theoretical background on focus groups. Situations in the daily life are used as examples to illustrate this theoretical background.

Exercise: what is a ‘natural’ focus group in the daily life of a community member? E.g. when a family makes a decision about what to plant and when, or when to collect firewood; when neighbours discuss how to resolve a problem; etc.

The facilitator describes the practical steps required to implement a focus group, taking note of them on a board or a flipchart page:

(i) Decide on focus group objectives, interview questions and discussion points;
(ii) Invite participants to participate and schedule a convenient time for the focus group to take place;
(iii) Prior to starting explain the purpose of the focus group;
(iv) Implement the focus group (see protocol for semi-structured interviews for details):
   a. Launch the discussion asking an open question
   b. Ask follow-up and emergent questions throughout the discussion
   c. Take good notes of the answers and the interaction between participants

The benefits and disadvantages of focus groups are then discussed. Facilitators are encouraged to add to the lists provided in Table 19 based on their own experiences.

Table 15: Benefits and disadvantages of focus groups

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collect data on group interactions and dynamics between different people within the group</td>
<td>Power dynamics within the group can result in biased results. Some people naturally are more at ease with speaking in a group than others (not necessarily the result of power dynamics), in which case careful moderation can help to ensure that all focus group participants are</td>
</tr>
<tr>
<td>Simple and easy method</td>
<td>given space to express themselves.</td>
</tr>
<tr>
<td>------------------------</td>
<td>-------------------------------------</td>
</tr>
<tr>
<td>Data can be richer than that emerging from interviews if/when people encourage each other to explore the issues through dialogue</td>
<td>Data may be difficult to analyse</td>
</tr>
<tr>
<td>People may not want to talk to each other about sensitive issues.</td>
<td></td>
</tr>
</tbody>
</table>

**Exercise:** the facilitator promotes a discussion among participants about what they think may happen during a focus group in their community: what may be people’s reactions to answering questions in a group (shyness? Will some people speak more than others?). Participants discuss what they may do, under the circumstances, to ensure the smooth flow of a focus group.

### III. Practical exercise
The facilitator reminds the group of the process for implementing a focus group. Participants decide which themes they wish to explore using the method. The group elects a facilitator and a note-taker. The focus group facilitator briefly discusses his/her strategies and questions for the focus group with the workshop facilitator prior to beginning. Once the focus group has started, the workshop facilitator observes and provides support and advice if necessary, checking specifically on the work of the note-taker. Once the session is over (probably after about 30-45 minutes), participants exchange experiences, opinions and ideas regarding the method.

At the end of the exercise, the workshop facilitator leads the process of systematising the notes taken by the note-taker during the exercise, using the approaches described in Methods group 0.

### IV. Group discussion
The facilitator mediates a discussion between the participants about the merits of the method and how it can be used to answer the project’s research questions. The facilitator also promotes a discussion on the notes taken, launching a group reflection on how these notes can be analysed for useful conclusions to be drawn.

The group decides what research questions may benefit from the focus group method, and brainstorm some open questions and discussion points that may be used to initiate dialogue during the focus group.

### V. Task assignment
Focus groups are planned for answering specific research questions. Participants suggest a schedule for implementing the method and a list of possible willing participants from the community to invite.

**Example of a work plan**

<table>
<thead>
<tr>
<th>I. Introduction</th>
<th>Day 1. 15 mins, AM.</th>
</tr>
</thead>
<tbody>
<tr>
<td>II. Theoretical revision</td>
<td>Day 1. 1 hr, AM.</td>
</tr>
</tbody>
</table>
### Workshops

**Session objectives**
The objective of this session is to train community researchers to lead a community workshop.

**Facilitators**
The session should be led by an external or local team member with abilities to lead a group discussion and who has expertise in leading community workshops.

**Participants**
All community researchers and any community member interested in learning the skills required to lead a workshop will be invited.

**Expected Results**
At the end of the session, the participants will have the skills necessary for leading a community workshop on any topic.

**General thematic content**
- a) The purpose and use of workshops
- b) The overall structure and proceeding of a workshop
- c) Workshop design
- d) Workshop leadership/facilitation
- e) Workshop evaluation

**Learning experiences**
- Theoretical revision for a) – e)
- Practical exercise for c) – e)

**Session development**
It is suggested the training session be organised as follows:

<table>
<thead>
<tr>
<th>III. Practical exercise</th>
<th>Day 1. 1-2 hrs, AM.</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV. Group discussion</td>
<td>Day 1. 1-2 hrs, PM.</td>
</tr>
<tr>
<td>V. Task assignment</td>
<td>Day 1. ½ hr, PM.</td>
</tr>
</tbody>
</table>

**Equipment and materials**
- Notebooks
- Pencils or pens
- Flip chart paper
- Marker pens
Figure 29: Framework for training community researchers in implementing community workshops

I. Introduction
The facilitator will provide the group with an introduction that covers (i) the purpose of the workshop, (ii) themes tackled by the workshop and how they will be addressed, (iii) length of the session, (iv) structure of the session, (v) outcomes of the session, etc.

II. Theoretical revision
The facilitator presents some of the basic theoretical background on workshops, explaining specifically what they are and how they are used. Given that most participants will have participated in at least one workshop in their life, this is a good occasion for them to express their own understandings and opinions about workshops. of what a workshop is, the frustrations they may feel during workshops, their opinion of what works and what does not, experiences they had of good and poor workshops, etc.

Exercise: Group discussion, using questions such as: what is a workshop in your experience? What are workshops useful for? What are the limitations of the workshops you have participated in? What are good practices in workshops? What are bad practices in workshops? The facilitator is encouraged to think of other useful questions to add to this list.

A volunteer note-taker takes down the following information on a flipchart page as the information may be useful for future exercises:

- Elements of a workshop
- Uses of workshops (the different aims of workshops)
- Limitations of workshops
- Good practices in workshops
- Bad practices in workshops
- etc.

Based on the previous discussion, the facilitator promotes a discussion on workshop structure. Depending on the aim of the workshop, it is likely to contain one or more of the elements described in Table 20.

Table 16: Workshop elements

<table>
<thead>
<tr>
<th>Introductions</th>
<th>The facilitator introduces the workshop, and if people don’t know each other, participants introduce each other.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workshop theme</td>
<td>Brief presentation, and group discussion to gauge participant’s</td>
</tr>
</tbody>
</table>
III. Practical exercise

Based on the previous discussion, the facilitator leads a process whereby the participants themselves organise a ‘practice’ workshop aimed to last between 1 and 2 hours (including a 10 minute evaluation at the end). The practice session will be led by an elected small group of facilitators and recorded by an elected note-taker. The other members of the group will be ‘workshop participants’.

The group brainstorms about what kinds of questions they need to answer to plan a good workshop. The discussion is likely to yield, amongst others, the following elements:

- What is the aim of our workshop?
- What do we hope to achieve by the end of our workshop?
- What are the elements we need for our workshop?
- How should the workshop be structured?
- What time will we allocate for each section of the workshop?
- How will we encourage people to participate?
- How can we encourage people to carry out practical exercises? What practical exercises should we include?
- What breakout sessions should we include? What should the tasks of each small group be? How can we make sure they complete their tasks in the allocated time?
- Is our plan likely to yield our expected results?

The ‘facilitators’ choose a workshop theme for their practice workshop (ideally small, self-contained elements of their next important ‘real’ workshop to be organised within the community). They then plan their workshop using the above questions (and others that have arisen) as guides for the process. During this time the ‘participants’ take a break.
Once the planning is complete, the workshop is carried out; the facilitator remains available for questions or issues that may arise during the practice. 10 minutes are allowed at the end of the practice workshop for briefly evaluating the structure and facilitation of the workshop.

IV. Group discussion
The facilitator encourages a group discussion about the method, to allow any uncertainties, queries or issues to be aired.

V. Task assignment
With the support of the facilitator the group plan a community workshop on the topic of the project, to be held shortly thereafter.

<table>
<thead>
<tr>
<th>Example of a work plan</th>
<th>Day 1 15 mins, AM.</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Introduction</td>
<td>Day 1. 1hr, AM</td>
</tr>
<tr>
<td>II. Theoretical revision</td>
<td>&gt; General discussion and exercise Day 1, 1hr. AM</td>
</tr>
<tr>
<td></td>
<td>&gt; Workshop structure</td>
</tr>
<tr>
<td>III. Practical exercise</td>
<td>Day 1. 1hr, AM</td>
</tr>
<tr>
<td></td>
<td>&gt; Brainstorm and workshop planning Day 1, 1-2hrs, PM</td>
</tr>
<tr>
<td></td>
<td>&gt; practice workshop</td>
</tr>
<tr>
<td>IV. Group discussion</td>
<td>Day 1. ½ hr, PM.</td>
</tr>
<tr>
<td>V. Task assignment</td>
<td>Day 1. ½ hr, PM.</td>
</tr>
</tbody>
</table>

Equipment and materials
• Notebooks
• Pencils or pens
• Flip chart paper
• Marker pens
**Data systematization and results analysis workshop**

The Results analysis workshop trains community research teams learn how to systematise their data, analyse it and draw conclusions for validation by the wider community.

**Session objectives**
This session aims to establish a co-enquiry framework for data systematisation and results analysis.

**Facilitators**
This workshop should be facilitated by an external or local team member with abilities to lead a group discussion and with expertise in social science research processes.

**Participants**
Local research team and any other community member that are participating in social science research within their communities.

**Expected results**
At the end of the session, the participants will know how to systematise their qualitative data, understand the steps to analyse their data and know how to draw conclusions based on their data analysis process.

**General thematic content**
- a) Systematising data sets
- b) Analysing qualitative data
- c) Drawing conclusions

**Learning experiences**
- Theoretical presentation, with exercises and examples, for a) and b)
- Data processing and analysis for a) and b)
- Dialogue and discussion for b) and c)

**Session development**
It is suggested the training session be organised as follows:

Figure 30: Framework for analysing data, drawing conclusions, and formatting results for presentation

**I. Introduction**
The facilitator will provide the group with an introduction that covers (i) the purpose of the workshop, (ii) themes tackled by the workshop and how they will be addressed, (iii) length of the session, (iv) structure of the session, (v) outcomes of the session, etc.

**II. Theoretical revision**
Before discussing conventional scientific data analysis systems, the facilitator leads the group through a discussion of the possible modes of systematising qualitative data. In a
co-enquiry setting, the conventional scientific processes for analysing and processing qualitative data (coding, transcribing, etc.) may be too time-consuming or complex for community researchers. In the Chinantla experience, the group used a combination of simple matrices and dialogue for the systematisation and analysis process. It is clear that some of the resulting analysis may lose some depth and complexity, yet it is also a system that is much more appropriate to community-based and co-enquiry processes.

The following is a general (and adaptable) matrix (Table 16) for systematising data arising from semi-structured interviews, oral histories and focus groups. A similar approach can be adopted for systematising and analysing broader ethnographic data, and in a future version of the present protocol a specific section on analysis of ethnographic data will be included.

In the Results column the research team will include an incipient analysis of the interview answers, draw tentative conclusions, and make connections between these conclusions and the research questions. However, in order to keep the process clear and simple, at the data systematisation stage, the research team should only fill in the Research Questions, Interview Questions and Answers column.

Table 17: Data systematisation matrix for semi-structured interviews

<table>
<thead>
<tr>
<th>Research questions</th>
<th>Interview questions</th>
<th>Answers</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research question 1</td>
<td>Interview question 1</td>
<td>Person A</td>
<td>I think that…</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Person B</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Focus</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Group X</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Etc.</td>
<td></td>
</tr>
<tr>
<td>Interview question 2</td>
<td>Person A</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Person B</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Etc.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
III. Practical exercise: processing our own data sets
During this session, the group works to fill in portions of this matrix with results from a methods practice session (whether the method was focus groups, interviews, or oral histories). The exercise can be carried out as a group, and led by literate members of the community research team. Ideally, the data would be systematised on a computer-based word processing software, as the resulting documents can be more efficient and user-friendly for the purposes of analysis. However, if this is not possible, it is suggested that the exercise be carried out using landscape-oriented flipchart pages and pens/pencils.

IV. Analysing results

• Exercise 1: Results analysis

In order to analyse results, the data systematisation matrix is used, and a process of patient and flexible dialogue, led by the facilitator, is used to elicit analyses. In the Results column the research team will include an incipient analysis of the interview answers, draw tentative conclusions, and make connections between these conclusions and the research questions. Connections between the results are made and notes of those are taken down on separate flipchart pages. This process may take a relatively long time, as it requires a constant back-and-forth between the facilitator and the researchers as the group allows analyses and conclusions to emerge.

• Exercise 2: Refining the analysis, the research questions and the method

Following this first step, a second matrix can be used to examine whether the conclusions drawn help to answer the original questions (Table 17). This second matrix also allows for further questions to emerge, allowing the group to refine their research and interview questions prior to field-based practice.

Adaptations

If the group is large, it is suggested that the group divide and that sub-groups engage in the process of analysis for each research question. However, as this process requires constant input by the facilitator, we suggest that more than one facilitator be available to ensure that each subgroup receive the support they need.

Conversely, in some cases (including the Chinantla) this training may only be relevant for those members of the community research team who are bilingual and literate. In other words, given the heavy accent on writing, it may be counter-productive to include members of the research team who do not have any training in writing and or systematic thinking.

If the large part of the group are monolingual, it is important to have an interpreter during results analysis. Often interpreters are youth or adults who have had secondary education. These interpreters will not only be necessary to support group dynamics but may also be a valuable support to the facilitator to understand group dynamics, motivations or doubts of the monolingual participants. They will also help with translating key concepts and thinking of appropriate imagery to translate complex ideas. They will need to dedicate extra time to working on the key words, transcribing written interviews and preparing materials. This means that they will have to dedicate more time than the others in the collaborative preparation of workshops. They therefore need to be motivated to participate!
Table 18: Data-research question comparison matrix

<table>
<thead>
<tr>
<th>Results</th>
<th>Overarching questions</th>
<th>Did we answer our questions?</th>
<th>If yes, how?</th>
<th>If no, how?</th>
<th>What other questions do I have?</th>
</tr>
</thead>
</table>

This process can also be visualised as in Figure 27:

![Diagram of research question process](image)

Figure 31: Have we answered our research questions?

**Adaptations**
During both these exercises, although especially Exercise 2, the research question and method is closely examined by analysing the kinds of results the research questions and methods have yielded. Both overarching research questions and the methods themselves are thoroughly revised at this stage, including through the re-drafting of interview questions so as to be more understandable to interviewees.

For example, in the Chinantla, the group found that the specific interview questions did not yield enough results to answer research question E, so they developed a new interview question in order to obtain more specific data. Moreover, they found that another interview question they had developed was too general resulting in answers that were too similar between interviewees, so they refined those interview questions and reflected on a variety of follow-up questions they could ask to obtain more precise information.

**V. Refining the research process and assigning tasks**
Once the final matrices for systematisation and analysis have been prepared for the group to use during field-based practice, the group assigns tasks within the community research team.
It is suggested that one or two brief day-long follow-up workshops are scheduled in order to (i) ensure that the systematisation and incipient analysis process is understood and underway, (ii) answer queries and resolve problems, and (iii) explore the need for further/different questions or methods.

**Adaptations**

In the Chinantla, we worked with a female translator who was also part of the research team to carry out the results analysis workshop. The exercises given in this protocol were adapted by the group to better suit their needs, given the very specific situation of having a community research team composed mostly of non-formally educated monolingual women. It is likely that the slightly more complex approach described in this section could be understood more easily in the case of a community research team with a slightly greater level of formal education.

A few days prior to the workshop, the facilitator met with the translator to translate all of the interview answers and write them in the Chinantec language. The key words from the interview responses were transposed, in Chinantec, on a blank card. On the back of the card were written the code for the interviewee and the number of the question being analysed. Together, the translator and facilitator devised an exercise to help the team group the answers together, and planned how she would carry out the translation and explanation for the rest of the team. The next day, all the team members were invited to the workshop and the translator explained that the work would be carried out in Chinanteco.

In the mean time, the group prepared flipchart pages with each question written at the top. With the help of the translator, the group then reads each question and assigns answer cards (in Chinanteco) to the respective questions. Team members were then asked to stick each answer by the appropriate question, grouping the answers according to similarity (similar answers to the same question were grouped together). For example, one of the questions that the community research team had devised for the interview was “How did you live prior to conservation?”. The resulting answers, summarised in Chinanteco key words were “we lived happily” (9 answers); “we lived in poverty” (8 answers); and “we lived in houses made of rustic materials” (2 answers).

Once the answers have all been organised per question on the flipchart pages on the wall, the facilitator and translator begin a dialogue, using the following questions, amongst others:

- What does it mean when many answers to a particular question are similar?
- Why do some questions only have one or two groups of answers?
- What does it mean when some questions have not been answered by all respondents?

Following this initial appreciation of the question-answer relationship, the group begins to analyse and discuss the answers for each question using a group dialogue. The answers for each question will be summarised and ideas regarding what these answers mean will be discussed. The specific and important issues relating to each question will naturally arise through dialogue, and will be taken note of throughout the session. The most important aspect of this element of the analysis is that everyone is sharing opinions and reflections regarding the themes that the questions have elicited. Here, the support of the translator is essential, as it ensures wide participation and a good understanding of the question-answer relationship.
Example of a work plan

<table>
<thead>
<tr>
<th>Activity</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Introduction</td>
<td>Day 1. 15 minutes, AM.</td>
</tr>
<tr>
<td>II. Theoretical revision</td>
<td>Day 1. 1 hours, AM</td>
</tr>
<tr>
<td>III. Processing our data</td>
<td>Day 1. 1 hour, AM</td>
</tr>
<tr>
<td>IV. Analysing our results</td>
<td>Day 1. 3-4 hours, AM and PM</td>
</tr>
<tr>
<td>V. Establishing a complete process and assigning tasks</td>
<td>Day 1. 1 hours, PM.</td>
</tr>
</tbody>
</table>

Equipment and materials
- All the notebooks and transcriptions from the data collecting period.
- Pencils or pens and A4 paper
- Flip chart paper
- Marker pens
- Projector and computer, if available

Participatory mapping

Addresses objectives:

Objective A. To document the most important changes in community life according to its members.

Objective C. To document current livelihoods and wellbeing status among community members and changes in this status over time.

Basic participatory mapping for community biocultural territories

Session objectives
To train community researchers in participatory mapping techniques that allow them to map the biocultural elements of their territories. As a result of the session, the community researchers will have the cartographic tools required to engage in problematising dialogue (Method 2) and systemic analysis (Method 3) of governance and land use change in their community territories.

Facilitators
The participatory mapping training should be led by an external or local team member with abilities to lead a group discussion and with expertise on participatory mapping techniques and processes (for more methodological information on participatory mapping see CTA 2006, 2010; Tobias 2000, 2010)

Participants
9. Local research team and any other community member interested in the use, management and changes of the territory.
10. Special attention must be given to integrate different social groups of the community into the workshop, such as women, young people and elders, as they can provide different views of the territory according to their own needs and activities.

Expected results
At the end of the session, the participants will have acquired basic abilities to generate diverse participatory maps of their biocultural territories.

General thematic content
a) Concept, history, uses and importance of maps;
b) Types of maps and kind of information that they include;
c) Mapping general concepts;
d) Use of GPS devices;
e) Elaboration of maps;
f) Revision of existent maps.

Learning experiences
• Theoretical presentation for themes a) - d)
• Practical exercises and group dialogue for d) - f)
• Focus groups for reflection and analysis for a) - f)

Session development
It is suggested the training session be organised as follows:

I. Introduction
The facilitator will provide the group with an introduction that covers (i) the purpose of the workshop, (ii) themes tackled by the workshop and how they will be addressed, (iii) length of the session, (iv) structure of the session, (v) outcomes of the session, etc.

II. Theoretical revision
The facilitator provides the theoretical background on (i) concept, history, uses and importance of maps; (ii) importance of maps regarding territorial management and land use change; (iii) map types (community, official, hydrological, vegetation, biocultural, etc.); (iv) the type of public and private information that can be included in maps. During this section, dialogue and participation by the rest of the team should be encouraged to make questions and propose ideas or previous concepts about mapping. It is recommended that time should be taken to discuss all the information that should and shouldn't be included in the maps, according to community agreements or desires.
Exercise: The facilitator works with the rest of the team to create a mental geographical map of the territory and land use. This map is the first attempt to draw on paper the participants’ perception of the territory. The map is drawn freely by the team on white flip chart paper and should include territorial borders, the urban area, the water bodies, agricultural zones, zones for cattle or any other animal raising, cultural or spiritual important places, etc. Once the map if finished, the facilitator promotes a dialogue about the map, what can we see now that is not very evident in our daily lives? What information is missing?

The second part of the theoretical revision is closely related to the practice of map elaboration (see next section). It covers the basic concepts of conventional mapping, such as coordinates systems, scales, level curves, orientation, legends, etc. Accuracy and precision are also discussed, highlighting the differences between the two concepts, and why and when to use them (see box below). For example if the map is for official use, accuracy is preferred over precision, while if the map is for local use, precision is enough and it is also preferred (i.e. knowing the place where a water body is located).

III. Elaboration of maps

The only way to fully understand the theoretical concepts and definitions is for the team to put it into practice by creating maps. In the Chinantla case study, several map elaboration exercises were implemented.

We use official maps of the Mexican Institute for Statistics and Geography (INEGI) and of the Agrarian National Registry (RAN) to locate the community territory on accurate geographical coordinates. Over this base, using tracing paper, the team drew a first map of community territory boundaries. Next, the team practised the use of different scales and created maps of different sizes.

Once they learned how to draw maps using the respective coordinates without the use of another official map as a base, the team proceed to elaborate various maps according to the communities’ requirements. For example, the team draw a land use map, a map of the different water bodies, as well as maps of vegetation types and of fauna populations (see protocols on vegetation and fauna monitoring for specific examples).

The elaboration of these maps must be accompanied by the use GPS devices for further accuracy and precision; for example the GPS will allow to locate

Some definitions

(Adapted from Foote and Huebner 2000).

Accuracy. Degree to which information on a map or in a digital database matches true or accepted values. It is possible to consider horizontal and vertical accuracy with respect to geographic position, as well as attribute, conceptual, and logical accuracy.

Precision: Refers to the level of measurement and exactness of description in a GIS database. Precise locational data may measure position to a fraction of a unit. Precise attribute information may specify the characteristics of features in great detail. Precise data may be inaccurate, for example, surveyors may make mistakes or data may be entered into the database incorrectly.

the limits of vegetation types, productive parcels, etc. Therefore, a session on the use and management of GPS devices must be included in this training. This training should cover, at the very least: (a) explanation of the GPS technology; (b) use of GPS windows and functions; taking and saving points in the field; (c) moving from one coordinate system to another; and (d) transferring GPS information into paper maps.

The final aim of this process is to build several layers of maps to have a biocultural cartographic compendium of the different cultural, environmental and biological elements of the community territory and its members’ daily lives. This can be done simply by drawing each map separately, according to the themes chosen by the research team and/or the community.

IV. Methods adaptation and revision

Once the team has practised how to elaborate mental maps and thematic community maps, the facilitator will promote a reflection about the methods. The reflection can be done through a two-way questions and answers session (facilitator <> rest of the team). Some key questions that could be discussed are as follows:

I. Do you think that using these mapping methods, the team can capture all the elements and information held within the territory?
J. What information is missing?
K. What other ways could be used to represent our territory?
L. What could this information be useful for?
M. What are the possible negative outcomes of using participatory mapping (misrepresentation and/or simplification of the complex indigenous notion of territory, creating conflict between communities, divulging information to outsiders, etc.)
N. What difficulties we had during the methods application?
O. How can we solve these difficulties?

Furthermore, the facilitators must be attentive to any difficulty or opportunity that arises during the methods practice, to discuss it during this session.

V. Revision of existing maps
Revision of existent official or not official maps is important both as a mapping practice and as an exercise in analysis of the precision of maps created by other actors or stakeholders. The first step of this exercise is to locate the different maps that have been elaborated for the local territory; these can come from government archives, historical records, conservation projects, NGOs, etc. The group makes a list of the different maps they know of while the facilitator provides support by searching electronic and bibliographical databases, if those are not easily available to the community researchers. Once the list is made, the team identify which maps can be printed and obtained for the community and which maps are of most interest to them for analysis. In the Chinantla case, the maps of most interest where those related to conservation areas and payments for environmental services, created by official institutions and conservation NGOs, along
with the agrarian maps of community boundaries. Once a physical copy of the map is in the community, the team proceeds to review it.

Some questions that may be useful to encourage analysis during this revision are:

- Is there any difference between our previous perception of the territorial elements and how they are represented in these other (often official) maps?
- Who produced the maps?
- Where did their information come from?
- What kind of technology did they use to elaborate the maps?
- What information do we think is not accurate or precise? Why? How can we prove its inaccuracy or lack of precision?
- Would we like to update or re-elaborate some of these maps?

VI. Task assignment

Mapping techniques can be extensively explored and practised according to local needs and chosen work themes. Participants suggest a schedule for implementing further mapping revision or elaboration and a list of possible willing participants from the community to invite.

Example of a work plan

Due to the nature of the mapping work, for which detailed information has to be gathered in the field and captured on paper, different sessions can be planned scattered along a couple of months. It will depend very much on the time availability of the local research team and the availability of the supplies (especially the external maps). The following is just an example for a continuous workshop, assuming that time is not a constraint and that the team has all the necessary material.

<table>
<thead>
<tr>
<th>I. Introduction</th>
<th>Day 1. 15 mins, AM.</th>
</tr>
</thead>
<tbody>
<tr>
<td>II. Theoretical revision</td>
<td>Day 1. 2 hrs, AM.  Concept, history, uses, importance and types of maps. Kind of information that can be mapped Day 1. 3 hr, AM. Practical exercise – mental map. Day 2. 2 hrs, AM Concepts of conventional mapping</td>
</tr>
<tr>
<td>III. Maps elaboration</td>
<td>Day 2. 2 hrs, AM Community territory boundary map using official maps as a base. Maps at different scales. Day 2. 2 hrs, PM Basic use and management of GPS Day 3. 4 hrs, AM Thematic maps Day 4. 6 hrs. Taking GPS points in the field and transferring to thematic maps.</td>
</tr>
<tr>
<td>IV. Methods adaptation and</td>
<td>Day 5. 1-2 hrs, AM</td>
</tr>
</tbody>
</table>
V. Revision of existing maps

Day 5. 2 hrs, AM
Verification of existing maps
Day 5. 4 hrs, PM
Updating or re-elaboration of existing maps.

VI. Task assignment

Day 6. 2 hours, AM

Equipment and materials
- Flip chart paper
- Tracing paper
- Colours
- Pencils or pens
- Marker pens
- Rulers
- Compass
- Small notebooks for the field-based
- Copies of maps created by/for official institutions, conservation projects, NGO organisation, historical processes.

Participatory mapping of the community’s strengths, vulnerabilities, opportunities and threats

Session objectives
To train community researchers in the use of participatory mapping techniques to help visualize the community’s strengths, vulnerabilities, opportunities and threats. As a result of the session, the community researchers will have the cartographic tools required to engage in dialogue (Method 2) and analysis (Method 3) of governance and land use change in their community territories.

Facilitators
The participatory mapping training should be led by an external or local team member with abilities to lead a group discussion and with expertise on participatory mapping techniques and processes (for more methodological information on participatory mapping see CTA 2006, 2010; Tobias 2000, 2010).

Participants
- Local research team and any other community member interested in territorial use, management and changes.
- Special attention must be given to integrate different social groups of the community into the workshop, such as women, young people and elders, as they can provide different views of the territory according to their own needs and activities.

Expected results
At the end of the session, the participants will have:
- Acquired the ability to represent, on cartographic maps, the strengths, vulnerabilities, opportunities and threats for the territory and the community.
• The tools to analyse land use change, as well as territorial opportunities and threats for livelihoods and wellbeing.

**General thematic content**

a) SWOT Analysis;
b) Current and historical strengths, vulnerabilities, opportunities and threats for the territory;
c) Historical analysis.

**Learning experiences**

- Theoretical presentation for themes a) and c)
- Practical exercises and group dialogue for b) and c)
- Focus groups for reflection and analysis for b) and c)

**Session development**

It is suggested the training session be organised as follows:

I. Introduction

The facilitator will provide the group with an introduction that covers (i) the purpose of the workshop, (ii) themes tackled by the workshop and how they will be addressed, (iii) length of the session, (iv) structure of the session, (v) outcomes of the session, etc.

II. Theoretical revision

In this section, three theoretical issues will be addressed:

- A common language for the research process
- SWOT analysis
- Historical analysis

**A common language for the research process**

The first step in this theoretical revision is to reach a common understanding for the process. Often external academics are used to freely deploying scientific and technical language without taking into account that most local people may not understand it. This section is not aimed at teaching or transferring the scientific and technical words to the community researchers, but rather at reaching a common understanding, between facilitators and community researchers, of how to name particular processes, objects, tools, approaches, etc.

For the purposes of this protocol, we propose to determine a common language for some concepts and for what that mean regarding territory and natural resources. For each one of these, the facilitator will promote an exchange of ideas: dialogue is encouraged to
analyse the differences between the external and the local definitions to pursue the main objectives of this workshop.

The proposed terms for discussion are:

- Territory
- Opportunity
- Strength
- Vulnerability
- Threat

The team’s work to define mutually understood concepts will continue throughout the workshop, as and when it is needed.

The facilitator must be aware that some words may have a stronger political load and therefore may need more time to be defined.

As a first result of this exercise, the team should adapt the language used during the rest of the process.

**SWOT analysis**

SWOT are the initials for Strengths, Weaknesses, Opportunities and Threats. SWOT is an analytic tool that helps to provide a diagnosis of a specific reality. The tool has its origins in corporative planning, yet given its usefulness it has been widely welcomed and used in action-research processes. For the purpose of language adaptation, we have chosen to use the word ‘vulnerability’ instead of ‘weakness’. The concept of ‘vulnerability’ allows to see the community or the territory as ‘vulnerable’ in front of other elements, that are important to consider in the analysis, and not just ‘weak’ due to internal causes.

At this stage, using the language previously decided upon by the group, the facilitator explains that a SWOT analysis will allow to make a diagnosis of internal factors (strengths and vulnerability) and external factors (opportunities and threats) that result in the present conditions of the given theme/object/system under scrutiny. Linking a SWOT analysis with maps enables the community researchers (and other community members) to engage in a visual representation connected with a diagnosis of the natural resource and landscape conditions.

**Historical analysis**

The facilitator explains that an historical analysis involves inquiring into how any given condition changes throughout time. In complement with the SWOT analysis, the historical analysis allows the community research team to examine how the strengths, weaknesses, opportunities and threats they have revealed have changed over time. It is useful to give a set amount of time (5, 10 or 20 years depending on the average age of the community researchers and the objective of the historical analysis – see below for the Chinantla experience) within which to carry out this analysis.
III. Elaboration of maps
The elaboration of maps at this stage will be used for two purposes:

- the Strengths, Vulnerabilities, Opportunities and Threats analysis
- the historical analysis

(i) Maps for Strengths, Vulnerabilities, Opportunities and Threats analysis
Using the mapping tools learned in the basic mapping training, the facilitator asks the research team to create a general map of the territory on a piece of flipchart paper. The map should have basic geographical elements such as community boundaries, main water bodies, main mountains or hills, the urban area, main roads, and landscape units.

Over the top of this first map, two map layers will be created using 2 sheets of tracing paper. Resources and their uses will be identified on the first layer; the facilitator helps to identify resources and processes that constitute a strength for the community. For example: What resources do we use to support our livelihoods? What resources or productive areas provide us with income? What resources, landscape units, and processes – such as water, forests, particular soils, etc. – support general ecological-territorial function?

On the second layer of tracing paper, the vulnerabilities, threats and opportunities are captured. When identifying these, special attention must be given to external and internal initiatives and projects that are present in, or relate to, each landscape unit. On each sheet, marks, labels, signs and icons can be drawn to identify the different elements.

(ii) Maps for historical analysis
For the purpose of this analysis, the research team needs to get satellite images or geographical maps of 20 and 10 years ago. These dates have been set for the Chinantla, as 20 years ago represents a period when no formal conservation strategies were in place while 10 years ago, formal conservation strategies began. If the budget allows it, satellite images for those periods are very useful, as they allow the team to examine vegetation cover changes and other land use changes. If the map has to be drawn, community elders ought to be interviewed by the community researchers in order to explore the land use distribution for those periods and how it has changed (see CRP on Basic Social Science research methods [p.183-227] for an approach to co-enquiry-framed semi-structured interview methods).

Then, another general map is drawn, this time with the current information, yet has to include the same elements as the historical maps, to ensure comparison. That is, if the map of 20 years ago shows agricultural fields as one of the elements, then this map has to show them too. An updated satellite image can be used too to corroborate the information on the current maps. The comparative analysis process is briefly described below.

IV. Map analysis

- Analysis of Strengths, Vulnerabilities, Opportunities and Threats
For the purpose of this analysis, we propose the method of problematising dialogue (see p. 229-230); this method allows the participants to engage in a deeper reflection, have their interest awakened and generate more elements regarding the local relevance of the work. To carry out this dialogue, we use the methodological tool of 'Generator themes' (Freire 1975), which are key work themes around which a deep dialogue can be developed, that ramify into or reach many other subjects important for the group.

In this case, the generator themes are the territory and its resources, as well as the strengths, vulnerabilities, opportunities and threats identified in the earlier process. To conduct a problematising dialogue using generator themes, a support object is used to launch the dialogue. In this case, the support object is the map itself, which can be used to catalyse the start of the dialogue by posing questions regarding concrete elements of the maps. From the moment it has started, the conversation will develop according to the group's interests. The facilitator must be very attentive to identify these interests, pose key questions and guide the dialogue to deepen the emergent themes. During the whole process one person has to take notes of the entire dialogue, highlighting the most important points in a synthesis at the end of the workshop. We propose the use of a table such as the below to record the information emerging from the problematising dialogue in a systematic way:

<table>
<thead>
<tr>
<th>LANDSCAPE UNIT</th>
<th>Resources</th>
<th>Uses</th>
<th>Strengths and Opportunities</th>
<th>Vulnerabilities and Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest</td>
<td>Wood</td>
<td>House and furniture building</td>
<td>A possible forest management plan. The forest in good health.</td>
<td>Illegal logging. Payments for Environmental Services.</td>
</tr>
<tr>
<td>Firewood</td>
<td>Cooking and heating</td>
<td>Enough wood to ensure adequate supply of firewood for the community.</td>
<td>Payments for Environmental Services.</td>
<td></td>
</tr>
<tr>
<td>Animals</td>
<td>Food</td>
<td>Creation of formal management units.</td>
<td>Lack of information about populations.</td>
<td></td>
</tr>
<tr>
<td>Acahual (secondary forest)</td>
<td>Animals</td>
<td>Food</td>
<td>Game</td>
<td>It seems that there are many animals.</td>
</tr>
<tr>
<td>Coffee plantation</td>
<td>Coffee</td>
<td>Sale Local consumption</td>
<td>A local cooperative.</td>
<td>Low prices, pests and diseases, post-harvest management.</td>
</tr>
<tr>
<td>Agricultural zone</td>
<td>Soils</td>
<td>Milpa cultivation</td>
<td>Is our main productive resource.</td>
<td>Lack of information on how to improve productivity, pests and diseases, lack of information on how to improve post harvest.</td>
</tr>
</tbody>
</table>

Table 1: Example of information table on resources, uses, strengths, vulnerabilities opportunities, and threats

Once the table is finished and to close the analysis, the facilitator encourages the team to:
• Dialogue about the synthesis table, briefly reviewing the main concepts and their relation with the basic map.
• Identify and write down a list of the main threats and vulnerabilities.

• **Historical analysis**
Once the team has two or three maps showing what the territory looked like at different moments in recent history, the facilitator encourages the team to analyse these using a “spot the differences” game. The facilitator promotes dialogue by asking questions like: What can we find in one map that is not found in the other? Why has this change happened? What has been the effect of this land use change in our livelihoods and wellbeing?

V. Methods adaptation and revision
Once the team has been able to practice elaborating and analysing, the facilitator encourages a reflection regarding the methods. The reflection can be done using a two-way questions and answers session (facilitator <> rest of the team). Some key questions that may be useful to discuss:

A. Do you think that through these mapping methods and analysis, we are able to understand all the processes that take place in our territory?
B. What information is missing?
C. What could this information useful for?
D. What problems or difficulties have we encountered during methods application?
E. How can we solve these problems?

Furthermore, the facilitators must be attentive to any difficulty or opportunity that arises during the methods practice, and bring it up for discussion during this session.

*Example of a work plan*
Due to the nature of the mapping work, for which detailed information has to be gathered in the field and captured on paper, different sessions can be planned scattered. It will depend very much on the availability of the local research team (time-wise) and of the supplies (such as the satellite images). The following is just an example for a continuous workshop, assuming that time is not a constraint and that the team has all the necessary material.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Introduction</td>
<td>Day 1. 15 minutes, AM.</td>
</tr>
<tr>
<td>II. Theoretical revision</td>
<td>Day 1. 1-2 hrs, AM.</td>
</tr>
<tr>
<td>III. Maps elaboration</td>
<td>Day 1. 2 hrs, AM.</td>
</tr>
<tr>
<td></td>
<td>- Maps for analysis of Strengths, Vulnerabilities, Opportunities and Threats Day 1. 2 hrs, PM.</td>
</tr>
<tr>
<td></td>
<td>- Maps for historical analysis</td>
</tr>
<tr>
<td>IV. Maps analysis</td>
<td>Day 2. 3 hrs, AM.</td>
</tr>
<tr>
<td></td>
<td>- Analysis of Strengths, Vulnerabilities, Opportunities and Threats</td>
</tr>
<tr>
<td>V. Methods adaptation and revision</td>
<td>Day 3. 2:3 hrs, AM.</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>-------------------</td>
</tr>
</tbody>
</table>

**Equipment and materials**

- Flip chart paper
- Tracing paper
- Colours
- Pencils or pens
- Marker pens
- Rulers
- Compass
- Any other maps of the local area (official, NGO, etc.) that have been created and that are available
- Copies of satellite images of different dates and/or geographical maps from different dates.
In this section, we present novel approaches to engaging in co-enquiry social research with communities. These two methods – TRIZ and problematising dialogues – are aimed at analyzing current realities, solving problems, and exploring future scenarios of change. In this brief introduction we provide some theoretical background on the two methods and how they can be integrated.

The first is the problematising dialogue process, adapted from Paulo Freire’s pedagogical approach amongst others; see Freire (1975/2007). Problematising dialogue is an ideal fit for a co-enquiry approach as it both challenges accepted wisdom and acts as a democratic, collective learning and reflection process. Implementing these dialogues in small groups allows all members of the community to participate yet gives them more freedom to express their opinions and reflections (which they tend not to do in community-wide settings). This dialogic approach may be complemented by the creation of a number of different participatory maps (see CRP on Basic Social Science Methods that help communities visualise how aspects of socio-environmental change impact their livelihoods and wellbeing.

TRIZ – the Theory of Inventive Problem Solving – is the second key methodology and tool upon which this protocol is built. TRIZ is the Russian acronym for Theory of Inventive Problem Solving. It was developed progressively by G.S. Altshuller between 1946 and 1998 (Khomenko et al 2007) in the context of inventions in engineering. It sought to establish a method for systematic analysis, problem-solving and planning for the future. Since the 1980s, it began to be used also in non-engineering contexts. As attempts were made to generalise the use of TRIZ to non-engineering spheres of life, researchers identified its limits in these spheres and sought to improve TRIZ’s ability to solve complex cross-disciplinary problems. Altshuller then proposed to transform classical TRIZ into a more general approach for problem solving, proposing the name of General Theory for Powerful Thinking, the Russian acronym of which is OSTM (Atshuller 1994, 1973; Khomenko et al 2007).

In the Chinantla context, the GDF team adapted elements of the TRIZ-OSTM toolbox to help communities resolve their problems, analyse socio-environmental change and plan for the future in the realm of natural resource governance, land tenure, livelihoods and wellbeing. One particular element of the TRIZ-OSTM toolbox has been used with great success in the Chinantla as communities have sought new ways of understanding the significant socio-environmental changes they are facing and new ways of addressing the resulting problems and inherent contradictions. This is the System Operator, or 9 windows, which will be discussed in greater depth shortly. The System Operator offers a
structured process for analysis of components and functions of a system\textsuperscript{7} and its relationship with its broader context as well as its content.

As far as we know, no instrument from the toolbox of participatory methodologies synthesises in one table the shared knowledge of the past, present and future of a system, its components (parts) and its context. Originally, the System Operator was created by engineers, for engineers – i.e. people with a basic knowledge of systems and the material laws of nature. The literature that examines its use in an adult context comes from the spheres of engineering and inventions; it is also used by practitioners and academics dedicated to problem-solving. However, the use of OSTM with children has been documented as part of an ample and ambitious programme of early schooling (pre-school and primary school), indicating both that it is not inherently complex and it has proven pedagogic uses. The literature shows no indication is has been used, prior to this COMBIOSERVE project, for addressing broader questions surrounding human life and our environmental context.

The System Operator has the flexibility to analyse living things, tools, human activities, and landscape units, amongst others; in effect, it can be used to analyse any system determined by the observer. The System Operator is a tool for both analysis and ‘problematization’ (see below). Users of the System Operator can mentally organize a system, its components and its context, in order to analyse its behaviour in the present, past and future. Once information is elicited and organized, users can proceed to ‘problematize’ changes and trends in the system. In this way, the System Operator can be used to identify the functions of a system as well as what it requires in order to fulfil its role. The principal reason the System Operator is so effective in analysing a system or problem is that it provides clarity on the context, functions and components of the issue being analysed. It helps cut through the complexity of real life in order to shed light on the core problem, therefore rendering the search for solutions more systematic and lucid. It is also a relatively easy tool to explain and to learn, and can be extracted from the TRIZ-OSTM toolbox and used without requiring greater theoretical contextualisation.

The System Operator and problematising dialogue approaches go hand-in-hand, and are presented in this methods protocol as an integrated process. Problematising dialogue is the key first step used by community researchers to critically appraise their reality, the problems they encounter both in their daily lives as community members and community researchers, and the implementation of the methodology itself. The System Operator then provides the method for analysing reality and seeking solutions to problems encountered.

\textsuperscript{7} A system is is a set of interacting or interdependent components forming an integrated whole. It has spatial and temporal boundaries and is influenced by its environment. In order to understand better the functioning and characteristics of any system, and therefore have more conceptual tools to apply in the System Operator workshop, we recommend further reading on Systems Theory, particularly von Bertalanffy 1968 and Varela & Maturana 1973, 1974
**Problematising dialogue**

Addresses objectives:

**Objective B.** Document the drivers of these changes

**Objective D.** To document community members' approaches to deal with impacts and utilize opportunities arising out of the changes their community is facing

**Objective E.** Explore possible trajectories of change under diverse future environmental, social, political and other scenarios

**Objective F.** To support community efforts as members reflect on the connection between research results and community decision-making processes

The problematising dialogue process does not benefit from a highly structured set-up, which is why this section is discursive and not structured like the other protocols. Here, facilitators and participants are equal co-learners, and the dialogue is launched using generator themes that arise among the participants (although some suggestions are made below). Anyone interested in the dialogue participates. There are no specific outcomes expected, and in practice every dialogue is uniquely informed by the participants’ conditions, location, ethnicity, diversity, personalities, and so on. Naturally, as it is a dialogue, the key principles of mutual respect, open communication, and allowing all participants the space to speak are essential.

The problematising dialogue uses critical thinking, pedagogical dialogue and a shift in perspectives to pose questions about a given situation, existing knowledge, accepted wisdom, or a problem at hand. To ‘problematize’ an issue in dialogue is to challenge every participant in the dialogue (including community members, community researchers and facilitators) to approach the issue radically differently. This is done first by recognizing, acknowledging and challenging and their prejudices, assumptions and expectations with regard to the issue, including those arising from knowledge and information available from ‘authoritative’ sources, such as academic sources, government, community authorities, etc. The specialist knowledge of the facilitation team must also be put through this process of doubt.

Themes proposed for problematising, are often called ‘generator themes’ in Freirean pedagogy. These themes are usually words or phrases that represent issues of vital importance for the individuals and/or community in question. The process of determining generator themes can benefit from props, such as images, videos, maps, puppet shows, audiotapes, objects, or whatever else is chosen by the participants. For example, in the context of Chinantec communities, whose lives were at the time dominated by questions surrounding the Payments for Environmental Services (PES) programme, a key generator theme would be ‘conservación’ as this was the local term for referring to the PES programme. Simultaneously, a useful prop would be the map of the PES areas and their overlap with community territorial use zones.
Using these generator themes, the problematising dialogue examines the relationships between the theme and the different spheres of reality – economic, political (what can be done), cultural, spiritual, and environmental – in the community. It reveals the relationships between the theme and the different actors, times and scales that are directly or indirectly involved in it.

Some of the basic questions to launch the problematising dialogue on the chosen theme include, amongst others: Why are we addressing it? How? For whom? What outcome do we hope to achieve? Who is here, addressing it? Who is missing? Any basic question surrounding the event of the dialogue itself is welcome, and participants are encouraged to pose these questions themselves. Other questions that help challenge and critically appraise the issue at hand can be:

- When did the problem start? How did it start? How is the problem maintained (how does it continue)?
- Where did it start? Does it take place at another scale: household, neighbourhood, town, region, state, county, continent, planet?
- Why does the problem happen? What or who causes it? What are the economic, political, cultural, spiritual or environmental causes?
- What are the economic, political, cultural, spiritual and environmental consequences?
- Who participates in the problem? Who or what suffers its consequences? Who are what maintains it? Who are what benefits from it?
- How are we dealing with the problem? Are there people who have more experience in dealing with these problems?
- And so on…

**The System Operator of TRIZ-OSTM**

Addresses objectives:

**Objective B. Document the drivers of these changes**

**Objective C. Document current livelihoods and wellbeing status among community members and changes in this status over time**

**Objective E. Explore possible trajectories of change under diverse future environmental, social, political and other scenarios**

‘System Operator’ workshop

*Session objectives*

To train community researchers in the use of the System Operator as a tool of analysis and for future planning. In the context of COMBIOSERVE, the workshop has been used for land management planning, and decision-making surrounding governance. This protocol was developed in a workshop in the Southern Bahia fieldsite, with Pataxó community researchers and with Chinantec community researchers in the Chinantla.
Facilitators
The System Operator workshop must be facilitated by an external facilitator who is knowledgeable in the process and able to explain it easily to people with little or no formal education. Through the process, community researchers ought to be able to learn how to lead the process themselves, and therefore facilitate future workshops.

Participants
Local research team and any other community member interested in analysing socio-environmental change and planning for the future.

Expected results
At the end of the session, the participants will have:
- Understood the functioning and uses of the System Operator;
- Acquired the ability to implement the System Operator to analyse realities and plan for the future

General thematic content
The System Operator or 9 windows – theoretical and practical

Learning experiences
- The simple theory behind the System Operator
- Practical implementation of the System Operator
- Group dialogue to reflect on the experience

Session development
It is suggested the training session be organised as follows:

Figure 34: Framework for training community researchers in the use of the System Operator

I. Introduction and brief theoretical overview
The System Operator can be introduced for analyzing simple systems that the community researchers are familiar with, for example a living being, a tool and a human activity in a particular community conserved area. The objective of this workshop is to provide a new way of analyzing land use management and governance and to predict how socio-environmental changes may affect communities in the future – i.e. human activities. However, in this protocol we suggest that the team analyse a living being and a tool as well as a human activity of interest to the community, as the first two are ideal
examples with which to learn the process. The facilitator gives the group the choice as to which living being, tool or human activity they wished to analyse in the workshop.

The workshop facilitator begins by explaining the System Operator to the group. The System Operator is also known as the ‘9 windows’: it uses a table composed of 9 cells as its principal visual organising instrument. The dynamic involves facilitator asking the group a series of questions, which the group works collectively to answer. Responses are written on a flipchart by a rapporteur, in view of all.

Table 9 (below) shows the general scheme of the System Operator. It indicated the general questions posed about the system, and the order in which they are posed (the numerical order). Window 1 is the window that presents the system under discussion; the other 8 windows relate to the context and components of the system, as well as its past and its future states.

Table 19: general scheme of the System Operator

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4. What was it?</td>
<td>1. What is it?</td>
<td>7. What will it be?</td>
</tr>
<tr>
<td>Description of the system in the past.</td>
<td>Description of the system in the present.</td>
<td>Description of the system in the future</td>
</tr>
<tr>
<td>What did it do?</td>
<td>What does it do?</td>
<td>What will it do?</td>
</tr>
<tr>
<td>5. What were its parts?</td>
<td>2. What are its parts?</td>
<td>8. What will its parts be?</td>
</tr>
</tbody>
</table>

PAST | PRESENT | FUTURE

II. Practice of the System Operator using a living being as an example

In order to explain what the ‘9 windows’ are and how they work, the workshop facilitator demonstrates how they might use the schema for analysing a living being. In the case of an initial workshop on the System Operator, the questions are asked and answered in the order shown in Table 10 (below), as this sequential approach helps introduce the tool.

Table 20: The System Operator explained using a simple example of a living being

<table>
<thead>
<tr>
<th>1. Place where the being lives at the beginning of its life</th>
<th>6. Place where the being lives when mature.</th>
<th>9. Place where the being lives at older age</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. The being at the beginning of its life.</td>
<td>4. The living being when it is mature.</td>
<td>7. The being at older age.</td>
</tr>
<tr>
<td>3. The living being’s parts at</td>
<td>5. Parts of the living being</td>
<td>8. Parts of the living being at</td>
</tr>
</tbody>
</table>

Here and in all of the examples used in the workshop, we purposefully used the simple term ‘parts’ rather than the more appropriate term ‘components’ because the former is more understandable by a heterogeneous

Adaptations
The Pataxó community researchers chose to analyse a hawk, a machete and the production of crafts. They chose not to use the term ‘analyse’, as they were speaking of a living being, but rather ‘recognise’, given that in this case they all knew what a hawk was but they sought to use the tool to ‘re-cognise’ it in a new way.
In the context of a living being, the questions that can help find answers for each cell can be as follows:

1. Where is the living being born?
2. What is the living being like when it is born?
3. What parts does it need to be born? What function/use does every part have?

The above questions all fall into the first column of the ‘9 windows’, that which covers the past conditions of the system – i.e. the living being at the beginning of its life. For the second column, which concerns the living being when it is mature (in the present), the following questions can be asked:

4. What is the mature living being like? What are the most important activities of the mature living being?
5. What are the parts that make it up? Describe its parts. What function/use do the parts have?
6. Where does the mature living being live?

For the third column, which covers the living being at the end of its life (i.e. the conditions of the system in the future), the following questions can be asked to complete the 9 windows:

7. What is an old living being like? Describe it. What can it no longer do?
8. What are its body parts like? How have they transformed?
9. Where does it live? How does its life end?

III. Repeat practice using a tool as an example

Having used this very simple example of a living being to illustrate the basic workings of the System Operator, the workshop facilitator explains the System Operator in more conceptual terms, using the example of an object. Effectively, in order to fully understand how to use the System Operator to identify the functions of the system under analysis and the needs it satisfies, the best example to use is that of a tool.

However, in this second iteration of the example, the facilitator will follow the more appropriate order of the System Operator, as indicated in Table 9. The first ‘window’, in the centre of the matrix, is where the object is named. Then, as Table 11 below explains, the subsequent ‘windows’ are generated and their questions can be asked, in the numbered order given.

Table 21: The System Operator explained using an object or tool

<table>
<thead>
<tr>
<th>6. Place where the activity took place with the object</th>
<th>3. Place where the activity takes place with the object</th>
<th>9. How will the place be in the future</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. The object’s past,</td>
<td>1. <strong>Name the object</strong> and</td>
<td>7. How will the object be in</td>
</tr>
</tbody>
</table>
according to its function/ the needs it satisfied | define its function: What does it do / what need does it satisfy? | the future according to its function/ the need it satisfies

5. The object’s parts which allowed it to fulfil its function | 2. Parts of the object which allow it to fulfil its function | 8. How will its parts will be in the future

| PAST | PRESENT | FUTURE |

Using the System Operator to analyse a tool, the group can base their analysis on the fact that the tools used today have a function and fulfil a need. In the past, either a primitive version of the same tool was used, perhaps with different components, or a completely different tool was used. In the future, humans may use a modified version of the same tool as today, or a completely different tool.

### Adaptations
In the example of the Pataxó community research team, they recognized the machete as the tool to examine. After analysing the contemporary machete and its multiple functions, the group chose one function to analyse both in the past and the future. They chose to analyse the agricultural function of the machete – i.e. its function to cut vegetation for the creation of a swidden plot. This same function was fulfilled in the past by the stone axe and fire; in the future it could be fulfilled by the tractor, a chainsaw, herbicide or agroforestry techniques that do not require such an aggressive approach to removing vegetation.

The analysis of a tool stands in contrast with that of the living being, which is far more adapted to one specific context, although the interaction between the living being and its context is more complex. However, in the case of a tool, the facilitator explains that depending on which tool is under scrutiny, there are either a greater or a lesser number of contexts within which to use it. The context determines whether we can use it, either by changing its components or changing the tool itself. For example, a machete can be used in a diversity of contexts, while the tractor requires a relatively flat piece of land and access to petrol, the herbicide requires a specific market economy context, and agroforestry requires patience, the transmission of traditional knowledge and new learning, and so on.

### IV. Repeat practice using a human activity as an example
The workshop facilitator then turns the group to the analysis of human activity, which is at the core of the workshop’s objectives. In order to analyse human activity, the System Operator asks the following questions (again in the numbered order given):

Table 22: the System Operator used for the analysis of a human activity

| 4. In the past, what human activity fulfilled the same function? | 1. What are we recognizing? What is its function? What are its qualities? | 7. What will the human activity be like in the future? |
What other human activity fulfils the same function? What works well? What does not work? How can it be bettered?  
What will substitute it?

<table>
<thead>
<tr>
<th>5. What were its parts in the past?</th>
<th>2. What are its parts now?</th>
<th>8. What will its parts be in the future?</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAST</td>
<td>PRESENT</td>
<td>FUTURE</td>
</tr>
</tbody>
</table>

Following the basic analysis using the System Operator, the facilitator then leads a problematising dialogue (p.229-30) on the topic of the human activity chosen.

**Adaptations**
The group chose to analyse, as their human activity, the production of crafts in the Reserva da Jaqueira. This analysis permitted them to link craft production with (i) the availability or absence of natural resources in the territory, (ii) the crafts’ intangible functions, and (iii) its economic role for community members.
The subsequent problematising dialogue covered issues such as: the need to control access to the territory, the community’s entitlement to the use and enjoyment natural resources, future economic opportunities for the next generation of Pataxó, and other cultural aspirations.

V. Repeat the process using a system or issue that the community is currently grappling with

If the system is an animal, a tool or a human activity, the facilitator can use the 9 windows schemes described above. If it is something else, the facilitator can use the general scheme for the System Operator is provided in Table 21 above.

For a basic analysis of the system/issue at hand, the following points and questions are used to stimulate the discussion:

- Name the system and its primary function (or activity)
- What are the current and the desired system structure (i.e. its components/parts)?
- How is the main function performed?
- What is the environment/context?
- What resources are available for the system (including natural phenomena)?

Questions regarding change are then explored:
• What aspects of the system, its components and the context have changed over time? What were the driving forces behind these changes?
• What aspect of the system, its components and the context stayed the same over time? What forces maintained these aspects/elements?
• What is the system’s meaning/important for the world, the planet, humanity? (beyond the context set in the System Operator)
• What are trends can we detect in the process of transformation of the context?
• Does the system tend to adapt to these changes or transform radically?
• What are the problems the system faces: are they related to the context, the characteristics of the system or its components? What are the opportunities?

The problems that face the system can be related to:
• A technical contradiction (two incompatible technologies)
• A physical contradiction (two incompatible physical qualities)
• A function that should be applied but we do not know how to do so
• A function that ought to be implemented in a different way
• Inefficient yet necessary action, that utilizes a great deal of resources
• A harmful action
• An overly complex system

Bearing in mind the potential nature of the system’s problems, the facilitator can lead a problematizing dialogue to resolve these problems. The following questions can be used to stimulate the discussion, depending on the nature of the problem the group has identified:
• What are the problems the system faces: are they related to the context, the characteristics of the system or its components? What are the opportunities?
• Who has the problem?
• What resources are involved in the problem?
• When does the problem occur? Under what circumstances?
• Where does the system occur?
• Why does the problem occur? How can we solve it?
• What are the mechanisms that prevent the achievement of our objectives related to the system? What helps to achieve these objectives? Provide the history.
• Can we change the system?
• What prevents the solution? (Time, money, people)
• Have there been any previous attempts at solving the problem? (Perhaps elsewhere, or perhaps similar problems)

V. Recapitulate and discuss
Once all of the examples have been thoroughly explored by the group with the facilitator’s support, the workshop concludes with a recapitulation and a discussion. The recapitulation involves the facilitator asking members of the group to lead through the 9 windows one more time, either conceptually or using another example of the group’s choice. During this process, participants may ask questions, and identify problems and
challenges. A rapporteur takes note of these questions and challenges, and following the recapitulation, the group works through each in turn. The facilitator encourages participants to answer questions and resolve problems, only stepping in if there is clearly a conceptual misunderstanding.

**Example of a work plan**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Introduction and brief theoretical background</td>
<td>1 hr, AM.</td>
</tr>
<tr>
<td>II. Practice of the SO with a living being as an example</td>
<td>1 hr, AM.</td>
</tr>
<tr>
<td>III. Repeat practice with a tool as an example</td>
<td>1 hr, AM</td>
</tr>
<tr>
<td>IV. Repeat practice with a human activity as an example, including</td>
<td>1-2 hrs, AM</td>
</tr>
<tr>
<td>problematising dialogue</td>
<td></td>
</tr>
<tr>
<td>V. Recapitulation and discussion</td>
<td>1-2 hrs, PM</td>
</tr>
</tbody>
</table>

**Equipment and materials**

- Flipchart
- Marker pens
- Pencils and paper for participants to take note, if necessary
Some challenges and adaptations
The first clear challenge is to adapt the tool's presentation to an audience of adults with no formal education. It may be that those participating in the workshop are adults or youth with some formal education; even if that is the case, we feel that it is important that all members of the community can have access to the tool (otherwise we run the risk of creating ‘elites’ who understand the tool while others do not). In order to ensure this democratic ownership of the tool, the language and approach must be such that the learners can learn how to share it with others in the community, whatever their level of formal education.

It is also important to repeat the process a sufficient number of times in order to ensure that the tool reveals its didactic potential. Our pedagogic proposal was to analyse first a plant, then an animal, a tool, a human activity, and finally a landscape. By progressively analysing increasingly complex systems, participants can learn how to use the tool more intuitively. However, it is also important to carry out repeat analyses using different plants, animals, human activities and landscapes, as repetition with variation allows participants to learn the concept of a system, and to define the characteristics of these systems. In order to carry out these repeat analyses, it is necessary to be present with the participants for prolonged periods.

As we have implemented the process, we have learned that, especially if time is short, it is convenient to share the tool with the local teachers, whether they are involved or not in the co-enquiry process. By working with teachers, our scope broadens out to a younger segment of the population, who are also in formal education, and who can contribute to the community-based research. Teachers can also benefit from the tool professionally. Once the teachers have grasped the process, they can support the didactic process and help in repeating the exercises.

We are currently working on an approach for sharing more aspects of the theoretical-methodological framework with participants, with a view to building community researchers’ capacities to use, adapt, and re-invent the tool to their own ends, as part of a full co-enquiry process.

Some lessons learned:
After having implemented a series of System Operator workshops, both in the context of COMBIOSERVE and elsewhere, GDF learned the following lessons:

- In order to teach the System Operator, the sequence is: analyse a plant, an animal, a tool, and then an activity. To analyse a plant, the same approach as the animal is taken.
- It helps to analyse the structural evolution of a being: a chick becomes a rooster.
- With the system, we can analyse the evolution of a function over time. Note that some systems, such as memory or paper, may have the same function over time.
- It is richer to analyse something we observe directly or with the assistance of a mediator object such as a map, a picture, a letter or a song. Basing the exercise on memory is not advised.
- The greater the group’s familiarity with the system/being under analysis, the more details they have to work with. In effect, experts often find it difficult to analyse a very generic system or being. For example, rather than simply analyse a ‘rooster’, it is better to analyse a ‘Polish rooster’.
- The unit of time used to analyse the past depends on the specific objectives of the research.
- The future can be imagined according to the exercise’s objectives, whether they are planning, analyzing trends, or exploring ambitions/aspirations.