



Managing natural resources

A SMART SKILLS MANUAL



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MEAS aims at promoting and assisting in the modernization of rural extension and advisory services worldwide through various outputs and services. The services benefit a wide audience of users, including developing country policymakers and technical specialists, development practitioners from NGOs, other donors, and consultants, and USAID staff and projects.

Catholic Relief Services (CRS) serves the poor and disadvantaged overseas. Without regard to race, creed or nationality, CRS provides emergency relief in the wake of natural and man-made disasters and promotes the subsequent recovery of communities through integrated development interventions. CRS' programs and resources respond to the U.S. Bishops' call to live in solidarity—as one human family—across borders, over oceans, and through differences in language, culture and economic condition. CRS provided co-financing for this publication.

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Table of contents

List of tables.....	v
List of boxes.....	vi
Foreword.....	vii
Acknowledgments.....	xi
Introduction.....	xii
LESSONS.....	1
Lesson 1. Engaging the community.....	3
Quiz 1.....	8
Exercise 1a. Why are natural resources important?.....	9
Exercise 1b. Setting goals.....	11
Lesson 2. Understanding the community context.....	13
Quiz 2.....	21
Exercise 2a. Vulnerability analysis.....	22
Exercise 2b. Mapping natural resource conflicts.....	24
Exercise 2c. Seasonal calendar.....	26
Exercise 2d. Transect walk.....	28
Staff Exercise A. Issues analysis in natural resource conflicts.....	31
Lesson 3. Identifying and engaging stakeholders.....	35
Quiz 3.....	39
Exercise 3. Stakeholder analysis.....	40
Lesson 4. Mapping problems and opportunities.....	43
Quiz 4.....	51
Exercise 4a. Drawing a social-resource map.....	52
Exercise 4b. Gender roles and responsibilities in natural resources management.....	55
Staff Exercise B. Making a Google Earth map.....	57
Exercise 4c. Identifying hotspots or problem areas.....	59
Exercise 4d. Problem tree analysis.....	60
Lesson 5. Making a natural resources management plan.....	63
Quiz 5.....	70
Exercise 5a. Choosing solutions.....	71
Exercise 5b. Developing a natural resources management plan.....	74
Lesson 6. Managing natural resources projects.....	77
Quiz 6.....	83
Exercise 6. Adaptive management and most significant change.....	84
Lesson 7. Monitoring progress.....	85
Quiz 7.....	90
Exercise 7a. Developing a monitoring plan.....	91
Exercise 7b. Gender analysis matrix.....	93

Exercise 7c. Costs and benefits of managing natural resources	95
ENDNOTE	97
ANSWERS TO QUIZZES	98
REFERENCES AND FURTHER READING	101

List of tables

1	Form for assessing natural resources.....	10
2	Example of vulnerability analysis.....	23
3	Issues analysis	33
4	Example of issues analysis	34
5	Who in the community manages natural resources?	38
6	Example of analyzing stakeholders	41
7	Year 1 budget for natural resource management activities	68
8	Example of selecting strategies to improve natural resource management.....	73
9	Ranking of potential solutions.....	73
10	Part of a natural resource management plan	75
11	Example of a monitoring form	87
12	Planning indicators	92
13	Gender analysis matrix	94

List of boxes

1	Ensuring sustainability in Afghanistan.....	7
2	Assessing the economic situation	16
3	Assessing policies, laws and institutions.....	17
4	Assessing ownership.....	17
5	Assessing vulnerable groups	18
6	Types of information to note in a transect walk.....	29
7	Example of a conflict.....	34
8	The value of stakeholder analysis in Haiti.....	37
9	What to include in the map	43
10	Ensuring everybody has a say	44
11	Identifying drivers and contributing factors	49
12	The story of Anita's community.....	66
13	Anita's community: The cost of conservation	67
14	Anita's community: Reaching outside the farmer group	68
15	Narrowing down: An example from Latin America	72
16	Using local knowledge is critical	78
17	Motivating participation in Haiti	79
18	Example of a gender analysis.....	93
19	Questions on types of impact	96

Foreword

In Haiti, members of the Kole Zepol savings and lending group learned financial literacy and management from a community facilitator. After 2 years, they have saved a small amount of capital. Now they feel inspired and ready to start a small business.

With the support of an NGO field agent, they conducted a market visit and identified two promising products that experience increasing demand and but remain low in supply: peanut butter and dried pineapple. The group calculated that both products can bring good profits. Only small investments in production and in processing equipment were required.

The group lives in a mountainous area with low vegetative cover and high erosion. After conducting basic analyses of their landscape – examining the erosion risks, slope and soil characteristics of their productive land – they came to important conclusions. Growing peanuts seemed to pose a great risk to the hillsides, which have to be uprooted to plant the crop. Pineapples, however, could be planted along contours and soil and water conservation structures. Pineapples would protect the hillsides and providing a source of revenue. As a result of their careful planning and consultations, the group picked the sustainable option: to produce and dry pineapple for sale.

Kole Zepol is an example of a new way of combating poverty in vulnerable rural communities – by helping them engage with markets.

To do this, the group members need various types of skills. Here are the main ones:

- **Organizational management:** the group members need to plan and monitor the performance of their work.
- **Financial skills:** they need to save money, invest it in the enterprise, and maintain financial records.
- **Market and enterprise skills:** they need to produce something that customers want to buy; they need to find those customers; and they need to plan their business to make a profit.
- **Natural resources:** they need to conserve their soil, water and other natural resources so they can produce on a sustainable basis.
- **Innovation:** they need to find new, more efficient and more profitable ways of doing things.

In common with many other development agencies, CRS is incorporating a multi-disciplinary approach into its development efforts. We realize that increasing food production alone cannot move poor rural people permanently out of poverty. Building the capacity of smallholders means helping rural communities to work together effectively, manage their money and natural resources, engage in profitable enterprises and learn how to innovate. These are all important elements in a successful and more sustainable agricultural development strategy.

Field agents, extension workers and development managers typically focus on one particular area of expertise. This series of training modules gives them a broader set of skills they need to understand and support a robust enterprise approach and to build the capacity of local people.

Through building the capacity of local people, we are reshaping the way we support vulnerable communities. As in the case of La Esperanza, communities progressively become agents of their own change. They identify and grasp opportunities that turn previous desperation into a brighter hope for the future.

Carolyn Woo
President and CEO, CRS

Preface

This set of manuals on “Skills for Marketing and Rural Transformation”, or “SMART Skills” for short, presents an integrated and sequential approach to building vulnerable farmers’ capacity to link with markets. The guides are intended for use by development facilitators, field extension agents and community leaders working with poor rural communities. They focus on helping to improve the livelihoods of smallholder farmers by improving the production and marketing of their crops and livestock products.

This guide contains the following parts:

- **The subject matter:** the knowledge and skills you need to master in order to teach the skills. They are printed as lessons on the white pages.
- **Quizzes to test your own knowledge.** These are printed on the light green pages. The answers are given at the end of the guide.
- **Exercises:** these are guides to follow in helping the groups master the knowledge and skills they need. These are printed on the pages marked with a green stripe. The lesson plans are also available as a PDF document at www.crsprogramquality.org/smart-skills-for-farmers/. You can print out these pages and have them laminated so they last longer.
- **Staff exercises.** These give you and your colleagues practice in particular skills. They are also printed on pages with a green stripe.

The training methods it contains are proven, and take into consideration the capabilities of field agents and the populations across many countries in Africa, Asia and Latin America. Many examples and records used in the guide come from field experiences and real cases. Names and other information, however, have been changed.

HOW TO USE THIS GUIDE

As a user learning the material. Read through this guide lesson by lesson, section by section, trying to absorb the information presented. Read both the lessons and the accompanying exercises. At the same time, picture how you would use the information and techniques described to help you work with farmers on developing their agro-enterprises. At the end of each lesson, answer the short quizzes. Check your answers with the list at the end of the guide. If you get all the answers right, congratulations! Go on to the next lesson. If you did not get all the answers right, go back to review that section again before moving on to the next lesson.

As a trainer working with field agents. You can use this guide to teach other field agents. You can present the information in the text, then work through the exercises with the participants. Guide the field agents on how they should conduct and monitor the training sessions. For some of the exercises, you can ask the field agents to pretend that they are farmers.

As a field agent working with farmers and other rural people. Once you have taken this course and passed the quizzes, you can use the guide to work with community members to develop their skills. Every group and every situation is different, so this guide cannot anticipate every problem you may come across. You should adapt the relevant items as necessary and use this guide as a basis for building your own series of learning events. If in doubt, check with your supervisor or ask your colleagues for advice.

Before teaching these materials, review and modify the following elements for your own local situation:

- **Names** of people, villages, and groups.
- **Currency.**
- **Amounts of the items** shared in the examples. These amounts could vary based on the target group's income levels. If the amounts are either too large or too small, participants may not feel that these tools apply to them.
- **Stories.** There may be more relevant examples for your community that will better communicate the objectives.
- Items being **bought and sold.**
- Types of **income generating activities.**
- When items are sold based on the **local seasons.**

Wherever possible, work in a **participatory manner** with the participants. This means you should make sure that it is the participants who are gathering and analyzing information and making decisions that will affect them. Your role is to facilitate their learning, not to do the job for them.

As a reference source. You can also use this guide as a reference. If you need to check on a technique or concept, look it up in the table of contents.

LEARNING ONLINE

If you are a CRS staff member or partner, you can also study the ideas in this guide online, through an e-course. Contact your CRS supervisor for a username and password. Once you have been registered for online courses you can begin the e-learning version.

The e-courses use the same text, quizzes and exercises as in this guide. Many of the tables are presented as **forms** that you can fill in online to help you record and analyze the data you have collected.

SMART SKILLS GUIDES

This series consists of the following guides.

- Introduction to SMART Skills for rural development
- Organizing and managing farmers' groups
- Understanding natural resources
- **Managing natural resources (this guide)**
- Facilitating saving and internal lending and savings communities (SILC)
- Financial education
- Marketing basics
- Seven steps of marketing
- Promoting innovation.

These titles are also being developed as distance learning products. As the process is rolled out and experimented with in different situations, we look forward to receiving feedback on modifications and improvements so that these learning products can be continually improved.

FARMBOOK SUITE

Farmbook Suite is a set of integrated mobile tools that have been developed to help agents support farmer groups. The tools are designed to assist with registration and basic data collection, improve training, support business planning, market analysis and monitor geo-referenced service delivery.

Farmbook Suite has several features to meet the needs of farmers, field agents and project managers:

- **Map & track for implementation and basic monitoring of farmer groups.** This application collects important farmer data to streamline and strengthen farmers' registration, e-learning, business planning and monitoring and evaluation at scale.
- **SMART Skills e-learning.** These courses provide agro-enterprise training to help farmers to increase production, grow their incomes and engage with markets.
- **Farmbook business planner.** This tool guides field agents and farmers through the process of creating business plans that are based on participatory value-chain studies.

These features will allow field agents to do the following:

- Register a farmer group
- Track the delivery of training to farmer groups by field agents
- Collect monitoring and evaluation information using digital forms
- Take e-learning courses
- Use the business planner to write a business plan
- Analyze pre- and post-season costs, revenue and profitability.

To learn more about Farmbook, visit the CRS.org website.

Acknowledgments

This manual and the other manuals in this series are the product of a process that was initiated in 2002 with Agroenterprise Learning Alliances in East Africa and Central America. Catholic Relief Services (CRS) and the International Center for Tropical Agriculture (CIAT) were co-facilitators and among the principal participants in these Learning Alliances. Since 2002, many other organizations and individuals have contributed to the content by adding new knowledge and experiences and by reviewing the materials brought together in this publication.

Sincere thanks to the following persons, without whose support we would have been unable to complete the manual:

- The many farmers and other community actors who have participated in CRS's agro-enterprise activities across three continents and whose needs and demands we hope are reflected in this manual.
- Jorge Enrique Gutiérrez, who produced the graphics.
- The CRS team of senior writers: Dina Brick, Gaye Burpee and Geoffrey Heinrich.
- The technical support and experience of David Gandhi.

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Introduction

Any agriculture or agro-enterprise project should consider the management of natural resources. The protection and sustainable management of soil, water, and land is critical for securing the long-term impact of your project. You've already learned about key concepts related to natural resource management in the previous manual. How can you use that information to help farmers improve their livelihoods by conserving and protecting the natural resources they depend on?

You have an important role to help farmer groups develop natural resources strategies and to organize these strategies into a **natural resources management plan**. Such a plan identifies key problems, sets clear objectives and goals, provides a detailed description of activities (including a timeline with dates and names of people responsible and a list of resources required), and presents a detailed budget to execute the plan. It also identifies indicators that enable groups to monitor and measure successes and challenges. A natural resources management plan can be used in multiple ways:

- As part of an agro-enterprise process where you're helping farmers to organize and sell to markets
- As part of production and livelihoods program where you're helping farmers improve their agricultural practices
- On its own, where your main goal is to improve livelihoods and reduce the community's impacts on global climate change through better natural resource management.

The best way to prepare and implement a natural resources management plan includes community engagement, information gathering, using **participatory rural appraisal** and other methods, and active participation from relevant community members. This effort may span several weeks or months, depending on the level of intervention and resources available. As the field agent, you will fulfill the role of facilitator, guiding the farmers through a series of exercises and actions, which will help them define the different components of the plan.

You can use the information from this module to identify appropriate techniques or technologies to utilize with your groups and lead them through successful implementation of their natural resources management plans. This module should be used along with the accompanying module, *Understanding natural resources*.

WHAT IS IN THIS MANUAL

There are many ways to design and implement a natural resources management plan. Most will contain some version of the basic steps outlined in the seven lessons of this manual:

- **Engaging the community.** Before beginning a project, you have to take a number of decisions regarding the types of groups you'll be working with, and whether you'll be focusing at a farm/plot, community, or watershed level. In this lesson you'll make key decisions about your project. You'll also conduct an initial meeting with farmers to motivate them to assess and explore improvements in their natural resource management.
- **Understanding the community context.** As a field agent, you must be familiar with the local context. This includes more than the biophysical environment. Good planning requires an understanding of the socioeconomic and policy context in which people build their livelihoods. In this lesson, you'll gather overall information about the area where you work.

- **Identifying and engaging stakeholders.** Natural resources are essential for the local community and are not confined by administrative boundaries. It is critical to understand all the different people who have a stake in natural resources and how they use and depend on these resources. In this lesson, you'll determine how to engage stakeholders that have interest or influence over resources.
- **Mapping natural resource problems and opportunities.** You will help farmer groups identify and map the resources in their area. Mapping is an inclusive exercise that gathers input from all affected members of the community by using participatory methods. In particular the differences between use and importance of natural resources between men and women will be addressed. Based on the goals they have chosen for their farms and communities, you will help them identify problematic areas (so-called hotspots) and areas that have high potential.
- **Making a natural resources management plan.** With your support, farmer groups and community groups will develop an "action plan" for implementing the identified interventions and achieving the desired objectives. Using information about the physical and socioeconomics characteristics, you will guide the group in identifying a package of appropriate management interventions for the different priorities. Action planning involves creating a timeline for activities with indicators for measuring success, assigning the responsible persons for each action, and securing the necessary resources for implementing the selected interventions.
- **Managing a natural resources project.** In this lesson you will learn the key roles you have as a field agent in the management of a project that deals with natural resources. You'll also learn about some skills you can look to build. This step will involve the creation of demonstration plots, pilots or on-farm trials, and providing new ideas and the materials needed to test these ideas. These actions are guided by an "adaptive management" approach, in other words enabling farmers to examine the effects of their efforts and to change course as needed in order to find the interventions that work best.
- **Monitoring progress.** With rural farmer groups and families, you will also track the implementation of the natural resources management plans. You will jointly develop a monitoring and evaluation system to measure progress. Also you will learn how to effectively use maps to monitor data over time, and how to integrate gender considerations in your monitoring. This system will allow you to measure progress and also to assess the impact of your activities more effectively.

Local people are the key agents of change. It is they who know and understand their problems and can offer some of the most practical solutions. You should use various participatory methods to draw these ideas out and share them across the community. A participatory approach enables you to learn together with local people, helps them realize that they can solve their problems, and gets them excited about doing so.

Participatory methods enable farm families to actively explore and experiment with the new ideas, instead of passively listening to lectures about new technologies. By taking active part in making decisions, farmer groups, community groups and farm families are on a good path to take ownership of the solutions and to apply them widely in their agro-enterprise.

Lessons



LESSON 1. ENGAGING THE COMMUNITY

IN THIS LESSON

This lesson describes the first steps in starting your natural resources management project and engaging the community. After completing this lesson, you will have:

- **Determined the focus of your project.** What kinds of groups will you be working with, and at which level (plot/farm, watershed or community)?
- **Held your first meetings.** How can you generate excitement and ownership about natural resource management?



WHAT IS THE FOCUS OF YOUR PROJECT?

The first step is to decide **who** you will be working with. Will you be working with groups or individuals? If you are working with groups, what kinds of groups? You will be faced with the challenge to decide the **geographic scope** of your work. Will it be at plot/farm level, micro-watershed level, or community level? Will you be working within watershed boundaries or administrative boundaries?

GROUPS OR INDIVIDUALS?

When seeking to improve how a community manages their natural resources, should you look to work with individuals or groups?

Working with organized groups is a good idea for several reasons:

- Many tasks can be tackled only by groups of farm families or by the community as a whole.
- Working with groups lets you reach many more people than if you were to visit individual farmers.
- Organized groups are likely to be much more effective than the same number of unorganized individuals working independently.

In some cases it may be necessary to work with individuals. For example, larger landowners may own land in critical areas of a watershed, and their practices affect farmers downstream. Working with individuals is often time-consuming and requires a lot of effort and resources. But the individuals may be critical to good resource management for the whole community or watershed.



TYPE OF GROUPS

The type of group you work with will depend on the kind of project:

- If your project is designed specifically to manage natural resources, you might work with groups already involved in some aspect of natural resources, such as **producers' associations**, **water committees**, and **innovation groups**.
- If the natural resources aspects are part of another marketing or production project, you might work with other groups, such as **savings and lending committees** or **marketing and agro-enterprise groups**.

Check whether existing groups are interested in specific natural resources. See the module in this series on *Organizing and managing farmers' groups* for ideas on how to strengthen or organize groups.

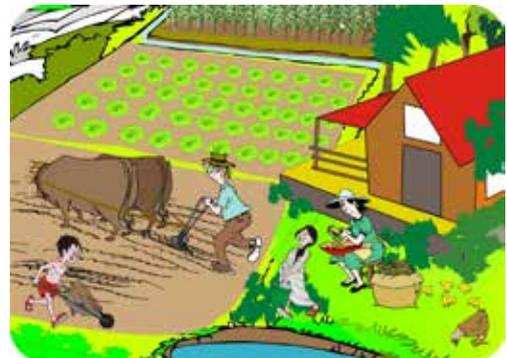


GEOGRAPHICAL SCOPE

Efforts to improve the management of natural resources can take place at different levels:

Individual farms. Certain types of work can be done by individual farmers on their own land. Examples:

- Planting grass strips
- Making compost
- Improved cultivation practices
- Planting forage on bunds
- Planting trees on field boundaries and at home
- Reducing pesticide use
- Recycling waste.



Groups of farmers. Other types of work may be better handled by groups. Many practices to manage natural resources require quite a lot of labor and are too much work for any individual farmer. They require several neighboring farmers to cooperate. Examples:

- Building terraces, contour bunds and channels to divert water
- Maintaining tree nurseries
- Planting woodlots and windbreaks.



Community or watershed. Some types of work need to be planned and carried out by the community as a whole, perhaps even over an entire watershed. These actions directly affect the entire community and require the community's participation and approval to work properly. Examples:

- Filling in large gullies
- Keeping livestock out of certain areas
- Protecting springs and watercourses
- Building small-scale irrigation schemes.



District or national. Certain types of activities need the involvement of the district authority or the national government. These include major earthworks that require heavy equipment and professional expertise, policy changes, and works that require government approval. Examples:

- Building large dams or big irrigation schemes
- Transfer of responsibility for managing forests.

Working at a higher level usually requires more resources and additional assistance, but has the possibility of reaching more people. Choose a scale of engagement that makes sense for your project and your community. The outcomes of a project are often more sustainable when all levels are engaged in some way.

WATERSHED AND COMMUNITY APPROACHES

The boundaries of a watershed only rarely coincide with administrative boundaries. Should you use a watershed approach, or should you work within particular administrative areas (such as a village or sub-district) or one defined by the community?

A **watershed approach** is a useful way to plan and manage natural resource activities. People within watersheds share the same resources, and what someone does upstream has an effect downstream. Because of this, a watershed approach enables communities to focus their efforts to manage their shared resources.

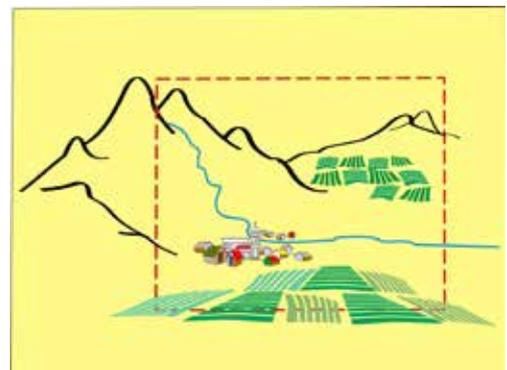
A **community approach** refers to managing an area that is defined by the people living in it even if it covers more than one watershed.

Both have advantages and disadvantages:

Watershed. May be a good approach when watershed areas are easily defined (such as hilly areas), and where erosion and water conservation are problems. This will require coordination with different local authorities, private landowners, and other community members where a watershed crosses administrative boundaries. It will also require good communication between people living upstream and those living downstream.

Community. Makes it easier to plan and manage activities with local authorities. This approach is appropriate when watershed boundaries are difficult to mark, or when watershed protection is not a priority.

In general, where erosion and water management are the main problem, you should try to work within watersheds, or sub- or micro-watersheds within a larger watershed. Where the main problems are not linked directly to watershed boundaries, it may be more convenient to work within an administrative area.



Conflicts or management concerns may arise if communities span more than one watershed, or if parts of a watershed or community area are owned by landholders who do not wish to participate in your natural resource management efforts. Be careful that you are aware of these and are able to address them.

CHOOSE A LEVEL

The most appropriate level at which to plan and carry out activities depends on the situation: the type of problem, the availability of resources, the project's goals, and the needs and opportunities in the community.

Discuss with local people the implications of working at different scales. It is likely that the group will plan some activities for their individual farms, and some at the community or watershed level.

FIRST MEETINGS

Once you have identified the groups to work with and determined the scope of your project, you are ready to have your first meetings. During these encounters you can introduce the groups to the project, and begin discussing what goals in terms of natural resources to achieve. It is important to get the participants excited about the work during your first meetings!

GENERATE INTEREST

A good idea for a first meeting is to discuss with local people about their resources and why they value them. See Exercise 1a for information on how to generate interest and commitment to the project, and ensure that the project meets the needs and goals of the farm families. You will also be learning together about important natural resources.



FARMERS' VISION AND GOALS

Whether you are working with existing groups or helping form new ones, you need to understand their priorities. To work effectively together, they need to develop common goals regarding crop production and the sustainable management of natural resources. These goals must reflect the different voices, needs and interests in the community so you can help them build links between these goals and livelihood needs.

In one of your first meetings, you should identify the members' vision for their farms and communities. Some questions to ask:

- What would you like to improve regarding your land, water, vegetation, animals or livestock, and other resources?
- What natural resources do you want to maintain?
- How does natural resource management fit within the broader livelihood and community goals?
- Five years from now, how would you like your community to look? What is the state of the forest, water and soil resources? How are livestock used and managed? What natural resource problems have been resolved?



The goals of the groups will vary. For example they may have more **general goals**:

- Reduce erosion in the community,
- Improve overall production by managing soil fertility,
- Stop the decline in firewood and timber.

Goals may also be more **specific**, such as:

- Develop a woodlot to assure a ready supply of firewood and timber,
- Maintain reed-beds to make mats and baskets.

By helping farmers identify their goals, you can help them decide which problems are the most important to them. **Exercise 1b** will help you guide farmers in determining their goals.

SUSTAINABILITY AND COMMUNITY OWNERSHIP

Sustainability is a big challenge for some projects. In many cases, NGOs pay farmers to conduct soil- and water-conservation measures, or to build large structures such as dams and canals. If local farm families view activities as “belonging to the project” and not as their own, it will be difficult to keep the community engaged in these activities after the project ends.

Projects are more likely to be sustainable if:

- The community group see a value in them.
- Participants really own the process and take leadership in decision-making about activities as early as possible.

Projects that make few or no payments in cash or in kind last longer. Those that bring in multiple actors to agree how to finance activities without project inputs last the longest. These actors may include government officials, local businesses, other projects and donors, and resource users from upstream and downstream. Project resources can be used to cover major costs that local actors cannot afford, or can provide start-up capital. Discuss with groups any payments that the project will provide, and work with them to plan for other financing.

CONCLUSION

This lesson has discussed how to determine the focus of your project, including the types of groups you will be supporting and the level at which your project will be based: farm, community, watershed, or regional.

We reviewed some of the characteristics of the watershed and the community approaches. We also discussed how to use the first meetings to engage the community and earn their trust and sense of ownership. These are essential elements to make natural resources management interventions sustainable.

The next lesson will delve deeper into how to understand the host community and the project context.



BOX 1 ENSURING SUSTAINABILITY IN AFGHANISTAN

A CRS program in Afghanistan paid local people to work in a soil and water conservation scheme. The local watershed committees decided to keep 10% of the money they earned in a community fund. They later used this fund to support economic activities of their women members and to conserve soil and water in other parts of the watershed. Setting up this fund was important because it increased the sense of ownership and perceived benefit of the conservation work, thus also increasing the responsibility that the members felt towards the conservation efforts.

QUIZ 1

Answers at the end of the guide.

1. Why is it usually better to work with groups in a natural resources management project?

- A. Working with groups lets you reach many more people than if you were to visit individual farmers.
- B. Organized groups are likely to be much more effective than the same number of unorganized individuals working independently.
- C. Many natural resource management tasks can be tackled only by groups of rural farm families or by the community as a whole.
- D. All of the above.

2. Planting trees upstream of an important community spring is probably an example of a natural resources management project taking place at what level?

- A. A farmer group
- B. Watershed
- C. Individual farmers
- D. National

3. Which of these questions should NOT be asked during the first meetings with farm families and their communities?

- A. What natural resources do you want to maintain?
- B. How is livestock used and managed?
- C. Which farming tools do you need the project to buy for you?
- D. How does natural resource management fit within the broader livelihood and community goals?

4. Certain types of work can be done by individual farmers, while others need to be done by groups, the community as a whole, or with the involvement of the national government.

Match each type of work with the most appropriate level.

TYPE OF WORK	LEVEL
A. Making compost	1. Community
B. Building a big dam	2. Individual farmer
C. Planting a windbreak	3. Group of farmers
D. Filling in a big gully	4. National government

5. You are working in an area with steep slopes where there is a lot of erosion. Which approach should you use?

- A. A community approach
- B. A watershed approach
- C. A land-management approach
- D. A marketing approach

6. Three projects are helping farmers to control soil erosion. Which one is likely to have the longest-lasting effects? Which is likely to have the shortest effects?

Put the projects in order, starting with the one likely to have the most permanent effects.

- A. A project that pays farmers to do the work
- B. A project that works with farmers but does not pay them
- C. A project that works with farmers but does not pay them. It also works with the local authority and people living further up the hill.

EXERCISE 1A. WHY ARE NATURAL RESOURCES IMPORTANT?

This activity explores people's awareness and knowledge of natural resource issues in their area.

OBJECTIVES

After completing this exercise the participants will be able to:

- Determine what natural resources are important for their livelihoods.
- Create awareness about the importance managing natural resources, and generating interest in this work.

EQUIPMENT NEEDED

- Flip chart and markers

TIME REQUIRED

- 1 hour

EXPECTED OUTPUTS

- List of natural resources, their characteristics and problems associated with them

PREPARATION

- Prepare a list of questions beforehand

SUGGESTED PROCEDURE

1. Divide the participants into two groups: one of men and one of women. (If the participants consist only of men or women, just divide the group in half. Differences in opinion will emerge and will serve as useful discussion points.) Give each group a flipchart sheet and marker pens.
2. Ask the participants to make a list of the **natural resources** they use (Table 1). This should include:
 - Different land types or areas (cropland, grazing land, forest, hillsides, valley bottoms, marshes, etc.)
 - Water sources (springs, rivers, ponds, groundwater)
 - Trees (forest, hedgerows, woodlots)
 - Plants (crop types, medicinal plants, wild plants)
 - Animals (livestock, insects, wild animals and birds, fish).
3. For each resource, ask them to note how they **use** it. For example, they may say that they use certain leaves for local medicines or teas; they collect fruit to sell; they use reeds to make mats; they cut trees for firewood; they fetch water for drinking and bathing etc.
4. Ask the participants why each of the resources is **necessary** for them. What would they do without them?
5. Ask the participants if they see any **trends** in the amount or quality of the resources? Are they more or less available today than they were one year ago or five years ago? Which ones are declining? How quickly? How do these trends affect people? What will happen if the trends continue?
6. Ask each group to **rank the key natural resources and the associated problems** in order of importance.
7. Bring the two groups back together. Compare and discuss their lists of priority resources and associated problems. Highlight the similarities and key differences between the two.
8. Explore the participants' interest in learning more about natural resources and solving the problems they have identified.
9. Summarize the discussion by recapping the most important natural resources, the trends each one experiences, and the top priority issues.
10. Plan a regular schedule of meetings. Make sure the details are agreed upon: one day per week? what time? where?

Assessing natural resources

TABLE 1 FORM FOR ASSESSING NATURAL RESOURCES

TYPE OF NATURAL RESOURCE	HOW USED	WHY NEEDED	TRENDS	RANK
Land types				
Cropland				
Grazing land				
Forest				
Hillsides				
Valley bottoms				
Marshland				
...				
Water sources				
Springs				
Rivers				
Ponds				
Groundwater				
...				
Trees				
Forest				
Hedgerows				
Woodlots				
...				
Plants				
Crops				
Medicinal plants				
Wild plants				
...				
Animals				
Livestock				
Insects				
Wild animals, birds				
Fish				
...				

EXERCISE 1B. SETTING GOALS

OBJECTIVE

After completing this exercise the participants will be able to:

- Determine the goals that farmer groups have for their livelihoods.
- Prioritize goals that farmer groups care about the most.

EQUIPMENT NEEDED

- Resource list from Exercise 1a, flip chart and markers

TIME REQUIRED

- 45 minutes

EXPECTED OUTPUTS

- Present and future lists

PREPARATION

- Exercise 1a
- Prepare a list of questions beforehand.

SUGGESTED PROCEDURE

1. Refer the participants to the lists they made in Exercise 1a. You may refer them to the discussion you had during previous meetings as well.
2. Divide the participants into groups of men and women. If the participants are all male or all female still divide them in different groups as valuable insights may emerge. The size of the groups will depend on the situation; it may be appropriate to have more than two groups.
3. Ask groups to look at their current list of existing resources. The three main questions are:
 - What are your main goals for your farms or community resources for your livelihoods?
 - What would you like your farms or community to look like in the future?
 - What are the key changes that would need to take place in order to achieve your goals and have the farms and community you want in the future?

4. Ask each group to draw the farm or community they would like to see in the future. Make sure that they include as much visual detail as possible, and that they describe the details if needed. For example, if there is a section of land covered by forest, ask them to specify what type of trees and vegetation are there. How do they see themselves using these trees? What else is there in the forest? Ask them to share in plenary.
5. Once the groups have identified the resource-related goals, ask them to prioritize them based on production, income, health and livelihoods. Highlight the top two or three goals on this list and compare them with the other groups. What important similarities are there between the different lists? What are the differences?

QUESTIONS FOR DISCUSSION

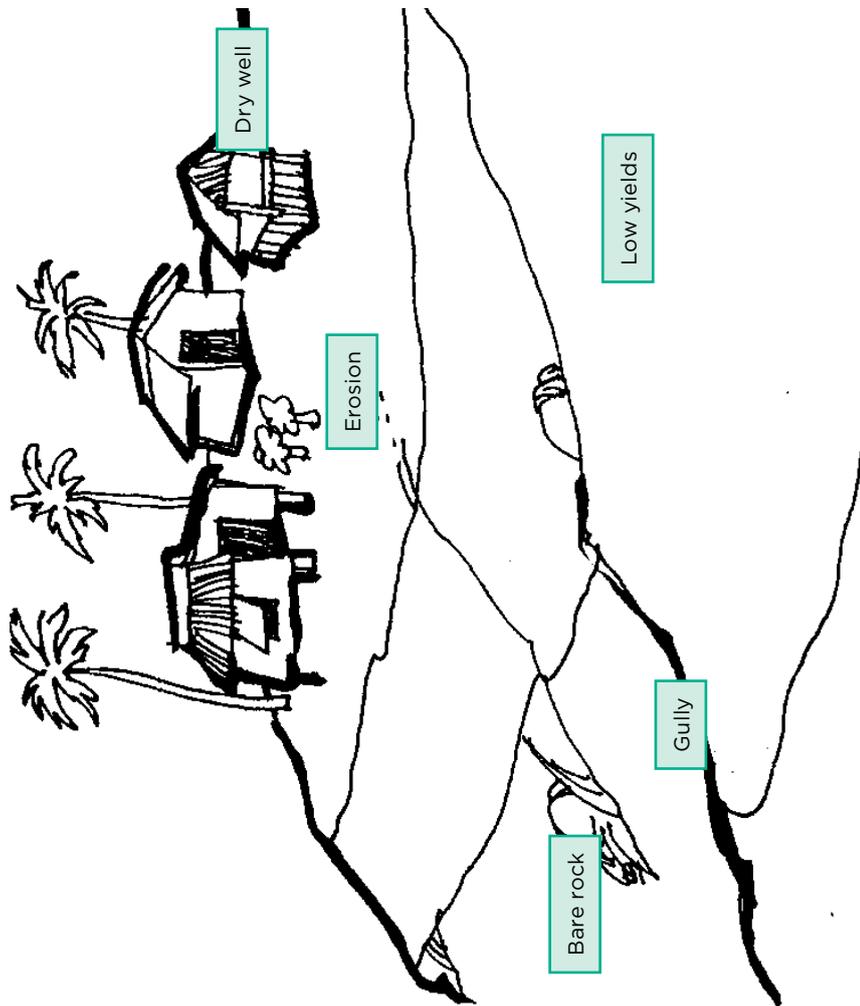
What are the most important goals for men and women? If they are different, what are the two or three main goals the group would like to prioritize? Consider selecting at least one each from the men's list and the women's list.

NOTES

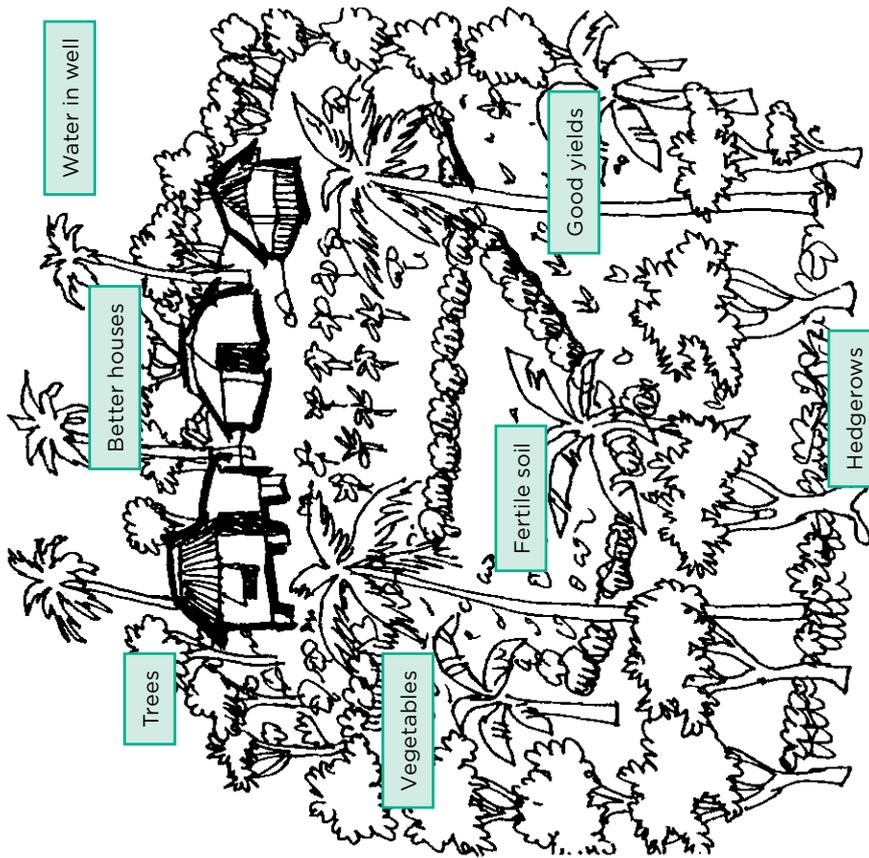
You may get many varied answers when you ask about goals, but continue to probe. Narrow the goals to those that are explicitly related to soil, water, and vegetation for all members of the group. For example, ask farmers to look at the goals they have listed. Which of these are related to your soil, water, and vegetative resources? Probe with further questions related to these resources. For example, if the response is "we want higher incomes," probe to find out more. What on your farm, or from your community, currently provides you with income? If farmers say it's their maize crop, there are several management practices they can use to increase the productivity of their maize. If farmers say it's their petty trading, note this down, but continue to probe to find other priority goals related to natural resource management. Organize identified goals by whether or not they are primarily related to local natural resources.

Setting goals

Current situation



Vision for future



LESSON 2. UNDERSTANDING THE COMMUNITY CONTEXT

IN THIS LESSON

As a field agent starting up or incorporating a natural resources management activity in a new area or existing project, you need to first understand the **community context**: the natural resources themselves, the socioeconomic background of the people, the policies and politics that govern natural resources, and any existing programs and actors active in the area.

After completing this lesson, you will have:

- Understood the key biophysical and socioeconomic information in natural resources projects.
- Learned about some of the participatory rural appraisal tools that you can use to gather biophysical and socioeconomic information.



LEARNING ABOUT WHERE YOU WORK

Many factors affect natural resources and depending on the location, farmers face different types of problems and opportunities.

Farmers who live in the Sahel in Africa, where soils are sandy and rainfall is less than 400 mm a year, face different problems from farmers living in lowland Bangladesh, where soils are rich but prone to annual floods.

Even at the local level, neighboring farmers often deal with highly varied conditions. For example, farmers with land at the top of a hill work in cooler conditions, with less water than those working in the valley bottom.

Many factors affect field conditions: the climate, soil type, elevation, the direction a field faces relative to the sun, the local land use, population, livelihood opportunities, land ownership and other socio-economic factors.

Being able to successfully work with a community on improving their natural resource options will depend not only on your understanding of the physical conditions but also your ability to gain the trust of the community. You will need to use both your social and technical skills to gain the community's support.

If you have prior experience working in the area and know the local people and the challenges they face, you may already be aware of some of the natural resource management problems. If you are new to the area, you should start out by getting a quick overview of the situation and the likely problems, before collecting detailed information about the community and its natural resources.

During your first visits, take time to understand the community. Try to learn about:

- The main natural resources and biophysical characteristics of the area.
- How local people use the different natural resources available to them to enhance their livelihoods.
- Differences between men and women's access to natural resources.
- How local people value different natural resources, including cultural norms, and practices.
- The local social and economic conditions that affect natural resources and people's livelihoods.



- Institutions, organizations, or local initiatives already active in the community.
- Key stakeholders you will need to meet or work with.
- Policies and governance structures, including who has ultimate authority on the use of forests, water sources and land.

TRENDS IN THE PHYSICAL ENVIRONMENT

At this stage, you just need to get a general understanding of community resources. Too much information can be confusing! A good way to collect the most important information is to look at **opportunities, challenges and trends**. Ask farmers: How do you use these resources now? What are the opportunities that these resources offer you in the future? What challenges to these resources present? What are trends have you been seeing over the past 5 years? 10 years? Below is a checklist of information you might collect as part of your trend analysis of the physical environment. Adapt these questions to suit your project goals.

AGROECOLOGY

Is the area arid, semi-arid, or humid? Is the land flat, gently sloping, or hilly? Irrigated or non-irrigated? Are there any wild birds or animals?

Have people noticed any changes in overall climate, or changes in patterns of rainy or dry seasons?

SOILS

Soil characteristics. What types of soil are there? What are the soil characteristics (sandy or clay; fertile or infertile)? How deep is the topsoil? How long will the soil hold water? Is the soil easy to cultivate? Are the soils different in different parts of the area? What do farmers do to maintain their soil fertility?

Do you see changes in soil characteristics compared to before? (More stony? Less topsoil? Fertility going up or down?)

Soil erosion. Do people see signs of erosion anywhere? What are the signs? Where is erosion a problem?

Is erosion getting worse or better anywhere? What do people do about it?

PLANTS

Crops. What crops are growing well on which soils? Which crops are grown, using which practices (monoculture, intercropping, rotation; plowing, direct seeding etc.)?

Are there any changes in cropping patterns? If yes, why?

Trees. Which tree or other plant species do people use? Where are they found? What types of trees do people plant and where? What do they use them for?

Forests. Is the cutting of trees in forests or communal lands controlled or managed in any way? How and by whom? What has happened to the forest resources over the last 10 years?



WATER

Water use. What are the community's main water sources? How do they use water – for irrigation, drinking water, household use, animals?

Are water resources increasing? Decreasing? Why? What needs to change?

Watershed management. Do people manage their watershed?

What is happening within local watersheds? Loss of trees? Loss of soil? Loss of water through too much runoff? What needs to change?



LIVESTOCK

What kind of livestock do people keep?

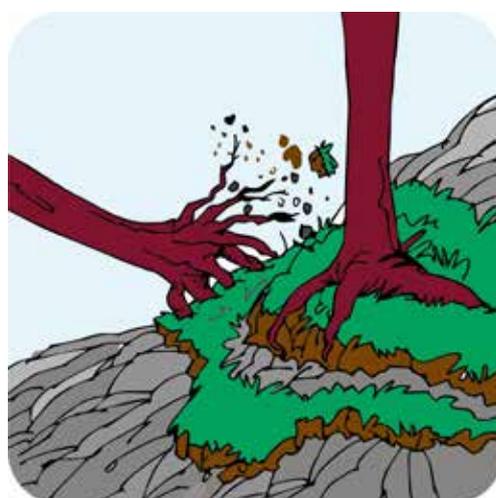
Are the numbers of livestock in the area increasing or decreasing? Which types of animals? What is the impact on people and the environment?



VULNERABLE OR HIGH RISK AREAS

In the past 10 years, what natural events have threatened natural resources or livelihoods? Are these at risk of happening again?

Is the frequency of natural disasters increasing? Decreasing? Which ones? What might be the cause(s)?



SOCIAL AND ECONOMIC ISSUES IN MANAGING NATURAL RESOURCES

Improving the management of natural resources requires an understanding not only of the **physical environment** (soils, plants, water, etc.), but also of the **social and economic situation**, including the policies and governance. Below are some examples of issues that will probably impact the success of your project, with questions you might want to ask.



THE ECONOMY AND MARKETS

People's economic situation may be a driver of how they value natural resource management. Most people will want an activity to benefit them in a concrete way so they are motivated to continue doing it. If their main income comes from agriculture, they can improve their livelihoods by managing natural resources well.

If your project has an agro-enterprise goal, then your farmer groups will need to know about local market potential for their product.

Take special care to note who controls resources; resources are not always equitably distributed and can be a source of great conflict (see "Ownership and control of natural resources" below).



BOX 2 ASSESSING THE ECONOMIC SITUATION

What are the main sources of income in the community? How does this change over the seasons?

What natural resources are most valued economically?

- Who has access to these resources, and how do they get access?
- Who controls access to these resources, and how?
- Who is responsible for managing these resources, and are they doing a good job?

Where are the main markets? Who has access to them? Who does not?

What expenses are men in charge of? What expenses are women in charge of?

During what seasons do people have the hardest times to make ends meet? What are the agricultural or natural resources that are most utilized during these seasons?

What markets exist for products that can be produced in environmentally sustainable ways?

What markets might exist for environmental services?

In all these questions it is important to try and understand differences in men and women's access and control of resources that provide economic gain. When we come to designing interventions, this information will be important in taking the right choices in terms of technologies and the respective roles and responsibilities of both men and women.

POLICIES, LAWS, AND INSTITUTIONS

Every country has different policies on managing resources, and usually policies can differ quite widely from one resource to the next. Some governments are quite strict in enforcing the policies they see as important; while others countries may not apply their laws very strictly or sometimes not at all.



BOX 3 ASSESSING POLICIES, LAWS AND INSTITUTIONS

Water: What are the local policies governing water use from different sources (bore holes, rivers, dams, other)?

Forests: What are the local policies governing forest management and use?

Wild animals: What policies govern how wild animals are protected or hunted?

Livestock: What policies exist for controlling herds? Do animals need to be tethered?

Who makes the regulations and who enforces them? Are regulations enforced?

How active and present are the local and national governments?

Does the local community have a say in how local natural resources are used?

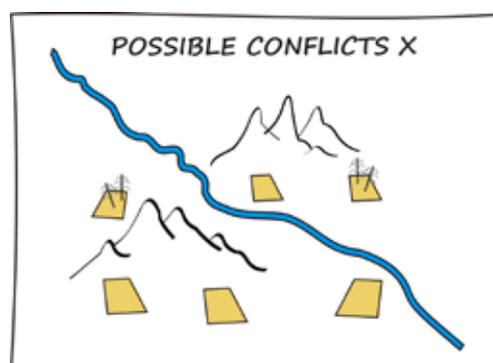
What happens in the case of a conflict?

OWNERSHIP AND CONTROL OF NATURAL RESOURCES

Some people in the community may have more responsibility over natural resources than others. Some people own their own land, while others have to use other people's land to farm. **Land tenure**, and how land is passed from one person to another, also vary from place to place. In some cases local communities have exclusive fishing, hunting or gathering rights, in others they have to share their resources with other nearby communities.

When resources are scarce, they can be a great source of conflict. If different groups of people use resources in different ways, this can also cause conflict. For example, farmers may come in conflict with livestock herders over access to the same plot of land that they cannot share: if it is used for farming it cannot be used for grazing. Make sure that different groups of people are involved in decisions on how to improve management, and monitor how they apply and benefit from the resource.

A conflict mapping exercise, such as Exercise 2b, can help you identify possible areas of conflict. Staff Exercise A provides additional information for facilitators who are interested in more in-depth analysis of conflicts over natural resources.



BOX 4 ASSESSING OWNERSHIP

Resource ownership and land tenure. What are the formal or informal rules governing land ownership? How is land passed from generation to generation? Do women and men face different benefits and challenges in terms of land ownership or land tenure?

Are there any regulations about how **communally owned land** (crops or grazing) is used? Who makes these regulations? Who enforces the regulations? Are they being enforced properly?

Landholding patterns. How many people are landless? How many farmers can be considered small, medium or large farmers? Are there many sharecroppers?

Common property. What types of common property exist? How is it managed? Are there any rules about conservation (e.g., bans on cutting trees, wildlife protection, replanting)?

Conflict. Are there resources that cause frequent conflicts? How are these conflicts regulated? How effective are these methods?

VULNERABLE PEOPLE

Think about the needs and potentials of different kinds of people in the community – rich and poor, young and old, farmers and herders, households headed by women and those headed by men, people owning the land and sharecroppers, and others. Each person's situation is different.

Helping the poorest farmers and most vulnerable people improve their natural resource management is very challenging. They usually have little if any formal education, live with disabilities (e.g., in places where many have been injured in violent conflicts), or are faced with other challenges (like HIV/AIDS). They could also belong to minority ethnic groups or lower socio-economic classes, which traditionally suffer discrimination.

Such people may not be able to spare time to attend discussions, may be stigmatized from participating in events, or may need extra help in trying out new technologies. They may not have any land, or their land may be in the most remote places or have the worst soils on the steepest slopes.

Exercise 2a gives some tools to ensure that the activities also support the poorest people in the community. It can also help you identify the main livelihoods options in the community where you work, so that your project can support those opportunities.

HOW TO GATHER INITIAL INFORMATION

There are several ways to gather information about natural resource management, including **participatory rural appraisal** tools that you may be familiar with. Depending on your situation, you may wish to use only some of these tools. Feel free to adapt them or add other tools you know. Only gather information that is relevant.

Collect only information that you know you will use in your work!

DIRECT OBSERVATION

When you visit the area, use your own experience and training to identify problems and possible solutions. Walk around to become familiar with the area and its problems. If you visit in the rainy season, remember that things may look very different in the dry season.

Tip: Take care to examine the soils especially; they can tell you a lot about the area and its potential. Use the soil tests in the *Understanding natural resources* module.



BOX 5 ASSESSING VULNERABLE GROUPS

Who are the most vulnerable people, according to the community? How many are they and where do they live? How is their relationship with others in the community?

How is their quality of life (housing, nutrition, health) relative to others in the community?

How are their livelihood options and practices connected to natural resources?



TALK TO LOCAL PEOPLE

Talk to a wide range of people to find out the problems they face and the solutions they hope for. You can interview people individually or in small groups, or conduct focus-group discussions on particular topics. Make sure you talk to a cross-section of people: men and women, rich and poor, landowners and landless, old and young. Note any differences among these groups.

Tip: Make sure you meet with local leaders before you plan any community meetings.



KEY INFORMANT INTERVIEWS

Find out who are the key individuals and leaders in the community: local leaders, heads of producer or marketing groups, heads of women's groups, heads of watershed or water-user committees, officials from the relevant ministries or local government units, staff of development organizations and other stakeholders.

Tip: Don't forget the private sector. You may find that they are willing to invest in products that contribute to sustainable agriculture and natural resources management.



PARTICIPATORY APPRAISAL

Techniques such as transect walks and seasonal calendars are helpful. Some techniques, such as socioeconomic analyses, may require more time with the communities.

Tip: See Exercise 2c for how to make a seasonal calendar. Look below about conducting a transect walk.



SECONDARY INFORMATION

Gather information from reports and documents, maps, satellite and aerial photographs, official statistics, and other development agencies and projects. You may be able to find this information in the community, in local government offices, through the relevant national government ministries and from development organizations that work in the area.

Tip: A lot of mapping data is also available online.



CONDUCTING A TRANSECT WALK

A **transect walk** is an organized walk across an area during which the participants examine and record the challenges and areas of high potential. The route for the walk is generally selected from a natural resource map of the area. It may be selected because it passes several key natural resources, or because it ensures that it goes through a particular problem area. Areas of high potential can also be included.

Once you have identified a route, ask participants to note or remember what they see along the way. They will use this information to create a **transect diagram**, which may show the crops and other vegetation, water sources, infrastructure like wells or dams, problems such as erosion or waterlogging, and other features. If you want, you can also go into greater detail, and note soil type, tree species or other details. If necessary, do several transect walks from different starting points to make sure you cover all the important land types in the area.

It can be scaled down. For example doing a transect walk on an individual farm to help farmers understand and analyze their own enterprises. Transect walks can provide the first building blocks for choosing intervention strategies at a later stage. See Exercise 2d for detailed instruction on doing a transect walk.



MAKE SURE YOU HAVE A MAP

There are many different types of map available. You can find maps of crop production, land use, soils, erosion, roads, and other infrastructure. A topographical map shows elevations and gives indication of the slope, along with hills and valleys, rivers, roads, and settlements. As it can help you pinpoint high-risk areas, it is a critical resource for soil and water management. If possible, bring such a map to your initial meetings so farmers can identify their communities, buildings and roads, water bodies, farms and plots.

Satellite and aerial images or maps can also help you study the topography and identify physical features, including forest or vegetative cover, or other land use in the community. Google Earth is an easy way to see overall land cover if you have a computer and an internet connection. The information is not usually up to date, but it still provides a useful overview of the area where you work.

CONCLUSION

This lesson has discussed the importance of having a good understanding about the project context. We reviewed key biophysical trends that need to be considered in natural resources management projects (agroecology, soils, plants, water, livestock and vulnerable areas), as well as socio-economic factors that also need to be understood as you implement your project (markets, policies and institutions, resource control, and vulnerable groups). To gather data on these issues we gave some examples of the key questions to ask, we showed the importance of maps, and we introduced tools and methodologies used in participatory rural appraisal.

As a field agent, you now have an excellent toolbox at your disposal to become knowledgeable about the context in which you will be working on.

The next lesson will review another important step in this process: how to identify and work with stakeholders.

QUIZ 2

Answers at the end of the guide.

- When starting to work with a community, you should learn about:
 - Key stakeholders you will need to meet or work with.
 - How local people value different natural resources, including cultural norms and practices.
 - How local people use the different natural resources available to them to enhance their livelihoods.
 - All of the above
- A clear understanding of the physical environment conditions in a community is sufficient for a successful implementation of a natural resources management project.
 - False
 - True
- It is important to target vulnerable people as they often live in areas where natural resources are limited and overexploited.
 - False
 - True

- Match the method for gathering information with the correct example.

METHOD	EXAMPLE
A. Participatory appraisal	1. You read the district's report on water resources
B. Direct observation	2. You talk to the head of the environmental women's group
C. Key informant interview	3. You take pictures of a large gully
D. Secondary information	4. You ask a group of farmers to draw what they consume throughout the year

- You want to conduct a transect walk. Put the activities into the correct order.
 - Draw a transect diagram
 - Analyze the transect with the community members
 - Plan a route to follow
 - Walk along the route with a group of local people
- You have a topographical map and a Google Earth image of the same area. Which two features are easiest to see on the map, and which on Google Earth?

INFORMATION SOURCE	FEATURE
A. Topographical map	1. Roads
B. Google Earth image	2. Field boundaries
	3. Vegetation
	4. Slopes

EXERCISE 2A. VULNERABILITY ANALYSIS

This exercise divides the community into different groups and analyzes how they manage and are affected by natural resources.

OBJECTIVE

After completing this exercise the participants will be able to:

- Determine who are the most vulnerable members of the community, and who are the least vulnerable.
- Describe how people of different levels of vulnerability use natural resources.

EQUIPMENT NEEDED

- Flipchart and markers

EXPECTED OUTPUTS

- List of different groups in the community and their interests in natural resources.

TIME REQUIRED

- 1-2 hours

PREPARATION

- Arrange meetings with your groups.

SUGGESTED PROCEDURE

1. Make a list of the different groups in the community – some that you think are vulnerable, some that are not.
2. Ask the community to brainstorm other groups or categories of people in the community. What else makes some people vulnerable and some not? Be sensitive to the local culture as you write these groups.
3. Facilitate a brief discussion about these different groups of people. Which are the most vulnerable? Which are the least vulnerable? Write down some words that people use when they answer. What does “vulnerable” mean in this community?
4. Next, make a list of the main natural resources in the community that people value. You can use images if some people are not literate.
5. For each resource, discuss each of the groups you wrote down. Ask the following questions:
 - Who has **access** to each of these resources? Who does not?
 - Who has **control** over each of these resources? Who does not?

- Who has a say in how resources are **managed**? Who does not?
- Do some groups cause more **damage** to resources than others? What would motivate them to change their behaviors?
- Do some groups have **opportunities** to benefit from – or to help others benefit from – improved natural resources management?

6. Note these characteristics in a table like Table 2.

QUESTIONS FOR DISCUSSION

You may find, for example, that many of the richer farmers have irrigated land in the valley, while the poorer farmers have small plots on steep slopes. Maybe landless people or children from poor families work on their neighbors’ land or herd their animals. Explore who owns or controls what land; who has rights to resources such as trees or grazing areas; and who has an interest (or no interest) in improving how resources are managed.

- Who are the most vulnerable people in the community? Who are the least?
- How do these vulnerabilities affect natural resources? How does good or bad management of natural resources affect vulnerable people?
- What do the differences in access and control of resources mean for your project?
- How can you ensure that even vulnerable people can benefit from managing their natural resources better?

NOTES

It is easy to overlook entire groups of vulnerable or important members of a community during implementation. The more vulnerable groups (e.g., the destitute) may not be able to attend meetings, or may not feel they have the right to express their views. Similarly, larger landowners may not be interested in the activities although their involvement is vital to success.

During implementation, make sure that all people from all categories are somehow involved in decision-making and in implementing activities. Design the monitoring and evaluation system to take these categories into account.

Examples of categories of people in a community

- Social status**
- Female-headed households
 - Community leaders



- Economic**
- Farmers and livestock keepers who generally are poor
 - People without land
 - Wealthy landowners
 - Child-headed households

- Diseases or physical difficulties**
- People living with HIV/AIDS or other diseases



- Type of farming**
- Farmers
 - Herders
 - Fishing

- Age**
- Adolescent girls
 - Adolescent boys
 - Elderly
 - Children under 2 years old or under 5 years old



- Ethnicity or religion**
- Different ethnic groups
 - People of various religions

TABLE 2 EXAMPLE OF VULNERABILITY ANALYSIS

CATEGORY	GENERAL DESCRIPTION	USE OF NATURAL RESOURCES	CHALLENGES OR OPPORTUNITIES
Economic: Large rice farmers	Well off, influential	More than 1 ha of irrigated land in valley Use irrigation water Complain of erosion and flooding	Potential for them to encourage water conservation upstream
Economic: Small farmers on slopes	Many sharecroppers. Less-well-off	Less than 1 ha of land on slopes Fields are infertile and eroded Cut trees to make charcoal	Cultivation of annual crops on steep slopes is a great risk of erosion Are pushed onto forested land due to lack of economic or political power; can cause destruction of forests
Age: Adolescent girls	Many out of school Most have big responsibilities at home	Responsible for water collection Responsible for wood collection	Often at great physical risk collecting wood and water
...

EXERCISE 2B. MAPPING NATURAL RESOURCE CONFLICTS

From FAO (2002)

Mapping is a useful tool for exploring the resource uses and perceived values by different stakeholders, and for identifying existing or likely conflicts.

OBJECTIVE

After completing this exercise the participants will be able to:

- Identify main existing or potential conflicts over natural resource use.
- Identify and understand the characteristics of the main actors in the conflicts.

EQUIPMENT NEEDED

- Flipchart and markers

EXPECTED OUTPUTS

- Map of natural resource uses and actual or potential conflicts around them

TIME REQUIRED

- 1-2 hours

PREPARATION

- Prepare a flip chart showing an example of a map of a resource conflict.

SUGGESTED PROCEDURE

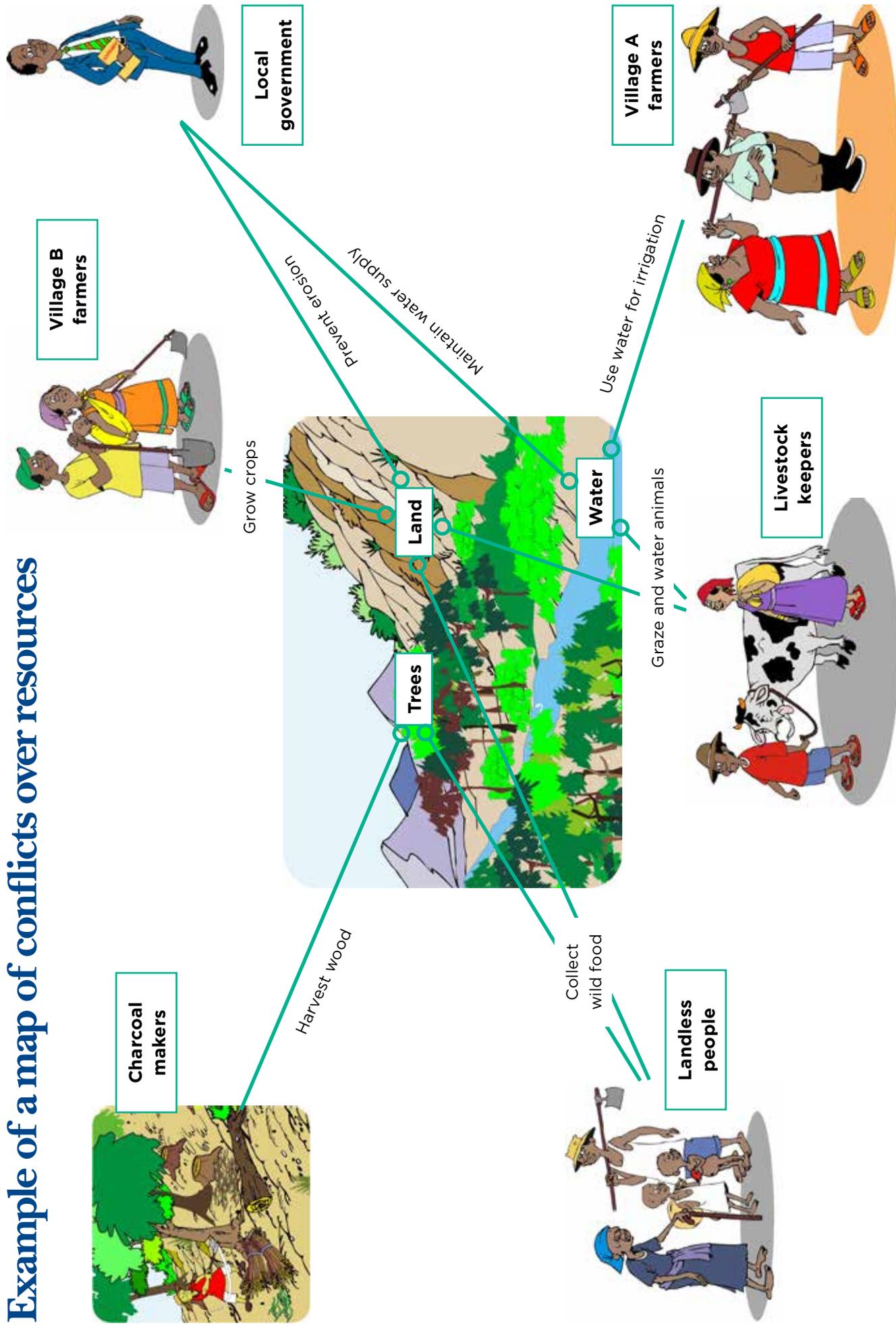
1. Explain to participants that they will need to identify a **resource conflict** in their community. When working with a group of participants from diverse backgrounds or locations, selecting a conflict that they are all familiar with can be difficult.
2. Post the example conflict map that you have prepared. In case the discussion gets stuck, use examples from the map to stimulate the participant's thinking and conversations. Try to minimize the use of the map in order to promote participatory learning and knowledge generation.

3. Ask the participants to begin by preparing a basic **sketch map** of the area where the conflict is centered. On this map, they are to show the major landscape features and relevant boundaries of tenure.
4. Next, ask participants to identify and mark the various **stakeholders** that use this area. Consult Exercise 2a for a list of different groups. Continue by helping them mark out areas of existing or proposed resource uses for the different stakeholders. The types of uses to be recorded on the map will be determined by the nature of the conflict.
5. For example, resource uses may include food or material collection, protected area boundaries, commercial timber harvest, religious or sacred cultural sites, nesting sites for endangered species and changes in the boundary of the resource used.
6. When participants are satisfied that all the pertinent information has been marked on the map, ask them to identify areas where land or resource uses are in **conflict**. These may include conflicts between existing uses, between existing and proposed uses, or between several proposed uses. Record the specific areas of conflict either by highlighting these areas on the map or by making a list of the specific points of dispute.
7. Ask participants to draw on the map the main **actors** involved in the conflict. Ask them to write down the main **interests** that each group has over the natural resources in question.

QUESTIONS TO STIMULATE DISCUSSION

- What are the primary sites of conflict?
- Which sites are of secondary importance?
- What are the potential consequences or impacts on different stakeholder groups if their existing or proposed uses are altered or ended altogether?
- What alternatives or possible solutions in land or resource use can be suggested from the information on the map?

Example of a map of conflicts over resources



EXERCISE 2C. SEASONAL CALENDAR

Adapted from FAO and IIRR (2012)

This exercise enables participants to describe and analyze their farming and other activities throughout the year. It builds an understanding of the farming system, and shows when it may be possible to make improvements in natural resource management.

The participants can draw the calendar using a number of different tools: on the ground using sticks, on a smooth concrete floor using colored chalk, or with marker pens on a big sheet of paper.

OBJECTIVE

After completing this exercise the participants will be able to:

- Visualize farming activities throughout the year, and understand the changes in farming and in the environment that occur during the year.
- Define when interventions in natural resources management may be needed.

EQUIPMENT NEEDED

- Sticks, pebbles, leaves or other local materials; area of flat bare ground or large sheet of paper, marker pens.

EXPECTED OUTPUTS

- A calendar showing farming activities and other features that vary from one month to another

TIME REQUIRED

- 1.5 hours

PREPARATION

- None

SUGGESTED PROCEDURE

1. Draw a line across the top of the piece of ground (or the paper) and divide it into 12 equal sections – one for each month. Draw several additional horizontal lines across the paper below the first one. These will become the rows in which the information on different activities will be entered.
2. It is usually easiest to start by asking about rainfall. Ask which month the rainy season begins (e.g., April), and write the name of this month at the start of the line. Write the names of the other months in order after it.
3. Ask the participants to indicate the relative amount of rainfall expected in each month. They can draw a line or use pebbles to show how much rain falls in each month (more pebbles means more rain).

4. Draw another horizontal line under rainfall row. Ask the participants to name the main crops they grow and to say when they plant and harvest each crop. Mark these on the calendar, perhaps using leaves or seeds from each crop.
5. Ask the participants to show when they do major tasks, such as plowing, irrigation, weeding, and repairing dams.
6. Ask them to show how much work the men put into farming (or other key livelihoods), and how much work the women do in each month. Use different rows and different types of stones or leaves for men and women (more stones mean more work is done in that month).
7. Repeat this process, one subject after another, for other topics: flooding, food availability, water availability, income sources, prices, and so on, until all the seasonal issues are covered. For each row, draw a symbol or letter next to it to show what it represents. Ask the participants to explain how they manage in times of food or water shortage, and to say at what time of year they have major expenses, where they obtain the income, and so on.
8. If possible make a record of the finished calendar (taking a picture or drawing it out on paper). It is useful to post it on the wall as a permanent record and reference for further discussions.
9. Have each group present their calendars to the other groups and facilitate a discussion.

QUESTIONS TO STIMULATE DISCUSSION

- What are the main sources of income in the community? How does this change over the seasons? How does income vary over the year? Are there periods of no income?
- How do women's calendars compare with men's? What are the busiest periods for women and for men? Are there daily, seasonal or yearly labor peaks and shortages?
- When are people likely to have spare time for major building work (such as building structures to control erosion)?
- How does food availability vary throughout the year? Are there periods of hunger?
- How does water availability vary throughout the year for various uses (household, small and large livestock, irrigation)?
- During what seasons do people have the hardest times to make ends meet? Which resources are used most during these seasons?
- What are the key natural resources used at different times of year? Are there periods of critical stress for these resources?

Example of a seasonal calendar

La Inmaculada. "Community"

Climate and Farming Activities Calendar.

	E	F	M	A	M	J	J	A	S	O	N	D
Climate	///	///	///	///	////	////	////	☀	☀	☀	☀	☀
Cattle	—	—	Cattle in Jima	—	—	—	—	Cattle taken to the woods	—	—	—	—
Maize	Weeding	Second Weeding	—	—	—	—	HARVEST	ploughing	planting	—	—	Weeding
Potatoes	weeding	planting	Harvest Hilling Up	—	—	—	—	—	planting	planting	Weeding	planting Hilling Up
Cereals	planting	—	—	—	—	—	Harvest	—	—	—	—	—

Source: Selener et al. 1999

EXERCISE 2D. TRANSECT WALK

You can use this exercise to gather information on the relationships between the landscape, land use, farming systems, soils, water use, and crops. It identifies opportunities and hotspots as well as stimulates discussion of local problems and possible solutions.

Once you have determined your priority areas from the mapping exercises, your transect walk should be conducted in those areas. A transect walk uses the information from the mapping exercise to get more detailed information about the area. Transect walks are also useful in your regular monitoring.

OBJECTIVE

After completing this exercise the participants will be able to:

- Identify and discuss key natural resources.
- Determine which issues are relevant for individual farms and which are at the watershed level.
- Determine which natural resources are not being used or managed to their full potential.
- Understand the relationships between the landscape, land use, farming systems, and problems with soil, water and crops.
- Record GPS coordinates of key resources or landmarks. You'll use these later to prepare a Google Earth map of the area (see Staff Exercise B).

EQUIPMENT NEEDED

- GPS, flip chart, markers, notebooks and pens

EXPECTED OUTPUTS

- One or more transect diagrams of the areas of interest to the farmer group as well as an understanding of the landscape, land use, land tenure, farming systems, and problems with soil, water, crops, and natural vegetation.
- A Google Earth composite map.

TIME REQUIRED

- 20 minutes for instruction; 2 hours for the transect walk; 1 - 3 hours for data organization, mapping and discussion.

PREPARATION

Prepare a checklist of the information the participants will be looking for, or a template for a transect diagram.

Choose a route that will cut across a large variety of landforms and land use types (e.g., from a hill across to a valley), and that is likely to cover the expressed/anticipated hotspots or opportunities in the area.

SUGGESTED PROCEDURE

1. Outline the goals of the transect walk. Decide the scope: Will it focus on a single "average" farm, or a larger area of the community or watershed? Use your resource map to decide where more detailed information might be useful and important.
2. Provide participants with materials and instructions on the planned walking route and the duration. Give them a checklist of information they should be looking for or a template for a transect diagram. If possible, show them a sample completed transect diagram.
3. Turn on your GPS and set it on "track". If you are not able to track, take waypoints along the way, including your start point, end point, and key resources along the way. Note in your notebook what each point represents.
4. During the walk, stop frequently at interesting places, and make sure you capture the differences in land use and soil type. Encourage participants to observe the main features, discuss the differences and record what they see at each place.
5. Use this opportunity to discuss with farmers about the key identified resources, priorities, and trends. Highlight several of the key topics associated with resource management and make sure the participants note down or memorize the information at each location.
6. At the end of the walk, ask one of the participants to draw a profile (cross-section) of the route on the big sheet of paper (or on a blackboard). Mark the most important land types and features (hilltops, river, village, forest, crops etc.) on this profile. Use little drawings to show trees, houses, crops etc.
7. Engage the participants in a general discussion about the information on the diagram. What were the key resources? How do they relate to each other? What are the key problem areas? What opportunities were identified?

QUESTIONS TO STIMULATE DISCUSSION

Some additional areas to discuss:

- **Healthy resources.** What resources are healthy or seeing positive trends? Why? What are the implications for the area?

- **Areas not reaching their potential.** Which areas are not reaching their potential and why? Which ones are the most important? Why? What are the effects or implications of these trends? How can these negative trends be reversed?

in different directions, you can cover more area and make sure the findings are more representative of the whole area.

NOTES

It may be useful to have two or more groups, each led by a different type of guide (e.g., a man and a woman, or people from two different ethnic groups or primary livelihood sources). By walking

BOX 6 TYPES OF INFORMATION TO NOTE IN A TRANSECT WALK

Soil type. Use local names for the soils. If too simple (e.g., the word used is just a name of a color, like “brown”) ask about other details, such as stoniness, depth and fertility.

Crops and vegetation. Use local terms and criteria to describe the cropping systems, pasture types, trees and other vegetation.

Animals. Record the type and approximate numbers of livestock. Are they stall-fed, ranched or free grazing?

Water. Note where the transect crosses or is near to any water sources, such as rivers, streams, springs and reservoirs. Ask how much water they normally hold and in which periods. Is there ever flooding? If yes, when, where and how frequently?

Ownership. Is land in the area privately owned or communally owned? Do the farmers own the parcels of land on which they work? If they rent or sharecrop, are they able to make decisions about soil and water conservation, such as tree planting or other technologies? Note that if problematic issues are identified, they may have to be addressed in the course of your later work.

Problems. Ask about any problems related to soils, plant nutrients, crops, water, forests, livestock, pests and diseases. Any recent changes in erosion, burning, fertilizer needs, crops, yields or pollution? Ask them to point out which signs indicate changes (e.g., certain types of plants flourishing or wilting).

Current management practices. For pasture and forest land, describe management practices such as fencing, controlled burning, seeding, selective felling and coppicing. For cropland, describe the soil management practices (tillage, soil conservation measures, fallows), cropping practices (rotations, intercropping, burning, weeding), nutrient practices (manuring, compost, fertilization, grazing of residues), water management (mulching, water harvesting, irrigation, drainage). Note what can be seen during the walk, but also ask what happens at other times of year.

Opportunities. Note what people say about ways to improve the management of resources, increase productivity and reduce land degradation. Which crops have they been considering as future livelihood options? What kinds of farming and animal products have been in high demand on the local markets? Which resources seem to be plentiful in the area?

Example of a transect diagram

<p>CANACHUÁN Poptún GUATEMALA</p>	<p>Paddock</p>	<p>Hillside</p>	<p>Banana trees</p>	<p>POND</p>	<p>Ploughed Field</p>
<p>Canchucan, Poptún, El Petén 24 April 1995</p>	<p>Black earth</p>	<p>Tierrablastre (white) red dirt/soil</p>	<p>Black earth mud</p>	<p>Black earth mud</p>	<p>Black earth mud</p>
<p>Potable water</p>	<p>Rain water</p>	<p>Rain water Springs</p>	<p>Rain water Springs</p>	<p>Well</p>	<p>Holes are dug to keep water springs</p>
<p>Coriander Chile Spring onion CUCUMBER CHAYOTE avocado Isote de Maya Coco nut Pine apple, orange Gle, papote Zucchini Custard apple, coffee Lettuce, onion, sugar corn, passion fruit</p>	<p>Coffee orange Mandarin Lime</p>	<p>Coffee orange Mandarin Lime</p>	<p>Coffee orange Mandarin Lime</p>	<p>Maize Beans Sugar cane Cassava Banana avocado Mango</p>	<p>Maize Beans Sugar cane Cassava Banana avocado Mango</p>
<p>hens chickens ducks cats dogs</p>	<p>Cows Horses sheep goats</p>	<p>coati wild pig raccoon Zanwado</p>	<p>Tacuazin Urucas Pizotes</p>	<p>shrimps</p>	<p>nic Ants</p>
<p>Guava Café Zote Paterna sursa Achiote Parantales Jocotalitos Nansales</p>	<p>Madre cacao Sombrade Ternero Seras, Cuje Jax mil Corasales pimicntales</p>	<p>San Juan Canshun Sedro Caroba Romon chichenpuntero Sala Sangre Bayillo Mutasano Morantillo Ormigo Cye Tomarindo Guana casti Sapote abato 60 pine | Seiba</p>	<p>Oranges Avocados Coffee Pineapples</p>	<p>Almonds Red apples</p>	<p>Red apples Orange trees</p>

Participants: Haris Orrego, Pablo Torres, Damian Ho, Tono Roman, Pab. Ico, Felix Ruiz Santiago & Scott Killogh

Source: Selener et al. 1999

STAFF EXERCISE A. ISSUES ANALYSIS IN NATURAL RESOURCE CONFLICTS

From FAO (2002)

Issue analysis is a way to learn about the views different stakeholders are likely to hold about sources of conflict. Separating a conflict into its various issues and then identifying the type of issue and its causes can help in developing a strategy for conflict management.

Issues analysis can be quite complicated and is best done once you have identified conflicts that you want to address. This exercise is designed for self-learning, but can be used also as a facilitation tool if appropriate.

OBJECTIVE

After completing this exercise the field agent will be able to:

- Identify the principal issues of a conflict
- Consider the most effective means of addressing these issues

EQUIPMENT NEEDED

- Note cards, pen and paper, printouts of Tables 3 and 4.

EXPECTED OUTPUTS

- A table outlining the major causes of community conflicts over natural resources

TIME REQUIRED

- 1 hour

PREPARATION

- Read and understand Tables 3 and 4.

SUGGESTED PROCEDURE

1. Think of a conflict that you have experienced in your work on natural resources. The conflict selected may be of any scale – local or national.
2. Identify three issues that are central to the conflict. What is the conflict about? What are its causes? What are some details about the conflict? Write each of these on a separate card.
3. Repeat these steps for two more conflicts.
4. One way of determining possible actions to manage conflict is to examine the types of issues within the conflict. There are five main types of issues from which most conflicts emerge:

- Problems with information
- Conflicting interests
- Difficult relationships
- Structural issues
- Conflicting values

Refer back to the conflict issues you wrote down on cards. Organize the cards into groups by clustering issues that seem similar. Label each cluster or category, recording the reason that they seem similar. See if you can categorize them into the five main types presented above.

5. A further level of analysis is to identify what gave rise to these issues. Issues frequently result where there is:

- A perceived or actual **difference** in opinion of various groups;
- A perceived or actual **threat** to one or more groups;
- A **gap** or an absence of important elements, like information.

First separating a conflict into its various issues and then identifying the types of issues and their causes (whether these are differences, threats or gaps) can be useful in developing a strategy for conflict management.

6. Read the example and take a few minutes to look at Table 4.

7. Take the list of issues for your conflict and develop your own issues analysis table on a flip chart:

- Identify the most appropriate category for each issue.
- Briefly describe the issue.
- Decide whether it resulted from a difference, a threat or a gap.

In reality, these categories of issues can overlap and the participants should be cautioned not to become anxious if there is no “clear fit.” It is important that the categories are used as tools to think more systematically about each of the contributing causes of conflict.

Decide which of these issues are most significant and mark these with a star (*).

8. When conflict has multiple contributing causes, it is unlikely that all the causes can be tackled or addressed simultaneously. You will have to set priorities. Emphasize that there are no set rules for establishing priorities. However, an important aspect of conflict analysis is to identify the most significant causes of conflict. One way is to rank the issues in terms of significance, and to distinguish which issues are:

- Immediate, requiring urgent action, or
- Underlying, presenting significant obstacles for lasting peace and perhaps needing to be addressed over a longer time period.

Ultimately, those involved in the conflicts will have to construct their own criteria for determining priorities for action. Determining linkages and identifying some of the roots of the conflict is very valuable for getting a clear understanding of the forces at hand and choosing which actions to take.

Refer to the example, in which the significant causes of conflict are marked and actions planned accordingly. Note which of the main issues are most immediate and which require long-term action.

9. Take a few minutes to look at the analysis and discuss possible actions for addressing the conflict based on that analysis.

QUESTIONS TO STIMULATE DISCUSSION

Think about the following questions:

- How useful was it to examine issues by category? Why?
- What are the benefits from distinguishing among issues that arise out of differences, threats or gaps? How did this affect your ideas about possible management actions?
- What difficulties did you encounter in this analysis?

- What were some of the factors or criteria that guided the groups' choice of possible actions?

NOTES

In conflict, groups ultimately have to construct criteria for action. They may decide to tolerate a certain level of local conflict in order to direct effort towards the underlying causes that are feeding the local dispute. Parties also have to consider their capacity to have a significant impact on these contributing factors.

Properly managing a conflict may require both short- and long-term strategies. For example, stakeholder groups could agree to a set of short-term actions to address an urgent issue, with the immediate aim of preventing further escalation and offsetting potential outbreaks of violence. The local conflict may continue to reappear, however, if fundamental structures or processes are not addressed. Complete resolution or prevention of recurring conflicts may be part of a wider strategy that includes building alliances with other stakeholder groups in order to change and improve policies, laws and institutions in support of community-based natural resources management.

Issues analysis

TABLE 3 ISSUES ANALYSIS

TYPE OF ISSUE	DESCRIPTION	POINTS TO REMEMBER WHEN MANAGING CONFLICTS
Conflicting ideas	<p>Conflicts over differing needs and desires, sharing of benefits and resource use</p> <p>Include perceived and actual competition of interests</p> <p>Conflicts can emerge from a perceived or actual lack of shared interests</p>	<p>Identify common or shared interests</p> <p>Underlying needs can often be satisfied in more ways than appear at first glance</p> <p>Clarify whether interests are real or perceived</p>
Not enough information	<p>Conflicts caused by lack of information or differences in interpretation of information</p> <p>Can be linked to differing methods of assessing, evaluating or interpreting information</p> <p>Poor communication (listening or expression) or miscommunication among disputing parties</p>	<p>Reach agreement on information needs</p> <p>Reach agreement on how information can be obtained and verified</p> <p>Reach agreement on criteria for evaluating or interpreting information</p> <p>A third party may improve communication</p> <p>Encourage transparent decision-making</p>
Difficult relationships	<p>Differences in personality and emotions, as well as misperceptions, stereotypes and prejudices</p> <p>Incompatible behaviors (routines, methods, styles), differing expectations, attitudes and approaches to problem solving</p> <p>History of conflict and bad feelings among the parties</p>	<p>Identify the specific difficulties, encourage conflicting parties to avoid generalizations in stating their difficulties with one another</p> <p>Aim to build positive perceptions and solutions</p> <p>Emphasize fair ground rules to be followed by all parties</p> <p>Work to realign or build relationships, fostering care and willingness among the participants</p>
Structural issues	<p>Differing ideas regarding appropriate management processes, rules, roles and power; can apply to meeting committees or organizations</p> <p>Perceived or actual inequality or unfairness concerning power, control, ownership or structures that influence access to or distribution of resources</p> <p>Factors that hinder cooperation, such as decision-making structures and responsibilities, time constraints, geography or physical settings</p>	<p>Help disenfranchised groups to understand their own and other parties' perceptions of the conflict</p> <p>Gain agreement on shared review of specific grievances (e.g., too much bureaucracy, poor representation)</p> <p>Aim to transform conflict into a force for social change so solutions are sustainable in the long term</p>
Conflicting values	<p>Differences among cultural, social or personal beliefs or different worldviews and traditions</p> <p>Can include different goals, expectations or assumptions that reflect personal history and upbringing</p>	<p>Frequently the most difficult to change</p> <p>Focus on interests or shared goals and avoid focusing on resolving differing values</p> <p>Require a long-term strategy that builds respect and supports the sharing and understanding of values among stakeholders</p>

BOX 7 EXAMPLE OF A CONFLICT

The villagers heard that the District Forest Office and the community forest users group had decided to restrict access to an area of forest in order to protect an endangered bird species.

The **district forest officers** had convinced the users group that restricting access was necessary to protect one of the few remaining nesting habitats for the bird and to stop poaching by hunters.

Male hunters in the village disagreed that the bird was in any danger, as they still saw many in the forest.

Women villagers were angry because the area to be

closed was where they collected housing materials and medicinal plants.

All the villagers feared that they would no longer be able to collect feathers for use in traditional ceremonies.

Both the women and the hunters saw the conflict as being centered on gaining continued access; the District Forest Office saw it as a conflict of unsustainable resource use within the region.

See Table 4 for an analysis.

TABLE 4 EXAMPLE OF ISSUES ANALYSIS

TYPE OF ISSUE	DESCRIPTION	DIFFERENCE, THREAT, OR GAP?
Conflicting ideas	Women need to collect forest materials and medicine plants The users group wants to stop the poaching of wildlife	Perceived difference in interests related to use of the forest (wildlife versus supporting local livelihoods) Perceived threat of the users group and the forest office restricting access to needed resources
Not enough information	Villagers have no access to information on the proposed restriction Hunters question how the bird is endangered	Gap (information): Lack of information on the proposed restriction provided by the users group to the village Gap (information): Validity of information needs to be confirmed
Difficult relationships	Previous bad relationship between the users group chairperson and the village	Perceived threat: Suspicions that the users group chairperson from another village is supporting forest office interests over this village's interests (as retaliation for a past dispute)
Structural issues	Consultation with villagers on forest use	Gap (communication): The forest office and users group did not consult the women or hunters before making the proposal
Conflicting values	The significance of local bird feathers in traditional ceremonies	Perceived difference: Forest officers' lack of appreciation for the ceremonial importance of bird feathers in determining relationships within villages
Proposed actions that emerged from the conflict analysis	Check with forest officers and the users group to see if the proposal is true Forest officers to provide and explain information on the birds and the significance of the area Women to negotiate the primary area of interest: securing access to necessary forest materials and medicinal plants Educate forest officers on the value of traditional bird feathers Other long-term actions: changing consultation process and making the chairperson more accountable to the entire constituency of the users group; village representative should have regular meetings with the chairperson	

LESSON 3. IDENTIFYING AND ENGAGING STAKEHOLDERS

IN THIS LESSON

After completing this lesson, you and your farmer groups will have:

- **Identified and engaged stakeholders.** Who needs to be involved? When? How? How will you engage community leaders, governments, NGOs, or other actors?
- **Recognized the importance of partnerships.** When dealing with watersheds or larger communities that have many stakeholders, strategic partnerships are critical.



THE IMPORTANCE OF STAKEHOLDERS

Stakeholders are those individuals, groups or organizations that have an interest or relation to a project or, in this case, a natural resource. Many people in the community share some of the same resources. In the case of a river, for example, farmers may rely on it for irrigation water, livestock keepers may water their animals there, and the women from the village may fetch water from it for household use.

Various people and organizations outside the community may also have an interest in the resource, or they may influence it. They are also stakeholders. For example, people downstream rely on a steady flow of clean water from the stream fed by the spring. The government may regulate the use of water. And what farmers further up the valley do may affect the amount of water in the spring.

It is important to understand who all these **stakeholders** are, and how and when they should be involved in your project. Exercise 3 describes how to do a **stakeholder analysis**, which helps determine:

- Who has an interest in or influence over the different resources in the watershed or community area?
- Who is affected by changes in these different resources?
- Where are the stakeholders located? Inside or outside the watershed or community area?
- How do they currently use the resources in question?
- What are their needs or interests for future use of these resources?
- How do the different stakeholders need to be involved in the resource planning and implementation process?

In the stakeholder analysis, the farmers may identify various formal or informal groups, such as village organizations, interest groups, service providers, NGOs, and

others. They may note individual landowners who could be helpful but alternatively could pose a challenge to working in a given community. A stakeholder analysis can also help farmers assess how groups and organizations might support or hinder the implementation of the resource management strategy you develop together. The analysis is also useful to explore connecting with other organizations to scale up your work across a wider area.

Because natural resources management projects often reach whole communities, it is critical to **build partnerships** that can help you get your work done as well as avoid or deal with conflicts.

STATE AND LOCAL GOVERNMENTS

Both **state** and **local governments** as well as **non-governmental organizations** are key stakeholders. For large watersheds or community areas, state and regional governments may be involved in every step of the process, especially if they are funding parts of it. They may also play other, less direct roles such as providing consultations, approvals and/or oversight. For smaller watersheds or community areas, it is a good idea to involve the local government throughout the entire process, from problem identification through planning, implementation and monitoring.

Government officials may need to intervene to create or enforce policies that restrict pollution (e.g., from industry) or to improve infrastructure, such as drainage or erosion control. They can provide political leverage, regulation, or access to funding to support the planned actions.

Development organizations active in the area are also important stakeholders that may provide key expertise and local contacts. Also they could be a direct source of funding, or may provide assistance in securing other funding sources.

THE MOST IMPORTANT STAKEHOLDERS: LOCAL PEOPLE

Ultimately, it is important that the members of the community recognize the problems in their area, realize the opportunities, and agree what to do about them.

For large areas, several communities may have to work together on long-term projects, or engage with the government or development organizations.

Building awareness about the critical importance of managing our natural resources sustainably, and motivating groups of farmers to come together and take action, is perhaps the most challenging aspect of working with local communities.

LEARNING FROM OTHER STAKEHOLDERS' ACTIVITIES

Your project may not be the first natural resource management intervention in the community. NGOs, government, local groups, or other stakeholders may have worked previously, or are currently engaged in your area. Take time to find out what initiatives there are in your area: learn from their successes and mistakes to make your own work more effective!

Table 5 gives an example of how to summarize the work of other initiatives. When you do your mapping exercises later, you can mark these areas directly on the map.



CONCLUSION

After completing this lesson you should have a clear understanding about the importance of stakeholders - not only those in your community, but also those outside, such as government institutions and international organizations. In addition to knowing who they are, you also have to understand their incentives and motivations. This will help you find ways to engage them in your project and prevent negative issues that may arise from a disenchanted stakeholder. Remember that often there is no need to “reinvent the wheel”: find out what other expert organizations are doing, and explore ways to partner and create synergies with them.

In Lesson 4, we turn our attention to maps and how they can help us better implement and manage a project.



BOX 8 THE VALUE OF STAKEHOLDER ANALYSIS IN HAITI

In Haiti, stakeholder analysis was a critical step in the watershed planning process for CRS field agents and community members.

The field agents found that most of the users in the higher elevations and recharge zones of the micro-watersheds were sharecroppers who actually did not own the land they were farming. This had serious implications on soil and water conservation. The landowners - who were not farming the land - did not take the responsibility to prevent erosion on the hillsides. They felt that the money they made from rent was enough. The sharecroppers, on the other hand, did not invest in long-term soil- and water-conservation measures because they did not own the land. The results were complete neglect of this valuable resource that both depended on for their livelihood.

Once this problem was identified, CRS was able to work with farmers to ensure that all landowners participated in discussions with sharecroppers about the resource management practices on their land.

TABLE 5 WHO IN THE COMMUNITY MANAGES NATURAL RESOURCES?

NAME OF ORGANIZATION OR PERSON	PRIMARY ACTIVITY	WHERE IS/WAS THE WORK DONE?	WHO BENEFITS?	POSITIVE ASPECTS TO DRAW ON	NEGATIVE IMPACTS OR CHALLENGES TO LEARN FROM	LINKS WITH YOUR ACTIVITIES
Ministry of Agriculture	Rice intensification	Lowlands	Rice farmers	Effective seed supply	Difficulties in fertilizer delivery	Link with input suppliers
Diocese development agency	Conservation agriculture	Hillside	Poor farmers	Excellent field staff	Lack of seed of cover crops	Coordinate and support activities
...

QUIZ 3

Answers at the end of the guide.

1. Stakeholders are those individuals located in a specific geographical area.

- A. False
- B. True

2. Which of these cannot be a stakeholder:

- A. Prosperity Microcredit Bank
- B. Golden Goose Farmer Association
- C. River Kowongo Irrigation pipe
- D. Trees for Life NGO
- E. Alfred Murcal – Regional representative of the Ministry of Water

3. While government agencies, development organizations, input suppliers and other civil groups are important stakeholders, the most important of all are the local people.

- A. False
- B. True

4. Mary, a field agent, is working with various stakeholders on a forest project. But she has got her notes mixed up. Help her match the stakeholders with the correct set of interests.

STAKEHOLDERS	INTERESTS
A. River management authority	1. Producing wood on a sustainable basis
B. District forest office	2. Managing water flow
C. Charcoal producers' association	3. Harvesting herbal medicines
D. Women villagers	4. Conserving trees and wildlife

5. Mary has noted the strengths and weaknesses of the various stakeholders she is working with. Help her put her notes in order by matching the stakeholders with their strengths or weaknesses.

STAKEHOLDERS	STRENGTHS OR WEAKNESSES
A. River management authority	1. Excellent knowledge of medicinal plants
B. District forest office	2. Has equipment to monitor water flows
C. Charcoal producers' association	3. Tend to overharvest wood
D. Women villagers	4. Some staff are inexperienced

6. Stakeholders may use, influence or be affected by natural resources (or sometimes all three). Match each stakeholder with the most appropriate category

STAKEHOLDERS	CATEGORY
A. River management authority: gives licenses to farmers to use river water	1. Uses the resource
B. District forest office: patrols forest to prevent illegal logging	2. Influences the resource
C. Charcoal producers' association: cuts trees to make charcoal	3. Is affected by the resource
D. Women villagers: Harvest medicinal plants from forest	
E. Farmers downstream find their fields flooded because of deforestation	

EXERCISE 3. STAKEHOLDER ANALYSIS

A stakeholder analysis identifies who has **interest** in natural resources in the area, who has **influence** over the resources zone, and when and how each stakeholder should be involved in the work. This helps ensure that the right people are consulted and take part in decision-making and implementation of the project.

If you have already done Exercise 2a, you can use this exercise to focus on stakeholders outside the community.

OBJECTIVE

After completing this exercise the participants will be able to:

- Identify the different stakeholders who need to be involved in planning and managing the natural resources.
- Identify potential conflicts or problems early on.

EQUIPMENT NEEDED

- Flip chart, marker pens

EXPECTED OUTPUTS

- A list of stakeholders who need to be involved in managing the natural resources, along with their interests and the type of involvement needed

TIME REQUIRED

- 1 hour

PREPARATION

- Find out about national and local regulations on water and watershed management in the area.
- Prepare a draft list of stakeholders to stimulate the discussion if necessary.

SUGGESTED PROCEDURE

1. Ask the participants to identify the stakeholders in the community who **manage** or **use** key natural resources. Encourage them to think of different groups: small and large farmers, livestock owners, landless people, the very poor and so on. Ask the participants to list the key characteristics of each group, and how they use land and other resources, such as wood and water. On a flip chart, make a table like Table 6 and list this information in the first three columns.
2. Invite the participants to think of people or organizations that **influence** the resources in some other way, for example, absentee landowners, farmers upstream whose land-use practices result in erosion, and government organizations that must give approval for major changes. Add rows to the table for this information.
3. Ask the participants to think of other people who are **affected** by these key natural resources. Examples include people downslope who rely on

water from wells fed by rain falling in the area, and villagers downstream whose land may be flooded after heavy rain. Ask the participants to think of their characteristics and how they interact, use, depend and influence the resources in question. List these groups in the table.

4. In the fourth column, list how each stakeholder may **influence** the resources and management improvements. For example, a local authority has influence because it can determine how the natural resources may be used. A large landowner may have influence because a planned irrigation canal has to cross her land. Influence can be both positive and negative.
5. In the fifth column, note how they may be **affected** by how the resource is used.
6. In the last column, note when and how each stakeholder should be **involved**. Immediately, in regular meetings with farmer groups? During budgeting? Implementation? Monitoring? The type of involvement may be one of the following:

- **Informed.** The stakeholder is kept abreast of activities through occasional visits, phone calls, copies of reports etc.
- **Consulted.** The stakeholder is more actively solicited for input (e.g., information, knowledge and decisions) but is not directly involved.
- **Actively involved.** The stakeholder has a strong voice in decision-making and works in partnership with the farmer groups.
- **In charge.** The stakeholder is responsible for managing part of the process and/or performance of the farmer groups.

QUESTIONS TO STIMULATE DISCUSSION

- Who owns the land? Who manages it? Who grows crops on the land? Who grazes their livestock or collects wood there?
- Where does the water come from? Where does it go once it leaves the land?
- What is the land tenure system in this area? How does land change hands? Where do the landowners or caretakers live? Do men and women manage different areas of land?
- Is the land and water shared by more than one village? Is there any conflict over ownership or sharing? Do the affected households have access to alternate lands for agriculture, or for grazing?
- What local or national regulations affect the use of the land, water and trees in this area? Which organizations are involved? What are relevant laws and by-laws, or policies? (For example, are there bylaws against cutting trees? Does the government provide subsidies?) Are the local regulations being enforced or ignored? How, and by whom?
- What other organizations or projects are active in the area?
- Are farmers organized in any type of local group? What types of groups (watershed committee, savings and internal lending group, farmers' cooperatives etc.)? What are their main strengths and weaknesses?

Analyzing stakeholders

TABLE 6 EXAMPLE OF ANALYZING STAKEHOLDERS

STAKEHOLDERS	CHARACTERISTICS	HOW THEY USE THE RESOURCES	INFLUENCE OVER THE RESOURCES	HOW THEY ARE AFFECTED	WHEN AND HOW TO INVOLVE STAKEHOLDERS
Smallholder farmers	Farm 1–2 ha each Organized in production groups	Grow crops Collect firewood Use irrigation water	Control erosion on own land	Erosion, flooding, lower soil fertility	Actively involve throughout the year
Herders	Keep 5 cattle and 10 goats From outside village	Herd animals on open land Use water for animals	Agree to restrict grazing	Lack of grazing	Actively involve in dry season
Ministry of Water	Office in town	Water for downstream users	Approve plans to protect springs		Consult periodically, obtain approval as required
...

LESSON 4. MAPPING PROBLEMS AND OPPORTUNITIES

IN THIS LESSON

After completing this lesson, you and the farmer groups will have:

- Conducted participatory mapping of the resources in the area, taking into account the social factors that influence the way people use and benefit from their resources.
- Analyzed men's and women's roles, responsibilities and preferences about natural resources and their management.
- Helped communities identify hotspots, or problems in natural resource management, as well as areas of high potential. These areas will be the focus of future natural resources management activities.



MAPPING RESOURCES IN A COMMUNITY OR WATERSHED

Maps are a very useful way to visualize problems and opportunities related to the natural resources in the community, and to plan interventions. They are useful both for field agents and for local people. The local people should be able to identify their fields and houses, as well as key landmarks such as rivers, ponds, hills and valleys, forested areas and others.

Accuracy is not the primary concern when going through the process of drawing a map. It is more important to gather information about how people perceive their resources. Depending on what is available the participants can use markers to draw a map on a large piece of paper; they can use sticks to draw a map on the ground and use leaves and stones to mark key landmarks (rivers, fields, forests, houses etc.).

The scope of the map varies and depends on the intended use. Maps may cover the entire community or watershed, a part of the village (such as a hillside where people wish to control erosion) or individual farms (for planning things like windbreaks, crop rotations and finding sites for animal housing and compost piles).

You should visit the areas identified on the participatory map. You might also consider conducting a series of transect walks in the mapped areas, which is a method of ground truthing, i.e. examining the issues in person.

Make sure you bring your GPS with you! You should be gathering points that you



BOX 9 WHAT TO INCLUDE IN THE MAP

Boundaries of the community or watershed, together with indications of geographic orientation and scale.

Villages and settlements where people live. This, along with the socioeconomic information you collect, will help you understand the link between the people and their land, water, vegetation and livestock.

Landscape and soils (hills, valleys, flat areas, slopes, soil types, rocky or sandy areas, swamps, etc.), as well as differences in altitude and soils.

Water resources (lakes, rivers, streams, springs, waterlogging, wetlands, and salinity), other water points and water use (wells, boreholes, springs, reservoirs, irrigation canals, rock outcrops that may be useful for water harvesting).

Infrastructure (roads, bridges, clusters of settlements such as hamlets or small villages, churches, schools, market places, other buildings).

can put on your Google Earth map. You can also update the community map with this information.

MAPPING SOCIAL DATA

In addition to the biophysical characteristics of an area, you also need to understand how people use the resources. You can find out what resources people value, how they interact with them, what policies guide them, and who has influence over them.

Why is social information important? Imagine that you create a resource map with the community. They list all the main water sources, agricultural land, and other important points. Without additional information you won't know how many people draw water from a particular source, or how many herders use a certain piece of land for grazing. You might miss some key information about the way people prioritize their resources, and the value they place on them.

The end result of doing both biophysical and social mapping is a social-resource map. Exercise 4a describes this process. It includes an example of a questionnaire for social information. You can also use some of the participatory appraisal tools from earlier lessons.

GENDERED RESOURCE MAPPING

Throughout the mapping process, think about how men and women often have different roles and responsibilities on the farm in the community, and in managing natural resources. They may have different skills and opinions as to what is important, and have different roles in decision-making. For example, if you ask women which trees they prefer, they may choose those that can be used for firewood or fruit, while men prefer those that can be used for poles or timber. Women may note that the distance to sources of potable water is an issue for the family, since she is the one who fetches water, while men may note that access to irrigation is more important.



BOX 10 ENSURING EVERYBODY HAS A SAY

When the participatory appraisal team gathered together villagers in North Omo, Ethiopia, to make a model to represent their area, they found that although about 30 people gathered around in interest, only a handful participated actively in building the community model. That handful were all adult men. Women silently looked on and children were shooed away if they got too near. Thus the final model represented a particular point of view.

The team then asked the women and children to make their own models on the ground right next to the men's model. The children quickly gathered sticks, leaves and stones and, under the direction of a 10-year old boy, built an extensive model which included features the men had left out. For example, the men's model showed the whole area as a patchwork of farm lands and discussions centered on the lack of grazing areas. Unaware of their elders' agenda, the children drew in the grazing areas. The team later learned that every farmer allocates part of his or her land

for grazing in addition to making use of communal areas.

Similarly, the women gathered many branches and twigs in order to create a detailed model of the rivers, their tributaries, crossing points and ponds. The issue of water availability, which the men had not brought up, became an apparent concern. The women also marked out the exact number of houses, discussing the number of inhabitants and the spaces between the houses. This led to discussions about social issues.

By broadening the input to include all members of this community, the team and the entire community had a more inclusive and representative map of the resources in the area. They also obtained some other important information, such as the importance of the resources for particular segments of the community, issues surrounding resource use and others.

Source: Socio-Economic and Gender Analysis Programme. FAO, 2001

These roles, responsibilities and preferences vary greatly from place to place. Exercise 4b helps you identify the different roles and responsibilities of men and women in the community. It is important to understand these differences to ensure that both men and women individually as well as entire households benefit from natural resource management activities.

Please remember to take into account both women's and men's ideas during mapping activities!

IDENTIFYING AND PRIORITIZING PROBLEMS AND OPPORTUNITIES IN NATURAL RESOURCES MANAGEMENT

Sometimes, people are already aware of the natural resource challenges they face. For example, they see a gully eating into their farmland, or know that every time it rains low-lying parts of the village are flooded. But they do not always realize that their problems can be solved.

At other times, people do not realize that natural resources are a problem. Soil erosion, for example, is often invisible: it happens slowly, over many years, so people are aware that their crop yields are declining but do not know why. Other slow changes may include falling groundwater levels, deforestation and pollution. These may happen so slowly that only older people know that the wells used to have water all year round, that a hillside used to be covered with trees, or that the river was full of fish.

Another way of looking at natural resources projects is to help farmers build on natural assets they already have. What resources have good potential that is not being realized?

Your job is to help local people recognize natural resource problems, understand their causes, identify possible solutions, realize that they can solve them, and get organized to put these solutions into effect. Below we show you how to do this at watershed and farm levels.

WATERSHED LEVEL: IDENTIFYING HOTSPOTS

Some natural resource management problems are obvious (such as flooding or gullying); others are less dramatic and harder to see because they are more gradual (such as the loss of topsoil).

Using a watershed or community approach, you can help farmers identify **hotspots** in their broader area. You may hear the word "hotspot" used in different ways: sometimes it's used to refer to a place where there is a lot of biodiversity that is at risk. Sometimes it is used to describe an area where there is severe risk of natural resource degradation. Some commonly used examples of hotspots include:

- A **biodiversity hotspot** is an area with many different species of plants, animals, or insects that are endangered.
- An **agro-environmental hotspot** is an area where human agricultural activities are having a detrimental impact on the environment. This has a dual effect of damaging the environment and reducing agricultural productivity.
- An **environmental hotspot** is an area where any natural resource is at risk. If your project is focused around reducing the risk of disasters due to floods, landslides, droughts, or other natural hazards, this may be what you'll be looking for.



You can help local people identify hotspots where problems can be seen easily. That will help them identify and prioritize the problems and decide what to do to solve them. They can draw them directly on their social-resource map.

COMMON SIGNS OF HOTSPOTS

Erosion

- Rills or gullies
- Patches of bare, stony soil where the topsoil has been removed
- Exposed tree roots
- Muddy water in streams
- Accumulations of silt in flat areas



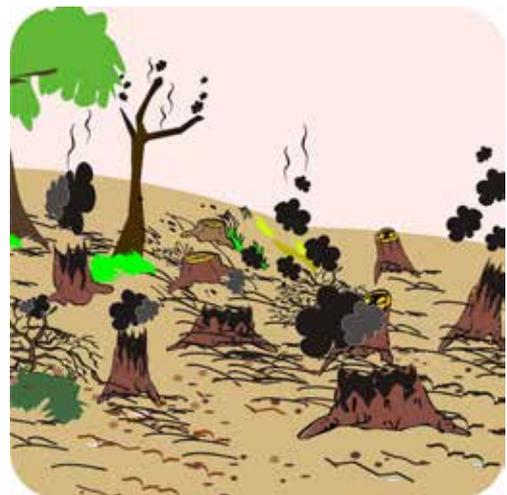
Other water problems

- Yellow or stunted crops
- Damaged canals and bunds
- Dry wells and springs
- Areas at risk of landslides



Soil fertility problems

- Bare, stony soil
- Poor crop growth
- Abandoned fields
- Certain types of weeds
- Evidence of burning fields to clear brush



Deforestation

- Tree stumps and trees with branches hacked off
- Land covered with bushes or coarse grasses that cannot be used for grazing
- Hills with trees only in small areas
- Evidence of charcoal making



Loss of native habitat and declining biodiversity

- Trends in land cover of native habitats
- Changes in the number of different plant or animal species
- Loss of forests or bush, replaced by houses or fields

The solution to these hotspots may not be in the same place as where the problem appears! To stop gullies from widening, for example, it is not enough to build dams across the gully and to plant grasses and trees in the gully. It is also necessary to prevent the gully from growing further by reducing the amount and speed of water flowing into it, and to trap the soil on the slopes. This can be done by planting vegetation above it.

Exercise 4c describes how to help local people identify resource hotspots.



FARM LEVEL: IDENTIFYING NATURAL RESOURCE PROBLEMS

If you're working at a farm level rather than a watershed level, you will probably looking more closely at some problems. The goals of these farmer groups may be more directly linked to increasing production or increasing incomes from production. See below for some examples of signs that can help you diagnose these problems. Refer back to the module on *Understanding natural resources* for help in identifying some of these problems. You can also bring in local agronomists for support. In general, farmers are very aware of the main problems they face. Listen to them!

CAUSES OF LOW CROP PRODUCTIVITY

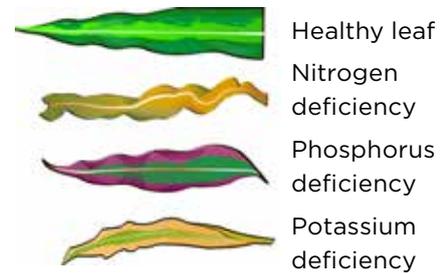
Insufficient water

- Wilting plants
- Soil is not moist below the surface.
- Presence of certain pests such as spider mites that feed on drought-stressed plants.
- Plants may die, starting from the tops of the plants, or the outsides.



Soil fertility problems

- Low yields
- Bare, stony soil
- Discolored leaves that show nutrient deficiencies
- **Not enough N:** leaves may yellow at the tip and along middle of the leaf; or, upper leaves may be light green and lower leaves yellow
- **Not enough P:** leaves may be darker or have a purplish tint along the edges.
- **Not enough K:** leaves may yellow at the tips and edges
- Thin topsoil (see Exercise 5b in the *Understanding natural resources* module).
- Few soil animals in topsoil (see Exercise 5a in the *Understanding natural resources* module).
- On slopes, a higher level of soil on one side of tree trunks or fence posts than the downslope side (may indicate loss of topsoil).
- Dried or burned leaves (may indicate improper fertilizer application).



Plant pests and diseases

- Low yields
- Discolored or shriveled leaves or roots
- Visible pests

Symptoms of pests and diseases vary widely. Consult a local agronomist to help you identify and address these issues with farmers.

IDENTIFYING CAUSES OF HOTSPOTS AND PROBLEMS

During your first meetings you identified goals that the groups would like to reach. But what are the goals that the farmer groups have for their natural resources? What is the potential of those resources? What are the causes and contributing factors that hinder increased productivity?

For example, if groups have identified that a local water source should provide potable water but the source is contaminated, this source is not reaching its expected potential. The next step is to determine the **cause** of the contamination. In this way, groups can identify technologies or practices to clean it and restore the source to its desired use.

An excellent tool to identify and differentiate among types of problems resulting from poor natural resource management is the **problem tree analysis**. Problem trees are diagrams that map out the anatomy of a particular issue, e.g. river pollution, distinguishing between the causes and the effects of the problem. This allows you to identify the key areas on which to devote time and resources. You can use the problem tree analysis described in Exercise 4d to identify the root causes of hotspots or other problems.



BOX 11 IDENTIFYING DRIVERS AND CONTRIBUTING FACTORS

Nicaragua

Juanita began a watershed protection project in Nicaragua. She started by interviewing farmers, local authorities, and other actors to determine the main issues in the community. She learned about the way farmers care for their land and water, and about their main natural resources concerns. Through her discussions with the community, she learned about their “driver”. Producing staple crops was important to the community for food and income. Farmers told her that over the past few years the water supply for these crops had been decreasing. For Juanita, water supply to increase production was their driver. The community was very excited to work with Juanita to increase their water supply through better management of their watershed and water points.

Haiti

In Haiti, Jean Pierre began a similar watershed protection project. He began in the same way as Juanita – he interviewed farmers, local authorities and other actors, and gathered biophysical and

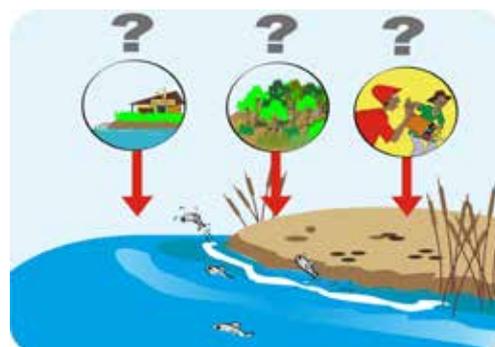
socioeconomic data about natural resource management. Through this process, he learned about a totally different problem from Juanita. The farmers told him that the hillsides were eroding, and their houses and farmland were at risk during floods. Jean Pierre discovered that these were the problems, but what was the cause? And what were the “drivers” that would really make the community excited about fixing the problem?

Jean Pierre conducted a social-resource mapping exercise. He learned that people were cutting down trees to make charcoal because harvesting their fruits was not very profitable. This lack of vegetative cover was a cause of erosion and landslides. He had found the driver.

To Jean Pierre, this community would not be interested if his watershed project focused on water supply, as Juanita’s did. This community’s driver was more economic. In response, Jean Pierre worked with the community to create a natural resources action plan that included planting trees that have an economic value – mango, coffee, and wood trees.

A CAUSE OR A CONTRIBUTING FACTOR?

The cause of a problem is the immediate underlying factor creating the resource problem. In many contexts, however, it’s important to look at other contributing factors that add to the source of the problem. It’s often necessary to address those contributing factors first rather than the problem itself. Often the actions that are adding to the problem hide the “driver” – the underlying need of the community that is driving this harmful behavior. See Box 11 for examples of drivers and how the field agents used them to address natural resource problems.



AREAS OF HIGH POTENTIAL

In addition to looking for problems (hotspots) it is also important to look for areas of unused potential. For example, a nearby perennial river could be used for irrigation, or an area of high soil fertility could be better managed to maximize productivity. As you do your mapping, focus on these areas where communities have strong natural assets, which can serve as building block for expanding existing or introducing new sources of livelihood. Use the following questions to guide your assessment of untapped natural resource potentials in the community:

- What natural resources seem to be in abundance (clean rivers, fertile soils, ample forest cover)?
- Are these resources being used currently, by whom and how intensively?
- Are they reaching their potential?
- If they are not reaching their potential, what are the existing livelihood practices that could benefit from better use of this resource?
- What new activities can harness the potential of this resource?



CONCLUSION

In lesson four we showed how maps can be excellent friends: they can help you visualize the areas where you are working, organize and prioritize your interventions, and track the project activities.

Boundaries, villages, landscapes and soils, water bodies, and infrastructure are some of the things we suggested you include in your maps. Social data, in particular that which considers gender differences in how people access and control resources, is also important to incorporate in your map.

Once you have both biophysical and social data mapped out, you and the community can identify and prioritize hotspots and other natural resources issues to focus on. We gave you some details on how to recognize those hotspots and productivity problem. We also presented the importance of distinguishing between a cause and a contributing factor, and left you with the problem tree – a useful tool to map out the anatomy of a problem.

In Lesson 5, we will look at the details of how to prepare a natural resources management plan.



QUIZ 4

Answers at the end of the guide.

- When drafting a participatory map, the most important thing is to be accurate.
 - False
 - True
- What should you NOT include in a biophysical map?
 - Hills, valleys, flat areas, slopes, soil types, rocky or sandy areas
 - Farmers' opinions, views, and recommendations
 - Lakes, rivers, streams, springs, waterlogging, wetlands, and salinity
 - Roads, bridges, clusters of settlements such as hamlets or small villages, churches, schools, market places, other buildings
- Gender resource mapping is important because women and men interact differently with the resources at hand. Therefore, knowing the differences in how each group values and prioritizes the resources is key for the implementation of a natural resources management project.
 - False
 - True

- Which is NOT a definition of a "hotspot"?
 - An area where average yearly temperatures surpass 25 °C.
 - An area with many different species of plants, animals, or insects that are endangered.
 - An area where human agricultural activities are having a detrimental impact on the environment.
 - An area where any natural resource is at risk.
- Some natural resource problems are fast and easy to spot, while others happen slowly, over many years. Which of these problems happens quickly, and which occurs slowly?

TIMEFRAME	PROBLEM
A. Quick, easy to see	1. Soil erosion
B. Slow, harder to see	2. Flooding
	3. Falling groundwater levels
	4. Deforestation
	5. Gullying

- On a transect walk, you observe some things that may indicate problems with natural resources. Match the observation with the most likely cause.

OBSERVATION	CAUSE
A. Patches of bare, stony soil	1. Soil erosion
B. Yellow, stunted crops	2. Deforestation
C. Land covered with bushes and coarse grass	3. Falling groundwater levels
D. Dry wells and springs	4. Infertile soil

EXERCISE 4A. DRAWING A SOCIAL-RESOURCE MAP

A map is a basic tool for identifying natural resource problems and opportunities and for planning interventions. Drawing a map together with the local participants enables them to become fully involved in the analysis and planning process right from the beginning. A social-resource map is different from other resource maps because it includes information about the community and how they are connected to the natural resources.

Mapping should not be looked at as a one-off exercise. A map can be the first step to identify priority areas, and more detailed maps of particular areas can be produced afterwards. Also, a map should be continually updated as changes and additions are made. You may also use this map to demarcate treated areas. You can get the participants to draw a map from scratch, or you can base it on an existing map or aerial/satellite photo.

This exercise is best done with a small group of people – no more than 15.

OBJECTIVES

After completing this exercise the participants will be able to:

- Produce a map showing key features of the area (watershed, community or village). It will indicate the land uses, soils, water features and vegetation – highlighting hotspots and opportunities.
- Identify problems in natural resource management and locate possible solutions.

EQUIPMENT NEEDED

- Large, flat area where you can draw a map on the ground.
- Sticks, stones, and leaves to show features such as buildings, fields and forests.
- Large sheets of paper and markers.
- Camera (to take pictures of the finished map).
- Where available, a topographic map, aerial or satellite photo (such as a printout from Google Earth). This is not necessary but can help guide the exercise, especially in larger catchment areas.

EXPECTED OUTPUTS

- A completed map of the watershed or community, showing features such as hills and valleys, rivers and streams, roads, buildings and fields, along with land use and areas with natural resource problems

TIME

- 2 hours

PREPARATION

Prepare a checklist with questions that are relevant to the natural resources issues in your area.

Choose somewhere suitable to draw the map:

- A large, clear, sandy piece of ground (draw in the sand with a stick, and use stones and leaves to show the locations of buildings, fields, forests, etc.).
- A smooth concrete floor (like the floor of a school classroom). Use colored chalk.
- A large sheet of paper (use colored marker pens).

SUGGESTED PROCEDURE

1. Determine the limits of the mapping area. Describe to the participants the area the map should cover – a watershed, a community, a village and surrounding gardens, a single farm, etc. Make sure the participants know the boundaries of this area: the administrative borders of the community, the ridges separating one watershed from another, the boundaries of the farm. If necessary, take people outside to point out the boundaries.
2. Chose a starting point.
 - If you're mapping a watershed or sub-watershed, ask a participant to start by identifying the main river in the area. Add tributaries and springs. From there, identify the ridges, and the points from which all water drains to the same point. (This might be the river's source, or the point where the river enters a larger river. Refer to the module *Understanding natural resources*, Lesson 4 for a reminder of what a watershed is.) Help the community to delineate the watershed.
 - If you're mapping a community area not limited by a watershed boundary, ask a participant to begin by choosing an important landmark in the community (the village hall, the church, the main road) and marking this on the map.
3. Ask the other participants to mark other important resources on the map. Do not interrupt unless they stop. If they do, prompt them for other things they could add: boundaries, villages and settlements, landscape and soils, water resources, infrastructure, land use, problem areas, or planned interventions. Ask them also to mark their own farms on the map. Refer to Box 9 for ideas on what to include.
4. Ask the participants a series of questions about the way they use and interact with their resources. Prepare a checklist beforehand with questions that are relevant to the issues in your area. You can refer to the "Social and economic issues" section in Lesson 2, and to Exercise 2a for questions to ask. If you've already done those analyses, you probably don't need to do them

again. Mark important responses on the map. Questions might include the following:

- **Demographics and vulnerability.** How many families live in the area? Where do the most vulnerable live?
 - **Important resources.** Identify the main resources. How much of each resource is available? How many people use it? Which are the main problems or hotspots?
 - **Areas of under-utilized potential.** Which areas have the most potential?
 - **Areas of social concern or potential conflict.** Which areas are riskiest? Who owns the important resources? Are there any ongoing conflicts around these resources? If so, how intensive and who is involved?
 - **Leadership.** Who has access or control over the resources? What community groups work already in the area?
5. When the map is finished, ask the participants to describe it and to discuss what it shows. Ask if there is anything that is unclear. Make sure they have marked things like the north point, directions and distances to nearby places, and so on.
 6. Finally, you might want to ask them to draw another map of how they would like their community to look in the future. This allows for some preliminary planning, and encourages people to contribute their ideas.
 7. Copy a map drawn on the ground onto paper, and post it on the wall in the community building as a permanent record. Take a photograph or copy the map to keep for reference. You'll use information from this map to make your Google Earth map. During subsequent transect walks, you'll take GPS coordinates and transfer them to Google Earth in order to prepare a composite map.

QUESTIONS TO STIMULATE DISCUSSION

- What resources does the community share? What do community members think about sharing common resources, such as forests and rivers? If there is disagreement about the planned use of a particular resource, how is this addressed?
- Can outsiders use the resources? What are the terms and conditions of such use? Who benefits?
- Do men and women have different rights to use land and water? How about people from different ethnic groups? Rich and poor?

NOTES

For most purposes, accuracy and scale are not important; it is more important to visualize the relative locations of different features.

Sometimes women are reluctant to contribute to the map. If so, ask them to draw a separate map. It will often show different things from the men's map – things that women see as important.

You can ask participants to draw maps showing specific resources, activities, use details: crop types and yields, disease problems, who in the family does what, soil types, and so on. You can then use this map as a starting point for discussing these issues.

Participants can also draw maps of their own farms and use these for describing their farming systems and analyzing problems and planning improvements.

You can use a map of a watershed as the basis of discussions on erosion, water conservation, upstream and downstream issues, policies, or land ownership.

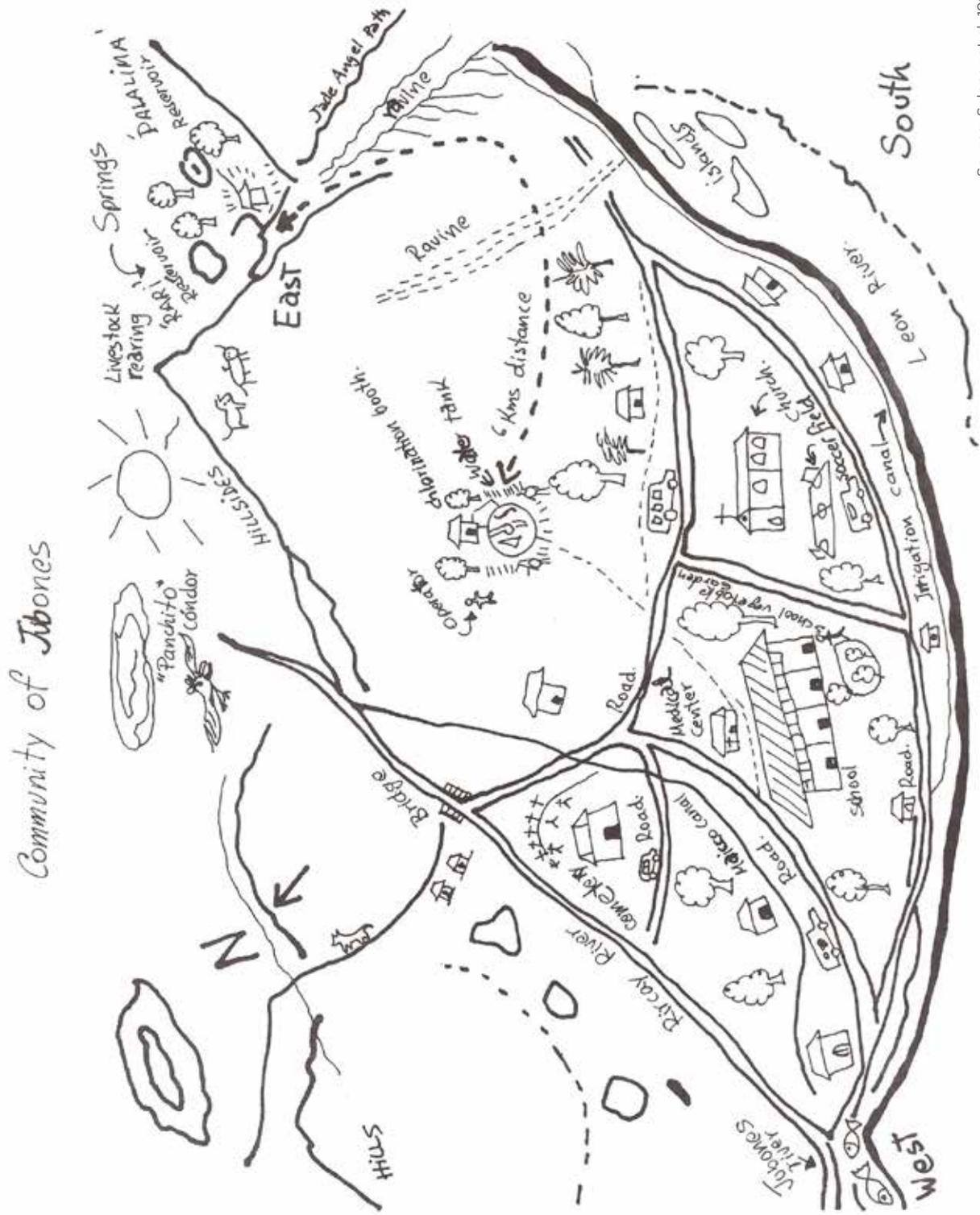
Maps are very useful for monitoring and evaluation as they can show changes over time. If participants draw a map at the end of the project cycle, they can compare it with the map at the start of your project to see what changes have taken place.



A HAND-DRAWN MICRO-WATERSHED MAP FROM AFGHANISTAN

Photo: David Gandhi, CRS

Example of a resource map



Source: Selener et al. 1999

EXERCISE 4B. GENDER ROLES AND RESPONSIBILITIES IN NATURAL RESOURCES MANAGEMENT

Adapted from FAO and IIRR (2012)

This exercise explores the difference between the perceptions, knowledge, and activities of men and women in relation to natural resources.

OBJECTIVE

After completing this exercise the participants will be able to:

- Collect information and explain the differences and similarities between the way that men and women interact with the natural resources in their community (perceptions, knowledge, and activities).

EQUIPMENT NEEDED

- Large sheets of paper, cards or small pieces of paper, marker pens

EXPECTED OUTPUTS

- A list of roles and responsibilities for men and women as well as shared ones

TIME REQUIRED

- 1 hour

PREPARATION

Make three large drawings of a man, a woman and a couple.

Prepare cards or small pieces of paper, each showing a different type of farm work (plowing, sowing, fertilization, weeding, harvesting, caring for livestock, etc.), daily household tasks, and community work.

SUGGESTED PROCEDURE

1. Put the drawings of a man, a woman and a couple in a row on the ground.
2. Ask the participants to put each of the cards showing agricultural activities and other tasks under one of the drawings. Instruct them to put a card under the drawing of the man if he normally does that task, under the woman if she does it, or under the couple if both do it. Start off with tasks that are easy to categorize, and then go on to more difficult ones. Let the participants take over the exercise and conduct the discussion.
3. Ask the group to analyze the workloads: how much work does each task take, and who does it? Link the tasks and workloads to land and water management activities. Explore the knowledge and perceptions of these resources and activities. Focus the discussion on how women might contribute and what problems they face in doing so.

QUESTIONS TO STIMULATE DISCUSSION

- How are women and men involved in managing land and water for different purposes: rainfed crops, irrigated crops, livestock production and so on?
- Compare what women and men do now to what their mothers and fathers used to do. How have the tasks changed? Why?
- Who (men, women, or together) should be involved in planning land and water management activities?
- Who does what, in families headed by women? In families affected by HIV/AIDS? How are these families different from other families?
- How are older people different in their handling of natural resources? How about people from different ethnic groups? Owners of big farms? Landless people? Richer and poorer people?

Example of a gender activity matrix

	MEN	BOTH MEN AND WOMEN	WOMEN
			
ACTIVITY	<p>Plowing</p> 	<p>Transplanting</p> 	<p>Sowing</p> 
	<p>Hoeing</p> 	<p>Harvesting</p> 	<p>Milking</p> 
	<p>Weeding</p> 	<p>Community work</p> 	<p>Cooking</p> 

STAFF EXERCISE B. MAKING A GOOGLE EARTH MAP

Google Earth maps are great planning tools that let you identify the priority areas, and map the key resources you and the community are looking to protect. You can also map areas with no activities to make comparisons with the area of your interventions.

OBJECTIVE

After completing this exercise participants will be able to:

- Prepare a composite Google Earth map combining the information available through satellite imagery with information collected through participatory appraisal methods, such as Exercises 2d and 4a.

EQUIPMENT NEEDED

- Computer with internet connection
- GPS device with cable to connect it to the computer
- Social-resource map prepared with the community
- GPS data and field notes recorded during the transect walk
- The social-resource map completed together with the community during Exercise 4a.
- The transect diagram completed during Exercise 2d. GPS coordinates of settlements, water points, key natural resources, hotspots, high potential areas and proposed treatment sites have been recorded.

EXPECTED OUTPUT

A Google Earth map of the project area (.kml or .kmz file) showing relevant information, such as settlements, physical features, natural resources, hotspots, and planned interventions (which can be used for planning, monitoring and reporting purposes). You can either print these or keep them on your computer.

TIME REQUIRED

- 1-2 hours to prepare the Google Earth base map
- 30 minutes to 1 hour to update the Google Earth map at regular intervals during the life of project

PREPARATION

- Download and install Google Earth free software on to the computer. Look up the website online and follow instructions for download.

SUGGESTED PROCEDURE

1. Open the Google Earth program.
2. Download your GPS data:
 - Connect the GPS device using the cable provided.
 - Switch on the device and download the data. This will be either waypoints, tracks, or both. A new file will be automatically created under the folder “Temporary places” (look in the sidebar of the Google Earth screen).
 - Save this file as .kml or .kmz with the appropriate file name on your computer’s hard drive. Use this file for future editing to prepare the Google Earth map. Remember to save it each time before closing Google Earth.
3. Open the Google Earth file by double-clicking on the file icon on your hard-drive. Google Earth will open and the screen should directly zoom into the imagery for the project area for which the coordinates have been downloaded from the GPS unit. If this does not happen, manually navigate to the project area on the Google Earth screen using the mouse. The waypoints will be represented by icons known as “Placemarks” and tracks by a line known as a “Path”.
4. Beginning with waypoint number 1, enter information for each waypoint by right-clicking on the Placemark icon. In the box which will open, enter the new name for the location and a brief description (you will need to refer to your notes taken during the social-resource mapping and transect walk). You may choose suitable icons to represent different locations. For example, settlements can be represented by the icon for the house, springs and wells by the blue water-drop icon, animal trails using the mule icon etc.
5. Using the “Add path” feature, draw boundaries for catchments, villages, community lands, hotspots etc. Label each of these by using the “Add placemark” feature and add the name and description. Areas can be estimated using “Easy-acreage” software, which you can source online from this link: www.wildsoft.org/EasyAcreage. (The cost of the software is about US \$20.)
6. By this method, the Google Earth map of the project is to be developed over the course of the project. Use different colors to differentiate between planned and completed interventions. The Google Earth map should be shared and discussed with the community, either by using a projector or printout.

EXERCISE 4C. IDENTIFYING HOTSPOTS OR PROBLEM AREAS

This exercise can also be done as part of the mapping or transect walk.

OBJECTIVE

After completing this exercise the participants will be able to:

- Identify natural resource related problems in a watershed or community.

EQUIPMENT NEEDED

- A map of the area
- The social-resource map completed together with the community during Exercise 4a.
- The transect diagram completed during Exercise 2d.

EXPECTED OUTPUTS

- Participants understand how to identify environmental hotspots and have identified key problems in their own area.

TIME REQUIRED

- 45 minutes to 1 hour

PREPARATION

Take a walk around the area again, looking for as many different kinds of evidence of soil erosion and other natural resource problems as possible. Choose several of these hotspots that are close together and easy to visit. Plan a walking route for the group to visit these areas.

SUGGESTED PROCEDURE

1. Together with the participants walk to the first hotspot.
2. Talk about the key signs of hotspots. Ask the group if they can see any of those signs nearby. After they have identified some, ask them what they think causes the problem, and what might happen if the problem continues.
3. Take the group to another hotspot nearby and repeat the discussion. Identify any additional problem areas that the group did not mention. Explain what is happening in these areas.
4. Ask the participants to look for additional hotspots as they are going home, and to remember how many, their location and type.
5. At the next meeting, ask people to share their observations and discuss briefly the extent of the erosion and other natural resource problems in this watershed or area.

EXERCISE 4D. PROBLEM TREE ANALYSIS

Adapted from Galpin et al. (2000) and Anyaegbunam et al. (2004)

A problem tree or causal diagram enables farmers to identify the root causes of problems they face and to assess the importance of each cause. That allows them to identify solutions that will address the problems rather than the symptoms. Problem trees and causal diagrams are similar, but a causal diagram does not include the effects. This exercise focuses on problem trees. The starting point is the list of problems drawn up in Exercise 4c.

OBJECTIVE

After this exercise the participants will be able to:

- Describe the causes and effects of individual problems and identify their root causes.

EQUIPMENT NEEDED

- Pieces of A4 paper, note cards or small pieces of paper; marker pens, thin sticks or bamboo canes

EXPECTED OUTPUTS

- One or more diagrams of a problem (or problems), showing the root causes as well as the range of effects associated with each problem

TIME REQUIRED

- 1-2 hours

PREPARATION

Based on the problems identified in Exercise 4c, invite relevant specialists to attend the session.

SUGGESTED PROCEDURE

1. Ask the participants to list the main problems they face that are related to soil and water management (this is an output from Exercise 4c).
2. Ask the participants to select one of the problems for one of the farming systems in the community. Write it on a piece of A4 paper and put it on the ground.
3. Ask the participants to think about the effects of this problem. For example, if “erosion” is the problem, the effects might include “loss of topsoil”, “declining crop yields”, and “silting of canals”. Some of these effects may already have been listed as separate problems in Exercise 4c.
4. Ask them to write the effects on cards – one card per effect. Ask them to put the cards on the ground on one side of the paper with the main problem. Use the sticks to show the connections between the problem and each of the effects. Write more cards and add them to the diagram to show further impacts of the effects (e.g., “flooding” as a result of “silting of canals”). Your diagram should now look like the branches of a tree, with the initial problem as the trunk, and the effects as branches and twigs.
5. When the group has finished the effects, move to the other side of the initial problem. Ask them to think why the problem occurs. For example, as causes of “erosion”, they might say “uncontrolled grazing”, “heavy rain” and “bare fields”.
6. Again, ask the group to write these causes on cards, and to put them on the ground with sticks to link the causes to the problem. You are now putting together the “roots” of your tree.
7. Ask in turn why each of these causes occurs. For example, they may say that the “bare fields” are caused by “lack of crop seed”, “lack of mulch” and “dry soil.” Get these ideas written on cards, and ask the group to add them to the diagram.
8. Again ask again why each new set of causes is happening. Continue adding more cards to the diagram to represent new causes. Make sure that each cause is written only once: you can add more sticks to link it to other roots of the tree.
9. When the participants feel that everything has been covered, step back and look at the whole diagram. Ask the participants to make any further changes they feel are needed.
10. Ask the participants to look at the cards at the outside edge of “causes” part of the diagram. These are the root causes. If the logic of the diagram is correct, solving these root causes will solve the other problems. Discuss possible solutions to these root causes with farmers. Which are outside of the farmers’ control? Which can they do something about? What solutions can they suggest? For example, for the root cause “poor soils” they might suggest “apply manure” or “grow legumes.”
11. Repeat this process for other major problems that have not yet been covered. Make sure they cover all the natural resource problems that have a high priority for the community.
12. Copy the final diagrams onto paper to make a permanent record.

NOTES

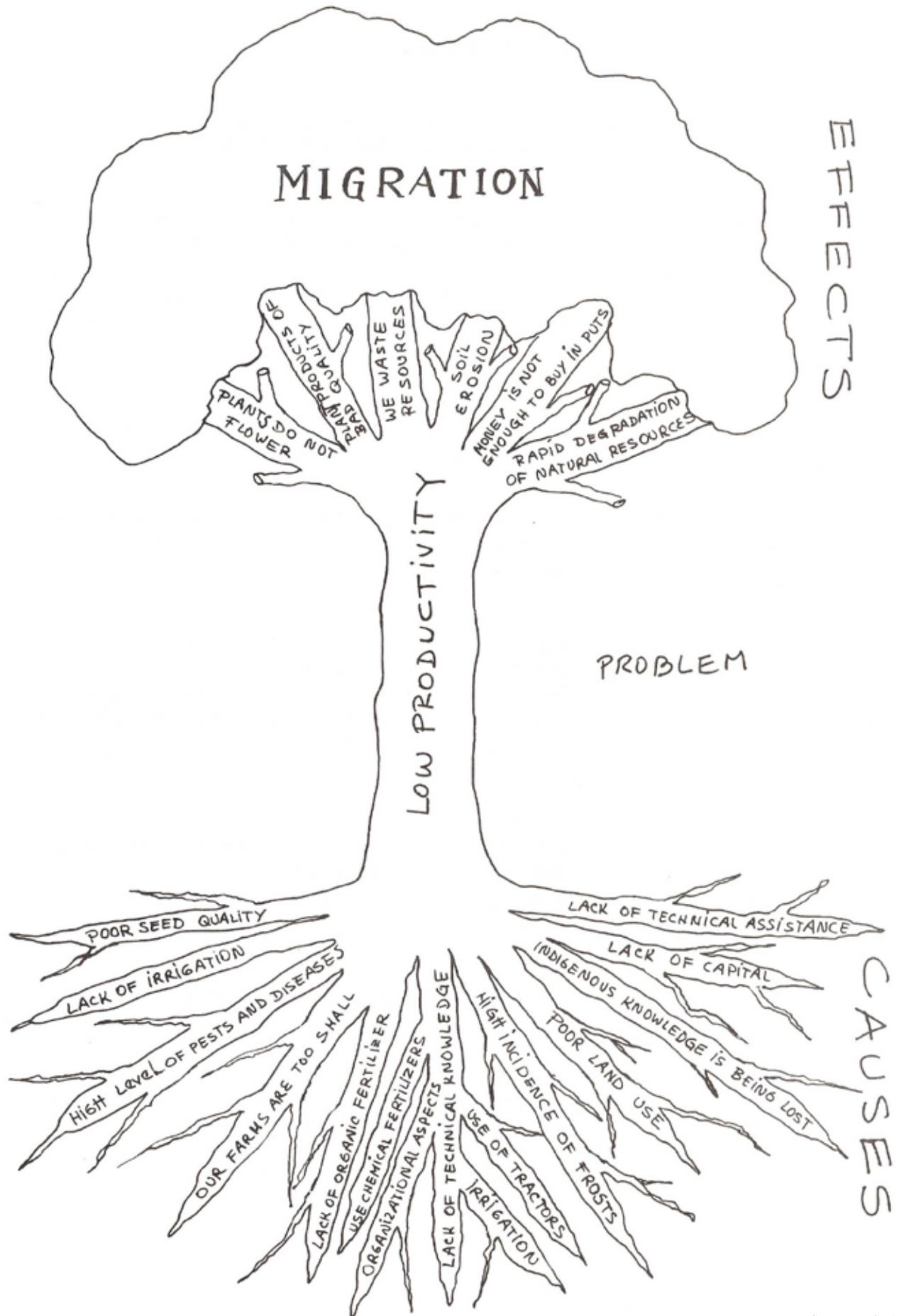
Instead of using cards and sticks, the participants can draw on the ground, a blackboard or a large piece of paper. However, that makes it more difficult to change the diagram as they are working.

Once the participants know how to do this exercise, you can break them into smaller groups and ask each to analyze one of the other problems. When they have finished, get them to present their diagrams to everyone and explain their reasoning.

It should become clear that solving one problem will automatically solve other problems too, perhaps even on other land types.

Many of causes of low productivity stem from the socio-economic, organizational, infrastructural, credit and marketing challenges. Consider the causes of these problems too, but focus mainly on the technical natural resource issues that the farmer groups can tackle directly.

Example of a problem tree



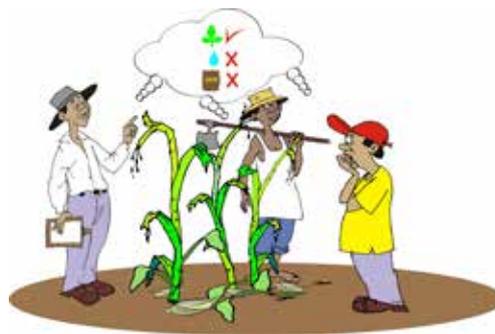
Source: Selener et al. 1999

LESSON 5. MAKING A NATURAL RESOURCES MANAGEMENT PLAN

IN THIS LESSON

You have learned about the natural resources in the community. The farmer groups have noted on their map any hotspots and important natural resource issues as well as areas of high potential for natural resources management interventions. After completing this lesson, you will have:

- Used this information to help groups decide what goals they want to achieve, and which techniques and technologies are most appropriate for achieving those objectives.
- Helped groups make a natural resources management plan, including the timing, people responsible, and estimated costs of activities.



SELECTING THE RIGHT TECHNIQUES

Techniques to manage natural resources are location-specific, so you'll have to work with farmers to adapt them to their needs.

For example, if the goal is to increase water availability for crops, it's important to understand the context in order to determine the best solutions. In some areas, insufficient water access for crop production can be solved by irrigation. This is not feasible everywhere: in very flat regions where making canals is very difficult, or in areas far from water sources where drip irrigation is impossible.

In such cases it may be more feasible to use rainfall more efficiently and work on the soil so it can retain moisture. Increasing rainfall infiltration and storage in the soil can lead to significant improvements in productivity, even in arid areas. If rainfall in your areas is insufficient for irrigation or to cover crop water needs, rainwater harvesting techniques can increase water availability.

The package of technologies you choose with the farmer groups must directly address the causes of the problem you're seeking to address, as well as any contributing factors that may exacerbate or sustain the problem.

Alternatively, instead of responding to a problem by developing new interventions, you could scale up existing practices that work well.

FINDING AND CHOOSING SOLUTIONS

Once farmers have understood the problems they face, they can decide what actions to take. A problem may have several possible solutions, which will vary in their effectiveness, costs, or how easily they can be adapted to local circumstances.

Look around for solutions that work in the area. For example, if a neighboring village has built a successful water-harvesting scheme, bring your farmer groups to look at it and see if they can learn from it. Perhaps there is a traditional practice that



can solve the problem? Encourage people to be creative in thinking of solutions. Also look for ideas from research institutions, extension agencies, and other projects.

Bear in mind that the solution may not be obvious. For example, many farmers think that the only way to control pests is to spray more insecticide. But in fact, spraying may worsen the problem because it also kills the natural enemies of the pest. In some situations, it may be better to stop spraying altogether to allow the natural enemies to control the number of pests.

See Exercise 5a for how to help local people to choose solutions to their priority problems.

TYPES OF SOLUTIONS

There are a number of common practices that can be modified so they fit the context of your community. Solutions may be based on vegetation, infrastructure, management, or a combination of these. Issues relating to natural resources tend to be complex, so most interventions are a combination of vegetative, infrastructure and social solutions.

Vegetation or biological solutions

These involve planting live contour barriers or ensuring year-long ground cover. Agronomic fixes for farm-level issues such as soil fertility amendments can be biological solutions too.



Infrastructure or physical solutions

These involve moving earth or rocks. They include making terraces, creating gully plugs, or constructing dams. They require more work than vegetative solutions.

Social solutions

The best solutions might not involve any physical labor at all. A social solution is a social or legal policy or management decision that tries to change people's behaviors. For example, you might notice that erosion is caused by free grazing livestock. This may require a social intervention – a change in the way people are managing their animals – to protect land from the destruction caused by free grazing. This kind of behavior change can occur through community-led behavior change education, social pressure, or even official legal policies.

These types of solutions may be more difficult to develop and implement, and may require additional external support (e.g., from village counsels or committees).



THE SOLUTION TO “NOT DO”

In some cases, the best solution for soil, water, or vegetation management is to not do anything. For example, for extremely steep slopes, not cultivating on the hillsides and allowing regrowth of natural vegetation may be the best solution to address erosion. You may also decide that livestock should not be allowed to graze above water points or on certain slopes prone to erosion. This is called **use exclusion**.

Building fences or posting signs asking people to stay out, or reducing the number of livestock that graze the land, can go a long way toward helping land cover recover. When the land is protected from overuse, and the conditions are right for life to return, plants come back in a natural order. This is called **natural succession**. The process of natural succession can take many years, even several generations.

Natural succession will **not restore** land when:

- There are no sources of seeds or native plants nearby.
- Rapidly spreading foreign plants take over and crowd out desirable plants.
- The land is so degraded or contaminated that nothing will grow.

Sometimes solutions like this are not appreciated by farmers, if they think that they are “losing” productive land. Use exclusion does not mean that the land is not used for anything at all. For example, excluding animals from grazing an area might be combined with allowing the animal owners to cut grass on the slopes which they can carry home and feed to the animals. This approach allows the productivity of the land to be maintained without erosion and loss of soil.

Check whether there are any areas that the group feels should not be planted or grazed, so as to allow vegetative regrowth. How might these areas be used in other productive but more sustainable ways? Are there issues of land ownership and land tenure that might prevent use exclusion in those areas?



BUILDING ON LOCAL KNOWLEDGE

You should learn – and encourage local people to build on – successful local practices that conserve natural resources. In general, projects will be more sustainable if they build on local practices and knowledge. Farmers have an intimate knowledge of the natural resources on their farms and in their communities. But they may not discuss them with their neighbors or try to improve or scale them.

Look for and encourage promising initiatives. For example, look for farms that are very productive despite a drought, or identify farmers who seem to be more successful while using the same available land and resources. Study what they do, and encourage others to copy them.



CHOOSING SOLUTIONS YOU CAN SUPPORT

Before investing a lot of time, effort and money in a particular solution, you have to be confident that it will work. Consider seeking technical advice from your colleagues or from external experts. You may need to try out potential solutions on a small scale before scaling them up (see the module on Promoting innovation for guidance).

BOX 12 THE STORY OF ANITA'S COMMUNITY

Anita's group determined that their spring had heavy siltation and thus was unsuitable for drinking. They did a problem tree analysis and noted that the high siltation was likely due to high runoff and erosion since there are bare slopes in the catchment area and on the banks of rivers and streams. Their indicator of this conclusion was the murky and poor-tasting water.

Their field agent asked them to further describe the cause of the problem: Why are the slopes bare? The group discussed and uncovered other contributing factors. Many people cut down trees for firewood.

They also allowed their animals to graze freely, which depleted ground cover.

Through this process, Anita's group decided that the best solution they could handle together as a group was to increase ground cover above the spring and in the fragile riverbank areas. This was a **vegetative or biological** solution.

They also decided that they needed to talk to local officials about instituting regulations to limit grazing in fragile areas. These **social practices** require longer-term planning with other stakeholders.

Also consider the budget and types of support that you and your project have available to support the group, as well as the group's capabilities and degree of organization. There is little point in encouraging the group to choose a solution that is doomed to fail because it is too ambitious or lies outside the mandate of your project. If in doubt, discuss with your colleagues and supervisor.

As a field agent, you are responsible for providing support to each farmer group. Make sure you select strategies and approaches that are feasible for the group to implement and for you to support. This means you'll need to plan sufficient visits to support each group. Don't take on more than you can support.



ISSUES THAT FARMER GROUPS CANNOT ADDRESS ON THEIR OWN

Upstream and downstream issues can be important drivers for improving the health of natural resource. For example, significant tree growth upstream can increase groundwater levels, thus increasing the duration and strength of stream flows. To address issues that involve stakeholders outside of the farmer group, it will be necessary to find the right social channels through which to engage these stakeholders. These could be either **formal channels** – such as village or community-level committees, or **informal channels** – such as friends or relatives who live in the communities upstream.

Watershed-level interventions can be complicated because so many stakeholders are involved. Organizing meetings of relevant stakeholders in the community along with some joint activity is a required first step. These meetings allow stakeholders to learn firsthand about key aspects of their watershed: boundaries, water bodies and other topography, slope, hydrology, rainfall, soil types, land uses, common pollutants and other characteristics.

Also the community may establish contacts with key stakeholders and identify who is responsible for what type of action. You, along with the community, might choose to organize a **watershed steering committee**. The steering committee could be drawn from the community and lead the



BOX 13 ANITA'S COMMUNITY: THE COST OF CONSERVATION

Anita's group noticed that the upland areas, where there are plenty of trees, are more stable, productive, and resistant to erosion. In other areas, they noticed that there is a lot of soil erosion and sediment enters the nearby water source. Anita saw that trees are important to stabilize the land, and to increase the availability of firewood.

However, her neighbors continued to cut these trees since they had few other income sources. Poor farmers are often left with little choice but to cut trees for firewood. Anita called together a community meeting to discuss the issue. Can they find alternatives

to firewood so that the community can maintain trees on the hillsides?

A good solution to problems like this is to find solutions that have dual purposes. For example, fruit trees provide both soil stability and increased water infiltration, and also can be harvested for food or sale. Thus, it is economically viable to maintain tree cover on these hillsides. In some places, crops like pineapple are planted on contours to stabilize slopes. Win-win solutions such as this should be sought whenever possible.

decision-making about the watershed. The committees or stakeholders prioritize concerns and form a **micro-watershed management plan**.

If your group is interested in **whole watershed planning**, additional steps may be necessary. Consult your local ministry of agriculture or ministry of environment for guidance.

STAKEHOLDER CHECK

- Are there any priority areas selected that require participation of people outside the group in order to find and implement effective solutions?
- If yes, who are the other stakeholders that need to be involved? What are the appropriate channels through which they can be successfully engaged?
- Are the proposed solutions reasonable and beneficial to all stakeholders?

MAKING AN ACTION PLAN

Using the information gathered from the first lessons, you can now write down a plan to address problems and take advantage of opportunities for natural resources to reach their potential. Literate farmers can write out their own resource management plans. Illiterate or semi-literate farmers may choose to simply revise the goal-setting map they've drawn earlier or draw a new plan.

A natural resources management plan should include:

- **Problems.** The list of priority problems the group wants to solve (such as "gully growing quickly").
- **Solutions.** The general strategy to overcome each problem (such as "reforestation using native species of fruit trees").
- **Goals and objectives.** The general and specific changes the farmers' group want to see in how their natural resources are managed (such as "improve livelihoods for farmers in hilly lands" and "increase the amount of fruit trees on the river-banks").
- **Activities.** The specific activities needed to put the solutions into effect (such as "build three checkdams" and "plant 450 guava trees").
- **Inputs.** The cash, materials, labor, and other inputs needed.
- **Location.** Where the activities will take place. You can show



BOX 14 ANITA'S COMMUNITY: REACHING OUTSIDE THE FARMER GROUP

Anita's group realized that four houses in the community were at risk of landslides due to bare ground on the hillside above them. They saw that it was caused by erosion, and this was because of mismanagement of resources upstream – but the people on that land were not part of the farmer group.

Anita's group decided that they must reach out to other stakeholders in the area to discuss the problem and come up with a solution. The group decided to hold a meeting with all community members living within their watershed boundary, and to create a watershed committee to deal with these larger issues.

this on your community social-resource map, or another map of the community or watershed.

- **Person(s) responsible.** The names of the individuals who will lead the work, and everyone who will participate, along with their roles (such as “Tom will bring sand,” “Claudia will gather bamboo and make carrying baskets”).
- **Timing.** The date the activity will begin, how long it will take, and when it will end. You can draw up a calendar to show the timing of the various activities.
- **Budget.** A good estimate of the costs or resources required to achieve the activities, and where the resources will come from to implement them.
- **Monitoring.** How to make sure that the work is progressing – and if not, why not. You may want to add indicators to each of the specific objectives.



Both farm-level and watershed or community-level plans can use similar formats. See Exercise 5b for instructions on making a natural resources management plan. Plans can be drawn as maps, written as charts, written as a narrative – or preferably a combination of these.

When plans have been finalized, consider covering them in plastic and hanging them on the wall of the homestead or community common area. This is a way for farmers to monitor their own progress towards their goals and objectives. If the participants are not literate, consider using a sketch map or other visual plan instead.

BUDGETING FOR ACTIVITIES

Nothing is free so it's important to ensure that communities are prepared to finance the work they are planning. A budget is a key component of any plan. It should include:

- A list of each activity
- The cost of each unit needed, the number of units needed, and the total cost for the number of units needed

TABLE 7 YEAR 1 BUDGET FOR NATURAL RESOURCE MANAGEMENT ACTIVITIES

DESCRIPTION	UNIT	UNIT COST	NUMBER OF UNITS	TOTAL	SOURCE OF MONEY
Labor – preparing land	Person-day	\$2.50	10	\$25.00	SILC group fund
Materials – compost	Tonnes	\$40	1	\$40	Group savings



A FARM DEVELOPMENT PLAN DRAWN BY A SEMI-LITERATE FARMER WITH “BEFORE” AND “AFTER” MAPS

Photo: CRS, Latin American and Caribbean region

- The source of the funding for each activity
- The duration of the planned action

You can help your groups develop a budget by referring to the *Financial education* module, as well as the budgeting sections in the module on the *Seven steps of marketing*. Table 7 gives an example of a simple budget.

CONCLUSION

In Lesson 5 we covered how to address the natural resources issues your community is facing. We discussed some of the techniques and the three types of technology solutions you can bring to a project: biological, physical, and social. In selecting the right combination of these solutions, we emphasized the importance of building on local knowledge, and of ensuring that the resources (human, monetary, organizational) are available to implement the project interventions. These interventions are the central part of the action plan, which describes how the project will be carried out. Also important are the goals and objectives, inputs, activities, location, timetable, budget, and human resources.

Now that you have implemented your project, lesson 6 will give you some key principles on how to manage your natural resources management plan.

QUIZ 5

Answers at the end of the guide.

1. Neighboring communities may already have found viable solutions to the problems your community is facing. It's a good idea to learn from what they did instead of trying to come up with a new ways to address the problem.

- A. False
- B. True

2. Match the description of the solution with its corresponding example.

DESCRIPTION	EXAMPLE
A. Vegetation or biological solutions	1. You teach farmers about rotational grazing
B. Social solutions	2. You build rock dams to reduce the speed of rain water
C. Infrastructure or physical solutions	3. You plant deep-seeded grass to reduce erosion

3. Natural succession is where the community gets together to plant native vegetation in a particular area.

- A. False
- B. True

4. Which of these issues fall outside the scope of a watershed steering committee?

- A. Mapping the users and practices of the main water bodies within a watershed
- B. Liaising with the Ministry of Agriculture's watershed department
- C. Monitoring and evaluating the fluctuations of crop prices
- D. Preventing and solving conflicts about access to water among various stakeholders

5. This document describes the specific details to carry out a natural resources management project:

- A. Budget and Gantt chart
- B. Stakeholder analysis
- C. Problem map
- D. Action plan

6. What is the best way to increase the amount of water available to crops?

- A. Harvest rainwater
- B. Dig a borehole and pump out water
- C. Divert a nearby stream
- D. It depends on the circumstances.

EXERCISE 5A. CHOOSING SOLUTIONS

Solutions are determined based on the problems, opportunities and the biophysical conditions of the area that you've just analyzed during your ecosystem assessment.

Having a comprehensive list of inputs, materials, people, funds, and other resources that are available for farmer groups to use in designing solutions is critical for selecting realistic solutions. Farmer groups should brainstorm techniques they're familiar with that have proven to be successful. You can use your inventory of local practices as a reference.

You should also reflect on the principles and technical options that you have just learned about, and try to connect them with the identified priorities. As a facilitator, you should have a good understanding of the possible technical solutions from the theory module and the annexes in this document to help your group find solutions.

OBJECTIVE

After completing this exercise the participants will be able to:

- Choose solutions that address their priority problems.

EQUIPMENT NEEDED

- Flip chart, markers

EXPECTED OUTPUTS

- A list of solutions to address the group's priority natural resource management problems

TIME REQUIRED

- 2-3 hours

PREPARATION

Review the list of priority hotspots or issues (Exercise 4c), and their causes and effects (Exercise 4d)

SUGGESTED PROCEDURE

For each of the top four or five priority issues the group identified earlier:

1. Develop a list of possible interventions based on the problems that you and the group member have uncovered and the solutions that you feel would work well locally.

2. Review this list and decide which interventions are most important for your group.
3. Review the initial list and decide which interventions can be addressed by the group members themselves, and which will require interaction with external stakeholders. Also discuss the types of resources that may be required to implement each of the interventions. If group members do not have the resources themselves, where could they obtain the resources?
4. Organize the results of the discussion in a table like Table 8.
5. Facilitate a follow-up discussion around these questions (you may add other ones as appropriate for your local context):
 - What are the most practical solutions given the resources that the group has access to?
 - What information might you still need before you finalize your strategy?
 - Do some of the interventions require consultation, input or action from external stakeholders? If yes – which ones and how could they be engaged?
 - Do you need more information on any of the solutions? If yes, where will you get it?
 - Do some of the solutions require more money or resources than the group has? If yes, what are other possible sources for the necessary resources?
 - Are there government or NGO programs within your area that could help with what you want to do? If yes, how do you get in touch with them and seek their assistance?

Remember: natural resource management problems are often a result of an inappropriate technology (e.g., overgrazing on slopes) and a social or economic problem (e.g., lack of access to adequate fodder). Solving the problem probably involves both a technological fix (fencing off the overgrazed area, planting fodder grasses) as well as a social initiative (getting people to agree to rules about grazing animals).

6. Discuss what additional activities you may need to add to ensure that the social aspects are addressed.
 - Are there land tenure issues you need to consider?
 - Are there any potential conflicts that could arise from these activities?
 - Is the local government or other community group ready and able to support these activities?
7. Agree on the main solutions and activities the group members would like to do.

BOX 15 NARROWING DOWN: AN EXAMPLE FROM LATIN AMERICA

A field agent from a CRS program in Latin America conducted a problem tree analysis and solution exercise with her group. Together they created a long list of best practices that might be used to improve maize production. The field agent realized that with her limited time and resources she couldn't support all of the interventions. She also realized that some interventions were more important than the others.

The field agent worked with the group to prioritize the most important interventions. Together they determined eight criteria for ranking natural resources management practices:

- **Key issue.** It addresses a fundamental or critical problem that needs to be resolved.
- **Easy to apply.** It uses simple techniques and methods
- **Potential for multiplication or scaling up.** It is popular with farmers, responds to a key problem, is easy to use, and is easily shared from one farmer to the next.
- **Local resources.** It does not overly depend on external resources and uses resources that are available, produced or developed in the community.
- **Low manual labor.** It reduces the family's work load, including children.

- **Environmentally friendly.** It promotes rehabilitation, improvement or responsible use of natural resources.
- **Immediate results.** It produces visible benefits within the first year of use. Producers want to see concrete results through comparisons and experimentation.
- **Economically viable.** It is low-cost and can be easily used by smallholder farmers.

The field agent then led her farmer group through a ranking process whereby they looked at each possible solution and gave it a score for each of the criteria: 3 for a high, 2 for a moderate, and 1 for a low score. This was done using voting. She could also have used proportional piling, or consensus discussion.

The participants decided that practices with a score above 20 would be promoted (see Table 9 for a sample of the ranked solutions). The field agent determined she was able to support the farmer groups with all the technologies. If farmer groups had selected a technology that the field agent could not provide, she would have taken the time to explain why she could not promote that particular technology.

Choosing solutions

TABLE 8 EXAMPLE OF SELECTING STRATEGIES TO IMPROVE NATURAL RESOURCE MANAGEMENT

PROBLEMS	SOLUTIONS	ACTIVITIES	INPUTS	STRATEGY AGREED
Why?	How?	What?	What with?	
Gully growing quickly	Slow down water in gully	Build check dams in gully	Stones	✓
	Reduce amount of runoff	Make stone or trash lines along the contour	Stones, dead brush	✓
		Build concrete dams	Stones, sand, cement	✗ Too expensive
Soils do not hold water, and dry out quickly	Improve soil structure and ability to hold water	Make and apply compost	Manure, plant materials	✓
Soil moisture lost through evaporation	Conserve soil moisture	No tillage or minimum tillage	Animal draft	✓
		Plant shade trees	Cash for seedlings	✗ Would shade crops
		Cut weeds and apply as mulch instead of burning		✓

TABLE 9 RANKING OF POTENTIAL SOLUTIONS

Practices to increase maize productivity

PRACTICES	BENEFITS	SCORING OF CRITERIA								Total
		A	B	C	D	E	F	G	H	
Soil management										
Minimum tillage or zero till	Reduces erosion, improves moisture retention, protects soil surface, adds organic matter, controls weeds	3	3	3	3	2	3	2	3	22
Green manure	Adds nitrogen, improves soil physical properties, enriches soil for other crops, encourages microbes and worms	3	3	3	3	3	3	2	2	22
Incorporating crop residues and animal manure into soil	Increases soil organic matter, availability of nitrogen and other nutrients, increases soil microbes and water-holding capacity	3	3	3	3	2	3	2	3	22
Planting along the contour	Controls erosion, improves water capture and infiltration, controls runoff	3	3	3	3	2	3	2	2	21
Live barriers on slopes	Controls erosion, produces forage and other products, improves infiltration and controls runoff	3	3	2	2	3	3	3	2	21
Drainage management on level soils	Controls excess water, avoids chlorosis, improves water use	3	2	2	2	2	3	3	2	19
Improved seed										
Seed with high germination rates	Lower input costs, no reseeding needed	3	3	2	2	3	3	3	2	21
Locally adapted varieties	Improved disease and insect resistance, greater adaptability to drought and excess rain, less expense for seed and fertilizer	3	3	2	2	3	3	3	2	21
Improved seed varieties	Greater yields and resistance to pests and disease, but cost more	3	3	1	1	2	2	3	1	16
Open-pollinated varieties	Easier availability of seed	3	3	3	3	2	3	3	2	22
Local production of certified seed	Easier availability of seed	3	2	2	3	2	3	3	3	21

EXERCISE 5B. DEVELOPING A NATURAL RESOURCES MANAGEMENT PLAN

This exercise leads the participants through the process of developing a plan to manage their natural resources. This plan may be for one year or for several years. It may cover a single farm, a group of farms, a particular area (such as an area being threatened by a quickly-growing gully), or the whole community or watershed. It may be best to start off with a large, general plan for the whole community or watershed, and then in another session to help individual farmers plan how to implement the activities on their own farms.

OBJECTIVE

After completing this exercise the participants will be able to:

- Develop and agree on a plan to manage the natural resources in a particular area.

EQUIPMENT NEEDED

- Large pieces of paper, markers

EXPECTED OUTPUTS

- An agreed plan (or plans) on natural resource management

TIME REQUIRED

- 3 hours

PREPARATION

It's a good idea to have already completed at least the following:

- Exercise 1b. Setting goals
- Exercise 4a. Drawing a social-resource map
- Exercise 4b. Gender roles and responsibilities in natural resources management
- Exercise 4c. Identifying hotspots or problem areas
- Exercise 4d. Problem tree
- Exercise 5a. Choosing solutions.

SUGGESTED PROCEDURE

1. Draw Table 10 on a flip chart. List in the first four columns the problems, solutions, activities and inputs that the farmer group identified in Exercise 5a.
2. In the **Activity** column, ask the group to be as specific as possible in terms of numbers and amounts. How many checkdams do they want to build? How large an area needs to be sown with grass?
3. In the **Inputs** column, refine the lists from Exercise 5a following the more detailed list of activities.
4. In the **Location** column, get them to specify exactly where the activity will take place. If it is helpful, get them to mark the locations on a map. You can use or copy the resource map they drew in Exercise 4a, or they can draw a new map.

(Note that the problems and the interventions may be located in different places. For example, if a dried-up well is a problem, the intervention may be a tree-planting campaign to protect the area upslope from the well.)

5. In the **Person(s) responsible** column, invite them to say who will lead the activity and make sure things get done, and who will do the work. Make sure that the leaders are responsible and committed, and that you get firm commitments from everyone! It may be advisable for the group to design a system of sanctions if, for example, someone does not turn up to work as agreed.
6. In the **Timing** column, put down the dates when the activities will take place. Again, make sure you get commitments from all concerned. If there are many activities, it may be useful to draw up a separate calendar showing what is going to happen when.
7. Ask the participants to look at the **activities**. Mark in one color those activities that will have a short-term benefit. Mark in another color those activities that will have a long-term benefit. Is there a good balance? Do you need to add, remove, or change any activities?

Natural resource management plan

TABLE 10 PART OF A NATURAL RESOURCE MANAGEMENT PLAN

PROBLEMS		SOLUTIONS		ACTIVITIES		INPUTS		LOCATION		PERSON(S) RESPONSIBLE		TIMING	
Why?	How?	What?	What with?	Where?	Who?	When?							
Gully growing quickly	Slow down water in gully	Build 3 check dams in gully	Stones, Refreshments (provided by Mira and Daniel)	In gully on west side of valley	Albert, Gregor, Filip, Mahmud, Leopold, Daniel	3 August							
	Reduce amount of runoff	Make stone or trash lines along the contour	Stones, dead brush	Area above gully, Mira and Daniel's farms	Peter, Lucia, Benjamin, Zachary, Leonora	3 August							
Soils do not hold water, and dry out quickly	Improve soil structure and ability to hold water	Make and apply compost	Manure, plant materials	Individual farmers' crop fields	All farmers in group, working individually	Before planting							
	Conserve soil moisture	No tillage or minimum tillage	Animal draft	Individual farmers' crop fields	All farmers in group, working individually	During crop season							
Soil moisture lost through evaporation	Cut weeds and apply as mulch instead of burning			Individual farmers' crop fields	All farmers in group, working individually	Before sowing, during weeding							

LESSON 6. MANAGING NATURAL RESOURCES PROJECTS

IN THIS LESSON

Once the natural resources management plans are developed, they need to be implemented and managed. Some of the techniques may be new to farmers, or they may need to assess which options are best for their particular context. Also, during the implementation, things may work out differently than expected, requiring adjustments throughout the life of the project.

Implementing natural resource management plans is a process of trial and error. Don't be discouraged if you are not seeing the results you expect. With a few adjustments the farmers' group will find the techniques that are right for their particular challenges and context.

After completing this lesson, you will have:

- Learned about the roles you may have as a field agent.
- Honed some of the key skills of a good manager of natural resources.
- Learned about adaptive management and how to modify activities by examining results.

ROLES OF NATURAL RESOURCES MANAGERS

As a field agent, you are also the manager of the natural resources component of your project. You may have multiple roles:

- Training farmers in new technologies, such as using an A-frame to lay out contour trenches.
- Creating demonstration plots to showcase technologies and monitor progress.
- Testing new ideas in selected areas with farmer leadership and involvement, such as using live barriers instead of trash lines to slow down water movement on hillsides, or testing drought-tolerant crop varieties.
- Providing materials, including inputs, equipment, refreshments, or payment for specialist services.

TRAINING FARMERS IN NEW TECHNOLOGIES

You may be expected to provide trainings in new techniques for farmers. Should you need more information on a particular technology, or if you do not feel comfortable conducting the training by yourself, please, seek support. There are many places where you can turn to for assistance: experienced farmers in the community, your organization, and other organizations or government projects active in the area. You can also look up information in specialized libraries or on the internet.

CREATING DEMONSTRATION PLOTS

There are many ways of demonstrating results to farmers. By establishing demonstration parcels on the fields of several farmers, they will be able to observe the resource improvements first hand. Successful demonstration plots can go a long way to encourage farmers to massively apply new technologies. It also enables them to see what does not work and what needs to be changed. Some field agents may



choose to take a “lead farmer” approach, in which technologies are demonstrated on the field of a lead farmer chosen by the group. Using this model, you can set up regular meetings to demonstrate the techniques on the plot, so that farmers can take the learning back to their own plots. Experiment with different extension models and determine which works best for your groups and fits in with your other activities.

Often in training programs, field agents train farmers once or twice and are not able to follow up to see whether farmers actually have benefited from the knowledge, or have adopted the practices on their own plots. A critical component of farmer training in demonstration plots is to **monitor**

understanding and adoption of the techniques. This requires that you register all farmer groups with which you’re working; note the skills or techniques you’re promoting; and create a monitoring plan where you visit the fields of other group members other than the lead farmer or demonstration plot. Check the module on Promoting innovation for more ideas.



BOX 16 USING LOCAL KNOWLEDGE IS CRITICAL

In the Gulbarga District of Karnataka, India, an NGO worked with farmers to prevent soil erosion in their fields. Farmers traditionally built high stone barriers that collected most of the soil but had openings below to let water through.

The NGO workers noticed that the farmers’ stone barriers allowed some soil to wash through to the fields below. And when high stone barriers were built at the lower edges of the field, some of the stones toppled over and had to be collected from below and replaced. They proposed building low-rise, solid stone barriers that would stop all the soil loss and would not need constant repairs.

The farmers said they did not mind replacing a few stones. But the NGO workers saw this as wasted effort. The farmers’ stone barriers took more work to build and they let soil through, failing to control erosion completely. The field agents proposed to test the new technology through an experiment. In some fields they would build solid, low stone walls. In others the farmers would build the traditional barriers.

At the end of the season, the farmers and the NGO workers met and compared the effects. Many farmers with fields below the new, solid walls were unhappy. Cattle wandered across the low walls onto their fields, and after the monsoons, these farmers had less new soil and less water for rice paddies than before.

These problems led to arguments between the owners of the lower fields and the fields above. The experiment showed the farmers that their own traditional barriers worked better than the “improved” walls. The farmers told the NGO workers that the solid stone walls caused too many problems.

Through this experience the NGO workers learned that the farmers’ traditional barriers not only prevented most of the soil erosion, they also prevented cattle from straying. Allowing some soil and water to pass through to the downstream fields provided for good neighborly relations.

Source: Conant and Fadem (2012) p.202.

TESTING NEW IDEAS

If you and your groups have decided to test or implement some technologies for the first time, on-farm trials or pilot projects may be a good activity. On-farm trials enable farmers to identify hypotheses, decide on possible solutions, establish trials, and measure the impact of the technology. Ideally, you should also be monitoring farmer group adoption of these technologies through your visit log, making mid-course adjustments as you go.

SKILLS OF NATURAL RESOURCES MANAGERS

Other aspects of the manager's work are less direct but equally important skills that you should develop:

- Keeping people enthusiastic and getting incentives right. Making sure people take full ownership by promoting good leadership.
- Maintaining work quality by managing staff, quality checks, and technical advice.
- Helping people change behaviors that damage natural resources.
- Adjusting your project based on results through adaptive management.



KEEPING PEOPLE ENTHUSIASTIC AND GETTING INCENTIVES RIGHT

Changing behavior is always difficult. Sometimes benefits from investments in natural resources take a while to become visible. Because of this time delay, it can be difficult to get farmers to follow through with new technologies and activities. Many farmers are not willing to take on new risks, and need to see immediate impacts in order to recognize that their efforts are not wasted.

A good strategy is to include a few activities with short-term impact in between those that require considerable efforts and have longer-term benefits. For example, if the desired long-term results are reforestation or regeneration of degraded hillsides, you can introduce higher-yielding staple crops that can be intercropped with the trees. Also, you could offer training on marketing alternative crops that the farmers can grow. The *Seven steps of marketing* module can help with this process.

Some other ideas to increase motivation and encourage adoption of techniques include:

- Identify some "quick wins," or activities that will show immediate or dramatic results. You may use demonstration plots to do this.
- Make sure all members of your farmer groups are involved in designing the project.
- Take farmers to see other farmer groups that have successfully implemented the practices you're trying to promote.
- Celebrate a finished job with a launching ceremony, or give out certificates to people who are good adopters.

BOX 17 MOTIVATING PARTICIPATION IN HAITI

In Haiti, CRS began by paying community members to dig infiltration ditches and build live barriers through a cash-for-work emergency response program. Field agents found that, while the community appreciated the benefits of the activities, they also were waiting for NGO support before they continued the work elsewhere.

For its next project, CRS tested a new incentive structure; the community provided the labor and local materials in exchange for seedlings and crop seeds that could be planted on the newly-protected hillsides.

How can you encourage farmers in your project to do the planned work on their own initiative?

SHOULD YOU GIVE AWAY INPUTS?

Groups should take on activities because they see the benefits in the short and long term. To that end, as a facilitator, you should be moving towards supporting a process of group-led natural resources management – not subsidizing all activities through cash or in-kind payments. This is generally unsustainable, as groups tend to develop a dependency on the NGO or institution instead of valuing the good management practices for the positive impacts they can have on the community.



Some activities are more infrastructure- or resource-intensive, such as large-scale watershed management programs. Where interventions need to be subsidized, the communities that benefit should still be required to make a contribution to the process. Consider discussing co-investment, where the community contributes materials, labor, refreshments or other inputs, and the NGO matches the contribution. Communities should be in charge of developing and implementing a long-term sustainability plan to maintain the watershed structures and management regulations.

GOOD LEADERSHIP

Leadership is critical to ensuring that work is completed in a timely and participatory manner and that it is technically sound. Key characteristics of a good leader include:

- **Exemplary character.** A leader needs to be trusted to take responsibility for the natural resources management strategy and plan. Group members must feel respect for their leader and trust him or her to make changes to the plan based on continuous monitoring and data analysis.
- **Enthusiastic.** People look to leaders who are inspiring and motivating to complete work, especially if there are no economic gains. Good leaders lead by example.
- **Confident.** Confident leaders make other group members confident that they too can contribute to the strategy.
- **Purposeful in situations of uncertainty.** In times of doubt about a particular decision or activity (e.g., land tenure conflicts, policy or budget discussions), a good leader will take charge with confidence.
- **Calm, composed and steadfast.** Good leaders are able to stay calm during emergencies, including flood or drought situations, and help find the way forward.
- **Focused and analytical.** A good leader keeps the main goal in focus and breaks it down into manageable steps to ease progress towards achieving the goal. This is particularly important when activities have both short-term and long-term objectives.
- **Committed to excellence.** The good leader maintains high standards of quality.
- **Knowledgeable.** The good leader does not need to be an expert, but knows when to ask for technical support when needed.



See the module *Organizing and managing farmers' groups* for more on leadership.

MAINTAINING WORK QUALITY

Depending on the way your groups are organized, different people might be responsible for monitoring the technical quality of the demonstration plots. Many projects choose to use a “lead farmer” methodology, wherein farmers who have some advanced knowledge of agronomy or have a leadership role in the community

are responsible for ensuring that the demonstration plot is maintained according to high technical standards.

Others could also be responsible for monitoring quality. In watersheds that have established watershed committees, selected committee members should be present when people are working with new techniques.

See the module *Promoting innovation* for more on seeking technical information or advice.

HELPING PEOPLE CHANGE BEHAVIOR THAT DAMAGES NATURAL RESOURCES

You may find that some people are hesitant to change the way they already manage their resources. For example, you might identify that farmers are planting groundnuts at the tops of hillsides, which is causing erosion during every harvest. However, it's difficult to encourage farmers to change the crops they plant, especially if they have an economic value.

Behavior change is a long process, and here are some ways to promote it:

- You can find people who have successfully changed a behavior, and ask them to share their experiences.
- You can create demonstration plots that highlight the behavior you want to promote, and invite farmers to watch the progress.
- You can discuss the importance of the behavior at different forums and meetings.

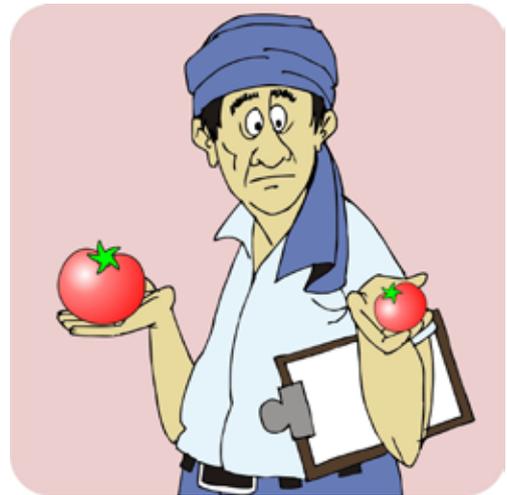
ADAPTIVE MANAGEMENT

It's important to remember that some activities might not work right the first time. If one of your groups is working to reduce soil erosion, for example, and you're not noticing any changes, you should look again at the main problems you identified. Maybe your strategy needs to be adjusted. Adjusting your project based on ongoing or preliminary results is called **adaptive management**, and it is a central part in natural resource management programs.

Use the data you're collecting to make sure that your strategy is helping groups achieve their goals. Exercise 6 shows one way to do this. More information and practical instructions on alternative methods of participatory monitoring and evaluation will be provided in Lesson 7.

CONCLUSION

Lesson 6 has given you the tools and knowledge needed to manage natural resources management projects well. We started out by describing the many roles you need to assume: trainer in new technologies, demonstrator of new practices, and tester of new ideas. We also covered the importance of leadership and other key skills you need to maintain high project quality, and to help participants adopt positive behaviors. Remember that more important than being perfect



is to learn from our mistakes and challenges. As such, we introduce you to adaptive management as a practical tool to review and adjust the interventions of on-going projects.

In Lesson 7, the final one in this manual, we'll cover the importance selecting good indicators and monitoring the progress of the project.

QUIZ 6

Answers at the end of the guide.

1. Which of these is NOT a role for a natural resources manager?

- A. Training farmers in gully treatment and prevention
- B. Trying out new vegetation to cover eroded soils
- C. Showcasing a water-harvesting technology at a demonstration plot
- D. Deciding who gets to participate in the project

2. Demonstration plots and on-farm trials are good ways to show a particular practice or technology to farmer groups.

- A. False
- B. True

3. Match the leadership skills of a field agent with its corresponding example.

LEADERSHIP SKILL	EXAMPLE
A. Confidence	1. Connects farmers with an NGO specializing in improved stoves that reduce firewood consumption
B. Analytical	2. Monitors the effect of each activity with detailed indicators
C. Knowledgeable	3. Inspires farmers to try new technologies and embark in practices never tried before by the farmers
D. Committed to excellence	4. Ensures project interventions maintain high quality standards

4. Match the type of activity with the correct example.

TYPE OF ACTIVITY	EXAMPLE
A. Keeping people enthusiastic	1. Getting expert farmers to check on activities
B. Maintaining work quality	2. Using a demonstration plot to show a new technique
C. Helping change damaging behavior	3. Identifying a “quick win” with immediate results
D. Adaptive management	4. Adjusting activities based on the initial results

5. Which of the following is an example of adaptive management?

- A. Changing activities to suit the needs of the local authority
- B. Trying out many different approaches and choosing the one that works best
- C. Monitoring progress and changing activities accordingly
- D. Adapting a piece of equipment so it can be used for different purposes

6. Which of the following statements about behavior change is most accurate?

- A. Easy! Just show people what they are doing wrong, and they will stop doing it
- B. Quick! Most people adopt new habits fairly rapidly
- C. Slow! Changing behavior often takes a long time, and people may go back to the old way of doing things.
- D. Impossible! Once people are used to doing things a certain way, it's very hard to get them to change

EXERCISE 6. ADAPTIVE MANAGEMENT AND MOST SIGNIFICANT CHANGE

Rather than looking for general trends, this exercise aims to identify the most important changes that have occurred in natural resources management. It is particularly useful to track changes in qualitative issues such as “capacity strengthening”. This exercise can be used as part of your **adaptive management** process.

Don't be afraid to modify your project as you go, based on what works and what does not!

OBJECTIVES

After completing this exercise the participants will be able to:

- Describe significant changes – positive or negative – that have occurred in the community, watershed, or on participants' farms.
- Share information among participants about changes resulting from the natural resource management activities taken.

EQUIPMENT NEEDED

- Notepaper, pens, large sheets of paper, marker pens

EXPECTED OUTPUTS

- The most significant changes and the corresponding reasons for the changes have been identified and shared among the participants.

TIME REQUIRED

- 1 hour

PREPARATION

Hold the initial session when the priority issues have been identified and the natural resources management plan is being developed. Hold subsequent sessions at agreed intervals afterwards.

Bring the groups' natural resources management plan.

SUGGESTED PROCEDURE

1. Ask the participants to identify what types of changes they wish to track. They should list issues they think are critically important, and relate directly to the groups' chosen goals and objectives. Probe for crosscutting issues, such as “equitable access to land for men and women”. Some examples of commonly observed changes include:
 - Changes in the farmers' production and/or income
 - Changes in the management rules or practices in their group
 - Changes in how farmers apply their knowledge
 - Changes in conflicts in the community (decreasing vs. increasing)
 - Changes in the physical environment in their fields or in community areas.
2. Decide how often you want to discuss each of these issues. That will depend on how fast things are likely to change. Some changes may happen fast, so you should discuss them more frequently; others will change more slowly, so you will need to discuss them only every few months. Help the group reach agreement on the single biggest change – which may be positive or negative. The discussion should provoke a rich and detailed review of the participants' experiences, as well as debate about why one change is more significant than another.
3. Ask the group to:
 - Write down what happened, with sufficient detail to allow someone else to verify it if necessary.
 - Explain why they have selected that particular change rather than something else.
4. Help the group to decide what they can do to overcome negative changes or prevent them from recurring. Also help them decide what to do to strengthen or expand a positive change.

QUESTIONS TO STIMULATE DISCUSSION

- What has been the biggest positive change related to each intervention in the last 6 months? What has been the biggest negative change?
- What can we do about a negative change? How can we prevent it from happening again?
- How can we spread the benefits of a positive change? How can we make sure more such changes happen?

LESSON 7. MONITORING PROGRESS

IN THIS LESSON

After completing this lesson, you will have:

- Created a realistic monitoring plan and developed indicators with farmer groups.
- Learned how to use a Google Earth maps to monitor key data over time.
- Integrated a gender-responsive approach to monitoring impact.



MONITORING IS NATURAL

We all do monitoring and evaluation all the time. Every time a farmer checks how her crop is growing, she is monitoring it. If she compares how it was doing for several consecutive months and then considers the reasons why she obtains the results, she is evaluating her farming.

Often people think that they will be “punished” or given “low marks” if they are facing problems or not meeting their goals. But that is not the purpose of monitoring. Monitoring is an excellent tool to check up on the results of your activities and adjusting future actions. This is an essential step to after you have developed and implemented your natural resources management strategy.

INDICATORS

When monitoring the implementation of your natural resources management plan you are checking for two things:

- Has the technology been built or the practice adopted?
- Is there measurable improvement in natural resources management towards meeting the group’s objectives and goals?

The first is called an **output indicator**; it measures only whether some activity has been done, but not the impact the activity is having. For instance, an output indicator is the number of farmers trained in how to build rock barriers.

The second is called an **impact indicator**; it measures the result of the activity, or the change that is occurring – whether positive or negative. For instance, an impact indicator is the percentage change in erosion rate thanks to the rock barriers.

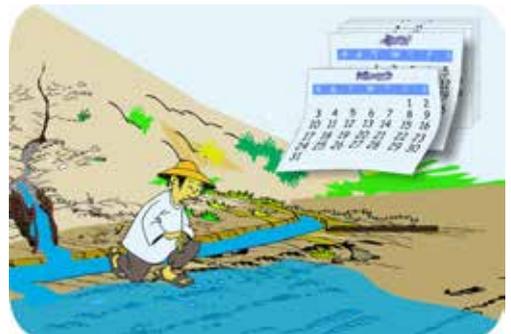
Indicators can also be either quantitative or qualitative. A **quantitative** indicator measures change based on percentages or absolute numbers, often based on statistical surveys. Quantitative data is often collected through:

- Measurement (directly measuring and calculating crop yield, level of soil moisture, rainfall)
- Written questions (in questionnaires or tests).

A **qualitative** indicator may be focused more on socio-economic and political factors. This kind of data can be collected through:

- Oral questions (interviews or group discussions)
- Pictures (photographs and drawings)
- Observations (what you see, as well as anecdotes or stories you hear).

You can gather information in many different ways. Which method you choose will depend on the type of data required, the time available, the skills of the staff, and the funds available for data collection.

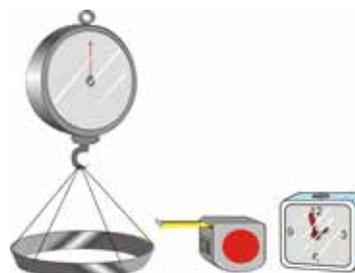


GOOD INDICATORS ARE “SMART” INDICATORS

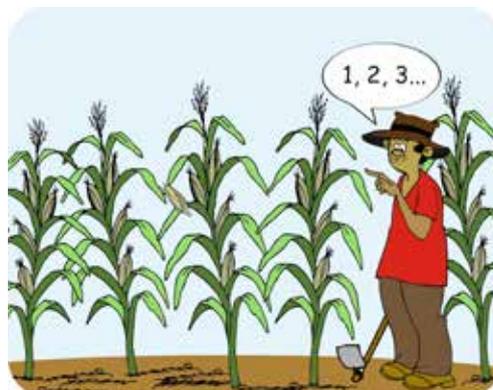
Specific. Indicators should be clear in what they’re measuring. If you want to promote a specific technique, state it clearly (e.g., the number of women farmers practicing water harvesting).



Measurable. You should be able to measure or count data, and it should not be difficult to collect. For example, don’t ask people to count the number of earthworms per hectare; try instead to count the number in a small, easily measurable area of 1 meter by 1 meter. Information should not be sensitive or confidential, such as money or number of cattle.



Achievable. The groups need to be able to reach the targets set, so the indicators need to be realistic, based on the time and resources available for the project. Choose goals together with the groups to make sure indicators are achievable.



Relevant. Indicators should be linked to the farmer groups’ goals, objectives, expected results and activities. For example, you do not need to measure water supply for a project if the groups have not identified water as a problem they are addressing.



Time-bound. Indicators should relate to the correct period of time. Choose a time period and only measure data during that period, such as changes in yield from July to October (source: FAO and IIRR 2012).



SMART = SPECIFIC, MEASURABLE, ACHIEVABLE, RELEVANT AND TIME-BOUND

PARTICIPATORY MONITORING AND EVALUATION

Farmer groups should be involved in deciding what indicators will be used for each intervention, and how each of them will be measured. They should also help to collect and record this information and analyze the results. This can help reduce your workload while also giving more project ownership to the farmers. It also allows the group to continue with the monitoring even after the project has closed.

You can monitor the technologies using forms like Table 11.

TABLE 11 EXAMPLE OF A MONITORING FORM

GROUP NAME	GOAL	TECHNOLOGIES PROMOTED	HOW DO YOU MEASURE ACHIEVEMENT?	
			Output	Impact
Turikumwe	Reduce erosion	Live barriers on 10% slope	Number of linear meters of live barriers planted	Farmers note less soil loss
	Increase soil moisture for maize	Mulch on main field	Number of kg of mulch applied	Soil dries out less quickly
	Improve vegetable production	Composting in homestead gardens	Number of kg of compost made and applied	Vegetable production increased from 50 kg to 75 kg
Amohoro	Improve soil fertility for maize – more Nitrogen	Intercropping with cowpea on maize fields, respecting appropriate plant spacing	Number of units of cowpea planted	Maize leaves are less yellow; yields increase

MONITORING PROGRESS USING MAPS

As a field agent, you may be supporting and monitoring a number of different group natural resources management plans. For monitoring purposes, you may find it helpful to map the areas and the specific activities that are currently being implemented. For example, you can map the areas where you are doing community-based soil and water conservation work, or the particular locations where you have established demonstration plots. Maps are very good for tracking your progress as well as for advocacy. There are various computer based tools – like Google Earth – that you can use.

Below is an image of two micro-watersheds outlined using Google Earth. The community determined that vegetative cover was the main underlying cause of their production problems. The community identified one micro-watershed to rehabilitate – a **treatment** area. In order to make sure that the impact was real, they decided to also monitor an adjacent watershed as a **control** area (see Lesson 5 of the *Promoting innovations* module).

In the map, the area on the left was designated for community work, while the one on the right was designated to be monitored for comparisons.

Both areas can be monitored according to indicators decided with the community, for example:

- Amount of soil erosion (measured by a trial plot set up to quantify soil loss in both zones)



**GOOGLE EARTH
IMAGE SHOWING
CONTROL AND
TREATMENT
WATERSHEDS**

Image: David Gandhi,
CRS

- Amount of land cover (monitored by semi-annual transect walks and a biodiversity inventory of both zones).

In this example, the field agents and community wanted to monitor the number of different plant species in each catchment area. So they conducted a biodiversity inventory using a simple Microsoft Excel form to monitor these indicators for both the control area and the area to be rehabilitated.

GENDER CHECK: ENSURING GENDER EQUITY IN YOUR NATURAL RESOURCES WORK

Previous sections discussed that men and women may have different goals for their natural resources. Men's and women's roles and responsibilities within the home and in communities will also impact your programs and the choice of activities. As you monitor your work, you may want to set up indicators to help you track the benefits to both men and women.

Gender-responsive indicators may include:

- **Output indicators** measure participation in or contribution to a certain activity, such as the number of men or women who are trained in a specific technique.
- **Impact indicators** measure some change related to the roles of men and women, or the relations between them.

Depending on the goals of your project, you may decide to include both quantitative and qualitative gender-responsive indicators:

Quantitative indicators

- Amount of time women and men take daily to implement natural resources activities
- Number of women and men using a specific improved technique or a new crop
- Amount of land accessed by or owned by women and men.



Qualitative indicators

- Benefits women and men derived from their participation in a natural resources project (prestige, respect, time off, acquired knowledge, etc.)
- Characteristics that women and men prefer in tree or crop varieties.

It's important to include both quantitative and qualitative indicators to ensure your natural resources management strategy and plan are gender-responsive. You may even be able to change inequitable practices in a positive way. You need to assure that your intervention has a positive impact on men, women, households and the community as a whole. For example, making sure that the natural resources activities didn't add too much to women's or girls' workloads, or that they didn't disrupt important community dynamics. You can use Exercise 7b to assess this impact.



MEASURING THE VALUE OF NATURAL RESOURCE MANAGEMENT

You may have already learned about profitability analysis in the module on the *Seven steps of marketing*. A basic profitability analysis is another way of recording and demonstrating the economic value of natural resources activities. However, benefits and costs are not only about profit. They can be cultural, social or political as well.

Another way to measure the value of natural resources management is through a simple cost-benefit analysis of impacts. If people understand the quantified costs and benefits from their actions, they can be motivated more easily to continue natural resources work on their own. Exercise 7c takes you through a simple cost-benefit analysis of your natural resources management project.



CONCLUSION

Congratulations! You just finished the last lesson in this manual. To recap, we demonstrated that as human beings we are always monitoring and evaluating all aspects of our lives. The same principles apply to project management only that this time we talk about indicators and put them in various categories, such as output or impact, and qualitative or quantitative. Remember what **SMART indicators** are: specific, measurable, achievable, relevant and time-bound. This is an easy way to know the characteristics objectives and indicators must have. Also, keep in mind the importance of engaging the community in helping you monitor and evaluate project activities. Equally important is the need to disaggregate indicators into male and females, so you know how the project is impacting each group differently.



QUIZ 7

Answers at the end of the guide.

1. Match each type of indicator with its definition.

TYPE OF INDICATOR	DEFINITION
A. Qualitative	1. Measures the changes using numeric values
B. Output	2. Measures the immediate effect of a particular activity
C. Quantitative	3. Measures the long-term effect of a particular activity
D. Impact	4. Measures the changes using non-numerical data

2. SMART indicators are those that can be described as Sustainable, Marginal, Articulated, Renewable, and Transparent.

- A. False
- B. True

3. Gender-responsive indicators are not necessary if you are working only with farmers.

- A. False
- B. True

4. Which of the following statements is correct?

- A. The farmers should not be involved in monitoring as it is important to get objective, accurate data.
- B. The farmers should be involved in monitoring as this will increase their ownership of the project.

5. When the group is testing a new technology, the “control” is:

- A. A plot where the farmers control the seed, fertilizer and other inputs to try to reach the maximum yield.
- B. A plot where the normal farmer’s inputs are applied.
- C. A plot where the field agent or researcher (and not the farmers) controls the inputs used.
- D. A plot that is monitored to make sure no extra inputs are provided.

6. When monitoring a project you should:

- A. Not collect information about men and women separately, as they are all members of your target group
- B. Collect information on men and women separately, and then add them together to get a complete picture
- C. Collect information on men and women separately so you can compare them

EXERCISE 7A. DEVELOPING A MONITORING PLAN

A monitoring plan is important because it will allow you to make sure that your project stays on track and is successful. It also focuses your efforts on asking and answering the right questions, thus helps you avoid wasting time and resources collecting information you will not use.

OBJECTIVES

After completing this exercise the participants will be able to:

- List questions for monitoring the farmer group's activities.
- Describe indicators to measure these questions.
- Explain how the indicators should be monitored, who should do it, how, where, and when.

EQUIPMENT NEEDED

- Large sheets of paper, cards, marker pens

EXPECTED OUTPUTS

- A list of questions that can be used to select indicators.
- List of indicators and detailed instructions how to gather and evaluate information.

TIME REQUIRED

- 2 hours (can be split in two 1-hour sessions)

PREPARATION

Develop the monitoring plan at the start of the implementation process when the detailed activity plans are being developed. Before developing the plan make sure you have completed the following exercises.

- Exercise 4a. Drawing a social-resource map
- Exercise 4d. Problem tree
- Exercise 5a. Choosing solutions.

SUGGESTED PROCEDURE

1. Divide the participants into groups of about 5 to 6 persons. Ask them to think of questions that can provide information on the progress towards achieving the goals and activity plans that they developed earlier. Ask the groups to write the questions on cards (one on each card) and to hand them to you. Note that you can ask each group to consider the same issues at one time, or divide up the goals and related action plans among the different groups. If you decide to have all of the small groups consider the same goals/action plans at the same time you can follow steps 2–6 below. If you decide to let each of the small groups work on different goals/action plans at the same time, then you will need to modify steps 2–6 accordingly.

2. In the plenary discussion, compile the questions from each of the small groups into similar topics. Rewrite them if necessary to make them clearer. Make sure the group as a whole agrees on the questions.
3. Break the participants into new groups of about 5 to 6 persons. Ask the groups to identify indicators to measure the answer to each question. (Keep the small groups the same if they are working on different topics.)
4. Ask a representative from each group to present the results of their work. Put the list of questions and indicators somewhere so all can see.
5. Look at the indicators and identify the ones that are most suitable and easiest to measure. Remember they must be SMART: Specific, Measurable, Attainable, Relevant and Time-bound.
6. Divide the questions and their corresponding indicators among the subgroups. Ask each group to discuss the following questions for each indicator:
 - Which tools can be used to measure this indicator (how)?
 - Who should be responsible?
 - Where do you need to take measurements?
 - What do you need to take the measurement (with what)?
 - When do you need to take the measurement?
7. Instruct the participants to write down their decisions in a table (Table 12).
8. When the groups have filled in their monitoring plan, rotate the groups so that each group gets the plan of another group in front of them. Let the new group discuss, review and if needed revise the plan.
9. In a plenary discussion, review the results of the groups and initiate a discussion about the monitoring plan.
10. Finalize and agree on the monitoring plan with all involved. Get firm agreements from the individuals responsible for different activities that they are willing and able to fulfill those responsibilities and that they are committed to doing so.

QUESTIONS TO STIMULATE DISCUSSION

- Is the monitoring plan realistic? Can it be achieved by the farmer group, without overloading them with monitoring and evaluation tasks?
- Does the monitoring plan have cost implications? If so, where will the necessary funds come from?
- Does the group have enough knowledge to carry out the monitoring, or is it necessary to involve other people? If so, who?
- Does the group need training on any of the tools and methods?

Example of planning indicators

TABLE 12 PLANNING INDICATORS

QUESTION	WHAT	HOW	WHO	WHERE	WITH WHAT	WHEN
	Indicators to measure	Tools, methods for gathering information	Who is responsible for gathering and analyzing information	Group or individual, location	Resources you will need	Dates, frequency
1. How do we know if people are learning about good land management?	Number of hectares being managed using at least 2 sustainable agriculture techniques	Survey	Field agent, plus representative from farmer group	Commune XXX	Survey print-out, notebook, GPS unit	Annually – next July
2. ...	...	...	...	...	...	...
3. ...	...	...	...	...	...	...

EXERCISE 7B. GENDER ANALYSIS MATRIX

Source: FAO (2002)

You should be continually monitoring your NRM activities to make sure that they are impacting men and women equitably. A gender analysis matrix is a very helpful tool to do that. It is advisable to build one after the groups are halfway through with their activities.

For this session, it is best that the project or activity selected is finished or near completion, and that several of the participants are familiar with it.

OBJECTIVES

After completing this exercise the participants will be able to:

- Identify how their natural resource activities impact men, women, communities and households differently.
- Decide if the activities are equitable.

EQUIPMENT NEEDED

- Flip chart, large sheets of paper, marker pens

EXPECTED OUTPUTS

- A completed gender analysis matrix

TIME REQUIRED

- 1 hour

PREPARATION

Develop the monitoring plan at the start of the implementation process when the detailed activity plans are being developed.

Draw the example matrix on a flip chart.

SUGGESTED PROCEDURE

1. Divide participants into groups of 4 or 5 participants (separate groups of men and women). Each group is to select one specific project or activity that was part of their project, and to write the name of the activity at the top of their flip chart.

BOX 18 EXAMPLE OF A GENDER ANALYSIS

A community forest reserve was established to allow the regrowth of a forest area that had been degraded by overharvesting for fuelwood, fencing, housing materials and carving wood. The project objective was to regenerate the local forest resources through the establishment and management of a community forest reserve. The community groups analyzed the activity and came up with the gender analysis matrix in Table 13.

2. Tell the group members that they will be discussing the impacts of the project or activity on four different levels: women, men, households, and the community. If it's relevant, you can add additional categories, such as adolescent girls.
3. Refer groups to the example in Box 18 and Table 13. Read it out loud. Discuss together the different parts in each box.
4. Ask groups to draw an empty matrix similar to Table 13 on their flip charts. For each group of people they should ask:
 - How much work do they have to do?
 - How much time do they have to spend?
 - What resources do they need?
 - How is their interaction with the rest of the community affected?
5. Remind groups that impacts can be positive or negative, so they should mark positive impacts with a plus (+) and negative impacts with a minus (-). If they are unsure of an impact but have reason to believe that it occurred as a result of the project or activity, they should list it but mark it with a question mark (?).

QUESTIONS TO STIMULATE DISCUSSION

- Ask for each group: What is the biggest impact on labor? On time? On resources? On culture and communities?
- Do some groups experience more negative impacts than other groups? More positive impacts than other groups?
- Are these impacts equitable?
- What do you need to do to change your project to make activities more equitable?

Example of a gender analysis matrix

TABLE 13 GENDER ANALYSIS MATRIX

	LABOR	TIME	RESOURCES	CULTURE AND SOCIETY
Women	<ul style="list-style-type: none"> - Walking further to collect fuelwood 	<ul style="list-style-type: none"> - 1 to 2 more hours per day to collect fuelwood 	<ul style="list-style-type: none"> - Not allowed to collect traditional medicinal plants + See the regrowth and think that there will be more fuelwood in the future 	<ul style="list-style-type: none"> - Less time for socializing and other chores
Men	<ul style="list-style-type: none"> + Jobs created for forest guards + Training for tourist guides in the reserve 	<ul style="list-style-type: none"> + Not collecting wood for carving (buying it from elsewhere) 	<ul style="list-style-type: none"> - Have to buy carving wood 	<ul style="list-style-type: none"> - Less busy and drinking more with their friends
Households	No change	<ul style="list-style-type: none"> - More time chasing animals 	<ul style="list-style-type: none"> - Fuelwood shortages + Tree growth in family plots inside reserve is improving - Have to buy fencing materials 	<ul style="list-style-type: none"> ? Fights with families
Communities	<ul style="list-style-type: none"> + Some people improve their knowledge of forest management 	<ul style="list-style-type: none"> ? More time spent on meetings of the reserve - Less time available for church functions 	<ul style="list-style-type: none"> + Regeneration in the forest reserve 	<ul style="list-style-type: none"> - Women not involved in decisions on reserve (time or location) - Women interact less with one another

EXERCISE 7C. COSTS AND BENEFITS OF MANAGING NATURAL RESOURCES

Adapted from Pant (n.d.) and Johnson et al. (2000).

Cost-benefit analysis is a tool used to compare, in monetary terms, the actual or estimated costs and benefits associated with a program. It can be simplified for evaluation. The group together creates a list of the costs and benefits associated with the activities.

OBJECTIVES

After completing this exercise the participants will be able to:

- Describe the social, economic, ecological, governance, and learning implications of a program.
- Compare costs and benefits to help a group make decisions around "tradeoffs," that is, which costs the group is willing to incur to achieve the benefits.

EQUIPMENT NEEDED

- Notepaper, pens, large sheets of paper, marker pens

EXPECTED OUTPUTS

- A detailed description of the costs, the benefits and a comparison of the two

TIME REQUIRED

- 2-3 hours

PREPARATION

Review the group's natural resources management plan and bring a few copies to the meeting. Prepare your checklist of questions beforehand.

Some projects have goals that are related to increasing profitability and incomes. Some are more explicitly focused on improving natural resources that don't have a dollar value. In either case, a cost-benefit analysis can be carried out:

- **Before the start-up of the activity** in order to verify that the activity is viable, either economically or otherwise.
- **During implementation**, in order to assess whether the activity is actually generating income or having other benefits recognized by the farmer group or community. If it is not, you should change your strategy.

PROJECTS ANTICIPATING ECONOMIC BENEFITS

Suggested procedure

If your project will likely lead to increased incomes, use the following steps. A detailed version of these guidelines can be found in the module *Seven steps of marketing*.

1. Ask participants to identify the type and amount of inputs required to implement the activity (materials and supplies, labor, interest to be paid if a loan has been/will be taken, etc.).
2. Ask participants to figure out or recall the cost (value expressed in money) of each one of the inputs mentioned above. Sum up the total cost.
3. Ask participants to figure out or recall the money value of activity outputs, i.e. the total benefit. This may include different items (for poultry the benefit would be the sum of income generated through the sale of eggs and chickens).
4. Compare the total cost with total benefit. This can be done by figuring out the actual income (benefits and costs) or by identifying the cost/benefit ratio (a pocket calculator can help).
5. Ask participants to analyze these figures and the implications of the comparison.

Questions to stimulate discussion

- To what extent has this activity been beneficial?
- Why is the difference between costs and benefit so big or small?
- What can be done to increase the benefits and decrease the costs?

PROJECTS ANTICIPATING NON-ECONOMIC BENEFITS

Suggested procedure

If the expected benefits are not monetary, experiment with other kinds of cost/benefit analyses. These are more difficult to quantify, but are equally important to measure. Below you can find instruction to one such approach that will also evaluate gender differences.

1. Divide participants into separate groups of men and women. Ask participants to list the resources they used to implement the activities. The resources can include time, inputs, labor, and materials. They can also include opportunity costs; for example, if they gave up attending a community meeting in order to tend to their activities. List these on a flip chart.
2. Ask participants to list the benefits they've seen from the work. These might be human, social, financial, physical, natural, or political benefits (Box 19). You can use the checklist below to

organizing your questions, or create your own based on the community context.

3. Compare the list of “costs” with the list of “benefits,” for all groups. Discuss the differences.

Questions to stimulate discussion

- What are the main reasons why these activities are important to you?
- What challenges are you encountering? Are they different for women and men?
- Have the benefits justified the costs?
- Who “paid the most” in costs (e.g., if additional labor was required, was it provided mostly by women)?
- Who is benefiting the most?
- Would you recommend this approach and these activities to others? Will you do this action again?

BOX 19 QUESTIONS ON TYPES OF IMPACT

Human assets

- Have group members developed specific skills through training?
- Have group members strengthened their problem-solving skills?
- Have group members been able to take the skills learned through demonstration plots to their own fields? Have they shared skills with their neighbors?

Social assets

- Has the internal organizational capacity of the groups been strengthened?
- Is the community working well with other community groups or organizations?
- Have conflicts been reduced?
- Did other people in the community adopt any of the improved practices?

Financial assets impact

- Has crop production increased?
- Have incomes increased?
- Has livestock been improved? Has fodder improved?

Physical assets

- Has infrastructure improved or increased?
- Has there been a reduction in erosion?
- Have there been reduced impacts of natural disasters on houses or land?

Natural assets

- Has there been any change in water quantity or quality?
- Has soil improved?
- Has there been a change in tree or plant cover?
- Have other resources been protected or enhanced?

Political assets

- Have community members and other landowners outside the farmer group engaged in the process?
- Have any policies been adopted or enforced, either at a group or community level, or in formal government structures?
- Has the local government taken interest or action in natural resources management?
- Has the capacity of the group to influence others been increased?

Endnote

It is of critical importance to protect, conserve, and restore the natural resources of our planet – soil, water and forests. We hope that the activities outlined in this manual will help rural households and communities protect and increase the productivity of the natural resource base that they depend on for their livelihoods. We also hope that through sustainable management of natural resources, these communities can reduce their impact on the global climate change, and continue to provide vital ecosystem services to their communities and the world as a whole.

This document is a work in progress, so if you have suggestions on how it could be improved, or examples of adaptations or successes that you would like to share with others, we would encourage you to send your inputs to agriculture@crs.org.

Answers to quizzes

Lesson 1

1. Why is it usually better to work with groups in a natural resources management project?

Correct answer: D. Working with groups has many advantages. But it may also be necessary to work with individuals, for example with large landowners who farm upstream.

2. Planting trees upstream of an important community spring is probably an example of a natural resources management project taking place at what level?

Correct answer: B. This is typical of a watershed project.

3. Which of these questions should NOT be asked during the first meetings with farm families and their communities?

Correct answer: C. A project that hands out equipment to farmers is likely to be unsustainable.

4. Certain types of work can be done by individual farmers, while others need to be done by groups, the community as a whole, or with the involvement of the national government.

Correct answers: A2, B4, C3, D1

5. You are working in an area with steep slopes where there is a lot of erosion. Which approach should you use?

Correct answer: B. Watershed approaches are best where erosion is a problem.

6. Three projects are helping farmers to control soil erosion. Which one is likely to have the longest-lasting effects? Which is likely to have the shortest effects?

Correct answer: A, B, C. Projects that work with other stakeholders tend to have the longest-lasting effects. Those that pay farmers often find the effects are short-lived.

Lesson 2

1. When starting to work with a community, you should learn about...

Correct answer: D. You need to know about both the social conditions and natural resources.

2. A clear understanding of the physical environment conditions in a community is sufficient for a successful implementation of a natural resources management project.

Correct answer: A (false). You also need to understand the social and economic situation.

3. It is important to target vulnerable people as they often live in areas where natural resources are limited and overexploited.

Correct answer: B (true). People are often vulnerable precisely because they live in such areas. Because they are vulnerable, they find it difficult to manage their natural resources in a sustainable way.

4. Match the method for gathering information with the correct example.

Correct answer: A4, B3, C2, D1

5. You want to conduct a transect walk. Put the activities into the correct order.

Correct answer: C, D, A, B

6. You have a topographical map and a Google Earth image of the same area. Which two features are easiest to see on the map, and which on Google Earth?

Correct answers: A1,4; B2,3

Lesson 3

1. Stakeholders are those individuals located in a specific geographical area.
Correct answer: A. Stakeholders may include people or organizations from outside the area.
2. Which of these cannot be a stakeholder?
Correct answer: C. Only individuals, groups or organizations can be stakeholders. An object (such as a pipeline) cannot be a stakeholder (though the organization that runs it may be).
3. While government agencies, development organizations, input suppliers and other civil groups are important stakeholders, the most important of all are the local people.
Correct answer: B. Local people have the biggest stake in the resource.
4. Mary, a field agent, is working with various stakeholders on a forest project. But she has got her notes mixed up. Help her match the stakeholders with the correct set of interests.
Correct answers: A2, B4, C1, D3
5. Mary has noted the strengths and weaknesses of the various stakeholders she is working with. Help her put her notes in order by matching the stakeholders with their strengths or weaknesses.
Correct answers: A2, B4, C3, D1
6. Stakeholders may use, influence or be affected by natural resources (or sometimes all three). Match each stakeholder with the most appropriate category.
Correct answers: A2, B2, C1, D1, E3

Lesson 4

1. When drafting a participatory map, the most important thing is to be accurate.
Correct answer: A (false). Participatory maps do not have to be accurate in order to show the most important issues.
2. What should you NOT include in a biophysical map?
Correct answer: B. These are farmers' opinions, not biophysical aspects.
3. Gender resource mapping is important because women and men interact differently with the resources at hand. Therefore, knowing the differences in how each group values and prioritizes the resources is key for the implementation of a natural resources management project.
Correct answer: B (true). Men and women often use different types of resources, so have different views about them.

4. Which is NOT a definition of a "hotspot"?
Correct answer: A. All the other options can be called "hotspots".
5. Some natural resource problems are fast and easy to spot, while others happen slowly, over many years. Which of these problems happens quickly, and which occurs slowly?
Correct answers: A (quick): 2,5; B (slow): 1,3,4
6. On a transect walk, you observe some things that may indicate problems with natural resources. Match the observation with the most likely cause.
Correct answers: A1, B4, C2, D3

Lesson 5

1. Neighboring communities may already have found viable solutions to the problems your community is facing. It's a good idea to learn from what they did instead of trying to come up with a new way to address the problem.
Correct answer: B (true). While the situation may be different, it may be possible to adapt their solution.
2. Match the description of the solution with its corresponding example.
Correct answers: A3, B1, C2
3. Natural succession is where the community gets together to plant native vegetation in a particular area.
Correct answer: A (false). Natural succession is where vegetation is allowed to regenerate naturally.
4. Which of these issues fall outside the scope of a watershed steering committee?
Correct answer: C. Monitoring crop prices is more likely to be the job of a marketing organization.
5. This document describes the specific details to carry out a natural resources management project.
Correct answer: D. An action plan shows the details on how to carry out a project.
6. What is the best way to increase the amount of water available to crops?
Correct answer: D. The best approach will depend on the specific situation.

Lesson 6

1. Which of these is NOT a role for a natural resources manager?
Correct answer: D. It is not your job to decide who participates – the farmers themselves should decide this.
2. Demonstration plots and on-farm trials are good ways to show a particular practice or technology to farmer groups.
Correct answer: B (true). Other methods include training, cross-visits and using lead farmers.
3. Match the leadership skills of a field agent with its corresponding example.
Correct answer: A3, B2, C1, D4
4. Match the type of activity with the correct example.
Correct answers: A3, B1, C2, D4
5. Which of the following is an example of adaptive management?
Correct answer: C. Adaptive management means monitoring activities, learning from mistakes and changing what you do accordingly.
6. Which of the following statements about behavior change is most accurate?
Correct answer: C. Changing behavior is not impossible, but it usually takes time.

Lesson 7

1. Match each type of indicator with its definition:
Correct answer: A4, B2, C1, D3
2. SMART indicators are those that can be described as Sustainable, Marginal, Articulated, Renewable, and Transparent.
Correct answer: A (false). SMART stands for Specific, Measurable, Achievable, Relevant and Time-bound.
3. Gender-responsive indicators are not necessary if you are working only with farmers.
Correct answer: A (false). It is important to measure how the project affects both men and women.
4. Which of the following statements is correct?
Correct answer: B. If the farmers monitor their own progress, they are more likely to continue the new practices in the future.
5. When the group is testing a new technology, the “control” is:
Correct answer: B. A control plot is where the normal inputs are applied. It is compared with the “treatment” plot (or plots), where new technologies are tested.
6. When monitoring a project you should...
Correct answer: C. It is important to monitor how the project benefits various types of people. Men and women may benefit in different ways, or one may benefit while the other does not.

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Managing natural resources

A SMART SKILLS MANUAL

Small-scale farmers in developing countries depend heavily on their natural resources: water, soil and the broader ecosystem. They need to use these resources wisely so they can continue to produce crops and raise animals.

This manual shows how field agents, extension workers and program managers can help farmers manage their natural resources. The seven lessons cover the following topics:

- Engaging the community
- Understanding the community context
- Identifying and engaging stakeholders
- Mapping natural resource problems and opportunities
- Making a natural resources management plan
- Managing natural resources projects
- Monitoring progress.

Each lesson includes guidelines, exercises to do with a group of farmers or with development agents, and quizzes to test your understanding.

This is one manual in a series on SMART Skills – the skills that field agents need to help farmers in developing countries improve their livelihoods. A companion manual describes how to help them understand their natural resources and why they should manage them in a sustainable way.

<http://www.crsprogramquality.org/smart-skills-for-farmers/>

