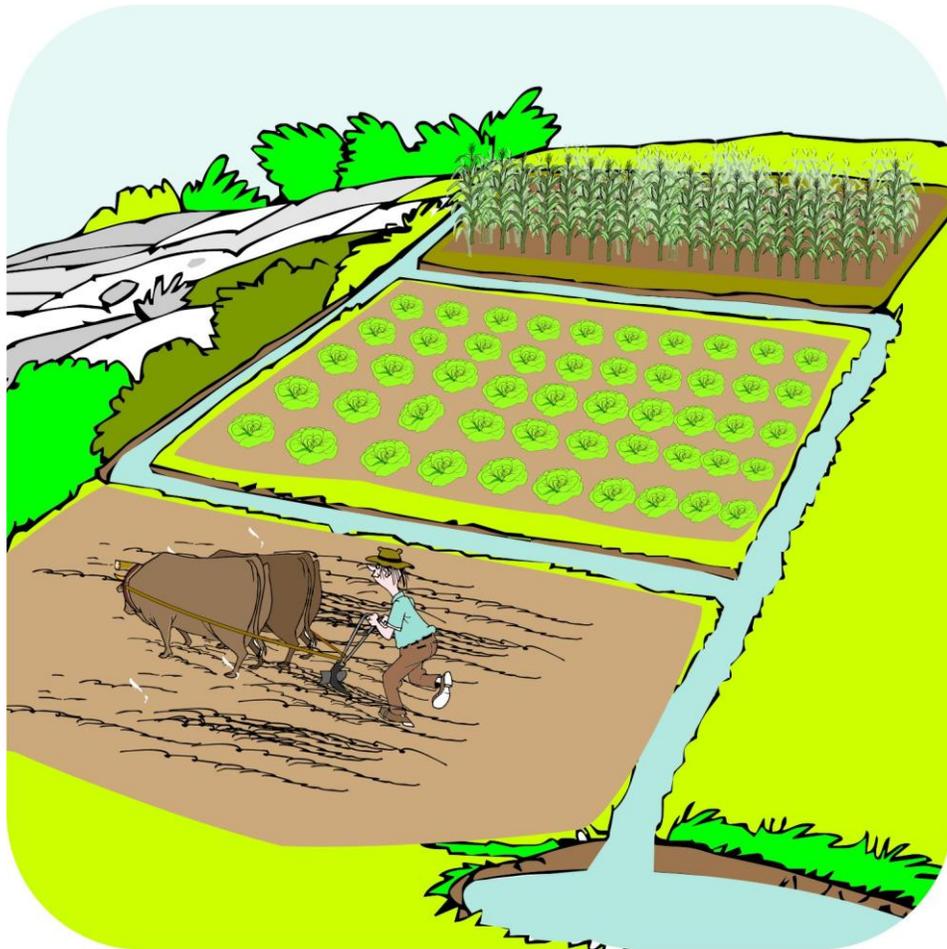


# Natural Resource Management

Tools for planning and implementing  
participatory NRM projects



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- The many farmers and other community actors that have participated in CRS's agroenterprise activities across three continents and whose needs and demands we hope are reflected in the orientation of the manual.
- Jorge Enrique Gutiérrez, who produced the graphics.
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- The technical support and experience of David Gandhi
- The editorial team of Shaun Ferris, Rupert Best, Nikola Stalevski and Paul Mundy.

# Foreword

*Members of the Kole Zepol savings and lending group learned key financial literacy and management skills from their community facilitator. After 2 years, they are functioning as a strong group, and have saved a small amount of capital. Now they've decided that they want to start a small business.*

*With the support of an NGO field agent, they conducted a market visit and identified two products that have both increasing demand and a low supply: peanut butter and dried pineapple. After doing a profitability analysis they learned from their marketing trainings, the group noted that both products have good possibilities for some profit for the group, with only small investments in production and in processing equipment.*

*The group lives in mountainous land with low vegetative cover, and high risks of erosion. Their field agent encouraged them to look at the environmental sustainability of these two products before investing in one or the other, recognizing that their enterprise would have lasting effects on the community and its environment. The group conducted basic analyses of their landscape, including characterizing erosion risks, slope, and soil characteristics of their productive land. They noticed that growing peanuts posed a great risk to the hillsides, since they had to be uprooted. Pineapples, however, could be planted along contours and soil and water conservation structures, thus protecting the hillsides while providing a source of revenue. The group plans to produce and dry pineapple for sale.*

Kope 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 five types of skills:

- **Organizational management:** they need to get organized to plan and manage 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 market- and business-oriented approaches 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 to engage in profitable enterprises has therefore become an integral part of our 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 the broad understanding and skills they need to understand the 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 Kole Zepol, 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 “Five skill sets for preparing smallholder farmers to successfully engage with markets” presents an integrated and sequential approach to building vulnerable farmers’ capacity for linking with markets. The manuals have been prepared for use by development facilitators, field extension agents and community leaders working with poor rural communities. The aim is to improve the livelihoods of these communities through better production and marketing of their crops and livestock products.

Each manual contains the following parts:

- **Lessons** containing the knowledge and skills you need to master in order to teach the skills.
- **Staff exercises** for you to learn to improve your own abilities as a field agent.
- **Field exercises** for you to use in helping farmers master the knowledge and skills they need. These lesson plans are printed in shaded pages. The exercises are also available as a PDF document on the CRS website [www.crsprogramquality.org/agriculture/](http://www.crsprogramquality.org/agriculture/). You can print out this document and have the pages laminated so it lasts longer.

## How to use this manual

**As a learner.** Read through this manual lesson by lesson, section by section, trying to absorb the information presented. At the same time, imagine the situations that you encounter in your work, and picture how you would use the information and techniques described to help you work with farmers on ensuring that their natural resources are well-managed and contribute to their livelihoods. Imagine how you would use the exercises.

**As a trainer working with field agents.** You can use this manual to teach other field agents about NRM. You can present the information in the text, then work through the exercises with the participants. The Field Exercises are intended for use with farmers and other rural people. There are also two Staff Exercises in this guide, which are intended to help field agents learn new concepts and tools. If you use the Field Exercise with field agents, ask them to pretend that they are farmers.

**As a field agent working with farmers and other rural people.** Once you have taken this course, you will have gained useful knowledge that you can share with farmer groups.

You can use the information and exercises in this manual to plan how to work with farmers to develop their agroenterprises in a way that ensures sustainability and good management of their natural resources. Every farmer group and every situation is different, so this manual does not try to tell you exactly what to. Instead, choose those items that you think the farmers need and can benefit from, and use this manual as a basis for building your own series of learning events so you can pass this information on to farmers. Feel free to **adapt** the exercises to suit your own situation, and to **develop new materials** as needed.

Wherever possible, you should work in a **participatory manner** with the farmers. This means you should make sure that it is not you but the farmers 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 manual 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 manual online, through an e-course. Contact your CRS supervisor for a **username and password**, then visit <https://crs.brainhoney.com> to register and start an online course. In some cases these courses may be available on a thumb drive, or smart stick.

The e-courses courses use the same text and exercises as in this manual. 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.

### **Farmbook software**

CRS and partners have developed a software application called **Farmbook**, which you can download from the CRS website. You can use Farmbook to register a farmer group and collect information about their production and business performance. Planned features for Farmbook will allow you to do the following:

- 1 Register a farmer group
- 2 Do a profitability analysis for a single product for your farmer group
- 3 Write a business plan
- 4 Produce a production plan for the season
- 5 Keep a record of training events and asset transfers to a group
- 6 Undertake a baseline survey and follow up annual audits.

To learn more about Farmbook, visit [www.crsprogramquality.org/agriculture/Farmbook.php](http://www.crsprogramquality.org/agriculture/Farmbook.php).

# Introduction

Any agriculture or agroenterprise project should include an element of natural resource management (NRM). The protection and sustainable management of soil, water, and land is critical to make sure that your project will continue to be beneficial to future generations of people.

You've already learned about key concepts related to NRM. How can you use that information to help farmers improve their livelihoods by conserving and protecting their natural resources?

You have an important role to help farmer groups develop NRM strategies and to organize these strategies in an **NRM plan**. An NRM plan identifies key problems; sets clear goals; and provides a description of activities, including a timeline with dates and names of people responsible, and a list of resources required, including a budget if one is needed. It also identifies indicators that enable groups to measure successes and challenges. This kind of plan can be used:

- As part of an agroenterprise process, where you're helping farmers organize to sell to markets;
- As part of production and livelihoods programs, where you're helping farmers with improved agricultural practices;
- On its own, where your main goal is to improve livelihoods and reduce the impacts of global climate change through better natural resource management.

The best way to prepare and implement an NRM plan includes community engagement, information gathering using **Participatory Rural Appraisal (PRA)** 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. You the field agent, acting as a facilitator, guide the farmers through a series of exercises and actions that 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. You will be able to lead groups through successful implementation of their NRM plans.

This module should be used along with “Natural Resource Management: Basic concepts and strategies” module and the “**Common Practices for Natural Resource Management**” annex.

## What is in this manual

There are many ways to design and implement an NRM plan, but most will contain some version of the basic steps outlined in the 7 lessons of this manual:

1. **Engaging the community.** Before beginning a project, you also have a number of decisions to make regarding the types of groups you'll be working with, and whether you'll be focusing at a farm or 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 explore opportunities in natural resource management.
2. **Understanding the community context.** As a field agent, you must be familiar with the local context. This includes more than the biophysical environment; good NRM 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 in which you work.

3. **Identifying and engaging stakeholders.** Because natural resources are important to so many people and are not confined by administrative boundaries, it is critical to understand the different people that have a stake in NRM. In this Lesson, you'll determine how to engage stakeholders that have interest or influence over resources.
4. **Mapping natural resource problems and opportunities.** Together with field agents, farmer groups identify and map the action area. This step enables farmer groups to identify the natural resource issues they would like to focus on. These are based on the goals they have chosen for their farms and communities, and their identified "hotspots" or areas of high potential.
5. **Making an NRM plan.** With your support, farmer groups will develop an "action plan" for implementing the identified interventions and achieving the desired objectives. Using information about the physical and socioeconomic characteristics, and the knowledge and information gained in the "Natural Resource Management: Basic concepts and strategies" module and the "**Common Practices for Natural Resource Management**" annex, you will be able to identify a package of appropriate management interventions for the different priorities the group has identified. Action planning involves creating a timeline for activities with indicators for measuring success, and securing the necessary resources for implementing the selected interventions.
6. **Managing an NRM project.** In this lesson you will learn key roles you have as a field agent that are required to manage an NRM project. 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 will require a spirit of "adaptive management" to enable farmers to examine the effects of their efforts and to change course along the way to find interventions that work best.
7. **Monitoring progress.** You and the farmers will also track the implementation of your NRM plans through a monitoring and evaluation system that you will jointly develop. This system will allow you to measure progress and also to assess the impact of your activities.

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.

Instead of passively listening to lectures about new technologies, participatory methods enable farmers to actively explore and experiment with the new ideas. They take part in making decisions. This helps ensure that the farmer groups will take ownership of solutions and use them widely.

# Lesson 1. Engaging the community

This lesson describes the first steps to take in starting your NRM 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? Will you be working at a plot or farm level, a watershed level, or a community level?
- **Led your first meetings.** How can you generate excitement and ownership about natural resource management?

*Figure 2 GRAPHIC NRM 201: A winding road with a village in the background, (3 houses) and a farm next to the road. Field agent (a woman!) standing on the road, scratching her head. The farm should show signs of erosion (e.g. gullies) and low productivity. Caption: "Where to start?"*

## ***What is the focus of your project?***

It's important to decide **who** you'll be working with. Will they be groups or individuals? What kinds of groups?

In an NRM project, it's also important to decide at what **geographical scope** you'll work. Will it be at a plot or farm level, or a community level? Will you be working within watershed boundaries, or administrative boundaries?

This section looks at these two questions.

### ***Groups or individuals?***

Should you work with individuals or groups to help them improve how they manage their natural resources?

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

- Many natural resource management tasks can be tackled only by groups of farmers or by the community as a whole.
- Working with groups lets you reach a 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.

*Figure 3 [GRAPHIC NRM 205: Series of 5 individual scenes: same field agent talking to 5 individual farmers, looking progressively more tired, until in the fifth scene she is exhausted]*

### ***What type of groups?***

The type of group you'll be working with will depend on the scope of your project. Many different types of groups can improve how natural resources are managed:

- If your project is designed specifically for NRM, you might work with groups already involved in some aspect of natural resources, such as **producers' associations**, **water management groups** and **innovation groups**.

- If your NRM project is part of another marketing or production project, you might work with other groups, such as **savings and lending communities, or marketing and agroenterprise groups.**

Check whether existing groups are interested in specific natural resources. See the module in this series on “**Group management**” for ideas on how to strengthen or organize groups.

Figure 4 [GRAPHIC NRM 206: Small drawings of different types of groups: producers’ association (with bags of grain), water management group (with irrigation water control gate), savings group (sharing money around table), processing group (with milling machine)]

### **Plot or watershed?**

Efforts to improve the management of natural resources may happen at different levels:

<p>[GRAPHIC NRM 215: Aerial view of a single farm with farm family, farmhouse and fields]</p>	<p><b>Individual farms.</b> Certain types of work can be done by individual farmers on their own land.</p> <ul style="list-style-type: none"> <li>• Examples: planting grass strips, making compost, improved cultivation practices, planting forage on bunds, planting trees on field boundaries and at home, reducing pesticide use.</li> </ul>
<p>[GRAPHIC NRM 216: Aerial view of several farms]</p>	<p><b>Groups of farmers.</b> Other types of work may be better handled by groups. Some of these measures are too much work for an individual farmer to do by him- or herself; others require several neighboring farmers to cooperate.</p> <ul style="list-style-type: none"> <li>• Examples: building terraces, contour bunds and channels to divert water, maintaining tree nurseries, planting woodlots and windbreaks.</li> </ul>
<p>[GRAPHIC NRM 217: Aerial view of whole village with river]</p>	<p><b>Community or watershed.</b> Some types of natural resource management work need to be planned and carried out by the community as a whole, and perhaps over an entire watershed. These actions directly affect the entire community and require the community’s participation and approval to work properly.</p> <ul style="list-style-type: none"> <li>• Examples: rehabilitating large gullies, keeping livestock out of certain areas, protecting springs and watercourses, building small-scale irrigation schemes.</li> </ul>
<p>[GRAPHIC NRM 218: Aerial view of large district with forest, hills, roads and rivers]</p>	<p><b>District or national.</b> Certain types of activities need the involvement of the district authority or the national government. These include</p>

	<p>major earthworks that require heavy equipment and professional expertise, policy changes, and works that require government approval.</p> <ul style="list-style-type: none"> <li>• Examples: building large dams or big irrigation schemes, transfer of responsibility for managing forests.</li> </ul>
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Working at a larger level usually requires more resources and additional assistance. Choose a scale of engagement that makes sense for your project and your community.

***Watershed or community?***

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 whatever 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.

Both have advantages and disadvantages:

<p>[GRAPHIC NRM 219: Map of watershed: A hilly area with a valley. A stream rising at the top of the valley. Fields on slopes and in valley, village with houses in valley. Boundary of area = boundary of the watershed]</p>	<ul style="list-style-type: none"> <li>• <b>Watershed:</b> Best for hilly areas where erosion and water conservation are problems. This will require coordination with different local authorities where a watershed crosses administrative boundaries. It will also require lots of communication between people living upstream and those living downstream.</li> </ul>
<p>[GRAPHIC NRM 220: Map of community: a flat area with several streams. Village in middle of area, with roads leading to it. Boundary = boundary of the community district (boundary crosses several streams)]</p>	<ul style="list-style-type: none"> <li>• <b>Community:</b> 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.</li> </ul>

In general, where erosion and water management are the main problem, you should try to work within watersheds. Where the main problems are not linked directly to watershed boundaries (such as marketing or biodiversity), it may be more convenient to work within each administrative area.

Conflicts or management concerns may arise if communities span multiple watersheds, or if parts of a watershed or community area are owned by landholders who do not participate in your

natural resource management efforts. Be careful that you are aware of these and are able to address them.

### ***Which level to choose?***

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 the 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've identified the groups you'll be working with and determined the scope of your project, first meetings should help introduce the groups to the project, and begin to decide together what goals people have for your work together. It's important to get them excited about NRM work through your first meetings!

### ***Generating interest***

A good idea for a first meeting is to discuss with local people about their resources and the relative importance of each resource. See [Field Exercise 1a](#) for information how to generate support and commitment to the project, while learning together about important natural resources.

*Figure 5 [GRAPHIC NRM 202: Same field agent holding meeting under tree with group of men and women farmers]*

### ***Where do farmers want to be?***

Whether you are working with existing groups or helping form new ones, you need to understand their priorities. They must have a common goal related to production or the sustainable management of resources.

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

- What do they want to do better with their land, water, vegetation and animal or livestock resources?
- What resources do they want to maintain?
- How does natural resource management fit within their broader goals?
- Five years from now, how would they like their community to look? What is the state of the forest, water and soil resources? How will they be using and managing their livestock? What natural resource problems have been resolved?

The goals of the groups you work with will vary. They may be general or specific. Examples of **general goals**:

- Reduce erosion in the community
- Improve overall production by managing soil fertility
- Stop the declining access to 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. Try **Field Exercise 1b**.

*Figure 6 [GRAPHIC NRM 207: Group of 4 men and women farmers, each with a thought bubble above his/her head: (1) tree seedling in pot, (2) small dam across gully, (3) making mats from reeds, (4) picking fruit from tree]*

### **Sustainability and community ownership**

Sustainability is a big challenge for some natural resource management projects. In many cases, NGOs pay farmers to conduct soil- and water-conservation measures, or to build big structures such as dams and canals. But it is often difficult to maintain buy-in from the community after the project ends.

Projects are more likely to be sustainable if

- The community or groups see a value in them, and
- Participants really own the process and take part in decision-making.

In your first meetings, discuss with the groups any payments that the project will provide for work done. Brainstorm ways you can encourage the community to co-invest.

#### **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 cash they earned in a community fund. They later used this fund to support women members' economic activities and to conserve soil and water in other parts of the watershed. Setting up this fund was important because it built the groups' feeling of responsibility for their conservation work.

### **Field Exercise 1a. Why are natural resources important?**

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

#### **Objective**

After this exercise the participants will be able to:

- Determine what natural resources are important for local people's livelihoods.

- Create awareness of the importance of improving the management of natural resources, and to generate interest in this work.
- Determine what are the main “drivers” to ensuring that people take care of their natural resources.

### Equipment

Flip charts, markers

### Expected outputs

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

### Time

One hour

### 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 and proceed with this exercise anyway. Differences will still be observed, and these will be useful discussion points.) Give each group a flip chart and marker pens.
2. Ask the participants to make a list of the **natural resources** they use on the flip chart. This should include different land types or areas (cropland, grazing land, forest, hillsides, valley bottoms, marshes, etc.), water (springs, rivers, ponds, groundwater), trees (forest, hedgerows, woodlots), plants (crop types, medicinal plants, wild plants) and 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 becoming more or less available? Which ones are declining? How quickly? How do the 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. What are the agreements and differences?
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 (one day per week? what time? where?).

## **Field Exercise 1b. Setting goals**

### **Objective**

After this exercise the participants will be able to:

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

### **Equipment needed**

Resource map from earlier Field Exercises

Flip chart and markers

### **Time required**

45 minutes for discussion

### **Expected outputs**

Present and future maps

### **Preparation**

Prepare your list of questions beforehand.

### **Suggested procedure**

1. Refer groups to the maps they made in the last session. You may refer them to the discussion you had during the last meeting as well.
2. If appropriate, divide participants into groups of men and women.
3. Ask groups to look at their current map 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 groups to draw the farm or community they'd like to see in the future. Ask them to share in plenary.
5. Once farmer groups have identified the resource-related goals, ask them to prioritize them based on production, income, health and livelihoods. Use PRA techniques for this. Mark the 2-3 most important goals on the map.

### **Notes**

You may get many varied answers when you ask about farm 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 farmers to ask more questions related

to these resources. For example, if farmer groups respond “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 natural resource management practices they can do 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.

### **Questions for discussion**

What are the most important goals for men and women? If they are different, what are the 2-3 main goals the farmer group would like to prioritize? Consider selecting at least one each from the men’s list and the women’s list.

# Lesson 2. Understanding the community context

As a field agent starting work in a community on NRM activities, you need to first understand the **community context** – the natural resources themselves, the socioeconomic background of the people, the policies and politics that govern NRM, and any existing programs and actors in the area.

After completing this Lesson, you will have:

- Understood the importance of both biophysical information as well as socioeconomic information in NRM projects.
- Learned about some PRA tools relevant to NRM to help you gather some initial information about the communities you are working with.

## ***Learning about where you work***

Natural resource problems and opportunities are very location-specific. They may differ from place to place depending on the climate, soil, land use, population, livelihood opportunities, land ownership and other community factors. Your success also depends on community buy-in and social factors that may at first seem unrelated to natural resources.

Perhaps you or your colleagues are already working in the area and know the local people and the challenges they face. If so, you may already be aware of some of the natural resource management problems in the area. 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.
- ✓ How 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 in regards to the use of different important natural resources, such as 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: What are the opportunities for you for

these resources? What are challenges? What are trends have you been seeing over the past 5 years? 10 years?

Box 1 is a checklist of information you might collect as part of your **trend analysis** of the physical environment. Adapt these to suit your project goals.

<b>Box 1. Physical environment: Examples of trends to consider</b>	
<i>For these main issues, find out: What are opportunities and what are challenges? What are the trends? Write down the main issues and trends that you find.</i>	
<b>Agroecology</b>	<ul style="list-style-type: none"> <li>Is the area arid, semi-arid, or humid? Is land flat, gently sloping, or hilly? Irrigated or non-irrigated? Are there any wild birds or animals?</li> </ul> <p>Have people noticed any changes in overall climate, or changes in patterns of rainy or dry seasons?</p>
<b>Soils</b>	<ul style="list-style-type: none"> <li><b>Soil characteristics.</b> 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?</li> </ul> <p>Do you see changes in soil characteristics? (More stony? Less topsoil? Fertility going up or down?)</p> <ul style="list-style-type: none"> <li><b>Soil erosion.</b> Do people see signs of erosion anywhere? What are the signs? Where is erosion a problem?</li> </ul> <p>Is erosion getting worse or better anywhere? What do people do about it?</p>
<b>Plants</b>	<ul style="list-style-type: none"> <li><b>Crops.</b> What crops grow best on which soils? What crops are grown, and using what practices (monoculture, intercropping, rotation; plowing, direct seeding, etc.)?</li> </ul> <p>Are changes in cropping patterns occurring? If yes, why?</p> <ul style="list-style-type: none"> <li><b>Trees.</b> What tree or other plant species do people use? Where are these found? What trees do people plant, and where? What do they use them for?</li> <li><b>Forests.</b> 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?</li> </ul>
<b>Water</b>	<ul style="list-style-type: none"> <li><b>Water use.</b> What are the community's main water sources? How do they use water – for irrigation, drinking water, household use, animals?</li> </ul> <p>Are water resources increasing? Decreasing? Why? What needs to change?</p> <ul style="list-style-type: none"> <li><b>Watershed management.</b> Do people manage their watershed?</li> </ul> <p>What is happening within local watersheds? Losing trees? Losing soil? Losing water through too much run-off? What</p>

	needs to change?
<b>Livestock</b>	<ul style="list-style-type: none"> <li>• What 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?</li> </ul>
<b>Vulnerable or high risk areas</b>	<ul style="list-style-type: none"> <li>• 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)?</li> </ul>

### ***What social and economic issues are important for NRM?***

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 policies and governance surrounding resources. Below are some examples of issues that will probably impact the success of your project, with questions you might want to ask.

### ***Economics and markets***

People’s economic situation may be a driver of how they value natural resource management. Most people want to see that an activity has a benefit for their livelihoods to motivate them to continue doing it. Also, if people’s main sources of income are agriculture-based, good NRM can help them improve their livelihoods.

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

#### Questions to understand 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 doesn’t?
- 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?

Figure 7. [ID]

Take special care to note who controls resources; resources are not always equitably distributed and can be a source of great conflict. See “Ownership of natural resources” below for more on this.

## ***Policies, laws and institutions***

Every country has different policies on managing resources. Some governments are quite strict in the policies they want to enforce; others do not apply the laws very well. Policies are different for different resources.

Questions on policies, laws and institutions:

- *For water:* What are the local policies governing water use from different sources (bore holes, rivers, dams, other)?
- *For forests:* What are the local policies governing forest management and use?
- *For wild animals:* What policies govern how wild animals are protected or hunted?
- *For 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?

*Figure 81 Figure 4 [GRAPHIC NRM 241: Group of people on a hillside looking at gully. Some pointing into the gully. One person taking notes.]*

## ***Ownership and control of natural resources***

There may be people in the community who have more responsibility over natural resources than others. Some people own land, some use other people's land.

**Land tenure**, and how land is passed from one person to another, also varies from place to place.

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, some people may be farmers, while others may herd livestock, and both try to use the same land. Make sure different groups of people are involved in decisions on how to improve management, and monitor how they apply and benefit from the improved technologies.

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

Questions on ownership:

- **Resource ownership and land tenure.** What are the formal or informal rules governing land ownership? How is land passed from generation to generation? Are there particular issues for women or men 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? Is the enforcement done well?
- **Landholding patterns.** How many people are landless? Are there many small, medium, 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?

Figure 9

### **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.

It can be very difficult to help the poorest farmers and most vulnerable people improve their natural resource management. These include less-educated people, those with disabilities (e.g., in places where many have been injured in violent conflicts), and people living with HIV/AIDS. They could also include people from minority ethnic groups, or from lower socio-economic classes. 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 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.

**Field Exercise 2a** can ensure that the activities support the poorest people in the community along with others. It also helps you understand what the main livelihoods options are for people, so that your NRM work can support those opportunities.

Questions to better understand vulnerable groups:

- Who are the most vulnerable people, according to the community? How many are they, and what’s their relationship with others in the community?
- What 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?

Figure 10 Figure 4 [GRAPHIC NRM 241: Group of people on a hillside looking at gully. Some pointing into the gully. One person taking notes.]

### **Ways 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 local situation, you may wish to use only some of these tools. Feel free to adapt the tools or add other tools you know. Only gather information that is relevant. **Don’t collect information you don’t know how to use!**

You should probably use a combination of the following:

[GRAPHIC NRM 208: Field agent looking at hillside where trees have been cut and gully is eating into the soil]

- **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**

	<p><b>potential. Use the soil tests in the “Natural Resource Management: Basic concepts and strategies” module.</b></p>
<p>[GRAPHIC NRM 209: Field agent sitting talking to group of four local people]</p>	<ul style="list-style-type: none"> <li>• <b>Talk to local people.</b> 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, land owners and landless, old and young. Note any differences among these groups.</li> </ul> <p><b>TIP: Make sure you meet with local leaders before you plan any community meetings.</b></p>
<p>[GRAPHIC NRM 210: Field agent talking to official-looking woman in office]</p>	<ul style="list-style-type: none"> <li>• <b>Key informant interviews.</b> Find out the key people to talk to: 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.</li> </ul> <p><b>TIP: Don’t forget the private sector. You may find that they are willing to invest in products that contribute to sustainable agriculture and NRM.</b></p>
<p>[GRAPHIC NRM 211: Field agent facilitating seasonal calendar exercise, where people draw calendar in sand on the ground using sticks, leaves and stones]</p>	<ul style="list-style-type: none"> <li>• <b>Participatory appraisal</b> techniques such as transect walks and seasonal calendars are helpful. Some techniques, such as socioeconomic analyses, may require more time with the communities.</li> </ul> <p><b>TIP: See <b>Field Exercise 2c</b> for how to make a seasonal calendar. Look below about conducting a transect walk.</b></p>
<p>[GRAPHIC NRM 212: Field agent looking at spreadsheet on computer, with book of statistics open on desk]</p>	<ul style="list-style-type: none"> <li>• <b>Secondary information.</b> 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.</li> </ul> <p><b>TIP: A lot of mapping data is also available</b></p>

### **Conducting a transect walk**

A transect walk is an organized walk across an area to study the challenges and areas of high potential.

A **route** is generally selected from a natural resource map of the area. It may be selected because it passes several key natural resources, or to ensure that it goes through a particular problem area.

Once you've identified a route, ask participants to note down what they see along the way to create a **transect diagram**. This 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. You can also use a transect walk to identify hotspots as well as high potential areas.

*Figure 11 [GRAPHIC NRM 229: Transect diagram]*

You can also do a transect walk on an individual farm to help farmers understand and analyze their own enterprises. If necessary, do several transect walks from different places to make sure you cover all the important land types in the area.

Transect walks can provide the first building blocks for choosing intervention strategies at a later stage. See [Field Exercise 2d](#) for how to do a transect walk.

### **Make sure you have a map!**

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, which may be critical for soil and water management. It shows hills and valleys, rivers, roads and settlements. It can help you pinpoint risky areas. 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; it's usually not up-to-date information, but still is useful to get a general idea of the area.

*Figure 12 [GRAPHIC NRM 213: Printed map of an area showing roads, rivers, village, contours]*

## **Field Exercise 2a. Vulnerability analysis**

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

## **Objective**

After this exercise the participants will be able to:

- Determine who are the most and least vulnerable in the community
- 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. Write down a list of different groups in the community – some that you think are vulnerable, some that are not. This might include the following:
  - Economic
    - Agriculturalists that generally are poor, like fishermen in some places
    - People without land
    - Wealthy landowners
    - Child-headed households
  - 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
  - Diseases or physical difficulties
    - People living with HIV/AIDS or other diseases
  - Social status
    - Female-headed households
    - Community leaders

- Type of farming
  - Farmers
  - Herders
  - Fisherpeople
- What else makes some people vulnerable and some not?

Ask the community to brainstorm other “groups” or “categories” of people in the community. Be sensitive to the local culture as you write these groups.

2. Facilitate a brief discussion about these different people. Which of these 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?
3. 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.
4. For each resource, discuss each of the groups you wrote down. Ask the following questions:
  - Who has access to each of these resources? Who doesn’t?
  - Who has control over each of these resources? Who doesn’t?
  - Who has a say in how resources are managed? Who doesn’t?
  - Do some groups cause more damage to resources than others? What do they need to change their behaviors?
  - Do some groups have opportunities to benefit from – or to help others benefit from – improved NRM?

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

**Table 2. Example of vulnerability analysis**

Category	General description	Use of natural resources	Challenges or opportunities
Economic: Large rice farmers	Well off, influential	> 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	< 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 great responsibilities at home.	Responsible for water collection Responsible for wood collection	Often at great physical risk collecting wood and water
...	...	...	...

## 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 young 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 NRM? How does good or bad NRM 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 are able to benefit from better NRM?

## Notes

It is easy for one or more category to be forgotten 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 involved in decision making and in implementing activities. Design the monitoring and evaluation system to take these categories into account.

## **Field Exercise 2b. Mapping natural resource conflicts**

[From *FAO Community-Based Forest Resource Conflict Management Training Package*.  
<ftp://ftp.fao.org/docrep/fao/005/y4301e/y4301e03.pdf>]

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

### Objective

After this exercise the participants will be able to:

- Identify main existing or potential conflicts over natural resource use
- Understand who the main actors in the conflicts are

## 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 flip chart with mapping example

## Suggested procedure

1. Explain to participants that they will need first to discuss and agree on a conflict that they are all familiar with. With a group of participants from diverse backgrounds or locations, selecting a conflict that they are all familiar with can be difficult.
2. Ask the participants to begin by preparing a basic sketch map of the area on which the conflict is centered. On this map, they are to show the major landscape features and relevant boundaries of tenure. Post the Sample conflict map and discuss as the activity is explained.
3. Next, ask participants to 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.

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 use boundary changes.

4. 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 among existing uses, between existing and proposed uses or among proposed uses. Record the specific areas of conflict either by highlighting these areas on the map or by making a list of specific points of dispute.
5. 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: Why do each of these groups want from the resources?

## Questions for Discussion

- ✓ What are the primary sites of conflict?
- ✓ Which sites are of secondary importance?
- ✓ What would the consequences or impacts be to the different stakeholder groups if their existing or proposed uses are stopped or changed?
- ✓ What alternatives or possible solutions in land or resource use are suggested from the information on the map?

## **Staff Exercise A. Natural resource conflict issues analysis**

[From *FAO Community-Based Forest Resource Conflict Management Training Package*.  
<ftp://ftp.fao.org/docrep/fao/005/y4301e/y4301e03.pdf>]

Issue analysis is best done in small groups to learn about the wide range of views different stakeholders are likely to hold about sources of conflict. Separating a conflict into its various issues, and then identifying the type of each issue and its causes (whether these are **differences**, **threats** or **gaps**) can be useful in developing a strategy for conflict management.

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

### **Objective**

After 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**

Post-its or blank cards, pen and paper, print-outs of the *Issues Analysis Table* and the *Example Issues Analysis*.

### **Expected outputs**

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

### **Time required**

1 hour

### **Preparation**

- Read and understand the *Issues Analysis Table*, and the *Example Issues Analysis*.

### **Suggested procedure**

1. Think of a conflict that you have experienced or know of through working with communities in NRM. The conflicts 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 post-it or card.
3. Repeat this again for 2 more conflicts you've seen that is focused on natural resources.
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 in which issues of a similar nature are clustered. Label each cluster or category, recording the reason they are seen to be similar. See if you can categorize them into the five main types presented.

5. A further level of analysis is to identify what gave rise to the issue. 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.
6. 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.
7. Read the example and take a few minutes to look at the *Example Issues Analysis*.
8. Take the list of issues for your conflict and develop your own issues analysis table on a flip chart. This will require:
  - identifying the most appropriate category for each issue,
  - briefly describing the issue
  - deciding 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 not a “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 (\*).

9. When conflict has multiple contributing causes, it is unlikely that all the causes can be tackled or addressed simultaneously. The situation requires the establishment of 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 of doing this is to rank the issues in terms of significance. In doing so, it is also useful to distinguish which issues are:
  - *immediate* and require urgent action,
  - *underlying*, presenting significant obstacles for lasting peace and perhaps needing to be addressed over a longer time period.

Ultimately, those involved in conflict will have to construct their own criteria for determining priorities for action. They may decide to focus on the issues that most immediately affect the conflict now, or they may decide to tolerate a certain level of what appears to be localized conflict in order to focus on the underlying issues of the dispute.

Again, determining linkages and identifying some of the roots of the conflict are valuable.

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.

10. 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 benefits are there in 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 the groups chose to decide on possible actions?

Note that, 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.

In closing, understand that 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 NRM.

### Handouts for exercise

#### *Issues Analysis Table*

Type of Issue	Description	Points to remember when managing these conflicts
Conflicting ideas	<ul style="list-style-type: none"> <li>• Conflicts over differing needs and desires, sharing of benefits and resource use</li> <li>• Include perceived and actual competition of interests</li> <li>• Conflicts can emerge from a perceived or actual lack of shared</li> </ul>	<ul style="list-style-type: none"> <li>✓ Identify common or shared interests</li> <li>✓ Underlying needs can often be satisfied in more ways than are at first obvious</li> <li>✓ Clarify whether interests are real or perceived</li> </ul>

	interests	
Not enough information	<ul style="list-style-type: none"> <li>• Conflicts caused by lack of information or differences in interpretation of information</li> <li>• Can be linked to differing methods of assessing, evaluating or interpreting information</li> <li>• Poor communication (listening or expression) or miscommunication among disputing parties</li> </ul>	<ul style="list-style-type: none"> <li>✓ Reach agreement on information needs</li> <li>✓ Reach agreement on how information can be obtained and verified</li> <li>✓ Reach agreement on criteria for evaluating or interpreting information</li> <li>✓ A third party may improve communication</li> <li>✓ Encourage transparent decision-making</li> </ul>
Difficult relationships	<ul style="list-style-type: none"> <li>• Differences in personality and emotions, as well as misperceptions, stereotypes and prejudices</li> <li>• Incompatible behaviors (routines, methods, styles), differing expectations, attitudes and approaches to problem solving</li> <li>• History of conflict and bad feelings among the parties</li> </ul>	<ul style="list-style-type: none"> <li>✓ Identify the specific difficulties, encourage conflicting parties to avoid generalizations in stating their difficulties with one another</li> <li>✓ Aim to build positive perceptions and solutions</li> <li>✓ Emphasize fair ground rules to be followed by all parties</li> <li>✓ Work to realign or build relationships, fostering care and willingness on the part of the participants</li> </ul>
Structural issues	<ul style="list-style-type: none"> <li>• Differing ideas regarding appropriate management processes, rules, roles and power; can apply to meeting committees or organizations</li> <li>• Perceived or actual inequality or unfairness concerning power, control, ownership or structures that influence access to or distribution of resources</li> <li>• Factors that hinder cooperation, such as decision-making structures and responsibilities, time constraints, geography or physical</li> </ul>	<ul style="list-style-type: none"> <li>✓ Help disenfranchised groups to understand their own and other parties' perceptions of the conflict</li> <li>✓ Gain agreement on shared review of specific grievances – e.g. too much bureaucracy, poor representation</li> <li>✓ Aim to transform conflict into a force for social change so solutions are sustainable in the long term</li> </ul>

	settings	
Conflicting values	<ul style="list-style-type: none"> <li>Differences among cultural, social or personal beliefs or different world views and traditions</li> <li>Can include different goals, expectations or assumptions that reflect personal history and upbringing</li> </ul>	<ul style="list-style-type: none"> <li>✓ Frequently the most difficult to change</li> <li>✓ Focus on interests or shared goals and avoid focusing on resolving differing values</li> <li>✓ Require a long-term strategy that builds respect and supports the sharing and understanding of values among stakeholders</li> </ul>

### ***Example for analysis***

*Read or print out the following example:*

One local village heard that the District Forest Office and the CFUG had decided to restrict access to an area of forest in order to protect an endangered bird species. The District Forest Officers convinced the CFUG that the restriction of 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 proposed closure was over an area that was important for the collection of housing materials and traditional medicinal plants. All the villagers feared that they would no longer be able to collect local bird feathers for use in traditional ceremonies. Both the women and the hunters in the village saw the conflict as being centered on gaining continued access; the Forest Office, saw it as a conflict of unsustainable resource use within the region

### ***Example Issues Analysis***

<b>Type of Issue</b>	<b>Description</b>	<b>Difference, threat, or gap?</b> (Points to remember when managing these conflicts)
Conflicting ideas	<ul style="list-style-type: none"> <li>Women need to collect forest materials and medicine plants</li> <li>The CFUG wants to stop the poaching of wildlife</li> </ul>	<ul style="list-style-type: none"> <li>✓ <i>Perceived difference</i> in interests related to use of the forest (wildlife versus supporting local livelihoods)</li> <li>✓ <i>Perceived threat</i> of the CFUG and the forest office restricting access to needed resources</li> </ul>
Not enough information	<ul style="list-style-type: none"> <li>Villagers have no access to information on the proposed restriction</li> </ul>	<ul style="list-style-type: none"> <li>✓ <i>Gap (information):</i> Lack of information on the proposed restriction provided by the</li> </ul>

	<ul style="list-style-type: none"> <li>Hunters question how the bird is endangered</li> </ul>	<p>CFUG to the village</p> <p>✓ <i>Gap (information)</i>: Validity of information needs to be confirmed</p>
Difficult relationships	<ul style="list-style-type: none"> <li>Previous bad relationship between the CFUG chairperson and the village</li> </ul>	<p>✓ <i>Perceived threat</i>: Suspicions that the CFUG chairperson from another village is supporting forest office interests over this village's interests (as retaliation for a past dispute)</p>
Structural issues	<ul style="list-style-type: none"> <li>Consultation with villagers on forest use</li> </ul>	<p>✓ <i>Gap (communication)</i>: The forest office and CFUG did not consult the women or hunters before making the proposal</p>
Conflicting values	<ul style="list-style-type: none"> <li>The significance of local bird feathers in traditional ceremonies</li> </ul>	<p>✓ <i>Perceived difference</i>: Forest officers' lack of appreciation for the ceremonial importance of bird feathers in determining relationships within villages</p>
<p><b>Proposed actions that emerged from the conflict analysis:</b></p> <ul style="list-style-type: none"> <li>✓ check with forest officers and the CFUG to see if the proposal is true;</li> <li>✓ forest officers to provide and explain information on the birds and the significance of the area;</li> <li>✓ women to negotiate the primary area of interest: securing access to necessary forest materials and medicinal plants;</li> <li>✓ need to educate forest officers on the value of traditional bird feathers;</li> <li>✓ other long-term actions: change consultation process and make chairperson more accountable to entire constituency of the CFUG; village representative to meet with chairperson.</li> </ul>		

## **Field Exercise 2c. Seasonal calendar**

*[Adapted from FAO (in press)]*

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.

You can get the participants to draw the calendar 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 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 NRM interventions need to be implemented

### **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, and 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, 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. In each case, draw a symbol or letter next to each calendar 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. Redraw the finished calendar on paper if necessary. Post it on the wall as a permanent record, in a place where it can be referred to in further discussions.
9. Have each group present their calendars to the other groups, and allow for 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 over the year? Are there periods of hunger?
- How does water availability vary over 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?

*Figure 13 [GRAPHIC NRM 240: Group of people drawing seasonal calendar on ground]*

## **Field Exercise 2d. Transect walk**

This exercise gathers information on the relationships between the landscape, land use, farming systems, soils, water and crop problems. It stimulates discussion of local problems, possible solutions and potential opportunities.

Once you've 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 and tools are also useful in your regular monitoring.

### **Objective**

After 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 watershed-level.
- Determine what 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 (**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 based on mapping exercises, and an improved 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, 1 hour for transect walk, 1–3 hours for data organization, mapping and discussion.

### **Preparation**

Checklist of 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) or “Hotspots”.

### **Suggested procedure**

1. Outline the goals of the transect walk. Decide whether it will 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 most useful and important.
2. Provide participants with materials and instructions on the amount of time they have. Give them a checklist of information they should be looking for, or a template for a transect diagram. Show them a sample diagram like the one they will be creating afterwards.
3. Turn on your GPS and set it on “track”. If you're not able to track, take waypoints along the way, including your start point, end point, and other 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 and discuss the differences, and record what they see at each place.
5. Take the opportunity to stop along the way and discuss with farmers about their resources, priorities, and trends. Make sure the participants note down information at each location.
  - ✓ **Soil type.** Use local names for the soils. If too simple (e.g., just a name of a color is used) ask about other details: stoniness, depth, 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 have and in which periods. Is there ever flooding? If yes, when, where and how frequent?
  - ✓ **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 if there may be any issues like this that may need to be addressed.
  - ✓ **Problems.** Ask about any problems related to soils, plant nutrients, crops, water, forests, livestock, pests and diseases. Any recent changes in erosion, burning, need for fertilizer, crops, yields, pollution? Ask them to point out things (such as certain types of plants) that indicate the changes.
  - ✓ **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.
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?

### Questions to stimulate discussion

Some additional areas to discuss:

- **Healthy resources:** What resources are healthy or seeing positive trends? Why is this the case, and 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?

### 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, people from two different ethnic groups or livelihoods). By walking in different

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

*Figure 14 [GRAPHIC NRM 239: Group of people on a hillside looking at gully. Some pointing into the gully. One person taking notes.]*

# Lesson 3. Identifying and engaging stakeholders

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, government, 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

Many people in the community share some of the same resources. For example, farmers may rely on a spring for irrigation water; livestock keepers may water their animals there, and women villagers may fetch water there for household use.

Various people and organizations outside the community may also have an interest in the resource, or they may influence it. For example, people downstream may 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.

*Figure 152. [GRAPHIC NRM 233: Three groups of people, each with 2-3 members: (1) government officials (with desk), (2) traders (with pickup), (3) watershed committee (with irrigation gate)]*

It is important to understand who all these **stakeholders** are, and how and when they should be involved in your project. **Field Exercise 3a** describes how to do a **stakeholder analysis**. The purpose of this is to 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 land owners who may help or pose a challenge to working in a given community. Help them assess how stakeholders might support or hinder the implementation of the resource management strategy you develop together. You might also identify other organizations you can link with to help you scale up your work across wider areas.

Because NRM projects often reach whole communities, it is critical to **build partnerships** that can help you get your work done, 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, for example providing consultations, approvals, and/or oversight.

For smaller watersheds or community areas, it is as 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 may provide key expertise and funding, or help in securing funding.

*Figure 36 [GRAPHIC NRM 234: Government officials (from NRM 233)]*

### **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 this awareness of the bigger issue – and motivating groups of farmers to get together to take action – is perhaps the most challenging aspect of working with local communities.

*Figure 12 [GRAPHIC NRM 235: Group of local people, drawn from each of the groups in NRM 232]*

#### **Box 2. 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 that actually did not own the land they were farming. This had serious implications on soil and water conservation. Since they were not farming the land, the landowners did not take 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.

Once this 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.

## 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 also have worked 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 2** gives an example of how to summarize the work of other initiatives.

**Table 2.** Who is doing what on natural resources in the community

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	Hillsides	Poor farmers	Excellent field staff	Lack of seed of cover crops	Coordinate and support activities
...	...	...	...	...	...	...

When you do your mapping exercises later, you can mark these areas directly on the map.

## Field Exercise 3a. 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 decisions.

If you have already done Figure 4 [GRAPHIC NRM 241: Group of people on a hillside looking at gully. Some pointing into the gully. One person taking notes.]

on socioeconomic analysis, you can use this exercise to focus on stakeholders outside the community.

### Objective

After 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** the natural resources. Encourage them to think of different groups: small and large farmers, livestock owners, landless people, the very poor, and so on. For each group, ask the participants to list their key characteristics, and how they use the land and resources such as wood and water. On a flip chart, make a table like **Table** and list this information in the first three columns.
2. Invite the participants to think of people or organizations who **influence** the resources in some other way. Examples include 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** the 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 ways the resources are important to them. List these groups in the table.

**Table 4.** Example of list of stakeholders

List of stakeholders	Characteristics	How they use the resources	Influence over the resources	When and how stakeholder should be involved
Smallholder farmers	Farm 1–2 ha each Organized in production groups	Grow crops Collect firewood Use irrigation water	Control erosion on own land	Actively involved throughout
Herders	Keep 5 cattle and 10 goats From outside village	Herd animals on open land Use water for animals	Agree to restrict grazing	Actively involved in dry season
Ministry of Water	Office in town	Water for downstream users	Approve plans to protect springs	Consulted, approval required
...	...	...	...	...

4. In the fourth column, list how each stakeholder may influence the resources and management improvements. For example, a local authority may have influence because it can say 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 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:** Stakeholder is kept abreast of activities through occasional visits, phone calls, copies reports, etc.
  - **Consulted:** Stakeholder is more actively solicited for input (e.g., information, knowledge and decisions) but is not directly involved
  - **Actively involved:** Stakeholder has a strong voice in decision making and works in partnership with the farmer groups
  - **In charge:** 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 watershed?
- ✓ What is the land tenure system in this area? Who owns the land? How does land change hands? Where do the land owners or managers 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? 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? (e.g., 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' cooperative etc.)? What are their main strengths and weaknesses?

# Lesson 4. Mapping Natural Resource Problems and Opportunities

Figure 17 GRAPHIC NRM 238: People drawing resource map on ground using sticks, leaves and stones]

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 basis for the activities in their NRM plans.

## Mapping resources in a community or watershed

Maps are a very useful way of visualizing problems and opportunities relating to a community’s natural resources, and for planning 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 landmarks such as rivers, ponds, hills and valleys, forested areas, etc.

You can ask a group of local people to draw a map **from scratch**. They can use markers to draw it on a large piece of paper. Or they can use sticks to draw a map on a flat piece of ground in the village, and mark houses, fields, forest etc. using leaves and stones. Accuracy is not the primary concern; it is more important to gather information about how people perceive their resources.

The **scope** of the map you create depends on what it is used for. 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).

Figure 18 [GRAPHIC NRM 221: Hand-drawn map of community showing the items in NRM 222–229]

### What to include in the map

Maps may include:

[GRAPHIC NRM 222: Close-up from NRM 221 showing boundary]	<ul style="list-style-type: none"> <li>• <b>Boundaries</b> of the community or watershed, together with indications of orientation (north?) and scale</li> </ul>
[INSERT]	<ul style="list-style-type: none"> <li>• <b>Villages and settlements</b> where people live. This, along with the socioeconomic information you collect, will help you understand the link between the people and</li> </ul>

	their land, water, vegetation, and livestock.
[GRAPHIC NRM 223: Close-up from NRM 221 showing hill and “thin soil”]	<ul style="list-style-type: none"> <li>• <b>Landscape and soils</b> (hills, valleys, flat areas, slopes, soil types, rocky or sandy areas, swamps, etc.), as well as differences in altitude and soils.</li> </ul>
[GRAPHIC NRM 224: Close-up from NRM 221 showing river and irrigation canal]	<ul style="list-style-type: none"> <li>• <b>Water resources</b> (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).</li> </ul>
[GRAPHIC NRM 225: Close-up from NRM 221 showing road, village, market place]	<ul style="list-style-type: none"> <li>• <b>Infrastructure</b> (roads; bridges; clusters of settlements, such as hamlets or small villages; churches; schools; market places; other buildings).</li> </ul>
[GRAPHIC NRM 226: Close-up from NRM 221 showing fields and forest]	<ul style="list-style-type: none"> <li>• <b>Land use</b> (cropped areas, crop types, wet and dry season grazing areas, forest) and <b>land tenure issues</b> (private or common land, owner or tenant or leasehold farmer, farm size and fragmentation).</li> </ul>
[GRAPHIC NRM 227: Close-up from NRM 221 showing gully, deforested area]	<ul style="list-style-type: none"> <li>• <b>Problem areas</b> (erosion, pollution, deforestation, invasive species such as <i>Striga</i> or <i>Prosopis</i>, etc.). See “Identifying Hotspots” below.</li> </ul>
[GRAPHIC NRM 228: Close-up from NRM 221 showing site of planned dam and route of irrigation canal]	<ul style="list-style-type: none"> <li>• <b>Planned interventions</b> such as the site of a new tree nursery or the route of a new irrigation canal.</li> </ul>

You should visit the areas identified on the participatory map. You might also consider conducting a series of transect walks in the mapped areas. This is called **groundtruthing**: you want to see firsthand what the issues are.

Make sure you bring your GPS with you! You should be gathering points that you 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 this kind of social information? Imagine that you create a map with the community. They list all the main water sources, agricultural land, and other important points. Without additional information, though, you won’t know how many people draw water from a particular source, or

how many people 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**. **Field Exercise 4a** describes this process. It includes an example of a questionnaire for social information. You can also use some of the PRA tools from Chapters 1 and 2 for this.

## Gendered resource mapping

Throughout the mapping process, think about how men and women often have different roles, and are responsible for different things on the farm. They have different roles 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 distance to 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.

These roles, responsibilities, and preferences vary greatly from place to place. **Field Exercise 4b** helps you identify the different roles and responsibilities that men and women have. It is important to understand these differences to ensure that both men and women benefit from natural resource management activities, and that whole households benefit from your activities.

Through your mapping, make sure that women and men's ideas are taken into account.

*Figure 19 [GRAPHIC NRM 236: A husband and wife farmer walking away from a drop-off point for grain. There is a trader there with sacks of grain behind him. The husband is holding the money from the sale and both are smiling. There is a cloud above the woman's head with a picture of children's clothes and books. Above the man's head there is a cloud with a tractor in it.]*

### Box 2. Ensuring everybody has a say

(taken from Socio-Economic and Gender Analysis Programme. FAO, 2001)

When the PRA team gathered together villagers in North Omo, Ethiopia to make a model to represent their area, they found that although about thirty people clustered around in interest, only a handful defined the features to be represented. That handful was all adult and all male. Women silently looked on and children were shooed away if they got too near. The model produced represented a particular point of view.

The team then asked the women and children to make their own models on spaces of ground next to the men's model. The children quickly gathered sticks, leaves and stones and, under the direction of a ten-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.

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.

## ***Identifying and prioritizing NRM problems and opportunities***

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 realize that it is possible to do anything to overcome such problems.

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 this project is to help farmers build on natural assets they already have. What natural resources hold good potential, but are not realizing their potential?

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.

*Figure 20 [GRAPHIC NRM 203: Village women around well. One pulling bucket out with only a drip of water in it. Another woman looking into well to see if she can see water]*

### **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).

If you're using a watershed or community approach, you can help farmers identify **hotspots** in their 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. Sometime it is used to describe an area where there is severe risk of natural resource degradation. Here are a few ways of thinking of them:

- A **biodiversity hotspot** is an area with many different species of plant, animals, or insects.
- An **agro-environmental hotspot** is an area where human agricultural activities are having a detrimental impact on the environment. This both hurts the environment, and makes agriculture less effective.
- 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 (Table 4). They can draw them directly on their social-resource map.

Figure 21 [GRAPHIC NRM 231: Map of watershed showing hotspots: labels with “erosion”, “tree cutting”, “floods”, “gully”, “low fertility”]

**Table 4.** Examples of common signs of hotspots

<p><b>Erosion</b> [image of rill erosion on a hillside]</p>	<p>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</p>
<p><b>Other water problems</b> [image – a contour bund that has water running through it downstream]</p>	<p>Yellow or stunted crops Damaged canals and bunds Dry wells and springs Areas at risk of landslides</p>
<p><b>Soil fertility problems</b> [image – a farmer watches while he burns the brush off his field]</p>	<p>Bare, stony soil Poor crop growth Abandoned fields Certain types of weeds Evidence of burning fields to clear brush</p>
<p><b>Deforestation</b> [image - ]</p>	<p>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</p>
<p><b>Loss of native habitat and declining biodiversity</b> [image – a person chopping down a large tree to put on a truck saying “logging”. A confused-looking bird doesn’t know where to go]</p>	<p>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 and/or fields</p>

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 necessary not only 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 velocity of water flowing into it, and to trap the soil on the slopes. This can be done by planting vegetation above it.

Field 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 may be looking more closely at different problems. The goals of these farmer groups may be more directly linked to increasing production, or increasing incomes from production. In these cases, there are different signs you can be looking for to diagnose these problems.

Refer back to the “Natural Resource Management: Basic concepts and strategies” module for help identifying some of these problems. You can also bring in local agronomists for support.

**Table 5. Examples of causes of low production on farms**

<p><b>Insufficient water</b></p> <p>[image – wilting plant, with a hot sun]</p>	<p>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</p>
<p><b>Soil fertility problems</b></p> <p>[image - three different leaves, reflecting deficiencies in N, P, K]</p>	<p>Low yields Bare, stony soil Discolored leaves that show nutrient deficiencies</p> <ul style="list-style-type: none"> <li>• 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</li> <li>• Not enough P: leaves may be darker or have a purplish tint along the edges</li> <li>• Not enough K: leaves may yellow at the tips and edges</li> </ul> <p>Thin topsoil (see Field Exercise x in “Natural Resource Management: Basic concepts and strategies” module) Few soil animals in topsoil (see Field Exercise x in “Natural Resource Management: Basic concepts and strategies” module) On sloped land, 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)</p>
<p><b>Plant pests and diseases</b></p> <p>[image – farmer standing by wilting plant, scratching her head; small white flies are all around the leaves]</p>	<p>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.</p>

In general, farmers know what their main problems are. Listen to them!

## 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 the natural resources from being more productive?

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, to restore the source to its desired use.

You can use the “**problem tree**” method described in **Field Exercise 4d** to identify causes of hotspots or other problems.

## What’s the difference between a cause and a contributing factor?

The cause of a problem is the immediate contributor to a resource problem. In many contexts, however, it’s important to look at other contributing factors that add to the source of the problem, as it’s often necessary to address those root causes of the problem rather than the problem itself – these are the “drivers” that will interest the community. For example, if soil erosion is caused by reduced ground cover, field agents might probe to find out why there has been reduced ground cover. Is it because of destructive burning practices? Is it due to deforestation? These are factors that can be addressed as part of a management plan.

### **Box 6. Identifying drivers and contributing factors**

Juanita began a watershed protection project in Nicaragua. She started by interviewing farmers, local authorities and other actors to determine what the main issues were in the community. She learned about the way farmers care for their land and water, and what their main concerns were for their natural resources. Through her discussions with the community, she learned about their “driver”: production of 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 low. 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.

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 their production wasn’t profitable enough. This lack of vegetative cover was a cause of erosion and landslides. He’d found his 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 an NRM action plan that included planting trees that have an economic value – mango, coffee, and wood trees. He also looked to link them to savings groups.

Figure 22 [GRAPHIC NRM x. ]

## Areas of high potential

In addition to looking for problems (hotspots) it is also important to look for areas of un-used 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.

What is the purpose of these resources? What use can they have for the community? Are they reaching their potential?

As you do your mapping, focus on these areas where communities have strong natural assets to build from.

## Field Exercise 4a. Drawing a social-resource map

A map is a basic tool for identifying natural resource problems and opportunities and for planning how to solve them. Drawing a map together with local people 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 their 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 Field Exercise is best done with a small group of people – no more than ten or fifteen.

### Objectives

After this exercise the participants will be able to:

- Produce a map showing key features of the area, including land uses, soils, water features and vegetation.
- Help local people understand what a watershed is, and to identify the boundaries of their own watershed or catchment area. If a watershed approach isn't appropriate in your area, you can use this exercise to map the community area in which you'll be working.

- Identify problems in natural resource management and to locate possible solutions.

### **Equipment**

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 or 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**

Choose somewhere suitable to draw the map:

1. 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.).
2. A smooth concrete floor (like the floor of a school classroom) (use colored chalk).
3. A large sheet of paper (use colored marker pens).

### **Suggested procedure**

1. Describe to the participants the area the map should cover – a watershed, the community, the village and surrounding gardens, a single farm, etc. Make sure the participants know where the boundaries of this area are: 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. Determine the limits of the map.
  - 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 "Natural Resource Management: Basic concepts and strategies" module **chapter x** 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, planned interventions. Ask them also to mark their own farms on the map. Refer to the section “What to include on a map” above for guidance.
4. Now, you’ll 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” section in Chapter 2 for questions to ask, and look at the “Vulnerability analysis” again as well. 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.** For each main resource, how much of the resource exists? 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 conflicts common here?
  - ✓ **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 about 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 to see 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. A photo of a hand-drawn micro-watershed map from Afghanistan is below.



[Photo: David Gandhi, for CRS]

**Notes:** 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 people disagree about using a 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; more important is 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. They often show different things from the men – things they see as important.
- ✓ You can ask participants to draw maps showing specific things: crop types and yields, disease problems, who in the family does what, soil types, and so on. You can then use the map as a basis 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–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.

## ***Field Exercise 4b. Gender roles and responsibilities in NRM***

*[Adapted from FAO (in press)]*

This exercise explores who (men or women) does what, who knows what, and who makes decisions, in relation to natural resources.

### **Objective**

After this exercise the participants will be able to:

- Collect information, and explain how household and community tasks are distributed between men and women.

### **Equipment needed**

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

### **Expected outputs**

A list of roles and responsibilities for men, women and jointly.

### **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. 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, 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. 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) 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 in terms of who does what?
- How are older people different in terms of who does what? How about people from different ethnic groups? Owners of big farms? Landless people? Richer and poorer people?

### **References on gender**

FAO's [website on gender and food security](#)

FAO's [Gender-Sensitive Indicators for Natural Resource Management](#)

USAID's [Women's Empowerment in Agriculture Index](#)

World Bank's [Gender in Agriculture Sourcebook](#)

## ***Staff Exercise B. Making a Google Earth map***

Google Earth maps are great planning tools, to let you as a field agent identify the priority areas, map them and the key resources you're looking to protect. You can also map a treatment area and a control area, to let you make comparisons later and see how you're progressing.

### **Objective**

After this exercise, participants will be able to prepare a composite Google Earth map combining the information available through satellite imagery with information collected through PRA methods such as the **Social-Resource map** and the **transect walk**.

### **Equipment needed**

- Computer with internet connection
- GPS device with cable for connecting to the computer

- Social-Resource map prepared with the community
- GPS data and field notes recorded during the transect walk.

### 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 GE base map
- 30 minutes to 1 hour to update the GE map at regular intervals during the life of project

### Preparation

- The Social-Resource map has been prepared together with the community (Field Lesson 2 a)
- Transect walk has been completed. GPS coordinates of settlements, water-points, key natural resources, hotspots, high potential areas and proposed treatment sites have been recorded. (Field Lesson 1d, 2c)
- Download and install Google Earth free software on to the computer. Look up the website online and follow instructions for download.

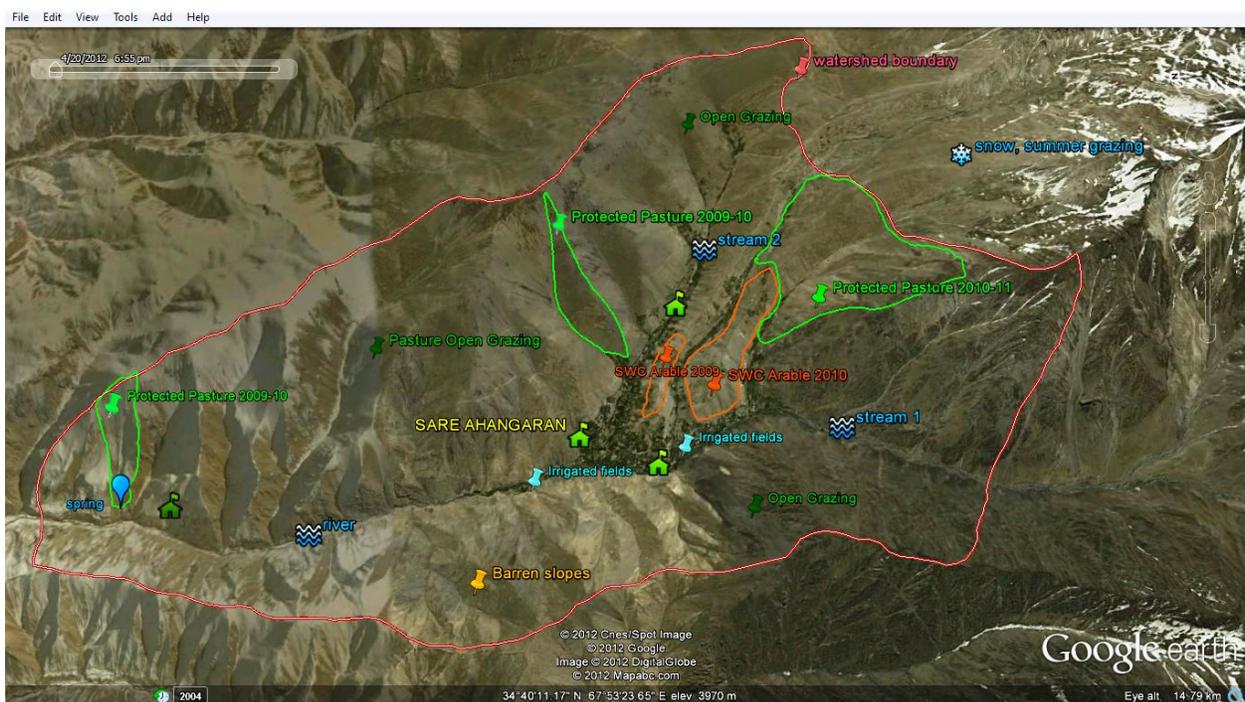
### Suggested Procedure

- Double click the Google Earth icon to open GE.
- Download your GPS data like this:
  - 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 Temporary Places (look in the sidebar of the GE screen).
  - Save this file as .kml or .kmz file with the appropriate file name on your computer's hard drive. Use this file for future editing to prepare the GE map. Remember to save it each time before closing GE.
- Open the GE file by double-clicking on the file icon on your hard-drive. GE 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 GE screen using the mouse. The waypoints will be represented by icons known as Place-marks and Tracks by a line known as a Path.
- Beginning with Waypoint number 1, enter information for each waypoint by right-clicking on the Place-mark 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 eg. 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.

- Using the Add Path feature, draw boundaries for catchments, villages, community lands, hot-spots 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: <http://www.wildsoft.org/EasyAcreage/> (Software is about US\$20.)
- By this method, the GE 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 GE map should be shared and discussed with the community either using a projector or print-out.

### *Composite GE map of Sara Ahangaran watershed*



## ***Field Exercise 4c. Identifying “hotspots” or problem areas within a watershed or area***

### **Objective**

After this exercise the participants will be able to:

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

Note that this can also be done as part of the mapping or transect walk.

### **Equipment needed**

A map of the area (from Field Exercise ).

### **Expected outputs**

Participants understand how to identify trouble spots in an area and have identified key problems in their own area.

### **Time required**

45 minutes to 1 hour

### **Preparation**

Field Exercise 2d (transect walk).

Field Exercise 4a (Social-Resource map)

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.

### **Suggested procedure**

1. Take the group 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.

*Figure 4 [GRAPHIC NRM 241: Group of people on a hillside looking at gully. Some pointing into the gully. One person taking notes.]*

## **Field Exercise 4d. Problem tree**

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 judge which of the various causes is most important. That will allow them to identify potential solutions that are likely to work, rather than merely addressing symptoms.

Problem trees and causal diagrams are similar. The main difference is that the causal diagram does not include the problem's effects. This description focuses on problem trees.

The starting point is the list of problems drawn up in **Error! Reference source not found.**

### **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; cards or small pieces of paper, say 15 x 21 cm (1/2 A4 size); marker pens, thin sticks (e.g., 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 **Error! Reference source not found.**, 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 **Field 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 in the middle of an open piece of ground.
3. Ask the participants to think of what effects the problem has. 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 **Error! Reference source not found.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 relationships 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 side, move to the other side of the initial problem. Ask the group to think of the causes of this problem – why it occurs. For example, as causes of “erosion”, they might think of “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 the causes they have just added occurs. For example, they may say 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 “why” for each of this new set of causes. Continue adding more cards to the diagram to represent new causes. Make sure that each cause is written only once: you can add 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 overcome the other problems. Discuss possible solutions to these root causes with farmers. Which are outside 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 in this diagram. Make sure they cover all the natural resource problems that are considered to be 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 parts of 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 during the session 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 environments. Consider the causes of these problems too, but focus mainly on the technical issues, as the farmer groups can test ways of dealing with these.

# Lesson 5. Making an NRM plan

You have learned about natural resources in your community. The farmer groups have noted on their map any “hot spots” and important natural resource issues, and areas of high potential for NRM interventions. After completing this lesson, you will have:

- Used that 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 an NRM plan**, including the timing, people responsible, and estimated costs of activities.

NRM techniques are very location-specific, so you’ll have to work with farmers to adapt them to their needs. For example, if increasing water availability for crops is determined as a farmer group goal, it’s important to understand the context in order to determine the best solutions. In some areas, insufficient water for crop production can be solved by irrigation. This is not feasible everywhere, such as 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 to enable soil to retain moisture. Increasing rainfall infiltration and storage in the soil can enable significant changes 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 mitigate, as well as any contributing factors that may exacerbate or sustain the problem.

Alternatively, instead of responding to a problem, a technology might scale up existing practices that work well.

## ***Finding and choosing solutions***

Once farmers have understood the problems they are faced with, they can decide what to do about them. A problem may have several possible solutions; these may be more or less effective, more or less expensive, and more or less doable in the 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, more spraying may make the problem worse because it also kills the natural enemies of the pest, allowing the numbers of the pest to explode. It may be better to stop spraying altogether to allow the natural enemies to control the number of pests.

See **Field 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 for your area. Solutions may be vegetative, infrastructure, or managerial. Some common ones are in the **annex** to these guides.

- **Vegetative or biological solutions** involve planting live contour barriers or ensuring year-long ground cover. These solutions are vegetative, or biological. Agronomic fixes for farm-level issues such as soil fertility amendments can be biological solutions, too.
- **Infrastructure or physical solutions** involve moving earth or rocks. They include making terraces, creating gully plugs, or constructing dams. They take 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 messages, 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 interventions on your list will probably be a combination of vegetative, infrastructure and social solutions.

### **Box 3. 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 high siltation was likely due to high runoff, since there are bare slopes in the catchment area and in riparian zones such as the stream banks. Their indicator of this was 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 together. They realized there were 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 riparian areas. This was a **vegetative, or biological**, solution.

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

### **The solution to “not do”**

In some cases, the best solution for soil, water or vegetation management is to not do something. For example, for extremely steep slopes, not-cultivating on the hillsides and allowing regrowth of natural vegetation may be the best solution. You may also decide that people's livestock should not be allowed to graze above water points or on certain slopes more prone to erosion as well. 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 letting land recover. When 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 have taken 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, however. 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 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?

#### **Box 4. Anita’s community: The cost of conservation**

Anita’s group noticed that that the upland areas where there are trees are more stable. In other areas, they noticed that there is a lot of soil erosion, and sediment enters the water source nearby. Anita saw that trees are important to stabilize the land, but also for firewood.

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

#### **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 them or scale them up.

Look for and encourage promising initiatives. For example, look for farms that produce well despite a drought, or identify farmers who manage to feed their families throughout the year even

though they have the same amount of land as everyone else. Study what they do, and encourage others to copy them.

**Figure 4** [GRAPHIC NRM 214: Farmer planting tree seedlings]

## 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 outside experts. You may need to try out potential solutions on a small scale before scaling them up. See the module on “**Promoting innovation**” for how to do this.

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 failure because it is too ambitious, or that 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 with each group 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.

## When issues are bigger than what farmer groups can address on their own

Upstream-downstream issues can be important drivers of natural resource health. 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 they can be engaged. 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 fruitful first step. These meetings allow stakeholders to learn firsthand about 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 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, there are additional steps that may be necessary. Consult your local Ministry of Agriculture or Ministry of Environment for guidance.

### **Box 5. Anita's community: Reaching outside the farmer group**

Anita's group realized that 4 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 they decided to create a watershed committee to deal with these larger issues.

#### **Teaching tool: 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 few steps, now you can write it all down in a plan to address problems and help natural resources 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.

An NRM plan should include:

- **Problems.** The list of priority problems the group decides to solve (such as “gully growing quickly”).
- **Solutions.** The general strategy to overcome each problem (such as “slow down water in gully” and “reduce amount of runoff”).
- **Activities.** The specific activities needed to put the solutions into effect (such as “build 3 check dams”).
- **Inputs.** The cash, materials, labor and other inputs needed.
- **Location.** Where the activities will take place. You can show 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 “Claudia will bring sand,” “Tom will provide refreshments”).
- **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.

Both farm-level and watershed or community-level plans can use similar formats. See **Error! Reference source not found.** for how to help people make an NRM plan. Plans can be drawn as maps, written as charts, written as a narrative – or a combination of these.

When plans have been finalized and agreed, 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.

If the participants are not literate, consider using a sketch map or other visual plan instead, like the one below.



*A farm development plan drawn by a semi-literate farmer with “before” and “after” maps. [Photo credit: CRS staff, Latin American and Caribbean region]*

## **Budgeting for NRM activities**

Nothing is free, and it’s important to ensure that communities are prepared to finance the NRM work they’re planning. A budget is a key component of any NRM plan. An NRM budget 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
- ✓ The source of the funding for each activity

- ✓ The length of time the budget is designed for

You can help your groups develop a budget by referring to the “Financial Education” module, as well as the budgeting sections in “7 Steps of Marketing.” A simple budget example is below.

**Table 1.** Year 1 budget for natural resource management activities

Description	Unit	Unit cost	Number of units	Total	Source of \$
Labor – preparing land	Person-day	\$2.50	10	\$25.00	SILC group fund
Materials – compost	MT	\$40	1	\$40	Group savings

### ***Field 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, at either farm or watershed levels.

A list of inputs, materials, people, funds and other resources that are available for farmer groups to use in designing solutions is critical to ensure that these solutions are possible. Farmer groups should brainstorm techniques they’re familiar with that have proven to be successful, and you can refer to your inventory of local practices.

You should also reflect on the principles and technical options that you have just learned about in relation to 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 this exercise the participants will be able to:

- Choose solutions to their priority problems.

#### **Equipment needed**

- Flip chart, markers

#### **Expected outputs**

A list of solutions to address the group’s priority natural resource issues.

#### **Time required**

2–3 hours

## Preparation

Review the list of priority hotspots or issues (**Error! Reference source not found.**) and their causes and effects (**Field Exercise 4d**).

## Suggested procedure

For each of the top 4 or 5 priority issues the group identified earlier:

1. Develop a list of possible interventions, based on what you and the local people know and feel would work well locally.
2. Review this list and decide which interventions are most important for your group to implement.
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 might the resources be obtained?
4. Organize the results of the discussion in a table like Table 2.

**Table 2. Deciding on 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		✓

5. As a follow-up discuss these and any other relevant questions:

- 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 discussion 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 (or farmers within the group) have? 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?
6. 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).

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 6. 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 she couldn't support all of the interventions with the groups, since she had limited time and resources. She also realized that some interventions were more important than the others.

So, the field agent worked with the group to prioritize the most important interventions. Together they determined 8 criteria that they used to rank NRM practices:

- **Key issue;** This kind of practice addresses a fundamental or critical problem that needs to be resolved
- **Easy to apply;** This kind of practices uses simple techniques and methods
- **Potential for multiplication or scaling up:** This kind of practice is popular with farmers, responds to a key problem, is easy to use, and is easily shared farmer to farmer
- **Local resources;** This kind of practice depends less on external resources, and uses resources that are available, produced or developed in the community
- **Low manual labor;** This kind of technology reduces the family's work load, including for children.
- **Environmentally friendly;** This kind of practice promotes rehabilitation, improvement or responsible use of natural resources
- **Immediate results;** Since producers want concrete results through comparisons and experimentation, this kind of practice produces benefits within the first year of use.
- **Economically viable;** This kind of practice is low-cost for use 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 was high; 2 was moderate; and 1 was low. 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. 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.

### Note

Box 9 describes another way of choosing appropriate solutions: choose criteria first and then rank the different solutions. This is helpful if you find it difficult to narrow the focus of your work. It is also helpful to make sure that you as a field agent have enough time and resources to support farmer groups.

Below is a photo of part of a chart made by the maize production group described in Box 9. They marked the best management practices that are above a certain "threshold" score. The field agent decided on this "threshold score" based on how many practices she knew she'd be able to support.

The group chose 20 as their "threshold score". They marked in green the practices they would promote, since the score is above 20.

Practice to increase maize productivity	Benefit of the practice	Scoring of criteria for selection of best bet practices								Score
		A	B	C	D	E	F	G	H	
<b>1. Soil management</b>										
a. Minimum tillage or zero till	Reduces erosion, improves soil moisture retention, protects soil surface, adds organic matter, controls weeds	3	3	3	3	2	3	2	3	22
b. Green manure. In Central America common green manure legumes are Velvet bean ( <i>Mucuna pruriens</i> ); Pigeon pea ( <i>Cajanus cajan</i> ), Lablab bean ( <i>Lablab purpureus</i> ), and others	Green manure provides important nitrogen fertilizer to the soil, improves soil physical properties, enriches soil for other crops, while it activates important soil microbial populations and valuable worms	3	3	3	3	3	3	2	2	22
c. Incorporation of crop residues and animal manure into soil, particularly material from corrals	Increases soil organic matter, availability of nitrogen and other soil nutrients, increases soil microbial populations and water holding capacity	3	3	3	3	2	3	2	3	22
d. Planting on the contour	Helps control erosion, improves water capture and infiltration, controls runoff	3	3	3	3	2	3	2	2	21
e. Live barriers on slopes greater than 10%, preferably plants/trees that have other uses (brisanta, Gandul, plants that provide livestock forage)	Helps control erosion, produces forage or other products, helps to increase soil water infiltration and control runoff	3	3	2	2	3	3	3	2	21
f. Drainage management on level soils	Controls excess water, avoids plant loss due to chlorosis and improves water utilization.	3	2	2	2	2	3	3	2	19
<b>2. Use of improved seed</b>										
a. Seeds with 98% or higher germination rates	Lower input costs, as re-seeding becomes unnecessary	3	3	2	2	3	3	3	2	21
b. Varieties adapted to local agroecological conditions (high or low altitudes, high/low precipitation, soil types, etc.)	Improved disease and insect resistance, greater adaptability to drought or excess rain, (higher yielding varieties require increased fertilizer, too costly for small farmers)	3	3	2	2	3	3	3	2	21
c. Improved seed varieties	Greater yields, but require more fertilizer, greater resistance to insects and disease, greater farmer effort to acquire these seeds	3	3	1	1	2	2	3	1	16
d. Use of open pollinated varieties (OPVs)	Easier access and availability of seed, OPVs can be produced locally	3	3	3	3	2	3	3	2	22
e. Local seed production under standards for certified seed with guidance of competent local authorities (improving community	Increased access / availability of seed via local production, seed production=source of income, greater farmer independence	3	2	2	3	2	3	3	3	21

## Field Exercise 5b. Developing a natural resource 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 help individual farmers plan how to implement the activities on their own farms.

### Objective

After 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:

Field Exercise 1b – Setting goals

Field Exercise 4a– Drawing a social-resource map

Field Exercise 4b – Gender roles and responsibilities

Field Exercise 4c – Identifying “hotspots”

Field Exercise 4d – Problem tree

Field Exercise 5a – Choosing Solutions

## Suggested procedure

1. Draw table 7 on a flip chart. List in the first four columns the problems, solutions, activities and inputs that the farmer group identified in **Field Exercise 5a (table 6)**.
2. In the Activity column, ask the group to be specific about numbers and amounts. How many check dams do they want to build? How large an area needs to be sown with grass?
3. In the “Inputs” column, refine the lists from **Field 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 **Field Exercise**, or they can draw a new map. (Note that the problems and the interventions may be in different places: 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.

**Table 3.** Example of 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
Soil moisture lost through evaporation	Conserve soil moisture	No tillage or minimum tillage	Animal draft	Individual farmers' crop fields	All farmers in group, working individually	During crop season
		Cut weeds and apply as mulch instead of burning		Individual farmers' crop fields	All farmers in group, working individually	Before sowing, during weeding

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 colors those activities that will have a long-term benefit. Is there a good balance? Do you need to add, remove, or change any activities?

# Lesson 6. Managing NRM projects

Once plans are developed, they need to be implemented. 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 in their context than the original, requiring adjustments throughout the implementation period. For these reasons, implementing management plans will involve some trial and error.

**Figure x** [GRAPHIC NRM 204: Group of men and women farmers. One of the farmers standing up with flip chart, talking to group. Field agent looking on. Several people talking, all looking happy. Drawing of slope with erosion control structures on flip chart]

Once you've developed a plan, you will need to support farmers as they implement their plans. After completing this lesson, you will have:

- Learned about the **roles you may have as a field agent**.
- **Honed some key skills** that you may need as an NRM manager.
- Learned about **adaptive management**.

## ***Roles of an NRM manager***

As a field agent, you are also the manager of the NRM 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, cash, refreshments, or payment for specialist services.

## **Training farmers in new technologies**

You may be expected to provide trainings in techniques for farmers. The **annex** contains short technical sheets. If you're not able to train others, seek out support. Make a training calendar that is realistic.

## **Creating demonstration plots**

There are many ways of demonstrating results to farmers. By establishing demonstrations on different farmer fields, farmers can see resource improvements first-hand, and it encourages them to use the various technologies. It also enables them to see what doesn't work and what

needs to be changed. Some field agents may choose to take a “lead farmer” approach, wherein 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 is to **monitor understanding and adoption of the techniques**. This requires that you register all farmer groups with whom you’re working; note the skills or techniques you’re aiming to transfer to them; and create a monitoring plan wherein you visit farmer fields of other group members outside of the lead farmer or demonstration plot.

Read about these in the “Promoting innovation” module.

## Testing new ideas

If you and your groups have decided to implement some technologies or solutions for the first time, or to test technologies to find which ones are most practical and effective locally, 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 outcomes. Ideally, you should also be monitoring farmer group adoption of these technologies through your visit log, and making mid-course adjustments as you go.

This process is covered in detail in the “Promoting innovation” module.

### **Box 7. 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, even when the monsoons came.

The NGO workers noticed that the farmers’ stone barriers allowed some soil to be lost 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 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 could not understand this. The farmers’ stone barriers took more work to build and they let soil through, failing to control erosion completely.

They proposed 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 soil erosion, they also prevented cattle from straying. Allowing some soil and water through prevented

good neighbor relations from eroding, which was more important to the farmers than a little extra work!

Source: *Hesperian Guide. Restoring Land and Planting Trees, p.202.*

## ***Skills of an NRM manager***

There are other aspects of a good NRM manager's role that are less direct, but equally important. They rely on special skills that you should try to develop. These may include:

- **Keeping people enthusiastic** and getting incentives right
- **Helping people change negative NRM behaviors**
- **Making sure things happen** and sticking to the plan
- **Maintaining quality of work** by checking quality, knowing how and when to get technical advice, and managing staff well
- **Making sure people take full ownership** by promoting good leadership
- **Adjusting your project based on results** through adaptive management.

### **Keeping people enthusiastic and getting incentives right**

Behavior change is always a difficult process. Sometimes benefits from NRM investments take a while to see. Because of this, it can be difficult to get farmers to invest in them. Many farmers are risk-averse, and need to see immediate impacts in order to recognize that their efforts are not wasted. It is a good idea to include activities that will have a short-term impact as well as those that have longer-term benefits.

If you are looking for long-term results (reforestation or regeneration of degraded hillsides, for example), identify short-term activities that people can do as well. For example, while trees are growing, provide support to improved-yield staple crops that can be intercropped with the trees. Or, offer trainings in marketing of alternative crops people can be growing and profiting from in the meantime. The "7 Steps of Marketing" guide helps with this process;

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

- Identify some "quick wins", or NRM 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 who have successfully done one of 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 8. 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.

What are some of the ways you can use to encourage farmers to do this work on their own?

### ***Should you give away inputs?***

Groups should be taking on NRM 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 NRM – not subsidizing all activities through cash or in-kind payments. This is generally unsustainable, as groups tend to begin to depend on the NGO or institution instead of valuing the good management practices for the positive impacts they can have in a community.

Some NRM activities are more infrastructure or resource-intensive, such as large-scale watershed management programs. Where NRM interventions need to be subsidized, the communities that benefit should still be required to make a contribution to the process. Consider discussing co-investment, wherein 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. Please review “Lesson 5: Leadership and management” from the “Skills farmers need for organizing and managing groups” module, which outlined key characteristics of a good leader:

1. **Exemplary character.** A leader needs to be trusted to take responsibility for the NRM strategy and plan. Group members must be able to respect their leader and trust him or her to make changes to the plan based on continuous monitoring and data analysis.
2. **Enthusiastic.** People look to leaders who are inspiring and motivating to complete NRM work, especially if there are no economic gains. Good leaders lead by example.
3. **Confidence.** Confident leaders make other group members confident that they, too, can contribute to the NRM strategy successfully.
4. **Purposeful in situations of uncertainty.** In times of doubt about a particular decision or activity, including land tenure, policies, or budget, a good leader will take charge with confidence.
5. **Calm, composed and steadfast.** Good leaders of NRM work are able to stay calm during emergencies, including flood or drought situations, to help find the way forward.

6. **Focused and analytical.** A good leader keeps the main goal in focus and breaks it down into manageable steps so as to make progress towards it. This is particularly important when NRM activities require both short-term and long-term objectives.
7. **Committed to excellence.** The good leader maintains high standards of quality.
8. **Knowledgeable.** The good leader does not need to be an expert, but knows when to call in technical support when needed.

Consider doing “Farmer Lesson Plan 3. Discussing leadership styles and qualities” from the group management module.

## Maintaining quality of work

Please review “Field Exercise 4. Seeking technical information or advice” in the “Promoting innovation” module.

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.

Other people may also be responsible for monitoring quality. In watersheds where there are watershed committees, for example, select committee members should be present when people are working with new techniques.

## Helping people change negative NRM behaviors

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. 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 NRM behavior you’re promoting, and invite farmers to watch the progress.
- You can conduct cost-benefit analyses to show the economic and non-economic advantages to a certain behavior.
- You can discuss the importance of the behavior at different forums and meetings.

Discuss with your team how you can address difficult problems like this.

## **Adjusting your project based on results**

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 due to your work, you should look again at what the main problems are. Maybe your strategy needs to be adjusted. This is called **adaptive management**, and it is critical in natural resource management programs.

Use the data you're collecting to make sure that your strategy is helping groups achieve their goals. **Field Exercise 6a** shows one way to do this. Guidance on alternative methods for participatory M&E will be provided in Lesson 7.

## ***Field Exercise 6a. Adaptive management and most significant change***

Rather than looking for general trends, this exercise aims to identify the most important changes that have occurred. It is especially useful to track changes in less easily quantifiable issues such as "capacity strengthening".

This activity 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 doesn't!

### **Objectives**

After 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.

### **Timing**

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

### **Preparation**

Review the Monitoring Plan, and make sure you have a few copies of it. Bring the groups' NRM plan with you, too.

### **Duration**

1 hour.

### **Materials**

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

## Steps

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 groups' chosen goals and objectives, or crosscutting issues, such as "equitable access to land for men and women". Some examples are:
  - Changes in farmers' production and/or income.
  - Changes in the management of their group.
  - Changes in how farmers apply their knowledge.
  - Changes in the physical environment in their fields or in community areas
2. Decide on 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 often; other things will change more slowly, so you need discuss them only every few months.
3. Ask the group a question like, "Since last month, what has been the biggest change related to who worked in the fields and how much time it took?" or "During the last half year, what do we think was the biggest benefit from our new approach?"
4. 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.
5. Ask the group to (a) write down what happened, with sufficient detail to allow someone else to verify it if necessary, and (b) explain why they have selected that particular change rather than something else.
6. 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 avoid it from happening again in the future?

How can we spread the benefits of a positive change? How can we make sure more such changes happen?

# Lesson 7. Monitoring progress

After completing this lesson, you will have:

- **Created a realistic monitoring plan** with farmer groups.
- Learned how to use a **Google Earth** map to monitor key data over time.
- Learned about **adaptive management**, and committed to modifying NRM activities based on the impact you're seeing from your monitoring activities.

## Monitoring isn't scary!

Monitoring and evaluation is something that we all do 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, what she did and 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.

Developing a good NRM strategy is the first step. Implementing the NRM plan is the second step. Checking up on the results and adjusting our actions is the last step. For best results, the tools to monitor the implementation of the plan are usually developed as part of the strategy.

## Indicators

When monitoring the implementation of your NRM plan you are checking for two things:

- 1) whether the technology has been built or the practice adopted.
- 2) whether there is measurable improvement in NRM that is leading groups towards meeting their 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. The second is called an **impact indicator**; it measures the result of the activity, or the change that is occurring, whether positive or negative.

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** (crop yield, level of soil moisture, rainfall)
- **Written questions** (in questionnaires or tests)

A **qualitative** indicator may have more focus on socio-economic and political factors. This kind of data may 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 to choose depends on the type of data required, the time available, the skills of the staff, and the money that can be used for data collection.

## SMART indicators

Good indicators are **SMART** (Specific, Measurable, Attainable, Relevant, Time bound):

- **Specific.** Indicators should be clear in what they’re measuring. If you want to promote a specific technique, for example, be clear about what that is, such as the number of women farmers using manure, or 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 to 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 an NRM 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 the July season to the October season.

Source: FAO (in preparation) “Discovery based Learning in Land and Water Management”

## 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 a form such as this one below and in **Field Exercise 7a**.

Group name	Goal	Technologies promoted	How do you measure achievement?	
			Output	Impact
Turikumwe	Reduce erosion	Live barriers on 10% slope	# of linear meters of live barriers planted	Farmers note less soil loss
	Increase soil moisture for maize	Mulch on main field	# of kg of mulch applied	Soil dries out less quickly

	Improve vegetable production	Composting in homestead gardens	# 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	# 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 NRM 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, and as advocacy tools. There are various computer based tools that you can use, like Google Earth.

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**, or **protected area**. In order to make sure they were having a real impact, they decided to also monitor an adjacent watershed as a **control area** (see “Treatments and control” in Lesson 5 of the “Promoting innovations” module).

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



[Image: David Gandhi, for CRS]

Both areas can be monitored according to indicators decided with the community, including ones like this:

- ✓ Amount of soil erosion (measured by a trial plot set up to quantify soil loss in both zones)
- ✓ Amount of land cover (monitored by semi-annual transect walks and a biodiversity inventory of both zones)

In the example above, field agents and the community wanted to monitor the number of different plant species in each catchment area, so conducted a biodiversity inventory. Field agents can create a simple excel form to monitor these indicators for both the control area and the area to be rehabilitated.

## Gender check: Ensuring gender equity in your NRM work

Previous sections discussed men's and women's goals for their natural resources, which may be different from each other. 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.

Gender-responsive indicators may also be either quantitative or qualitative. These will depend on the goals of your project.

- A **quantitative indicator** that is gender-responsive might include:
  - Amount of time women and men take daily to implement NRM activities
  - Number of women and men using a specific sweet potato variety or improved technique
  - Amount of land accessed by or owned by women and men
- A **qualitative indicator** to measure gender-responsiveness may include:
  - Benefits women and men derived from their participation in an NRM project (this could be 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 NRM strategy and plan are gender-responsive. You may even be able to change inequitable practices in a positive way.

It's a good idea to make sure your programs are addressing the needs of men and women, communities and households as positively as possible. This means, for example, making sure your activities didn't add too much to women's or girls' workloads, or they didn't disrupt community dynamics in a negative way. Try **Field Exercise 7b** to check this.

Source: FAO. “[Gender-Sensitive Indicators for Natural Resource Management](#),” 2011.

## **Measuring the value of natural resource management**

You may have learned about profitability analysis in the “7 Steps of Marketing” skill set guide. A basic profitability analysis is another way of recording and demonstrating the economic value of conducting NRM 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 NRM is through a simpler cost-benefit analysis of impacts. By quantifying costs and benefits with the community, people can be incentivized to continue NRM work on their own. **Field Exercise 7c** takes you through a simple cost-benefit analysis of your NRM project.

## ***Field 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 lets you answer the right questions and avoid wasting time and collecting information you will not use.

### **Objectives**

After 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, where, with what and when.

### **Timing**

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

### **Preparation**

**Field Exercise 4a – Social-resource map**

**Field Exercise 4d – Problem tree**

**Field Exercise 5a – Choosing Solutions**

### **Duration**

6 hours, or 2 sessions of about 3 hours each.

### **Materials**

Large sheets of paper, cards, marker pens.

## Steps

1. Divide the participants into groups of about 5–6 persons. Ask them to think of questions to answer so that they can find out whether the group and its members are making progress on the goals and activity plans that they developed earlier. Ask the groups to write the questions on cards (one on each card) and 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 below accordingly.
2. In 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 5–6 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 – i.e., they must be SMART: specific, measurable, attainable, relevant and timely.  
 \*\*\* If it is already late, break for the day and continue during another session. \*\*\*
6. Divide the questions and their corresponding indicators among the subgroups. Ask each group to discuss which tools to use to measure the indicator (how), who should be responsible, where to do the measurements, with what and when. They should write down their decisions in a table

Question	What	How	Who	Where	With what	When
Key question to answer	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 Norbilus (representative from farmer group)	Les Anglais commune	Survey print-out, notebook, GPS unit	Annually – next July
2. ...	...	...	...	...	...	...

7. 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.
8. In a plenary discussion, review the results of the groups. Discuss the questions below.

### **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?
- ✓ Finalize and agree on the monitoring plan with all involved. Get firm agreements from people responsible for different activities that they are willing and able to fulfill those responsibilities and that they are committed to doing so.

### **Additional references:**

CRS' Propack III: A Guide to Creating a SMILER M&E System:

<http://www.crsprogramquality.org/publications/2011/1/17/propack-iii-english.html>

NRI's Participatory Monitoring and Evaluation for NRM and Research:

<http://www.nri.org/publications/bpg/bpg04.pdf>

PELUM's Participatory Monitoring and Evaluation Guide:

[http://www.pelumuganda.org/other\\_publications/PME\\_Guide.pdf](http://www.pelumuganda.org/other_publications/PME_Guide.pdf)

## **Field Exercise 7b. Gender Analysis Matrix**

*[From FAO Community-Based Forest Resource Conflict Management Training Package.*

<ftp://ftp.fao.org/docrep/fao/005/y4301e/y4301e03.pdf>]

You should be continually monitoring your activities to make sure that NRM activities are impacting men and women equitably. A Gender Analysis Matrix can help you do this. It's a good idea to do it after the groups are half-way through with their activities.

### **Objectives**

After this exercise the participants will be able to:

- Identify how their NRM activities impact men, women, communities and households differently
- Decide if NRM activities are equitable

## Timing

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

## Preparation

Draw the example matrix on a flip chart.

## Duration

1 hour

## Materials

Flip chart, markers.

## Steps

1. Divide participants into groups of 4 or 5, and separate men and women. Each group is to select one specific project or activity that was part of their NRM project. (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.) They should write the name of the activity at the top of their flip chart.
2. Tell the group members that they will be discussing the impacts of the project or activity at four levels: on women, on men, on households, and on the community. If it's relevant, you can add additional categories, such as adolescent girls.
3. Refer groups to the example. Read it out loud. Discuss together the different parts in each box.
4. Ask groups to draw a similar matrix on their flip charts. For each group of people they should ask:
  - What impacts does this activity have on [the group's] labor?
  - What impacts does this activity have on [the group's] time?
  - What impacts does this activity have on the way [the group] uses resources?
  - What impacts does this activity have on the way [the group] interacts in the community?
5. Remind groups that impacts can be positive or negative, so they should mark positive impacts with a (+) and negative impacts with a (-). 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 (?).

### ***Example Gender Analysis Matrix***

*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.*

Community groups analyzed the activity and came up with this Gender Analysis Matrix.

	<b>Labor</b>	<b>Time</b>	<b>Resources</b>	<b>Culture and society</b>
<b>Women</b>	–Walking further to collect fuelwood	–1-2 more hours per day to collect fuelwood	– Not allowed to collect traditional medicine plants  + See the regrowth and think that there will be more fuelwood in the future	– Less time for socializing and other chores
<b>Men</b>	+ Jobs created for forest guards  + Trained as tourist guides in the reserve	+ Not collecting carving wood (buying it from elsewhere)	– Have to buy carving wood	– Less busy and drinking more with their friends
<b>Households</b>	No change	+ More time chasing animals	– Noticing fuelwood shortages  + Tree growth in family plots inside reserve is improving  – Pay for fencing materials	? Fights with families
<b>Communities</b>	+ Some people improve their knowledge of forest management	? More time spent on meetings of the reserve  – Less time available for church functions	+ Regeneration in the forest reserve	– Women not involved in decisions on reserve (time or location)  – Women interact less with one another

### Questions to stimulate discussion

- ✓ What groups see the biggest impacts in labor? In time? With resources? In the culture and communities?
- ✓ Do some groups see 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?

## ***Field Exercise 7c. Costs and benefits of managing natural resources***

(Developed using: Pant, Mendakini, Participatory Evaluation, UNESCO; FAO. “Participatory Cost/Benefit Analysis”; Using participatory research and gender analysis in natural resource management)

Cost-benefit analysis is a tool used to compare, in monetary terms, the actual or estimated costs and benefits associated with a program. When used as a simplified tool for evaluation, the group together can create a list of the costs and benefits associated with the project, program, or other activities.

### **Objectives**

After this exercise the participants will be able to:

- Describe the social, economic, ecological, governance, and learning implications of a program, for example, to evaluate the economic sustainability of that program over time
- 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, or which risks they are willing to venture to meet the stated objectives

### **Timing**

Some projects have goals that are related to increasing profitability and incomes. Some NRM projects 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 verify that the activity is viable, either economically or otherwise; or
- **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’s not, you should change your strategy.

### **Preparation**

Review the group’s NRM plan, and bring a few copies. Prepare your checklist of questions beforehand.

### **Duration**

2-3 hours.

### **Materials**

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

## Steps

### ***Procedure for projects anticipating economic benefits:***

If the project you're working on will likely lead to increased incomes, use the following steps. A detailed version of this is in the "7 Steps of Marketing" guide.

1. Ask participants to identify the type and amount of inputs required to implement the activity (materials and supplies to be bought, labour, 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 above inputs. 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 instance, in the case of poultry raising, the benefit would be the sum of income generated through eggs and chicken selling, and the money value of new layers).
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 make sense of these figures by posing questions like: To what extent has this activity been beneficial? What can be done to increase benefits and decrease costs?

### ***Procedure for projects anticipating non-economic benefits:***

If 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 is one way to do it.

1. Divide participants into separate groups of men and women. Ask participants to list the resources they used to implement the NRM activities. Resources can include time, inputs, labor, and materials. It can also include opportunity costs; for example, if they gave up attending a community meeting in order to tend to their NRM activities, this could be listed as a cost. List these on a flip chart.
2. Ask participants to list the benefits they've seen from the NRM work. These might be human, social, financial, physical, natural, or political benefits. You can use the checklist below as a way of organizing your questions, or create your own based on the community context.

#### ✓ *Human assets impact*

- Have group members developed specific NRM skills through trainings?
- Have group members strengthened 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 impact*

- Has the internal organizational capacity of the groups been strengthened?
- Has community been able to work 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 impact*
  - Has infrastructure improved or increased?
  - Has there been a reduction in erosion?
  - Have there been reduced impacts of natural disaster for houses or land?
- ✓ *Natural assets impact*
  - 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 impact*
  - 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 NRM?
  - Has the capacity of the group to influence others been increased?

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?
- 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? Which women and which men in the communities are seeing the most benefits?
- What are the main benefits women see? Men?
- What about challenges? Are they different for women and men?
- Would you recommend this approach and these activities to others? Will you do this again?

# Resource Materials

## Useful web resources

**FAO Community-Based Forest Resource Conflict Management Training Package.** A useful set of tools to identify and analyze resource-based conflicts.

<ftp://ftp.fao.org/docrep/fao/005/y4301e/y4301e03.pdf>

# End Note

It is critically important to everyone in the world that we protect and maintain our natural resources – especially soil, water and forests. We hope the activities 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, combat the likely impacts of global climate change, and continue to provide vital ecosystem services to their own 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](mailto:agriculture@crs.org).