

Forest Biodiversity Monitoring

Guide to community-based approaches

Zabrina Welter and Riina Jalonen



RESEARCH
PROGRAM ON
Forests, Trees and
Agroforestry



USAID
FROM THE AMERICAN PEOPLE

Bioversity International is a global research-for-development organization. We have a vision – that agricultural biodiversity nourishes people and sustains the planet.

We deliver scientific evidence, management practices and policy options to use and safeguard agricultural and tree biodiversity to attain sustainable global food and nutrition security. We work with partners in low-income countries in different regions where agricultural and tree biodiversity can contribute to improved nutrition, resilience, productivity and climate change adaptation.

Bioversity International is a CGIAR Research Centre. CGIAR is a global research partnership for a food-secure future.

www.bioversityinternational.org

Acknowledgements:

The authors are thankful to Marlene Elias and Hugo Lamers for their comments on earlier versions of this guide. The guide was developed with funding from the U.S. Agency for International Development (USAID) and the CGIAR Fund Donors (<http://www.cgiar.org/who-we-are/cgiar-fund/fund-donors-2>). The work is part of the CGIAR Research Program on Forests, Trees and Agroforestry.

Citation

Welter Z & Jalonen R. 2019. Forest Biodiversity Monitoring – Guide to community-based approaches. Bioversity International, Rome, Italy

Cover photo

Women's self-help group planting trees on an abandoned field in Madhya Pradesh, India.
Credit: IORA Ecological Solutions Ltd.

© Bioversity International 2019

Bioversity International Headquarters

Via dei Tre Denari, 472/a

00054 Maccarese (Fiumicino)

Italy

Tel. (+39) 06 61181

Fax. (+39) 06 6118402

bioversity@cgiar.org

www.bioversityinternational.org

Edited by Ree Sheck

Design and Layout: Luca Pierotti

ISBN: 978-92-9255-121-6

Contents

INTRODUCTION	1
Objectives of the guide	2
Focus on forest biodiversity	2
How to use the guide	4
Who the guide is for	4
PART I - OVERVIEW OF COMMUNITY-BASED MONITORING	7
1. WHAT IS COMMUNITY-BASED MONITORING?	9
1.1 Benefits and constraints of CBM approaches	10
1.2 Community-based forest management: Giving a frame to CBM	14
1.3 Why are institutional arrangements important for community-based monitoring?	14
1.4 Examples of monitoring topics	15
1.5 Summary of the chapter	17
2. ADAPTING TO SOCIOCULTURAL CONTEXTS	21
2.1 Gender and social inclusion	22
2.2 Local ecological knowledge	24
2.3 Capacity strengthening	24
2.4 Knowledge sharing	26
2.5 Summary of the chapter	27
PART II - STEPS AND RECOMMENDATIONS FOR COMMUNITY-BASED MONITORING	31
3. PLANNING AND PREPARATION	33
3.1 Selection of participating communities	35
3.2 Introducing the idea of community-based monitoring	35
3.3 What do we want to monitor – and why?	37
3.4 What incentives for participation?	37
3.5 Who should be involved?	38
3.6 Establishing a coordinating team	41
3.7 Summary of the chapter	41
4. DEVELOPMENT OF THE MONITORING PLAN	43
4.1 Developing a feasible yet comprehensive plan	44
4.2 Institutional set-up	45
4.3 What to monitor: using indicators to understand change	48

4.4 Methods and tools for monitoring	50
4.5 Who participates in implementation?	54
4.6 Planning ahead for sharing the findings	54
4.7 Summary of the chapter	55
5. IMPLEMENTATION AND REFLECTION	57
5.1 Data auditing and progress reports	58
5.2 Data analysis and reflection	58
5.3 Adapting and scaling the plans	59
5.4 Summary of the chapter	60
APPENDIXES	63
Appendix 1. Tips for gender-responsive data collection	64
Appendix 2. Tools for different monitoring purposes	66
Appendix 3. Useful methods and tools handbooks	68
BIBLIOGRAPHY	71

Introduction

IN THIS CHAPTER

- **Brief introduction to community-based monitoring**
- **Objectives of this guide**
- **How to use this guide**
- **Who the guide is for**

Monitoring of natural resources and their management is a key element for effective decision-making in constantly changing and uncertain situations. Monitoring helps participants to improve their understanding about resource management as a whole and alerts them about possible events or crises that can affect management outcomes¹. Monitoring can reduce risks, increase transparency and accountability, enhance learning, and improve the successful implementation of activities. It helps ensure that changes to management approaches come from learning and reflection instead of hasty reactions or unilateral decisions².

Here we understand monitoring as a process of collecting and analyzing repeated observations over time in relation to a specific issue and predefined objectives. Monitoring needs to be a focused data collection and analysis process, designed to answer specific questions about particular topics. Monitoring has four critical features: it³

- Oversees a process of multiple measurements or observations
- Measures aspects of specific issues or concerns
- Measures progress towards a set of goals
- Communicates results to guide or correct management or enforcement actions.

Involving local communities in monitoring initiatives makes the process more participatory and contextually relevant, less dependent on external inputs, simpler and usually less expensive. Strategies vary from including local men and women in data collection to more participatory processes that involve communities in setting objectives and to complete local ownership, where community members are in charge of the process from design to data collection and analysis⁴. Benefits and limitations can be found in each approach. Generally, the more expert-based models tend to have higher levels of accuracy and precision, which helps in detecting certain trends and changes. Participatory monitoring systems are often perceived to result in lower accuracy, but in reality, this is not necessarily true⁵. Also, participatory approaches may prompt faster decision-making based on the monitoring results, at least if local stakeholders have control over their resources.

Participatory monitoring initiatives, particularly the ones that are community driven, can increase the sense of ownership towards the management of natural resources and favour the development of adaptive management strategies by facilitating discussion, participation and learning within local communities⁶. Thanks to community-based forest management approaches – where monitoring is one of the key activities – communities are finding alternative ways to deal with income poverty and food insecurity, for example,

through harvesting non-timber forest products (NTFP) more sustainably, improving the quality of their products and developing their own local markets⁷.

Interest in community-based forest monitoring approaches has experienced a surge since the last decade, partly due to efforts to mitigate climate change through protecting and restoring forests and improving their management⁸. Monitoring initiatives stemming from global climate-change mitigation targets are by definition driven by external need and often result in a strong emphasis on data collection, tied especially to data-intensive international carbon-accounting systems. Community members may become service providers and gain jobs and income from their involvement in monitoring. While useful in their own right, such monitoring initiatives can only be sustained as long as external resources are available. Additionally, because the data needs are largely defined by outsiders, monitoring results are often not adequately fed into the local resource management systems to inform and help improve practices that may have contributed to forest degradation in the first place.

These experiences prompt a review of models for community-based monitoring (CBM) to assist facilitators in selecting suitable approaches for each context and the objectives. Initiatives that focus on the communities' role as data collectors often have overly optimistic views of the process, expecting that it can bring significant benefits mainly through technical interventions and training. Initiatives that emphasize social learning as a key for successful monitoring initiatives often are so context specific that it is difficult to provide generic guidelines on steps to be taken.

Objectives of the guide

The guide is designed to help facilitators develop CBM initiatives for **forest biodiversity** by providing a series of steps, recommendations and examples to guide the process. The approach discussed covers a middle ground between monitoring approaches that focus on data and those that focus on social learning. While the guide applies to forest biodiversity, similar approaches can be used to monitor other aspects of natural-resource management. The guide includes tips on using participatory tools for the collection of biodiversity data and insights on how to encourage the participation of local actors across social groups in decision-making processes that affect forest biodiversity resources in their communities and surrounding landscapes. Participation seeks to strengthen the capacities of those most affected by the uncertainty of environmental change by helping them understand resource trends and the risks and consequences of past and present activities, and to adapt their management practices accordingly. It also seeks to increase transparency and accountability of resource management by facilitating sharing of information about current uses and decision-making processes related to forest biodiversity.

Although the guide mainly uses examples on NTFPs, it builds on generic monitoring frameworks, and many of its approaches can be applied to other local resources, including those that are physical (for example, water resources) or cognitive (local knowledge).

Focus on forest biodiversity

This guideline focuses on CBM of forest biodiversity – the diversity of species and their genetic resources that form the basis of growth, productivity and adaptive capacity of species in a changing forest environment. These factors in turn affect the goods and services that forest-dependent communities are able to obtain from forests. Relevant issues for monitoring may include the impacts of harvesting, forest conversion or climate change on the diversity, size, productivity or regeneration potential of tree species and their populations that together form forest ecosystems; the knowledge, skills and practices of community groups involved in their management; or the effectiveness and equity of decision-making and benefit-sharing processes related to biodiversity resources.

Forest-dependent community members often, but not always, have detailed knowledge about the species, their ecology and suitable management practices. The knowledge, needs and priorities for the use of biodiversity resources and the ability to influence their management vary among community members, according to, for example, age, gender, ethnicity, wealth and land ownership.

The most marginalized social groups (e.g. ethnic minorities, landless households) are often the ones most dependent on forest resources for their livelihoods and therefore often particularly knowledgeable about the status of these resources and factors affecting them. Inclusive participatory biodiversity-monitoring initiatives may help participants understand and renegotiate roles of diverse user groups in forest management towards more equitable decision-making and benefit sharing⁹.



Photo: Monitoring the progress of forest restoration, Madhya Pradesh, India. Credit: Bioversity International/R. Jalonen

How to use the guide

This guide is divided into four main sections. The **following**, or **first, section** provides a working definition of CBM and explains what benefits the approach can bring to local communities. It also introduces frameworks and concepts relevant to CBM and ends with examples of types of biodiversity monitoring systems and their uses. The **second section** includes cross-cutting issues that every monitoring initiative should take into account to be sustainable and equitable. These include existing institutional arrangements and rules, gender and social-justice issues, inclusion of local ecological knowledge, capacity strengthening and information sharing. The **third, fourth** and **fifth** sections provide practical guidance for developing a CBM initiative for forest biodiversity. They address issues that community members and facilitators should take into account in the preparation, implementation, analysis and feedback phases of CBM. The sections include a series of tips, recommendations and examples from case studies that have applied CBM for forest biodiversity resources.

Who the guide is for

This guide is designed for groups and organizations involved in, planning or interested in CBM initiatives, particularly for improving the management of forest biodiversity.

- *Men and women in local communities* interested in designing, implementing and/or evaluating a CBM programme. Some community members may participate directly in facilitating, designing, monitoring, analyzing data and sharing information and will benefit from guidance on steps that can be taken to define and achieve monitoring goals. Others may participate more indirectly or irregularly, for example by attending community meetings to define priorities and goals or for feedback sessions on monitoring results, but they too can benefit from an overview of the process.
- *External facilitators* from nongovernmental, research or other organizations that aim to support community members in planning and implementing CBM initiatives. They frequently already have the capacity and experience to facilitate participatory processes in planning, implementation and evaluation projects but can benefit from specific knowledge on CBM-related concepts and approaches. Facilitators may also come from within the community and be trained for that role through externally led projects.
- *Other stakeholders*, organized groups within or outside the community, willing to contribute to a monitoring initiative or interested in its activities and results – for example, farmer or self-help groups, cooperative societies, or forestry or other local government departments. These groups are often not directly affected by or involved in the initiative but are interested in supporting it or having their opinions heard. They are important audiences since they provide feedback, can advise those having more active roles and may influence the success of implementing the initiative.

Box 1: Innovations in ecosystem management and conservation

This guide was developed as part of the 'Innovations in ecosystem management and conservation (IEMaC)' project implemented in India from 2014 to 2017. The goal of the initiative was to reduce pressure on India's forests through efficient and sustainable use of forest resources. The initiative sought the following outcomes:

- User-friendly, affordable, gender-sensitive fuelwood management tools, techniques and approaches developed, demonstrated and adopted by households and commercial entities in the IEMaC project region
- Sustainable harvesting practices and enterprises for non-timber forest products (NTFPs) adopted by men and women in the project communities
- Community-based forest monitoring system adopted by the Joint Forest Management Committees, especially involving women in project sites.

The initiative developed and pilot-tested the innovations in 25 villages in Mandla District, Madhya Pradesh, and in 25 villages in Uttara Kannada District, Karnataka.

Funded by USAID under the Innovation for Forest Resources Management Program, the initiative was led by IORA Ecological Solutions Pvt. Ltd. in close collaboration with partner organizations MART and Bioversity International. Field activities were implemented by the Centre for Advanced Research and Development in Madhya Pradesh and LIFE Trust in Karnataka.

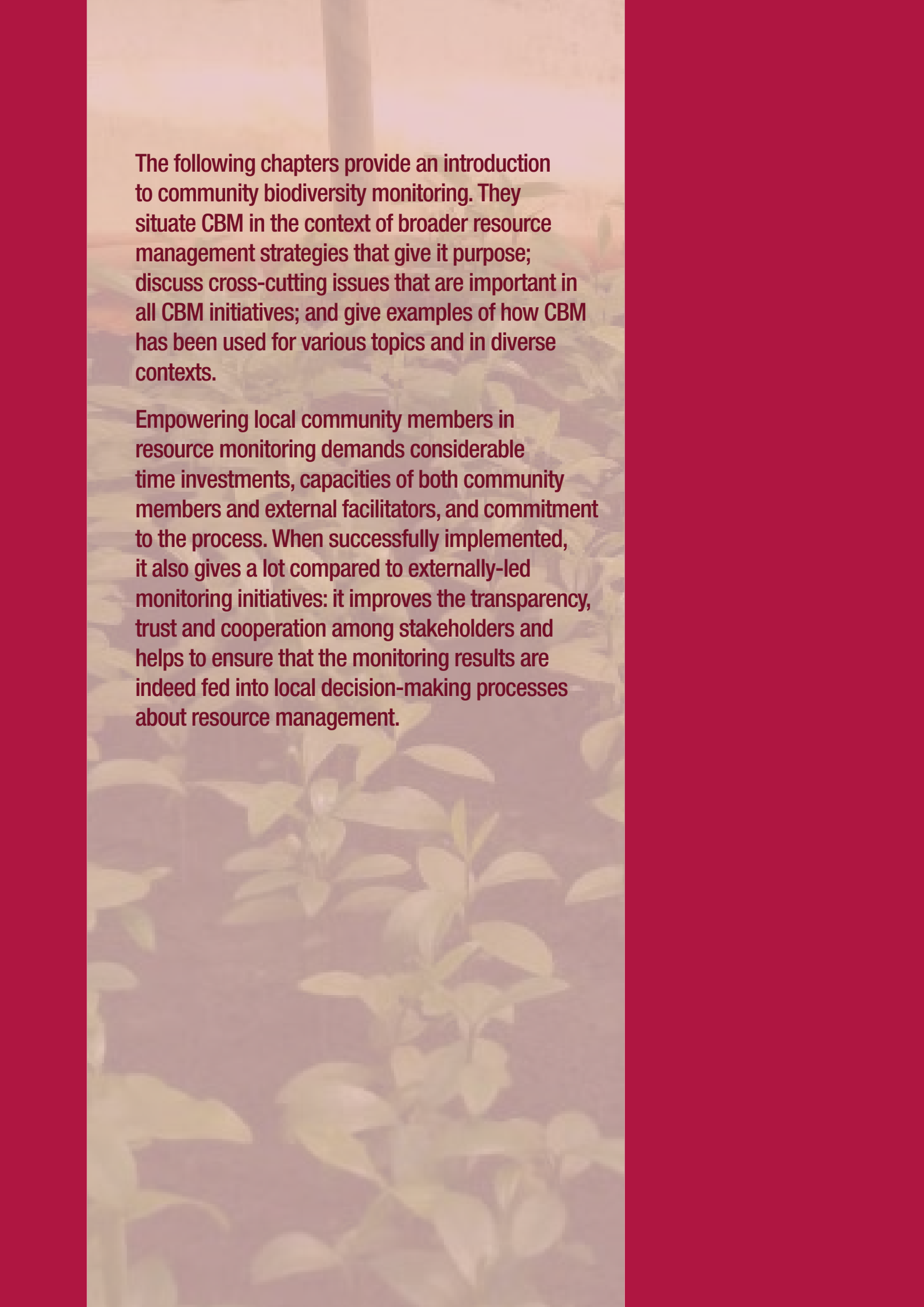
For more information, see: <http://ioraecological.com/spotlight/iemac/>

Notes

- ¹ Izurieta A, Sithole B, Stacey N, Hunter-Xenie H, Campbell B, Donohoe P, Brown J, Wilson L (2011) Developing indicators for monitoring and evaluating joint management effectiveness in protected areas in the Northern Territory, Australia. *Ecology and Society* 16 (3): 9.
- ² Guijt I (2007) Strengthening learning in adaptive collaborative management. The potential of monitoring. In *Negotiated learning: Collaborative monitoring in forest resource management*, ed. Guijt I (Resources for the Future, Washington D.C.), pp 3-22.
- ³ Ottke C, Kristensen P, Maddox D, Rodenburg E (2000) *Monitoring for impact: lessons on natural resources monitoring from 13 NGOs*. (World Resources Institute and Conservation International. Washington, D.C.
- ⁴ Danielsen F, Burgess ND, Balmford A, Donald PF, Funder M, Jones JPG, Alviola P, Balete DS, Blomley T, Brashares J (2009) Local participation in natural resource monitoring: A characterization of approaches. *Conservation Biology*, 23, 31-42.
- ⁵ Rist L, Uma Shaanker R, Milner-Gulland EJ, Ghazoul J (2010) The use of traditional ecological knowledge in forest management: An example from India. *Ecology and Society* 15(1): 3. Available at: <http://www.ecologyandsociety.org/vol15/iss1/art3/>
- ⁶ Bergamini N, Blasiak R, Eyzaguirre PB (2013) *Toolkit for the indicators of resilience in socio-ecological production landscapes and seascapes* (United Nations University Institute of Advanced Studies).
- ⁷ Fernandez-Gimenez, ME, Ballard HL, Sturtevant VE (2008) Adaptive management and social learning in collaborative and community-based monitoring: a study of five community-based forestry organizations in the western USA. *Ecology and Society* 13(2): 4.
- ⁸ Danielsen et. al, (2009).
- ⁹ Hegde N, Elias M, Lamers HAH, Hedge M (2017) Engaging communities in social learning for inclusive management of native fruit trees in Central Western Ghats, India. *Forests Trees and Livelihoods*, 26(1): 65-83.

PART I

Overview of community-based monitoring



The following chapters provide an introduction to community biodiversity monitoring. They situate CBM in the context of broader resource management strategies that give it purpose; discuss cross-cutting issues that are important in all CBM initiatives; and give examples of how CBM has been used for various topics and in diverse contexts.

Empowering local community members in resource monitoring demands considerable time investments, capacities of both community members and external facilitators, and commitment to the process. When successfully implemented, it also gives a lot compared to externally-led monitoring initiatives: it improves the transparency, trust and cooperation among stakeholders and helps to ensure that the monitoring results are indeed fed into local decision-making processes about resource management.

A photograph of a field of young green plants, likely a tea plantation, with rows of small bushes stretching into the distance. The plants are vibrant green and appear to be in the early stages of growth. The background shows a slightly hazy, natural setting.

1

**What is
community-based
monitoring?**

IN THIS CHAPTER

- **Benefits and constraints of CBM**
- **CMB in the context of community-based resource management**
- **What are institutional arrangements and why is it important to take them into account in CBM?**
- **Examples of CBM approaches**

1.1 Benefits and constraints of CBM approaches

CBM is a process of data gathering, analysis and decision-making by community-based actors to assess effectiveness of natural resource management and options for improving it¹⁰. Also called participatory or collaborative monitoring, it helps communities develop a shared understanding of the surrounding landscape and how it is changing, thereby helping them to make better-informed collective decisions about natural resources and adapt to the changing environment and society¹¹. Making monitoring a participatory and bottom-up process often improves transparency and accountability, communication, trust and cooperation among the actors involved in the process¹².

CBM can provide diverse benefits for improving the lives and livelihoods of community members:

- *Community empowerment*: empowers locals to analyze their own problems and have a say in decision-making processes that affect them directly. By gathering accurate data, community members can gain power to challenge inappropriate forest management and influence related political processes¹³.
- *Forest governance*: improves local forest governance through raising awareness of the existence or extent of a problem among community members, local organizations and local government units¹⁴.
- *Social inclusion*: fosters participation, communication and collaboration. It helps include the voices of marginalized groups such as women, the elderly, youths and minorities in planning and decision-making regarding forest resources.
- *Economic benefits*: helps improve yields or quality of products and bring new income opportunities for families¹⁵ (see Box 2).
- *Capacity strengthening*: increases local forest-management capacities commensurate with the monitoring system's degree of participation and inclusiveness¹⁶. Nevertheless, communities typically need a fair amount of social capital to be able to lead monitoring processes on their own. Building that capacity where it is lacking is a relevant objective for externally led monitoring projects.
- *Social learning and adaptive capacity*: nurtures opportunity for collective learning by feeding useful information into management decisions. Communities can learn to deal with uncertainty and change by increasing their capacity to analyze and solve problems through adaptive management¹⁷.

Participatory monitoring can help address some of the complex problems that surround the management of natural resources, such as linear planning, imposed solutions and marginalization of stakeholders, but it is not a foolproof solution¹⁸. Realizing the benefits of participatory monitoring requires considerable time investments, capacities and commitment. If community members do not have the time to acquire the

necessary skills and insights, participatory monitoring becomes just another externally driven evaluation tool¹⁹. Monitoring can be aimed at enhancing learning about resource management, but to be effective, the monitoring process itself needs to incorporate reflection and learning, aiming at self-improvement. Important questions include how to develop appreciation of dialogue among stakeholders as a basis for learning and how to avoid powerful social groups' dominating the process. Experiences from around the world show that facilitation plays a critical role in guiding and balancing the process, given that multiple interests are usually involved²⁰.

Different types of monitoring schemes can be identified based on how much local stakeholders participate in the planning and implementation of the activities (Table 1). Monitoring approaches led by external experts are often thought to be more accurate and are easier to scale up. However, there is little impact on local capacities until community members are involved in analyzing data, not just collecting it. Expert-led monitoring systems are also typically not tied to local decision-making processes and may therefore fail to produce relevant information at appropriate times to help improve resource management.



Photo: Preparing an action plan for forest conservation, Uttara Kannada, India. Credit: LifeTrust

Table 1. Typology of monitoring schemes based on stakeholder participation

TYPE OF MONITORING	STAKEHOLDERS	CHARACTERISTICS	BENEFITS	LIMITATIONS
Type 1. Externally driven and executed	External experts	Design, data analysis and decision-making about management done by experts funded by external agencies	<ul style="list-style-type: none"> • High accuracy and precision • Better chances for scaling up • Low cost for local communities 	<ul style="list-style-type: none"> • Depends on external expertise and resources • Slow input to decision-making • No potential for strengthening local capacity • High cost for external agencies
Type 2. Externally driven with local data collectors	External experts; local stakeholders as data collectors	Design, analysis and interpretation of the data done by external experts	<ul style="list-style-type: none"> • High accuracy and precision • Better chances for scaling up • Intermediate costs for external agencies and locals 	<ul style="list-style-type: none"> • Depends on external expertise and resources • Slow decision-making • Low potential for strengthening local capacity
Type 3. Collaborative monitoring with external data interpretation	External experts, local stakeholders	Design and data analysis done by external experts; data collection and management decisions by locals	<ul style="list-style-type: none"> • High accuracy and precision • Better chances for scaling up • Intermediate costs for external agencies and locals • More dependent on local expertise 	<ul style="list-style-type: none"> • Still very dependent on external expertise • Slow decision-making • Low potential for strengthening local capacity
Type 4. Collaborative monitoring with local data interpretation	External experts, local stakeholders	Training and advice provided by experts; data collection and analysis and management decisions made by locals	<ul style="list-style-type: none"> • High requirement on local expertise • More timely decision-making • Higher chances for strengthening local capacity 	<ul style="list-style-type: none"> • Low accuracy and precision • High costs for external agencies and for locals • Fewer chances for scaling up
Type 5. Autonomous local monitoring	Local stakeholders	Design, collection and analysis of data and management decisions by local stakeholders; scheme used in customary systems of natural resource management	<ul style="list-style-type: none"> • High requirement on local expertise • More timely decision-making 	<ul style="list-style-type: none"> • Less accurate and precise • Locals carry all costs • Fewer chances for scaling up

Source: Danielsen et al.²¹

Box 2: Monitoring of rule compliance and its effect on forest regeneration in India

Ghate and Nagendra studied the effectiveness of forest monitoring was studied in three communities in Maharashtra, India²². Monitoring had different origins in each case: it was either sponsored by the state, initiated by a local nongovernmental organization (NGO) or initiated by the community members themselves. Compliance with forest rules was most effective – and positive impacts on the forest condition most visible – in Deulgaon community, where the system was initiated by the community members themselves.

Markegaon community: state-sponsored management system

Monitoring started with the creation of the Joint Forest Management program in 1997. A Forest Protection Committee was created that restricted tree felling, alcohol consumption and the types of trees harvested for fuelwood. Forest protection and patrolling activities were on a voluntary basis, with three people selected for 12-hour vigils on a daily basis. This community was the most permissive of the three: set rules were not well-known to community members and penalties were not strictly imposed. High-value timber species were logged unsustainably, with negative impact on forest regeneration.

Ranvahi community: NGO-initiated management system

Monitoring activities were started by a local NGO to solve problems from excessive harvesting and poaching by neighbouring villages. Monitoring focused on establishing a set of rules and a system of sanctions directed to control harvesting by outsiders. Activities were successful in controlling outsiders but not unsustainable harvesting by villagers. The forest retained high-value timber trees, but the community struggled with limiting grazing and fires caused by community members themselves.

Deulgaon community: self-initiated management system

Perceptions of forest degradation and its negative impacts on water quality prompted community members to start monitoring in the early 1990s. They restricted commercial felling of some tree species to enable self-consumption and production of gums that have traditional value; harvesting of trees below minimum size; and the selling of timber, fuelwood and fodder. Compliance with rules was monitored through strict forest patrolling against outsiders and by imposing fines for poaching. Fines were established by the community members and helped improve compliance also among villagers. Strict monitoring, sanctions and forest protection activities had a positive impact on forest regeneration, with growing numbers of young trees, saplings and seedlings compared with the situation before monitoring.

1.2 Community-based forest management: Giving a frame to CBM

CBM is part of a bigger set of strategies and actions that aim to improve the sustainability and equitability of forest management at a local level. There are many examples of community-driven forest management models that can serve as frameworks for CBM. One of these is *adaptive collaborative management* – a participatory approach in which people agree to lead conscious, facilitated efforts to foster communication, collaboration and opportunities to learn collectively about the impacts of their own actions in relation to the landscape where they live²³.

Another relevant framework is *community biodiversity management*, a methodology that promotes the conservation and sustainable use of biodiversity at the local level²⁴. It focuses on increasing the social capital and decision-making power of community-based organizations, to help them secure access to and control over their biological and genetic resources²⁵. It does so by enhancing awareness and understanding of local biodiversity resources among community members and strengthening local institutional arrangements and capacities. Participatory monitoring and evaluation has an important role in the methodology, because it enhances transparency in resource management and helps locals take an active role in planning, implementing and evaluating management actions. This is where CBM becomes an important tool for increasing the effectiveness of resource management. Community biodiversity management was used as the framework in the project ‘Innovations in ecosystem management and conservation (IEMaC)’ in the context of which this guide was developed (Box 1).

1.3 Why are institutional arrangements important for community-based monitoring?

Institutional arrangements are sets of rules that determine who is eligible to make decisions in a given context and how. While promoting cooperation and collective action, they also define the dos and don’ts in every particular context²⁶. Institutional arrangements can be rules, policies, regulations and sanctions aimed at resource management; cultural and social practices; traditional authorities and customary rules, and co-management arrangements like joint forest management by local communities and the government²⁷. Together they represent the broader objectives and rules that give the purpose for monitoring.

Natural resources such as forests and fisheries are often common-pool resources, collectively owned or managed by community members. Effective institutional arrangements are key to ensuring that such resources are sustainably extracted and managed²⁸.

When CBM and enforcement of rules are combined with secure tenure and clear boundaries of management units, they often lead to more effective efforts for protecting natural resources²⁹. Also, when communities organize themselves to establish and enforce their own rules for managing common-pool resources, they tend to do it more efficiently than when rules are externally imposed³⁰. CBM helps develop shared understanding of what behaviours are allowed and the ones that are not, which helps instill a sense of justice and trust among community members³¹ (Box 3). Experiences show that people’s participation in conservation activities largely depends on positive evaluation of rules, acceptance of conflict resolution systems and confidence in how local managerial committees function³².

A good way to start understanding institutional arrangements is to explore what formal and informal rules the community has established for managing common-pool resources. This will then determine how the CBM system can be implemented and sustained over time.

Box 3: How institutional arrangements resulted in behavioral change: experience from Sirsi, India

The Joint Forest Management Programme was created in India in 1993. It established the need for villages to create their own Village Forest Committees (VFCs; also known as Joint Forest Management Committees). The effectiveness of these local institutional arrangements in forest management was studied in Sirsi, Karnataka, in the context of the project 'Innovations in environmental management and conservation' (Box 1). Semi-structured interviews were conducted with a total 45 VFC members, community members and representatives of local forest departments.

In those villages where VFCs were established, the communities created new forest-related rules³³. Community members believed that this process resulted in a broader awareness that directly translated into a behavioural change towards more sustainable management. Although interviewees opined that there were still problems with rule enforcement and monitoring, they saw positive impacts on forest condition. People perceived that the risk of getting caught if breaking forest-use rules had increased because more people were engaged in monitoring the forest. As stated by one interviewee: "The rules were created by the villagers themselves, so if someone breaks the rules, he breaks the rules of the village. The others will stop him and ask what he is doing, why he is not respecting what they all agreed upon" (VFC president, male, Sirsi)³⁴.

1.4 Examples of monitoring topics

Monitoring natural resources or biodiversity management can vary widely depending on what is monitored and how. Objectives of monitoring need to be linked to the objectives for resource management to be meaningful and helpful in decision-making. Examples of monitoring follow.

- **Compliance monitoring** to assess how well rules and previously agreed management terms are being implemented and enforced on the ground. It is often a relevant monitoring goal because the effectiveness of management depends on compliance with agreed rules and guidelines. When clear rules and a shared understanding of these do not already exist, they must first be developed among community members. It is important to consider how rules are determined and by whom and that they may be imposed at different levels, for example, by the forestry department or by powerful members of the community — at times with adverse effects on more marginalized groups (see Chapter 2.1).
- **Monitoring of impact** to assess the implementation of specific projects and their impacts on resources. Impact monitoring can be based on establishing baselines, understanding changes or trends, and considering thresholds and performance. See Table 2 for a description of each type of scheme and examples of what each can monitor.
- **Using State-pressure-benefit-response monitoring framework** provides a comprehensive approach for understanding whether the status of resources is changing, how and why. It also covers how the concrete benefits to the community are affected by these changes and how the community is responding to the situation. The framework is discussed in more detail in Chapter 4.3.



Table 2. Options for monitoring impacts

TYPE OF MONITORING	STAKEHOLDERS	CHARACTERISTICS
Baseline monitoring	Measures the status of a resource to establish a regular or 'normal' value. Identifies 'normal' or 'natural' biological values, which can help in looking for thresholds against which to monitor.	<ul style="list-style-type: none"> • Monitoring of bird species richness • Income from NTFP sales • Existence of rules regarding NTFP harvesting
Change/trend monitoring	Assesses any change in quantity and quality of a resource. Requires monitoring data from at least three points in time to identify a trend.	<ul style="list-style-type: none"> • Changes in the walking distance required to access a resource • Time required to collect a head load of NTFPs
Threshold monitoring	Compares monitoring results to a predetermined threshold. Single observations can be used to compare current status to the target. Thresholds tend to be effective once a target has been set.	<ul style="list-style-type: none"> • Women's participation in community-level organizations and decision-making • Compliance by community members with a rule to stop forest clearing
Performance monitoring	Assesses how agreed monitoring or management activities were implemented and what impact they are having.	<ul style="list-style-type: none"> • Project's success in reducing destructive behaviour • Change in NTFP availability since project interventions

Source: Adapted from Ottke et al.³⁵

Box 4: Monitoring for organic certification of forest products³⁶

Many certified organic products in markets are not cultivated but collected in areas where they grow naturally. Regulations for achieving organic certification apply to such products as much as they do for cultivated crops. Collection tends to be intensely monitored by certification bodies that also inspect purchasing locations, main processing and trading locations, and collectors' homes. Organic certification requires information along the entire supply chain. Community-based monitoring can help gather the necessary information for certification and ensure compliance regarding many basic rules of organic wild collection certification. In return, organic products can give communities a higher income than nonorganic products once organic certification has been achieved.

Information needs that CBM can help provide include:

- **Collecting areas:** the area where plants are collected needs to be clearly defined and known to the certification body. These areas must avoid all use of prohibited inputs (e.g. chemical fertilizers or pesticides) for at least three years and be away from contamination sources.
- **Collected plants:** Ecological sustainability is one of the main concerns of organic wild collection. Neither the methods of collection nor the quantities harvested can affect either the ability of plant species to regenerate or their habitats. A list of collected plants with detailed information of each must be available to guarantee sustainable collection, something that community-based monitoring can help create and continually update. Some certification bodies may ask for careful monitoring of the plant population. CBM can also help ensure that harvested amounts are within agreed limits to avoid overexploitation.

1.5 Summary of the chapter

- Community-based monitoring is more than a process of data gathering, analysis and decision-making by multiple actors. It enables better-informed collective decisions about natural resources and strengthens the adaptive capacity of communities. It can also improve transparency, accountability, communication, trust and cooperation and fosters community building.
- Community-based monitoring is part of a bigger set of strategies and actions to improve the sustainability and equitability of natural resource management at a local level.
- Sustainable natural-resource management is achieved with clear rules, shared understanding about them, effective enforcement, clearly defined area boundaries and secure land tenure. Community-based monitoring initiatives are implemented in this broader context. They typically contribute by monitoring resource condition, assessing the effectiveness of management actions and identifying a need for changes in practices.
- Realizing the benefits of community-based monitoring requires considerable time investments, capacities and commitment. Without these, it becomes simply another external evaluation tool.

Notes

- ¹⁰ Danielsen et al. (2009).
- ¹¹ Fernandez-Gimenez Ballard, Sturtevant (2008)
- ¹² Cundill G, Fabricius C (2009) Monitoring in adaptive co-management: toward a learning based approach. *Journal of Environmental management* 90 (11): 3205-3211.
- ¹³ Izurieta et al. (2011).
- ¹⁴ Ottke et al. (2000).
- ¹⁵ Constantino PdAL, Carlos HSA, Ramalho EE, Rostant L, Marinelli CE, Teles D, Fonseca-Junior SF, Fernandes RB, Valsecchi J (2012) Empowering local people through community-based resource monitoring: A comparison of Brazil and Namibia. *Ecology and Society* 17(4): 22.
- ¹⁶ Danielsen et al. (2009).
- ¹⁷ Fernandez-Gimenez, Ballard, Sturtevant (2008).
- ¹⁸ Guijt (2007).
- ¹⁹ Dos Santos MC, Stone S, Schmink M (2007) Creating monitoring with rubber tappers in Acre, Brazil, ed. Guijt I. *Negotiated learning: Collaborative monitoring in forest resource management* (Resources for the Future, Washington D.C.), pp. 35-46.
- ²⁰ Guijt (2007).
- ²¹ Danielsen et al (2009).
- ²² Ghate R, Nagendra H (2005) Role of monitoring in institutional performance: Forest management in Maharashtra, India. *Conservation and Society* 3(2): 509.
- ²³ Evans K, Larson A, Mwangi E, Cronkleton P, Maravanyika T, Hernandez X, Müller P, Pikitle A, Marchena R, Mukasa C, Tibazalika A, Banana AY (2014). *Field guide to adaptive collaborative management and improving women's participation* (CIFOR, Bogor, Indonesia).
- ²⁴ Sthapit B, Lamers HAH, Rao VR, Bailey A (2016) Community Biodiversity management as an approach for realizing on-farm management of agricultural biodiversity. In: eds. Sthapit et al. *Tropical fruit tree diversity. Good practices for in situ and on-farm conservation* (Routledge, Oxon, UK), pp 31-66.
- ²⁵ de Boef WS, Subedi A, Peroni N, Thijssen M, O'Keeffe E (2013) *Community biodiversity management: Promoting resilience and the conservation of plant genetic resources*. (Routledge, Oxon, UK).
- ²⁶ Ghate R, Mehra D, Nagendra H (2009) Local institutions as mediators of the impact of markets on non-timber forest product extraction in central India. *Environmental Conservation* 36(1): 51-61.
- ²⁷ Bergamini, Blasiak, Eyzaguirre (2013).
- ²⁸ Ghate R, Nagendra H (2005) Role of monitoring in institutional performance: Forest management in Maharashtra, India. *Conservation and Society* 3(2): 509.
- ²⁹ Dietz T, Ostrom E, Stern PC (2003) The struggle to govern the commons. *Science* 302, 1907-1912.
- ³⁰ Ostrom E, Nagendra H (2006) Insights on linking forests, trees, and people from the air, on the ground, and in the laboratory. *Proceedings of the National Academy of Sciences*, 103, 19224-19231; Dietz, Ostrom, Stern (2003); Ghate, Nagendra (2005).

³¹ Ghatе, Nagendra (2005).

³² Das N. (2011) Women's dependence on forest and participation in forestry: A case study of joint forest management programme in West Bengal. *Journal of Forest Economics* 17(1): 67-89.

³³ Elias M (2016b) Innovations in Ecosystem Management and Conservation. Technical Report. Diagnostic Study: Timeline (Bioversity International, Selangor, Malaysia).

³⁴ —(2016a) Innovations in Ecosystem Management and Conservation. Technical Report. Diagnostic Study: Semi-structured Interviews (Bioversity International, Selangor, Malaysia).

³⁵ Ottke et al. (2000)

³⁶ Institute of Marketecology (2005). *Guidance manual for organic collection of wild plants* (SIPPO, Zurich)



2

**Adapting to
sociocultural
contexts**

IN THIS CHAPTER

- **Relevance of gender and social inclusion issues in forest biodiversity management**
- **Avoiding common barriers to participation**
- **Incorporating local ecological knowledge in community-based monitoring initiatives**
- **The importance of capacity strengthening and information sharing**

A number of issues are relevant to any community-based monitoring initiative, independent of the country, sociocultural context or monitoring goals or targets. These include considering how different people in the community are involved in resource management; how local knowledge systems can contribute and be combined with modern scientific knowledge; and how monitoring needs to build in learning.

2.1 Gender and social inclusion

Landless people or small landholders in forest-fringe zones often depend largely on forests for meeting their daily livelihood and subsistence needs³⁷. Because of this, they have a major stake in how natural resources are managed and they merit equal opportunities to participate in and influence management decisions³⁸. Research shows that increasing the participation of women and other marginalized groups in forest-user groups and decision-making can improve not only their livelihoods but also the management of natural resources³⁹.

Nevertheless, who can participate in community-level institutions and initiatives is determined by informal rules, norms and perceptions. Class, caste and gender typically influence how resource-use rights are allocated, who participates and who plays what roles⁴⁰. These factors often interact with each other: for example, women from different social classes may have very different access to resources and decision-making. Lack of participation may result from⁴¹:

- *Lack of information*: marginalized groups may lack information about the provisions, roles and responsibilities of resource management programs. It may not be clear what such programmes apply to and what their benefits are, which can lead to a lack of interest.
- *Social and cultural restrictions*: gender, caste or race can determine whether a person is allowed to share a platform with other villagers and speak in public.
- *Few direct benefits*: direct benefits for women and marginalized groups are seldom discussed and prioritized. Forest management discussions may often be around timber and not include minor forest products such as fuelwood or fodder.
- *Lack of formal education*: respondents may feel that the lack of formal education prevents them from expressing or defending their opinions.
- *Lack of female staff of government agencies*: when programmes are implemented with the support of a government agency, the lack of female staff often hinders women's participation. Women may find it difficult to interact with male staff, who equally find it difficult to approach women and to include their concerns. Nongovernmental organizations may have similar constraints regarding staff.
- *Influence of outsiders*: if monitoring programmes are carried out with support of external agencies, project workers may impose their own ideas of what is relevant for a project. For example, they might

determine what type of information should be collected based on their expectations and interests rather than on the views of the community members⁴².

- *Household responsibilities*: housework, childcare and other responsibilities often make it extremely hard for women to find time to attend community meetings. Timing and venues for meetings are often decided without considering their impact on women's ability to participate⁴³. Meeting places may be far, and having or not having a motorbike can make a big difference in the ability to attend⁴⁴.
- *Lack of means for information sharing*: if the settlements are dispersed and people do not have telephones, it can be difficult for them to obtain information about events and opportunities to participate⁴⁵.

Because of such sociocultural factors, devolving decision-making power to the community level often does not result in equal opportunities within the community, unless specific actions are taken to support participation of all. Participation should be empowering, meaning that all members — regardless of gender, class, caste or race—have a voice and can influence the group's decisions⁴⁶. It needs to include people not just as individuals but also as a collectivity⁴⁷.

Tips for increasing participation

Participants and facilitators of community meetings and activities can support the effective participation of marginalized groups in local communities by the following actions:

- *Make the process as gender-responsive as possible*: make a conscious commitment to introduce discussions on gender and participation throughout the process⁴⁸. Be aware that gender relationships and norms mean different things in different places. Facilitate processes in ways that encourage women's active participation, as it is often difficult for women to voice their perspectives even when they have a seat at the table.
- *Define rules against discrimination*: include rules that counter discrimination against any member of the community and set in place processes for dealing with discrimination.
- *Increase the representation of disadvantaged groups*: research has shown that increasing the numbers of disadvantaged groups can make a significant difference to the results of management processes⁴⁹. Consider increasing the quota for representatives of women, indigenous peoples, ethnic groups, youths and elderly people.
- *Consider gender-responsive membership rules*: ensure that the rules for committee memberships are inclusive and allow for more than one household member to join. Rules that allow only one member per household typically hinder women's participation since men are usually the ones who participate on behalf of their household⁵⁰.
- *Build communication networks among organizations of marginalized groups*: opening communication among these organizations helps groups understand each other's constraints and challenges and create trust, empathy and a sense of collective identity or togetherness. That can then assist in overcome divisions arising from social or economic differences. Communication and mutual understanding can be fostered by carrying out forums for deliberation, where the groups can get to know each other better, share information, discuss differences, identify priorities, create strategies for their inclusion and forge a sense of solidarity. This can be an effective tool for helping them promote their interests in other deliberation scenarios that also involve dominant groups⁵¹.
- *Plan your participatory process in the context of existing social conventions*: do that by first organizing separate meetings for men and women if needed and then bringing groups or their representatives together to have a collective dialogue. Even if inequalities are not very evident at the beginning,

strategies should focus on strengthening capacities and leadership abilities of women's and other marginalized groups and fostering their involvement in governance and decision-making processes.

- *Use appropriate and understandable language and communication channels:* when sharing results from the monitoring process, communicate them through channels that the target groups – including women and vulnerable groups – use and in a language that is understandable by all⁵².

2.2 Local ecological knowledge

Local ecological knowledge is defined as the knowledge, innovations and practices of indigenous peoples and local communities about the relationship of living beings with one another and with their environment. It is also referred to as traditional knowledge. This knowledge is passed orally from generation to generation and is developed from experience gained over time and adapted to the local culture and the environment^{53, 54}. Local ecological knowledge has gained interest in research and natural resource management, with a recognition that it can contribute to the conservation of biodiversity, rare species, protected areas, ecological processes and sustainable resource use in general.

Community-based monitoring systems need to be compatible with local knowledge systems and incorporate related knowledge, where relevant. This can result in a better sense of ownership, cultural appropriateness and more relevant information for communities. Indigenous peoples often hold knowledge that only they can provide. Traditional uses, perceptions and beliefs about the forest are in many cases compatible with good practices for sustainably managing natural resources⁵⁵. For example, harvesting may be banned at certain times of the year to allow nature to recover, or before certain festivals that mark the ripening of fruits and onset of harvesting⁵⁶. Local ecological knowledge systems acknowledge uncertainty, unpredictability and change in environmental conditions. They also correspond to principles of continuous learning and adaptive management on which community-based monitoring is founded. Both local ecological knowledge and adaptive management assume that nature cannot be controlled and both emphasize ecological cycles and renewability⁵⁷. Social learning processes then become important, where local peoples learn from their environment through observation and reflection.

Local ecological knowledge is embedded in institutional arrangements and social norms. It includes taboos and other regulations that define how communities should use or protect their resources and build resilience in ecosystems. Taboos are also reflected in sanctions that can be useful for enforcing good practices of interest for monitoring.

2.3 Capacity strengthening

Capacity is the overall ability of a person or a group to perform corresponding responsibilities. Adaptive capacity is sometimes considered as a specific area of capacity – the capacity to adapt to a changing environment (social, ecological or both). Capacity depends on both people's capabilities (knowledge, skills and attitudes) and the overall size of the task and the resources needed to perform it, among other things⁵⁸.

Local capacities are crucial in community-based monitoring initiatives for creating a sense of ownership, timely implementation, collecting and interpreting relevant information and feeding the results into decision-making about natural resource management – all working in a group of people with diverse needs and expectations. Sustainability of the monitoring program depends on community members' capacity to carry out these tasks. Hence, capacity can be seen both as a means and an ends of CBM; continual strengthening of capacity is required throughout planning and implementation of the monitoring process.

Ideally, capacity strengthening starts from the point when community members come together to discuss and decide what the monitoring needs and goals are, what to monitor and how. Remember that capacity strengthening can be maximized if the leadership of the program is established locally. Significant changes in local capacities start to occur only when community members participate in analyzing and interpreting information, not simply collecting it according to instructions (Table 1)⁵⁹.

There is no magic formula for building capacity and each process is different. Developing skills in facilitation, leadership, participatory-planning and decision-making processes, conflict management, data collection methods and tools, record-keeping, data entry, analysis and communication techniques (such as how to make presentations and what language to use) are some examples. Use of information and communication technology in participatory monitoring has become popular⁶⁰, but it also requires substantial capacity-building efforts to teach community members how to use the software and tools.

If a monitoring programme involves stakeholders such as forestry authorities, they may also require capacity strengthening and sensitization on how to best support community-based initiatives. Capacity strengthening can help stakeholders better appreciate and include local knowledge, support local institutions and identify opportunities to transfer decision-making powers to them, and ensure transparent and inclusive decision-making processes.

An assessment of current capacities and capacity-strengthening needs when developing a monitoring plan will help recognize and understand gaps, identify existing and latent capacity, and ensure that they are enhanced and linked to outcomes to achieve a desired result. A good way to build capacity before starting the actual field activities can be to test and experiment with tools and approaches in small pilot projects. Practice is one of the keys to successful planning and implementation of monitoring, and reflecting and discussing progress and lessons learned can significantly enhance and speed up learning. A capacity-needs assessment is also a capacity-strengthening process, and therefore the process is just as important as the outcomes⁶¹. For an example of including capacity strengthening in a CBM programme, see Box 5.

Box 5: Linking monitoring to capacity strengthening

Constantino and co-workers studied three wildlife monitoring systems in Brazil and Namibia were studied to identify factors that best led to the empowerment of local communities⁶². Having a focus on capacity strengthening and education led to strong local empowerment. In Acre, Brazil, people became psychologically and socially empowered when the monitoring program was incorporated into an indigenous education program. It also gave continuity to training processes. Monitoring was adopted at community schools to teach subjects like math, indigenous language and ecology. This strategy did not necessarily guarantee the quality of the information, but it strengthened capacities at the community level. Training of monitoring participants and other representatives developed their individual skills in literacy and numeracy. Several people collected similar data that were later shared in community meetings. This gave participants an opportunity to learn from each another and improve their skills in data collection and analysis.



*Photo: Training the youth to monitor the availability of wild edible plant species, Sarawak, Malaysia.
Credit: Bioversity International/R.Jalonen*

2.4 Knowledge sharing

Knowledge sharing is often overlooked in CBM initiatives. The more the community as a whole starts to participate in the initiative, the more that attention should focus on knowledge sharing. Facilitators need to ensure that knowledge sharing protocols with clear rules are established at the start of a consultative process and that all participants and stakeholders agree on them to avoid misunderstandings or conflicts. A useful way to do so is by creating a communication strategy when the monitoring plan is designed. The strategy identifies who will be part of the knowledge sharing process and what rules and guidelines are needed to foster effective communication with different stakeholders. Workshops, meetings, posters, maps, videos and short reports, as well as media outlets such as radio, might be useful ways to share information within local communities. People should also receive training on how to make presentations, what language they should use and how to answer questions from the audience. If communities want to share information with the government, more formal presentations and corresponding skills will be needed.

Box 6: Lessons learned from a community-based monitoring initiative in Guyana

A community-based monitoring initiative by WWF, implemented in Guyana, adopted a rights-based approach to data sharing⁶³. Data generated from monitoring could be shared only with the free and prior informed consent (FPIC) of the community members. This helped to protect the rights of those who not only generated the data but also could potentially be affected by data sharing. Experiences from the project generated the following lessons:

- Data sharing requires serious attention within CBM initiatives.
- Data sharing protocols are important governance instruments for CBM projects. Hence, they should reflect the sociopolitical context in which data are collected.
- Data sharing requires clear processes, agreements, roles and local data management capacities to ensure that communities maintain control over data while also enabling it to be shared effectively.
- Consensus building is needed about when and how data should be classified, especially for sensitive issues. Communities should understand that sharing certain data or information might be risky.
- Data sharing protocols should be based on the principles of FPIC to enable effective and equitable data sharing that also respects data ownership rights by locals.
- Data sharing protocols need to be periodically reviewed because data changes over time.

2.5 Summary of the chapter

- Barriers to the participation of marginalized social groups reduce the relevance of community-based monitoring and can negatively affect sustainability of resource use. Typical barriers include lack of information about decision making, lack of formal education and confidence, few direct benefits from participation, and social and cultural restrictions.
- Including local ecological knowledge in community-based monitoring can result in a better sense of ownership, cultural appropriateness and more relevant information for communities. Local ecological knowledge is often compatible with good management practices.
- Capacity strengthening is both the means and an end of community-based resource monitoring. Hence, it should be an ongoing process in any monitoring initiative in order to achieve ownership and community empowerment.
- Knowledge sharing requires clear processes and agreements to ensure that communities maintain control over data and decide who they want to share it with. Agreements are best developed before data collection starts, and then regularly updated.

Notes

- ³⁷ Angelsen A, Overgaard Larsen H, Lund JF, Smith-Hall C, Wunder S (2011) *Measuring livelihoods and environmental dependence: methods for research and fieldwork* (Earthscan, London, Washington)
- ³⁸ Das (2011)
- ³⁹ Haverhals M, Ingram V, Elias M, Basnett B (2014) *Gender and forests, tree and agroforestry value chains* (LEI Wageningen UR, Wageningen).
- ⁴⁰ Agarwal B (2015) The power of numbers in gender dynamics: Illustrations from community forestry groups. *Journal of Peasant Studies* 42(1): 1-20.
- ⁴¹ Godbole G (2002) Joint forest management and gender. Working Paper No. 4 for the Engendering Eden project (International Famine Centre, Cork, Ireland).
- ⁴² Mosse D (1994) Authority, gender and knowledge: Theoretical reflections on the practice of participatory rural appraisal. *Development and Change* 25, 497-526.
- ⁴³ Godbole G (2002).
- ⁴⁴ Elias (2016a), 23.
- ⁴⁵ Ibid.
- ⁴⁶ Ibid.
- ⁴⁷ Agarwal B (2001) Participatory exclusions, community forestry and gender: An analysis for South Asia and a conceptual framework. *World development* 29(10): 1623-1648.
- ⁴⁸ Haverhals M, Ingram V, Elias M, Basnett B (2014).
- ⁴⁹ Ibid.
- ⁵⁰ Agarwal, (2001).
- ⁵¹ Ibid.
- ⁵² Bergamini, Blasiak, Eyzaguirre (2013).
- ⁵³ CBD (2016) *Traditional knowledge and the Convention on Biological Diversity* (United Nations Convention on Biological Diversity)
- ⁵⁴ Berkes F, Colding J, Folke C (2000) Rediscovery of traditional ecological knowledge as adaptive management. *Ecological Applications* 10(5): 1251-1262.
- ⁵⁵ Evans K, Guariguata MR (2008) *Participatory monitoring in tropical forest management: A review of tools, concepts and lessons learned* (CIFOR, Bogor, Indonesia).
- ⁵⁶ Jalonen R, Lamers HAH, Elias M (2018) *Guidelines for equitable and sustainable non-timber forest product management* (Bioversity International, Rome)
- ⁵⁷ Berkes, Colding, Folke (2000).
- ⁵⁸ Stephen P, Triraganon, R (2009) *Strengthening voices for better choices: A capacity needs assessment process* (IUCN, Gland Switzerland)
- ⁵⁹ Danielsen et al. (2009).

⁶⁰ WWF (2015) *Community-based monitoring, reporting and verification know-how: Sharing knowledge from practice*. Available at: <https://www.globalcanopy.org/publications/community-based-monitoring-reporting-and-verification-know-how-sharing-knowledge>

⁶¹ Stephen, Triraganon (2009).

⁶² De Araujo Lima Constantino P, Carlos H, Ramalho E, Rostant L, Marinelli C, Teles D, Fonseca-Junior S, Fernandes R, Valsecchi J (2012) Empowering Local People through Community-based Resource Monitoring: A Comparison of Brazil and Namibia. *Ecology and Society* 17, no. 4

⁶³ WWF (2015) *Community-Based Monitoring, Reporting and Verification Know-How: Sharing Knowledge from Practice*. (WWF, Forest and Climate Programme).

PART II

Steps and recommendations for community- based monitoring

The following chapters provide practical guidance for developing a community-based monitoring system. They address issues that community members and facilitators of the process should take into account during the preparation, implementation, analysis, and monitoring and evaluation phases of CBM. The chapters include a series of tips, recommendations and examples from case studies where community-based biodiversity monitoring has been applied.

The monitoring process is divided here into the planning and preparation phase, development of the monitoring plan and implementation of the plan. The steps are not intended as fixed – each process is unique and needs to be based on the local, evolving context. Flexibility and communication are important from the very beginning.

Before starting, keep in mind this guidance for monitoring programs⁶⁴:

- Know what you are doing and why
- Keep it simple and direct
- Aim for credible, unbiased information that can be used for management action
- Communicate the results to generate impact.

3

Planning and preparation

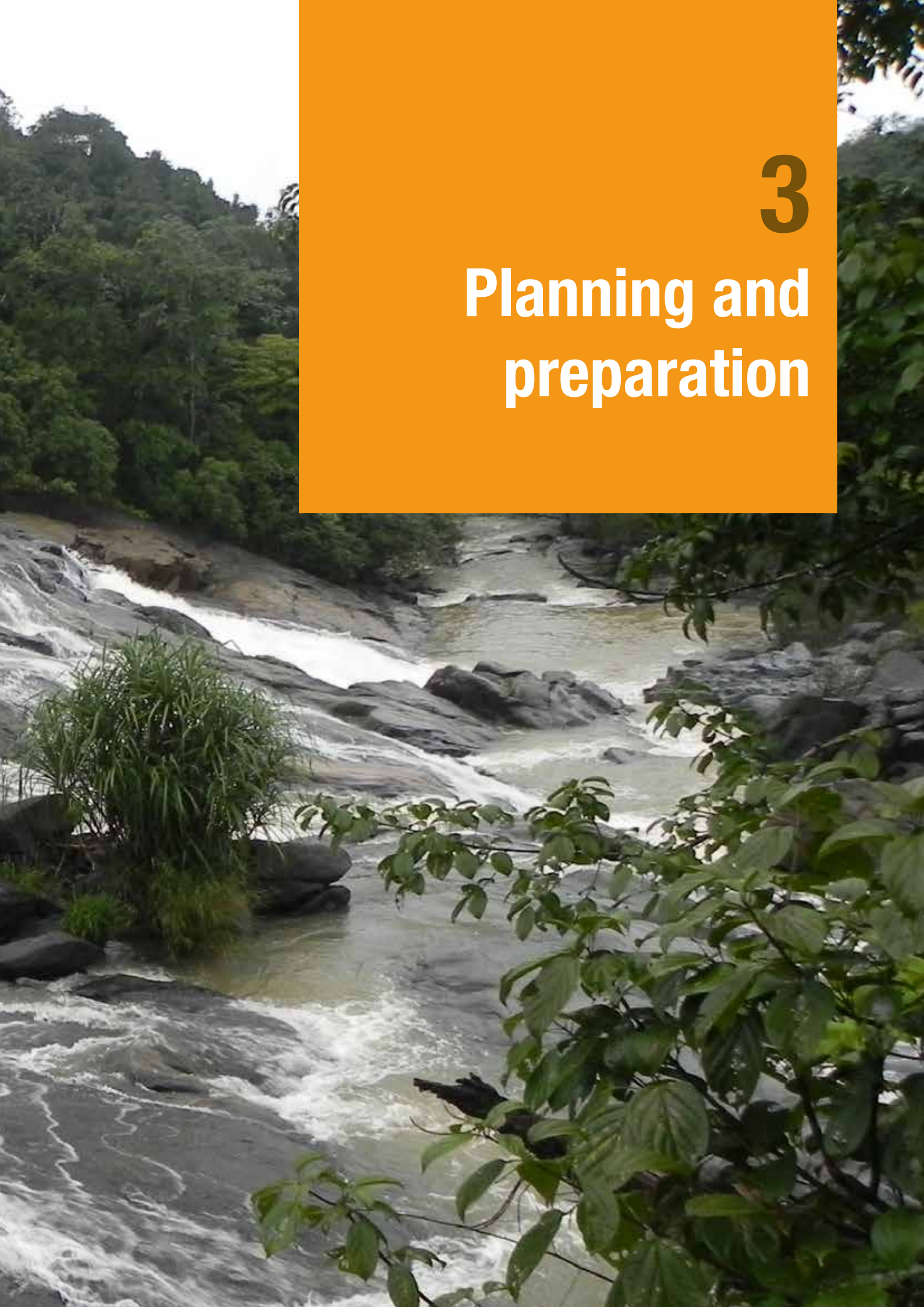


Table 3. Overview of steps

PHASE	CROSS-CUTTING ISSUES				ISSUES	ACTIVITIES	
Planning and preparation	1.3 INSTITUTIONAL ARRANGEMENTS	2.1 GENDER AND SOCIAL INCLUSION	2.2 LOCAL ECOLOGICAL KNOWLEDGE	2.3 CAPACITY STRENGTHENING	2.4 KNOWLEDGE SHARING	3.2 Introducing the idea of community-based monitoring	First meetings with the community to introduce CBM and understand needs and interests.
						3.3 What do we want to monitor – and why?	Identify problems and needs for monitoring; prioritise what to monitor; define monitoring goals
						3.4 What incentives for participation?	Weigh benefits and costs of monitoring with stakeholders
						3.5 Who should be involved?	Identify stakeholders
						3.6 Establishing a coordinating team	Select members; consider representation of different social groups
						Development of the monitoring plan	4.2 Institutional set-up
4.3 What to monitor: using indicators to understand change					Define indicators and other ways to track change		
4.4 Methods and tools for monitoring					Select tools		
4.5 Who participates in implementation?					Define roles of participants and stakeholders		
4.6 Planning ahead for sharing the findings					Develop a communication plan: what information will be shared with who and how?		
Implementation and reflection					5.1 Data auditing and progress reports		Monitor and document data collection to allow possible adjustments as needed.
					5.2 Data analysis and reflection	Identify status, trends, gaps, action needs and reflections on the process, among the CBM team and then in discussion with broader community and other stakeholders. Feed results into resource use plans.	
	5.3 Adapting and scaling the plans	Revisit the plan and the problems it targeted. Expand based on early successes. Identify opportunities for scaling out					

IN THIS CHAPTER

- **Introducing the idea of community-based monitoring**
- **Defining monitoring goals**
- **What motivates community members to start monitoring?**
- **Who should participate?**

3.1 Selection of participating communities

If the monitoring programme is externally led, it may start with the selection of the participating communities. CBM is most relevant when men and women in the participating communities depend directly on the natural resources that the monitoring programme would focus on. This ensures that they will benefit from monitoring and are likely to continue it after the intervention. CBM requires collective action, and within the typical time frame of development projects, it is most feasible where community members routinely collaborate and have established community-based organizations such as forest-user groups or other self-help groups.

In externally led projects or programmes, it is important to seek FPIC to participate from the community members⁶⁵. This process allows the community members to understand and negotiate how, when and by whom the initiative would be implemented and how it may affect their lands and resources. The consent should be sought from all those whose lives may be affected, including marginalized groups, — not just from community leaders. Consent from community leaders is typically needed before any other activities can start. Consulting them beforehand is also crucial for gaining their support for the initiative.

A community meeting can then be organized to seek the consent of other community members. Marginalized social groups may either not be able to attend such meeting, have difficulties in following the discussion due to language barriers or not feel comfortable about raising questions or concerns. Separate meetings with these groups may be needed to ensure that their voices are heard.

3.2 Introducing the idea of community-based monitoring

Before members of the participating community can agree to implement a monitoring programme, they need to develop a shared understanding of what CBM means, what it aims to achieve and, where relevant, get to know how it has worked in other cases. This is important for motivating the actors to participate actively in the definition, implementation and evaluation of the monitoring programme.

A good way to get started is to organize a community-level meeting, where those interested in initiating a monitoring programme explain the concept and what benefits it could bring to the community. Useful topics to communicate and discuss at the meeting include: what CBM is, its benefits and constraints (Chapter 1.1), how it could help address the resource management issues that the community is facing (Chapter 1.2-1.3), the role of the community members in deciding what information monitoring should generate and how it is best collected (Chapter 3), and common steps for implementing such a program (Chapter 4). It is important to reflect with the community members about whether they believe that CBM can indeed help in managing the issues they are concerned about and in dealing with future challenges.



Photo: Rapidly receding forest edge is a cause for concern for villagers who still rely on non-timber forest products for income. Madhya Pradesh, India. Credit: Bioversity International/R. Jalonen

Box 7: Tips for preparing community meetings⁶⁶

- *Plan and prepare in advance*: makes sure that the design, organization and convocation is inclusive enough and has a clearly defined purpose that suits the needs of the participants.
- *Include diverse stakeholders*: include diverse people, voices, ideas and information to have legitimate and efficient outcomes.
- *Encourage collaboration*: support and encourage the different participating actors to work together towards a common goal.
- *Support openness and learning processes*: help participants listen to each other and creatively explore new ideas. Make them listen to each other and apply information in a way that can generate new processes. Be adaptive in the process.
- *Foster transparency and trust*: make sure you are open and clear about the process, share information about the outcomes with all stakeholders and include what they have to say. Share also other relevant information, such as laws, regulations, policy briefs and newsletters.
- *Consider impact and action*: make sure that each proposed idea has the potential to be applied and the potential to make a difference.
- *Advance in small-steps*: social change takes place through institutional arrangements that are multifunctional, diverse and adaptable. Hence, the process takes time and should occur in small-steps, promoting small-scale learning, flexibility and adaptability.
- *Adapt methods to context*: Do not get stuck with one working method. Use different tools and techniques that allow you to adapt and be flexible in situations of uncertainty and change.

Note that care is needed when translating terminology to local languages. In many languages ‘monitoring’ is traditionally associated with supervision and control by authorities or other external actors and may, therefore, be met with reluctance or suspicion.

3.3 What do we want to monitor – and why?

What to monitor depends on what is important for each community, what it believes is affecting biodiversity resources and benefits to the community, and how it feels it can benefit from monitoring. Monitoring can be focused on ecological aspects (often emphasized by external actors) and also on social, cultural, political or structural issues affecting the community and its well-being.

It is useful to agree on a goal for monitoring: it helps to focus the planning process on what kind of information should be collected to support decision-making. Asking “who needs to be learning what and why” can help identify the goal⁶⁷. A goal should be straightforward, specific, achievable and based on priorities. For example, a goal could be behavioural change within a stakeholder group, improved availability of key forest species or improved livelihoods of locals⁶⁸ resulting from more sustainable resource management. Table 3 provides examples of monitoring goals and corresponding indicators used in different projects.

Participatory exercises such as **problem tree** or **vision and action plan** can help define monitoring goals. Other, more specific exercises then help narrow monitoring needs by providing preliminary information about the availability and status of the resources of interest – for example, **participatory resource mapping**, **seasonal calendars** or **four-cell analysis** (See Chapter 4.4). **Scoring exercises** can help prioritize monitoring topics.

Different social groups often have different priorities – and are differently able to express those publicly. It is generally useful to conduct group discussions separately for relevant social groups to better understand the diversity of priorities and needs. This can also help schedule meetings and choose venues in ways that foster opportunities to participate.

3.4 What incentives for participation?

Community members need to recognize what motivates them to start and continue a monitoring programme and what benefits – concrete or abstract – they expect from the process. If incentives are not clear or depend on external actors, a monitoring programme is not likely to be sustainable on its own. It is useful to discuss motivations from early on.

Box 8 presents examples of the incentives that men and women in two Indian states expected from engaging in collective forest monitoring and management activities. These incentives can be divided into in-kind and cash incentives and those that are under the control of the community members versus external actors. Direct cash incentives are often dependent on external support. Other, less tangible, incentives include obtaining useful information that helps in planning livelihood activities (for example, information about expected yields) or ensuring equitable distribution of benefits (for example, based on monitoring the time that households contribute to collective activities).

Monitoring also involves costs, at least in terms of time and labour. Often these are not equally distributed among community members. Benefits and costs should be carefully weighed among those who are likely to be affected.

Box 8: Incentives for motivating stakeholder participation

Through the participatory *vision and action plan*, villagers in the Karnataka and Madhya Pradesh states of India identified incentives that would motivate them to participate in forest monitoring and management activities. The incentives included:

- Allocation of rights to harvest non-timber forest products from specific trees to those villagers actively involved in monitoring (mentioned in a men's focus group)
- Allocation of harvesting rights to forest areas by hamlets to reduce open access and incentivize monitoring and more sustainable management by the hamlet households (women's focus group)
- Skill development for women's groups in processing, value addition and marketing of the forest products and cultivated fruit varieties (women's focus group)
- Provision of dead and fallen trees at subsidized rates to villagers for building houses, cattle sheds, etc. (men's and women's focus groups)
- Payment for conducting monitoring (women)
- Honorarium for Village Forest Committee members to encourage them to monitor and protect the forest (men)
- Entire revenue of Village Forest Committees shared only among those collectors of forest products who have committed (by oath) to follow sustainable collection practice (men)
- Welfare Fund for the village established by the Forest Department (men).

3.5 Who should be involved?

The people participating in a monitoring program define it by the way they work together and the roles they play in planning and implementing it. Identifying the key stakeholders in a community and consulting them is key to understanding local priorities, the current state of the natural resources, related past and ongoing initiatives in the area, capacities of the different stakeholders, opportunities for collaboration and the right community representatives for the monitoring program⁶⁹.

Identifying who participates can be a very sensitive topic. Communities are not homogenous but complex entities, where relationships, hierarchies and power dynamics affect any decision-making and management activity. External facilitators in particular need time to understand the context and the range of people who may affect, and be affected by, issues relevant to the development of the monitoring programme and invite them to participate. Pay attention to the existing, formal or informal organizations at the community level, such as farmer groups or women's self-help groups. Such organizations can often help engage with the community and establish and sustain monitoring practices, while they themselves can be strengthened in the process as people find new ways to collaborate that build social capital.

A Venn diagram or **who counts matrix** can help identify stakeholders and their needs. Several other participatory tools exist for similar purposes⁷⁰. Stakeholders can also be identified by experts; by other stakeholders; through self-selection through response by interested participants to announcements at meetings or media; using written records or population data; or using oral or written accounts of major events⁷¹. Remember that who the key stakeholders are depends on who you ask in the community (see Box 9). Marginalized groups are often left out unless specifically targeted.

Facilitators, whether external or internal, should serve as the bridge between all stakeholders, so that strong channels of communication and cooperation are built. Initiating community meetings and participatory workshops among the representatives of the communities, local groups and organizations, and the government is a good way to start building these bridges. Make any participatory process as recurrent, open, flexible and relevant as possible for community members in order to build and sustain channels of communication.

It sometimes requires considerable time to get stakeholders, involved in the process, especially the more marginalized groups. Keep in mind constraints that can hinder participation of women and other marginalized social groups and seek to actively encourage and engage these groups in the process (Chapter 2.1). Diverse participation yields more detailed and balanced information about the local context, since different groups have different knowledge and priorities regarding natural resources.

In the beginning, it is useful to focus activities on developing trust with and among the relevant groups in the community rather than emphasizing collection of detailed data⁷². If trust is lacking or participants are not clear about the motives or purposes of the process, they may be hesitant to speak openly about the issues affecting them.

In the end, sustainability of the monitoring initiative requires considerations of who is, and should be, driving it. Initiatives led by external groups often suffer from lack of local ownership and collapse during handover, unless that is aspect is carefully planned from the outset. Locally led initiatives in turn commonly lack capacity to identify and implement monitoring methods that yield useful data to support decision-making. Asking “who should drive monitoring” can help open discussion about existing inequalities and benefits, once trust is developing between facilitators and participants⁷³.

Box 9: Stakeholder identification

As part of a participatory action plan exercise for the project ‘Innovations in environmental management and conservation’ (2014–2017), male and female members of 50 villages in Sirsi and Mandla, India, identified the different stakeholders they thought were relevant for addressing problems in forest management. Stakeholders were identified through free listing in gender-segregated groups after the participants had first listed the problems they were facing with forest resources and prioritized actions for addressing the problems.

Both women’s and men’s groups considered the Forestry Department as the overall most relevant stakeholder to improve forest management. Women placed more emphasis than men on the role of villagers and women’s self-help groups, whereas men’s groups, more often than women, mentioned nongovernmental organizations, the Village Council, cooperative societies and other government departments as important stakeholders. Men could name more stakeholder groups than women, especially external and formal organizations, an indication of their more extensive roles in and interactions with such organizations.





Photo: Women prioritising problems for collective action, Uttara Kannada, India. Credit: LifeTrust

3.6 Establishing a coordinating team

Once the community members decide to proceed and start a monitoring programme, the people who will be in charge of coordinating the activities should be selected. They will then work together (with the support of facilitators if relevant) to set up the monitoring program and coordinate data collection, analysis and information sharing. They should be capable of mobilizing people and facilitating meetings and be sensitive to social equity and participation of the marginalized groups. Again, it is important to consider social inclusion in forming the CBM team and selecting the facilitators, thereby enabling participants of all backgrounds to contribute their ideas and share any concerns during the process.

3.7 Summary of the chapter

- Start by developing a shared understanding of what community-based monitoring is and how it can help manage biodiversity resources compared to, or together with, externally led initiatives. A community meeting with all interested participants is often a good way to start.
- Recognize the motivation to start a monitoring programme and how the community members expect to benefit from it. Without clear incentives, monitoring will likely not be sustained, especially after any external support ends.
- Take time to identify the key stakeholders and understand their interests, priorities, capacities and relationships with other stakeholders.
- Pay attention to gender and equity considerations from the outset, aiming to involve people from all social groups in the process of defining CBM needs, benefits and resources required for its implementation. Diverse participation results in more detailed and balanced information about the local context and issues.

Notes

- ⁶⁴ Ottke, Kristensen, Maddox, Rodenburg (2000)
- ⁶⁵ FAO (2016). *Free Prior and Informed Consent: An indigenous peoples' right and a good practice for local communities: Manual for project practitioners* (FAO , Rome, Italy), 52p. Available at: <http://www.fao.org/documents/card/en/c/5202ca4e-e27e-4afa-84e2-b08f8181e8c9/>
- ⁶⁶ NCDD (2010) Resource guide on public engagement. Available at: http://www.ncdd.org/files/NCDD2010_Resource_Guide.pdf
- ⁶⁷ Guijt (2007).
- ⁶⁸ Ottke et al. (2000).
- ⁶⁹ UNU-IAS, Bioversity International, IGES, UNDP. (2013) *Toolkit for the indicators of resilience in socio-ecological production landscapes and seascapes* (United Nations University Institute of Advanced Studies).
- ⁷⁰ Chevalier J, Buckles C (2008) SAS2 social analysis systems: *A guide to collaborative inquiry and social engagement* (IDRC, Ottawa, Canada—Sage Publications, New Delhi). Available at: <http://www.sas2.net/>
- ⁷¹ Chevalier J, Buckles C (2008)
- ⁷² Mosse (1994).
- ⁷³ Guijt (2007).

4

Development of the monitoring plan

वार्षिक
मुदायिक दिवस
IEaC
Ecosystem
Management & Conservation
यान 11 अगस्त, 2015
रोपण के तहत क्षेत्र 0.5 हेक्टेयर
रोपित प्रजातियों के नाम - आंवला, अमर
ईंधन की लकड़ों के पौधों की संरक्षण



IN THIS CHAPTER

- Existing rules for resource management as a context
- Monitoring with indicators
- Methods and tools for monitoring
- Planning for sharing the findings

4.1 Developing a feasible yet comprehensive plan

Once community members have decided to embark on a monitoring programme, they need to decide what actions they will take, why, how and by whom and how the implementation process itself will be monitored and results shared.

Developing a detailed monitoring plan is in itself not that difficult: the challenge is in deciding on what can be feasibly implemented. Ambitious plans with comprehensive lists of indicators or a very technical focus often end up on the shelf — they become too complicated and time-consuming to follow without continuous external support. Hence, it may be better to start small, perhaps monitoring just one or a few indicators first, and then grow the initiative as participants gain confidence and motivation from seeing the results. Keeping it simple will also help diverse social groups participate in the initiative, including those who may have been excluded from community-level processes in the past.

Key questions that help develop a comprehensive monitoring plan include the following:

- What are the main issues we have in resource management? How does monitoring help address them?
- What specific information do we need to understand how the resources are being affected and why?
- How and when are we going to collect data to keep it both informative and feasible?
- Who will analyze the data and how?
- Who needs to be involved, in what roles and why?
- When, how and how often will the findings be shared among stakeholders?

Box 10: “Start small and grow it”

Community-based monitoring was studied in Deulgaon community in Maharashtra, India, where monitoring had developed as a self-led initiative⁷⁴. In the 1990s, a local policeman and a resident convinced the community to develop strategies that could halt all activities that were leading to deforestation. Community members created their own system for compliance with monitoring rules. They started with the monitoring of a single rule – allowing each household to harvest wood for home consumption only, banning extraction for sale. The monitoring system was effective in fostering compliance, so villagers gradually added more rules to monitor. Based on comparison between this and other less successful community initiatives, the authors of the study recommend starting monitoring programs with a simple activity and then slowly adding more elements or indicators as positive experiences accumulate and management contexts become more complex.

4.2 Institutional set-up

Unsustainable resource use is often linked to lack of formal or informal rules or to their insufficient implementation. Interviews and participatory exercises such as a **Venn diagram** or **vision and action plan** can be organized to study the institutional context and understand how different social groups in the community feel about existing rules: are they legitimate, transparent and inclusive? Facilitators can support community members in visualizing what kind of institutional arrangements they see as useful (Box 11). It is often helpful to focus first on strengthening the already existing capacities and institutional arrangements and on fostering social learning about what works and what doesn't in responding to the shared needs and priorities.

Here are some guiding questions for understanding the local institutional context as a basis for monitoring:

About institutional set-up:

- What local institution is in charge of natural resource management (for example, a forest management committee, land-use or co-management group)? If there is more than one institution, do the institutions cooperate and work together?
- How capable is the institution in formulating, monitoring and enforcing the rules for resource management? Why?
- How accountable, legitimate and transparent is the institution and why?
- How good is it in ensuring that all relevant social groups have rights and access to resources, opportunities for education, access to information and opportunities to influence decision-making?

About rule and sanction systems:

- What rules (if any) exist for controlling the management of natural resources?
- Are they imposed or locally established?
- Are the rules clearly defined (e.g. are they formalized by a policy, a law or through customary practices)?
- Do all community members know, understand and accept the rules?

- How well are the rules being enforced at the moment? Why or why not?
- Is compliance with rules monitored? If yes, how?
- Are there sanctions for breaking the rules?
- Are the sanctions clearly defined? Are they understood, known and accepted by all community members?
- How well are the sanctions enforced? Is enforcement local or external (e.g. by community organizations or government authorities)?
- Are the sanctions applied to community members, outsiders, or both?

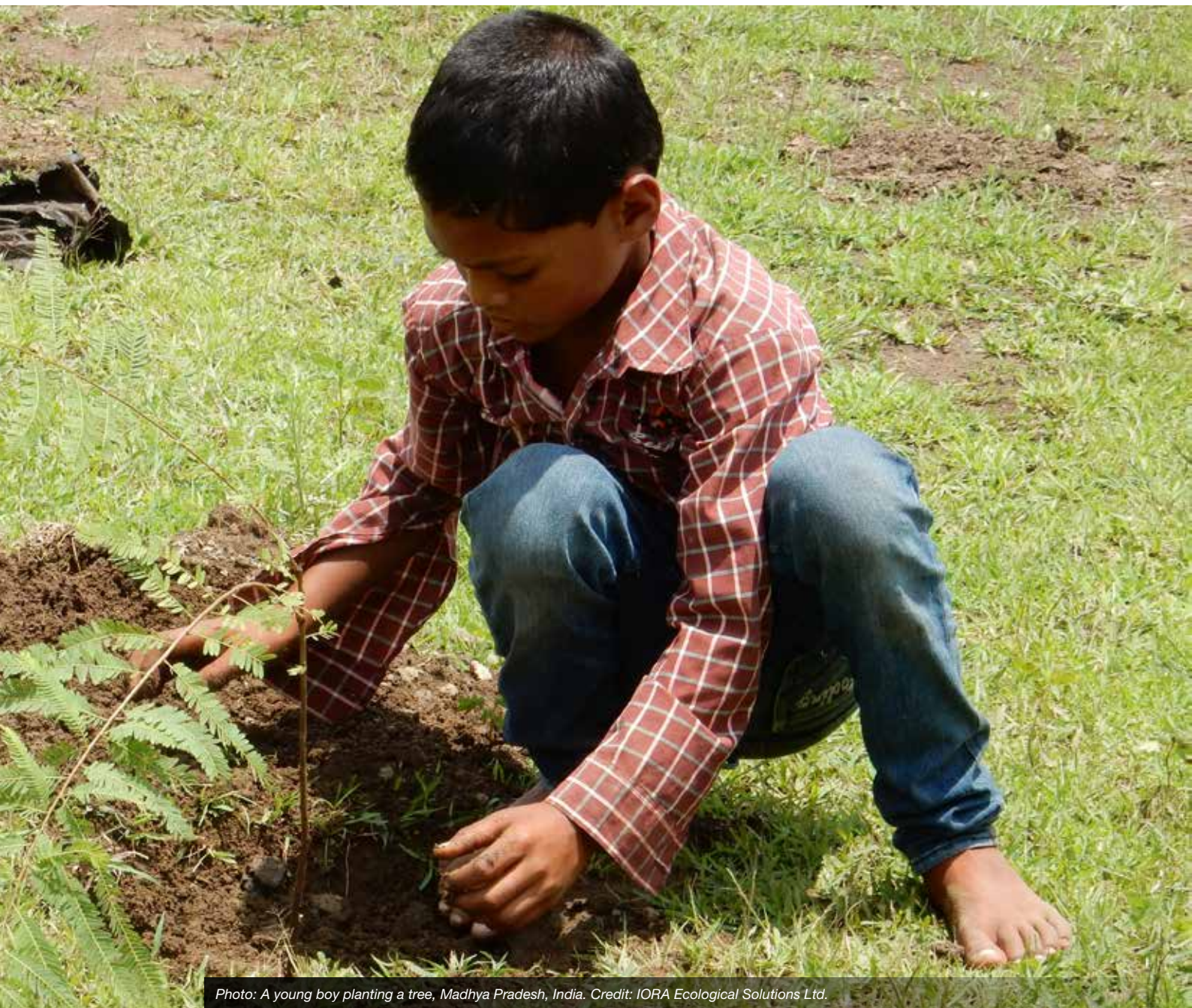


Photo: A young boy planting a tree, Madhya Pradesh, India. Credit: IORA Ecological Solutions Ltd.

Box 11: Solutions identified by community members for improving forest-related rule enforcement in Mandla, Madhya Pradesh, India

In Mandla district, Madhya Pradesh, India, Joint Forest Management Committees (JFMC) were established in many communities in the early 2000s, but few have been successful in helping community members to understand, agree and follow rules on forest use. Interviewed villagers believed that existing forest rules were not followed by everyone and that many people were unaware of their existence, which has contributed to rapid forest degradation⁷⁵. According to a Forest Department officer, villagers “are not aware and have no idea” about specific fines they can face if offending the rules⁷⁶. Nevertheless, when participatory vision and action plan exercises were conducted with men and women from 25 villages, they came up with specific ideas and recommendations on how forest management can be improved by clarifying rules and better enforcing them. Several men’s groups also proposed actions to strengthen JFMCs to help them carry out these activities. Examples follow.

Rules for forest protection

- Prohibit illegal trespassing by outsiders (men’s and women’s groups)
- Prohibit cutting of trees for non-timber forest products (men’s and women’s groups)
- Prohibit cutting trees for fuelwood or timber (men’s groups)
- Allocate the forest right declaration (*Van Patta*) only to original residents of the area (men’s groups)
- Prohibit harvesting of unripe fruits (women’s groups).

Actions for rule enforcement

- Establish a monitoring committee to monitor illegal trespassing and harvest (men’s and women’s groups)
- Recruit forest guards to protect and monitor the forest, carried by the JFMC (men’s and women’s groups)
- Take strict action against people that breach rules set by the JFMC (men’s and women’s groups)
- Establish a duty station in the forest, done by the Forestry Department of (men’s groups)
- Building a toilet for the forest guards in the forest (men’s groups).

Actions for strengthening village-level institutions

- Establish a new, proactive JFMC (men’s groups)
- Establish an honorarium for JFMC members to encourage them to monitor and protect the forest (men’s groups)
- Establish a Welfare Fund for the village, done by the Forest Department (men’s groups)
- Professionally train young villagers to reduce forest dependency (men’s groups).

4.3 What to monitor: using indicators to understand change

Monitoring is typically based on tracking the status of indicators. An indicator is an observation of what people expect to see changing as a result of changes in environment or management practices⁷⁷. Indicators may be quantitative, such as amount of yields, or qualitative, such as stakeholders' perspectives on whether a given situation is improving or not.

Indicators can help community members observe change and thereby increase their capacity to respond to social, economic and environmental pressures and shocks and improve their environmental and economic conditions, resilience and livelihoods⁷⁸. Indicators can also empower community members in decision-making processes and adaptive management by helping substantiate views and claims and facilitating a continuous process of discussion and participation within local communities, which leads to a better understanding of their problems. To be useful, indicators need to be defined in relation to the given goal of monitoring⁷⁹. Indicators should help track change over both space and time, and the information needed for tracking should be simple enough to collect.

Nevertheless, indicators have their weaknesses as well. To start with, 'indicator' as a term may sound too technical and might be difficult to define⁸⁰. Other words can be used to explain what information is needed to be able to monitor changes – for example, 'how can we know' or 'what tells us' that the status of the resource in concern is changing. Secondly, with many different stakeholders providing inputs, indicator lists easily become long and difficult to apply. Thirdly, indicators do not provide information about the reasons behind observed changes and are only able to document expected phenomena, not surprises⁸¹. Regular meetings among stakeholders to discuss and reflect on what they are observing in their communities remain important to complement indicators.

The **state-pressure-benefit-response framework** can help develop a comprehensive monitoring plan that provides information on both the reasons and consequences of changes in the monitored resources (Table 3). It helps to identify monitoring topics or indicators that enable understanding whether the status of a resource is changing, how and why, as well as how the benefits to the stakeholders are affected by these changes and how stakeholders are responding to the situation. Each aspect requires different types of information that vary depending on how easy or tedious it is to collect and how quickly the monitored indicators respond to changes in what is monitored. Hence, the framework can be very helpful in evaluating how feasible and comprehensive a monitoring system is. Although the framework was developed for studying changes in biological resources, it could be applied for other types of resources that are relevant for a community, for example local ecological knowledge or the number of young people in the community that may be affected by out-migration.

Table 4. Types of indicators in the state-pressure-benefit-response framework.

QUESTION	TYPE OF INDICATOR	EXAMPLES OF MONITORING ACTIONS
How is the status of the resource changing?	State	Analyzing the conditions and status – are we losing species diversity, local knowledge or other resources? Where, which and how?
Why resource is being lost?	Pressure	Monitoring the extent and intensity of the causes of loss, for example deforestation or out-migration
What are the implications for the society (community)?	Benefit	Quantifying or otherwise assessing the benefits that humans derive from the resource and the costs of loss, for example, income from NTFP harvests or forest protection from adhering to cultural traditions regarding forest use
What does the society (community) do about it?	Response	Measuring the implementation of policies or actions to prevent or reduce loss, for example, existence of informal and formal rules for NTFP harvesting and their enforcement

Adapted from: Graudal et al.⁸²

Box 12: Identifying indicators for timber harvesting by communities

Cunha dos Santos and co-workers supported communities in the western Brazilian Amazon in developing criteria and indicator frameworks for monitoring community timber harvesting⁸³. To develop indicators, they first did a diagnostic study in which they identified the major issues and problems perceived by the community members, such as negative social impacts of the timber-harvesting projects and related tenure conflicts. The study revealed differences between two stakeholder groups – rubber tappers and timber harvesters that made it impossible to use a single work plan and set of indicators for the entire community. Hence, the researchers focused their work on rubber tappers while trying to ensure that the voices of the other stakeholder groups were heard in the process. Community meetings were organized to define criteria and indicators, building on four key questions: (1) what is your dream for the forest in the future? (2) what key elements are needed for sustainable forestry management? (3) how can you recognize a sustainably managed forest? and (4) how can you recognize good community management? With the help of exercises involving participatory mapping, future scenarios and semi-structured interviews, community members were able to compile answers to the questions as well as identify areas of consensus and divergence. An initial set of criteria and indicators emerged from this process.

4.4 Methods and tools for monitoring

Methods encompass tools, strategies or techniques used for collecting data. The most appropriate methods for each situation depend on the monitoring goals, the available local and external skills (if the monitoring program is supported by external actors), the availability of resources, cost, time, and the community's engagement.

Examples of methods that can be useful for monitoring changes in the resources, threats to them, benefits to the community and adequacy of their responses follow. A more comprehensive list of participatory methods that can support community-based monitoring is given in Table 4.

Participatory methods — examples

- *Participatory mapping*: Community members create a map that shows the availability of natural resources in the vicinity of their village. The method helps analyze access to resources and identify socioenvironmental conflicts, especially when done in segregated groups by gender, ethnicity or other relevant social groups⁸⁴. Through dialogue and discussions, participants can reach a common understanding and consensus about the areas where monitoring is needed to help ensure sustainable use of the resources⁸⁵.
- *Transect walks*: This method is similar to transects as an ecological research method, but information is collected by community members, possibly as part of daily routines such as fuelwood collection.
- *Four-cell analysis*: see Box 13

Other social research methods

- *Field observation*: Actions are documented in the field, for example, extent of unsustainable or illegal activities. Generally, it is used in combination with secondary resources and photographic documentation⁸⁶.
- *Key informant interviews*: These provide a valuable source of often detailed information about the situation or problem, including events that happened in the past⁸⁷. People may interpret or remember events differently, so it is important to compare the results among interviewees and with information from other sources.

Ecological/environmental research methods:

- *Sample plots*: This method is useful for measuring the characteristics of plant populations in a specific area, by selecting several smaller sample plots and using the information from these plots to make generalizations about the larger study area⁸⁸. Collected information may include number of plant species, number of flowering trees, number of tree stumps or trees whose branches have been cut during (unsustainable) collection of tree products. Ideally, the plots should be placed randomly in the area being monitored to allow the generalization of results.
- *Transects*: Information is collected along a line that usually traverses environmental gradients⁸⁹. Information can be collected at fixed intervals (e.g. availability of specific plants) or whenever a relevant phenomenon is observed along the line (e.g. bird species). Transects can be used for monitoring both plant and animal populations and impacts of forest use on them.
- *Phenological observations*: The timing of life cycle events of target plants or animals is recorded (for example, the onset of flowering or fruiting). This information helps understand whether changes in the environment are affecting the life cycles. Timing of flowering or fruiting is often sensitive to weather patterns and affects the number of flowers or fruits that plants can produce. This in turn affects species



Photo: Identification of issues in forest use motivated villagers to write a letter of their concerns and action needs to the Forest Department, Uttara Kannada, India. Credit: LifeTrust

that depend on flowers and fruits for food or other uses, including honey bees, game and human populations⁹⁰.

- *Spatial analysis with Geographic Information System (GIS) and remote sensing*: This research method is now broadly used in landscape ecology to generate information about land use⁹¹. Many publicly available datasets exist that permit comparison of ecological and socioeconomic information, for example, on forest cover, fires, road networks and human population densities. In monitoring, the methods are best suited for landscape or higher level studies and to complement information from field studies.

Different types of methods can complement each other: for example, participatory exercises such as **four-cell analysis** can be used to get an idea of the most heavily used and threatened species, and ecological measurements can then be planned to assess these species' availability in more detail.

To understand change, the measurements or exercises can be repeated regularly. Reasonable interval of the assessments depends on the topic and how quickly things are expected to change; for example, capacities can be assessed before and after training events on sustainable collection practices. Fruiting, number of collectors, yields, damage to the resources or incomes can be monitored on a seasonal or annual basis. Broader changes in community well-being or in the environment that take time to manifest could be monitored annually or every few years.

Some tools can give an idea of the changes in the past even when applied for the first time, for example **timeline, four-cell analysis** (species that have already disappeared), or **resource maps** drawn to show past availability. People typically have difficulties in remembering past events accurately, especially recurring and common activities. Repeated measurements therefore give better information on these topics. Trends of species in the wild can be understood by collecting information about different life stages — for example, availability of both large fruit trees and their seedlings in the forest.

Table 5. Tools and methods for community-based monitoring. Tools in bold are described in Appendix 2

PHASE	STEPS	TOOLS AND METHODS
Planning and preparation	Introducing the idea of CBM	Community meeting, Free and Prior Informed Consent
	What do we want to monitor and why?	Problem tree, future scenarios , vision and action plan, participatory resource mapping, seasonal calendar, four-cell analysis, scoring exercises; interviews and surveys
	What are the incentives for participation?	Community meetings, vision and action plan, interviews and surveys
	Who should be involved?	Venn diagram, who counts matrix, expert selection, self-selection, review of literature and records
Development of the monitoring plan	Institutional set-up	Vision and action plan
	What to monitor: indicators	State-pressure-benefit-response framework, community meetings, pathway exercise
	Methods and tools for monitoring	Ecological and environmental methods: sample plots, transects, phenological observations, GIS
		Participatory methods: participatory mapping, transect walks, pre-and post-harvest meetings, participatory estimates of production and extraction
		Other social research methods: field observation, key informant interviews
	Who participates in monitoring?	Community meetings, training of community facilitators
	Planning ahead for sharing the findings	Communication plan and strategy
Implementation	Data auditing and progress reports	Coordination team meetings
	Data analysis and reflection	Community meetings; future scenarios, vision and action plan
	Adapting and scaling	

Box 13: Four-cell analysis for understanding species diversity and threats⁹²

Four-cell analysis is a rapid participatory assessment technique that allows evaluating the amount and distribution of species or varietal diversity. It was originally developed for studying state, richness and evenness of crop diversity within farming communities. In the project 'Innovations in environmental management and conservation' (2014-2017), Four-cell analysis was used to gain insights about the status and trends of NTFP species diversity in Uttara Kannada and Mandla districts in India. With the help of the tool, common, unique and rare NTFP species and varieties and appropriate intervention types were identified in the study landscapes to improve conservation and sustainable use of the species.

Four-cell analysis was conducted with gender-segregated groups in 53 villages in the study landscapes. Groups were of mixed ethnicity and caste to ensure broad participation and to generate awareness about the often extensive ecological knowledge of the lower caste, most forest-dependent groups. At the end of each session, each group shared its results with the other groups, which were then discussed among all participants.

This analysis allowed villagers to develop a comprehensive understanding of NTFP species collected from the forest, whether marketed or used for home consumption as fuelwood, food, fodder, agricultural tools or medicine. NTFP diversity recorded in Uttara Kannada was extremely high: group participants from 25 villages listed on average 71 species per group, for a total of 272 species. Of these, 219 could be identified by researchers by botanical name, and 40 could be identified as unique by local name but not by botanical name. Wild mango (*Mangifera indica*), wild jackfruit (*Artocarpus heterophylla*), kokum (*Garcinia indica*), and honeybees (*Apis spp.*) were most often listed as important species for home use — they have various food, cosmetic or medicinal uses. Villages across the Mandla landscape listed a total of 73 NTFP species. Aonla (*Phyllanthus emblica*), chakoda (*Cassia tora*) and mahua (*Madhuca longifolia*) were listed most often by both men's and women's groups as important NTFPs for income generation. Groups also identified NTFP species that had been 'lost' and were no longer available in their landscapes.

Four-cell analysis can help identify socioeconomically important and/or threatened target species for monitoring programmes. If conducted regularly every few years, four-cell analysis provides an overview of trends in species diversity, their uses and threats.

4.5 Who participates in implementation?

Once the relevant stakeholders are identified, it is important to define the roles each one is going to play, most of all for those who will be participating actively in the monitoring program. This can be done through meetings or workshops that clarify roles and responsibilities, available resources, timing of monitoring and expected workload, as well as possible compensation or other incentives.

If the monitoring programme is initiated by outsiders, it is important to train some members of the community as community resource persons who will then take the lead in facilitating the process. This helps sustain activities over time, beyond the time span of individual projects.

4.6 Planning ahead for sharing the findings

The communication plan defines how information will be shared throughout the monitoring process. The communication strategy defines the audience to which the community wants to communicate the results and conclusions or recommendations (for example, community members or specific user groups in the community, the government, neighbouring communities, private companies, schools, etc.), as well as the best way to communicate the data⁹³. Possibilities can include posters, newsletters, radio announcements, paper reports and community resource maps. If results of monitoring are communicated to different audiences, the plan needs to specify what information is shared with each group and in what form.

In initiatives where many parties are involved (such as local community, government and external organizations), a clear process for data sharing is key to ensure that communities – the ultimate owners of the data – maintain control over how data is used and how to access it. Protocols and methods for sharing information should be developed and agreed by the stakeholders before the monitoring plan is implemented. In a monitoring programme in Guyana, the following objectives were set for a data-sharing protocol: record the project’s key stakeholders and their roles in data-sharing decisions; categorize data into different degrees of sensitivity (red, yellow and green); define the process to follow for data of different categories; and specify who must be consulted before any data are shared⁹⁴.



Photo: Visions for future condition of forest and its resources, Madhya Pradesh, India. Credit: Bioversity International/R. Jalonen

4.7 Summary of the chapter

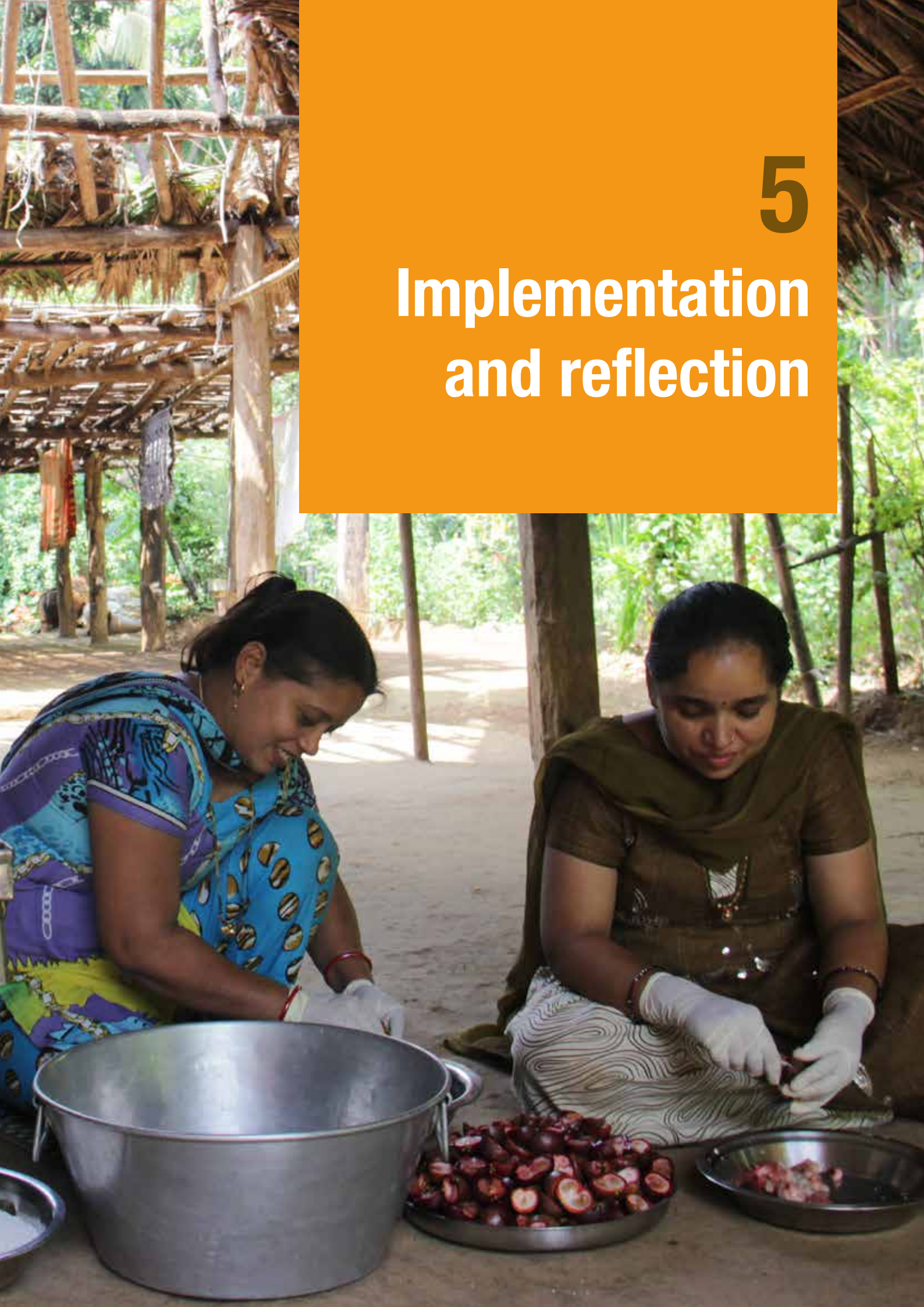
- Lack of formal or informal rules, or their insufficient implementation, is often a key factor behind unsustainable resource use. Collect information about the existing rules, their implementation and the perspectives of community groups about the rules to identify opportunities and limitations for monitoring.
- Indicators are a useful monitoring tool in that they help observe change. Indicators must be defined in relation to the given monitoring goal. Remember that indicators can only capture expected events or phenomena.
- Be careful not to create a monitoring plan that is too complicated to be sustained over time. ‘Start small and grow it’ is often a good recipe for success when building a culture of community-based monitoring.

Notes

- ⁷⁴ Ghate, Nagendra (2005)
- ⁷⁵ Elias (2016b).
- ⁷⁶ —, 2016a.
- ⁷⁷ Evans et al. (2014).
- ⁷⁸ UNU-IAS et al. (2013).
- ⁷⁹ Graudal L, Aravanopoulos F, Bennadji Z, Changtragoon S, Fady B, Kjær ED, Loo J, Ramamonjisoa L, Vendramin GG (2014) Global to local genetic diversity indicators of evolutionary potential in tree species within and outside forests. *Forest Ecology and Management* 333: 35-51.
- ⁸⁰ Evans et al. (2014).
- ⁸¹ Guijt (2007).
- ⁸² Graudal et al. (2014).
- ⁸³ Cunha Dos Santos, Stone, Schmink (2007)
- ⁸⁴ Ibid.
- ⁸⁵ Ayers J, Anderson S, Pradhan S, Rossing T (2012) *Participatory monitoring, evaluation, reflection and learning for community-based adaptation: A manual for local practitioners* (CARE International, Atlanta, USA).
- ⁸⁶ Ottke et al. (2000).
- ⁸⁷ Ibid.
- ⁸⁸ University, C. U. P. S. (2009). Environmental Inquiry. Available at <http://ei.cornell.edu/ecology/invspec/plotsample.html>
- ⁸⁹ Southwood TRE, Henderson PA (2009) *Ecological methods*. (Blackwell Science Ltd)
- ⁹⁰ Haggerty BP, Mazer SJ (2008) *The phenology handbook: a guide to phenological monitoring for students, teachers, families, and nature enthusiasts*. UCSB Phenology Stewardship Program (University of California, Santa Barbara)
- ⁹¹ Dempsey C (2011) *Conservation Biology and GIS*. Available at: <https://www.gislounge.com/conservation-biology-and-gis/>
- ⁹² Lamers HAH (2016) *Diagnostic study: Diversity assessment of non-timber forest products using four cell analysis*. Innovations in Environmental Conservation and Management, Technical Report. (Bioversity International, Rome, Italy).
- ⁹³ Conrad TC, Daoust T (2008) Community-based monitoring frameworks: Increasing the effectiveness of environmental stewardship. *Environmental Management* 41: 358-366.
- ⁹⁴ Herold M, Skutsch M (2011) Monitoring, reporting and verification for national REDD+ programmes: two proposals. *Environmental Research Letters* 6(1): 1-10.

5

Implementation and reflection



IN THIS CHAPTER

- **Checking data for quality**
- **Feeding the results into decision-making**
- **Considerations for scaling up**

Now it is time for the community members to implement what they have learned and planned and start collecting data. During the process, it is important to:

- Continue to promote participation and local leadership
- Keep in mind that building capacity is an ongoing process, and new capacity needs may crop up during the process
- Reflect on the monitoring activities and identify opportunities for learning, including creating platforms for sharing and learning where possible

5.1 Data auditing and progress reports

The monitoring team should work together to double-check the collected data as soon as possible after the collection event, when observations are still fresh. Data should then be entered into a registry as agreed in the monitoring plan. It is very useful to keep a log of events during data collection of any issues that may have affected the results or data quality and any decisions taken during data cleaning.

The monitoring team should report frequently to the coordination team, especially at the beginning of data collection. How often this is done depends on what has been agreed in the monitoring plan. This helps to track monitoring activities in the field and to identify data flaws or repetitions.

5.2 Data analysis and reflection

Results of monitoring can be compiled in maps, graphs, pictures, tables or narratives, depending on the topic. Results should be presented in an easily accessible form that all relevant stakeholders can understand, so as to facilitate collaborative analysis and learning.

Community meetings can be organized to present and analyze the early results from the monitoring process. It is important to organize reflection sessions regularly so that they become a common practice that feeds back information to the monitoring system and the management program. Each participant involved in monitoring activities, as well as the intended users of the collected information, should be involved. Facilitators should guarantee a diverse group that includes men, women, youths, the elderly and ethnic groups.

Participants should revisit the problem that they initially wanted to solve through monitoring, reflect on the monitoring results and on what they can learn from them. Discussions should revolve around interpreting the results and identifying changes and trends, as well as reflecting whether things are progressing as they were originally planned, what has gone well and what areas need further improvement. At the end, the community members should agree on adjustments to the natural resource management plans and activities, as well as to the monitoring system, where relevant.



Photo: An elderly woman carrying fodder to homestead, Nepal. Credit: Bioversity International/M. Elias.

5.3 Adapting and scaling the plans

As said before, CBM is best implemented as part of broader frameworks such as community biodiversity management or adaptive collaborative management. Flexibility and adaptive capacity are important for dealing with uncertainty and sudden change in the broader institutional context. Feedback and redefinition of the monitoring plan, by revisiting the problem definition and prioritization (Chapter 3.3-3.5), is a way to enhance adaptive management since it promotes a practice of constant exchanges of experiences and information, which eventually leads to social learning about the knowledge of what works and what does not and to community empowerment⁹⁵. Goals, roles, rules, methods and tools can then be modified based on the evaluation of the plan.

The need and capacity to scale a monitoring system depends on what the community originally planned. Based on early successes, the monitoring plan can be expanded at the community level by including new indicators or new monitoring goals.

Generally, CBM systems are very relevant for local levels but difficult to scale out because of the specificity of the project designed and the data collected. The deeper the ownership of the monitoring system by locals, the more difficult it is to directly scale it up. Because the schemes are fully self-determined, the issues being monitored and the indicators used are locally defined, and there may be little communication with external agencies⁹⁶.

If scaling out the initiative is an objective, then significant questions need to be answered⁹⁷:

- Is there enough local institutional capacity to carry out the process?
- Does the local community have the skill to do so?
- Is the data collected at the local level compatible with the national datasets?
- Are there any resources available for scaling up?
- Does all the community agree with scaling up the process?
- Is there a general agreement on what data are going to be shared and how?
- Can the lack of agreement on data protocols and guidelines regarding the use of collected data slow down the process of integration?

5.4 Summary of the chapter

- It is useful to plan checks for data quality and discussion of early results with community members to help assess and adjust monitoring approaches early in the process, where relevant.
- When the results of monitoring become available, community members should revisit the problem that they initially wanted to solve through monitoring and reflect what can be learned from the results. Ideally, they should be able to use the results to identify what changes may be needed in how natural resources are managed.
- Feasibility of scaling up community-based monitoring systems should be considered carefully since the systems are typically very context-specific.



Photo: Village Forest Committee members patrol their forest to protect valuable Rosewood trees, Cambodia. Credit: Bioversity International/R.Jalonen

Notes

⁹⁵ UNU-IAS et al. (2013); Fernandez-Gimenez, Ballard, Sturtevant (2008).

⁹⁶ Danielsen et al. (2009).

⁹⁷ Bellfield H, Sabogal D, Goodman L, Leggett M (2015) Case study report: Community-based monitoring systems for REDD+ in Guyana. *Forests* 6: 133-156.

APPENDIXES

Appendix 1. Tips for gender-responsive data collection

Conducting gender-responsive data collection means that facilitators are aware of the roles, responsibilities and priorities of both men and women in a community, and intentionally develop activities in order to benefit both of them. It typically results in richer, more diverse information since men and women often hold different types of ecological knowledge. Bioversity International has created a series of practical tips for gender-responsive data collection⁹⁸:

- *Establish mixed-gender field teams:* If collecting data through interviews or group discussions, it is useful to have both men and women in the field teams. Women facilitators can have better access to women participants, who can feel more comfortable opening up to other women than to men. The same is also true with male facilitators and male participants. Other factors of social differentiation, such as socioeconomic or ethnic background, can also make it difficult for women or men to relate to each other and should be considered when forming field teams.
- *Collect sex-disaggregated data:* Collecting sex-disaggregated data helps to have a broader picture of the community where the monitoring initiative is being executed. When conducting participatory activities, care is needed to ensure that men's opinions do not influence those of women and vice versa. To avoid this, separate focus groups can be developed.
- *Capture other forms of social difference:* Other factors of social differentiation, such as class, ethnicity, age and wealth status, among others, cross-cut gender. Hence, when collecting data, facilitators should consider including both men and women from different types of contexts. Since they might not communicate well with each other in some cases, separate focus groups might be needed.
- *Seek appropriate approvals:* To avoid any backlash in women's participation in data collection, practitioners should look for legitimate sources of approval. In addition to asking for women's consent approval, facilitators might also have to find out who the relevant gatekeepers of the household and the community are and also ask them for their approval, such as village leaders, teachers or religious leaders.
- *Schedule activities at convenient times:* Facilitators should take into account the different schedules of men and women when conducting data collection to ensure that activities are held at times convenient for both of them. If data collection can be done during men's and women's daily routine, the quality of the data collected can improve — they do not feel the pressure of having to go back to work, and may give more detailed and thoughtful responses.
- *Select appropriate meeting locations:* Facilitators should try to find appropriate places for conducting interviews to preclude mobility restrictions, thereby ensuring broader participation.
- *Seek privacy:* In many contexts, women tend to speak more freely when men do not surround them. In such settings, separate focus groups and gender-segregated interviews conducted in private spaces are useful. A strategy for achieving this is by doing interviews with men and women simultaneously.
- *Use appropriate language:* The people collecting data should communicate with men and women in a language they feel comfortable with. In many cases, women might not speak the national language. Remember to assess the level of literacy of communities. Facilitators should avoid using technical terms that participants are not familiar with.

- *Manage group dynamics:* In focus groups, attention should be paid to who is participating and who is not. Equal participation and dialogue should be encouraged among participants with different perspectives. If it is obvious that some participants are not willing to participate, a reorganization of groups might be useful.
- *Feedback findings to participants:* Facilitators should share and verify data with both men and women to help them better understand their situations and give them the chance to change or follow up the results if they so desire. After sharing results separately, it is useful to bring both groups together to exchange perspectives and create a collective learning process.

Appendix 2. Tools for different monitoring purposes

Community meetings: Meetings can be applied in all the stages of the monitoring process. They can be held regularly and serve as an interactive platform for explaining monitoring concepts and goals and to validate findings from monitoring⁹⁹.

Four-cell analysis: This rapid assessment technique evaluates the amount and distribution of species diversity within farming communities and the threats to the species from overharvesting or insufficient cultivation. The tool also helps to find suitable interventions for different groups of species, for example, species suitable for marketing that could improve livelihoods or species that should be conserved or multiplied to prevent their disappearance¹⁰⁰.

Future scenarios: This tool is used to understand personal ambitions and plans as well as the perceived changes in landscape and resources¹⁰¹. It assists actors in visualizing an ideal future that builds on current strengths and accomplishments¹⁰². In Brazil, future scenarios were used in combination with participatory mapping in order to identify social, economic, political and ecological issues related to the management of the natural resources that the community was interested in monitoring.

Interviews and surveys: These techniques gather data from primary sources, such as the people living in the monitoring area, and allow identification of practices and activities carried out there^{103,104}. In Lao PDR, village-level interviews and household surveys were conducted to ascertain the exact area where each household collected non-timber forest products (NTFPs), the amount they collected and the income they received from them¹⁰⁵.

Participatory resource mapping: This tool helps analyze access to resources and identifies socioenvironmental conflicts¹⁰⁶. Maps can be used to visually represent basic information such as population distribution, administrative boundaries, land use, natural resources and infrastructure in a way that can be accessed rapidly. By making it participatory, through dialogue and discussions, participants can reach a common understanding and consensus about the monitoring plan¹⁰⁷. In Lao PDR, participatory mapping was used to build a common understanding between villagers and scientists on the location of NTFPs and their importance and how villagers spatially used their land and resources. Maps were developed by groups of men and women, both also divided by youth and elder groups, and one group of village officials¹⁰⁸.

Pathway exercises: Pathway exercises are used for designing specific plans and strategies. Participants assess the present situation, what needs to be done in order to change it and what resources and skills communities have in order to achieve that goal. For each identified situation, strategies are created that seek to answer the questions of how, who and when to solve the problem. For an example of a plan developed in Amazonian Bolivia, see Evans et al. (2014)¹⁰⁹.

Preharvest and postharvest meetings: These meetings were used in a community monitoring initiative in South India. Collectors of NTFPs met before the beginning of the harvesting season to discuss the importance of resource monitoring; identify local ecological knowledge about the fruit production, extraction and regeneration; and collectively develop a format for recording observations and monitoring and discuss follow-up activities. In postharvest meetings they reviewed the harvest in terms of amount of fruits harvested and the harvesting techniques used and they shared their field observations. During the project, harvesters had the opportunity to reject, change and adapt various monitoring methods to select those most appropriate for them¹¹⁰.

Participatory estimations of production and extraction rates: In a monitoring initiative in South India, community members were asked to visually estimate the amount of fruits produced in seven areas within their forest before and after harvest in order to create resource productivity and extraction maps. This allowed them to understand and monitor how much fruit they were extracting and how much was left in the forest for regeneration, to sustain productivity¹¹¹.

Problem tree: This is a tool for understanding problems, their causes and impacts in natural resource management scenarios. This technique is recommended in contexts where communities struggle with complex issues that need further exploration and thought¹¹².

Scoring exercises: Using this simple and flexible tool, participants rate options based on selected criteria. In Laos, scoring exercises were used to select the most important forest products. Scoring was also used to assess the importance of forest in the past, present and future from a local point of view and to understand the evolution of local perceptions¹¹³.

Seasonal calendars: These help identify seasonal patterns and trends in the use and availability of natural resources. Seasonal calendars can be used to compare seasonal variation over a year and also to compare a season in the past with the present one. Hence, they can be useful to provide a baseline for indicators of adaptive capacity, such as food sufficiency, income diversification and access to natural and other resources. When used in monitoring, they can provide useful information that informs reflective discussions¹¹⁴.

Timeline: A timeline can be used to identify patterns and trends in the use and availability of natural resources — and factors affecting them — over longer periods of time, typically up to 20 to 25 years. Factors affecting the resources either positively or negatively can be ranked based on how important they are, and how much they are within or beyond the control of the community members¹¹⁵.

Venn diagram: This tool helps understand which institutions are important to different social groups in the community, to analyze engagement of different groups in local planning processes and to evaluate access to services and availability of social safety nets¹¹⁶.

Vision and action plan: The plan is useful for drawing out the local priorities for the monitoring plan. It helps identify key problems related to natural resources as perceived by locals, potential solutions and their visions of the future (see Boxes 8 and 11)¹¹⁷.

'Who counts' matrix: This matrix helps differentiate the people whose livelihoods are deeply intertwined with forest management from other stakeholders. The tool suggests seven dimensions by which forest stakeholders can be set apart from others, as well as a scoring technique for formal managers to use to determine whose well-being must form an integral part of sustainable forest management in a specific context¹¹⁸.

Appendix 3. Useful methods and tools handbooks

Tools for adaptive collaborative management

Ayers J, Anderson S, Pradhan S, Rossing T (2012) Participatory monitoring, evaluation, reflection and learning for community-based adaptation: A manual for local practitioners (CARE International, Atlanta, USA).

Evans K, Larson A, Mwangi E, Cronkleton P, Maravanyika T, Hernandez X, Müller P, Pikile A, Marchena R, Mukasa C, Tibazalika A, Banana AY (2014) Field guide to adaptive collaborative management and improving women's participation (CIFOR, Bogor, Indonesia).

Tools for collaborative inquiry and participatory processes

Chevalier JM, Buckles DJ (2008) SAS2 social analysis systems: A guide to collaborative inquiry and social engagement (IDRC, Ottawa, Canada—Sage Publications, New Delhi). Available at: <http://www.sas2.net/>

Tools for dialogue and public engagement

NCDD (2010) Resource guide on public engagement. Retrieved from: http://www.ncdd.org/files/NCDD2010_Resource_Guide.pdf

Tools for resilience and adaptive management

UNU-IAS, Bioversity International, IGES, UNDP (2014) Toolkit for the indicators of resilience in socio-ecological production landscapes and seascapes (SEPLS), (United Nations University Institute of Advanced Studies).

Modern technological tools

WWF (2015) Community-based monitoring, reporting and verification know-how: Sharing knowledge from practice. Retrieved from <https://www.globalcanopy.org/publications/community-based-monitoring-reporting-and-verification-know-how-sharing-knowledge>



Photo: Storage hut, countryside in Lao PDR. Credit: Bioversity International/R. Jalonen

Notes

- ⁹⁸ Bioersivity International (2013) Practical tips for conducting gender-responsive data collection.
- ⁹⁹ Boissière M, Bastide F, Basuki I, Pfund JL, Boucard A (2014) Can we make participatory NTFP monitoring work? Lessons learnt from the development of a multi-stakeholder system in Northern Laos. *Biodiversity and Conservation* 23: 149-170.
- ¹⁰⁰ Lamers (2016).
- ¹⁰¹ Cunha Dos Santos, Stone, Schmink (2007).
- ¹⁰² Chevalier, Buckles (2008).
- ¹⁰³ Angelsen et al. (2011).
- ¹⁰⁴ Ottke et al. (2000).
- ¹⁰⁵ Boissière et al. (2014).
- ¹⁰⁶ Cunha Dos Santos, Stone, Schmink (2007).
- ¹⁰⁷ Ayers et al. (2012).
- ¹⁰⁸ Boissière et al. (2014).
- ¹⁰⁹ Evans et al. (2014).
- ¹¹⁰ Setty RS, Bawa K, Ticktin T, Gowda CM (2008) Evaluation of a participatory resource monitoring system for nontimber forest products: the case of amla (*Phyllanthus* spp.) fruit harvest by Soligas in South India. *Ecology and Society* 13(2): 19. Available at: <http://www.ecologyandsociety.org/vol13/iss2/art19/>
- ¹¹¹ Ibid.
- ¹¹² Evans et al. (2014).
- ¹¹³ Boissière et al. (2014).
- ¹¹⁴ Ayers et al. (2012).
- ¹¹⁵ Ibid.
- ¹¹⁶ Ibid.
- ¹¹⁷ Jalonen R, Lamers HAH (2016) *Diagnostic Study: Vision and action plan*. Innovations in Environmental Conservation and Management, Technical Report. (Bioersivity International, Selangor, Malaysia).
- ¹¹⁸ Colfer CJP, Prabhu R (1999) *Who counts most? Assessing human well-being in sustainable forest management* (Vol. 8) (CIFOR, Bogor, Indonesia).

BIBLIOGRAPHY

- Agarwal B (2001) Participatory exclusions, community forestry and gender: An analysis for South Asia and a conceptual framework. *World development* 29(10): 1623-1648.
- (2015) The power of numbers in gender dynamics: Illustrations from community forestry groups. *Journal of Peasant Studies* 42(1): 1-20.
- Angelsen A, Overgaard Larsen H, Lund JF, Smith-Hall C, Wunder S (2011) Measuring livelihoods and environmental dependence: methods for research and fieldwork (Earthscan, London, Washington)
- Ayers J, Anderson S, Pradhan S, Rossing T (2012) *Participatory monitoring, evaluation, reflection and learning for community-based adaptation: A manual for local practitioners* (CARE International, Atlanta, USA).
- Godbole G (2002) Joint forest management and gender. Working Paper No. 4 for the Engendering Eden project (International Famine Centre, Cork, Ireland).
- Bergamini N, Blasiak R, Eyzaguirre PB (2013) *Toolkit for the indicators of resilience in socio-ecological production landscapes and seascapes* (United Nations University Institute of Advanced Studies).
- Bellfield H, Sabogal D, Goodman L, Leggett M (2015) Case study report: Community-based monitoring systems for REDD+ in Guyana. *Forests* 6: 133-156.
- Berkes F, Colding J, Folke C (2000) Rediscovery of traditional ecological knowledge as adaptive management. *Ecological Applications* 10(5): 1251-1262.
- Bioversity International (2013) Practical tips for conducting gender-responsive data collection.
- de Boef WS, Subedi A, Peroni N, Thijssen M, O’Keeffe E (2013) *Community biodiversity management: Promoting resilience and the conservation of plant genetic resources*. (Routledge, Oxon, UK).
- Boissière M, Bastide F, Basuki I, Pfund JL, Boucard A (2014) Can we make participatory NTFP monitoring work? Lessons learnt from the development of a multi-stakeholder system in Northern Laos. *Biodiversity and Conservation* 23: 149-170.
- CBD (2016) Traditional knowledge and the Convention on Biological Diversity (United Nations Convention on Biological Diversity)
- Chevalier J, Buckles C (2008) SAS2 social analysis systems: *A guide to collaborative inquiry and social engagement* (IDRC, Ottawa, Canada—Sage Publications, New Delhi). Available at: <http://www.sas2.net/>
- Colfer CJP, Prabhu R (1999) *Who counts most? Assessing human well-being in sustainable forest management* (Vol. 8) (CIFOR, Bogor, Indonesia).
- Conrad TC, Daoust T (2008) Community-based monitoring frameworks: Increasing the effectiveness of environmental stewardship. *Environmental Management* 41: 358-366.
- Constantino PdAL, Carlos HSA, Ramalho EE, Rostant L, Marinelli CE, Teles D, Fonseca-Junior SF, Fernandes RB, Valsecchi J (2012) Empowering local people through community-based resource monitoring: A comparison of Brazil and Namibia. *Ecology and Society* 17(4): 22.
- Cundill G, Fabricius C (2009) Monitoring in adaptive co-management: toward a learning based approach. *Journal of Environmental management* 90 (11): 3205-3211.
- Cunha dos Santos MC, Stone S, Schmink M (2007) Creating monitoring with rubber tappers in Acre, Brazil, ed. Guijt I. *Negotiated learning: Collaborative monitoring in forest resource management* (Resources for the Future, Washington D.C.), pp. 35-46.
- Danielsen F, Burgess ND, Balmford A, Donald PF, Funder M, Jones JPG, Alviola P, Balete DS, Blomley T, Brashares J (2009) Local participation in natural resource monitoring: A characterization of approaches. *Conservation Biology*, 23, 31-42.
- Das N (2011) Women’s dependence on forest and participation in forestry: A case study of joint forest management programme in West Bengal. *Journal of Forest Economics* 17(1): 67-89.

- De Araujo Lima Constantino P, Carlos H, Ramalho E, Rostant L, Marinelli C, Teles D, Fonseca-Junior S, Fernandes R, Valsecchi J (2012) Empowering Local People through Community-based Resource Monitoring: A Comparison of Brazil and Namibia. *Ecology and Society* 17, no. 4
- Dempsey C (2011) *Conservation Biology and GIS*. Available at: <https://www.gislounge.com/conservation-biology-and-gis/>
- Dietz T, Ostrom E, Stern PC (2003) The struggle to govern the commons. *Science* 302, 1907-1912.
- Elias M (2016b) Innovations in Ecosystem Management and Conservation. Technical Report. Diagnostic Study: Timeline (Bioversity International, Selangor, Malaysia).
- (2016a) Innovations in Ecosystem Management and Conservation. Technical Report. Diagnostic Study: Semi-structured Interviews (Bioversity International, Selangor, Malaysia).
- Evans K, Guariguata MR (2008) *Participatory monitoring in tropical forest management: A review of tools, concepts and lessons learned* (CIFOR, Bogor, Indonesia).
- , Larson A, Mwangi E, Cronkleton P, Maravanyika T, Hernandez X, Müller P, Pikile A, Marchena R, Mukasa C, Tibazalika A, Banana AY (2014). *Field guide to adaptive collaborative management and improving women's participation* (CIFOR, Bogor, Indonesia).
- FAO (2016). *Free Prior and Informed Consent: An indigenous peoples' right and a good practice for local communities: Manual for project practitioners* (FAO, Rome, Italy), 52p. Available at: <http://www.fao.org/documents/card/en/c/5202ca4e-e27e-4afa-84e2-b08f8181e8c9/>
- Fernandez-Gimenez, ME, Ballard HL, Sturtevant VE (2008) Adaptive management and social learning in collaborative and community-based monitoring: a study of five community-based forestry organizations in the western USA. *Ecology and Society* 13(2): 4.
- Ghate R, Nagendra H (2005) Role of monitoring in institutional performance: Forest management in Maharashtra, India. *Conservation and Society* 3(2): 509.
- , Mehra D, Nagendra H (2009) Local institutions as mediators of the impact of markets on non-timber forest product extraction in central India. *Environmental Conservation* 36(1): 51-61.
- Graudal L, Aravanopoulos F, Bennadji Z, Changtragoon S, Fady B, Kjær ED, Loo J, Ramamonjisoa L, Vendramin GG (2014) Global to local genetic diversity indicators of evolutionary potential in tree species within and outside forests. *Forest Ecology and Management* 333: 35-51.
- Guijt I (2007) Strengthening learning in adaptive collaborative management. The potential of monitoring. In *Negotiated learning: Collaborative monitoring in forest resource management*, ed. Guijt I (Resources for the Future, Washington D.C.), pp 3-22.
- Haggerty BP, Mazer SJ (2008) *The phenology handbook: a guide to phenological monitoring for students, teachers, families, and nature enthusiasts*. UCSB Phenology Stewardship Program (University of California, Santa Barbara)
- Haverhals M, Ingram V, Elias M, Basnett B (2014) *Gender and forests, tree and agroforestry value chains* (LEI Wageningen UR, Wageningen).
- Hegde N, Elias M, Lamers HAH, Hedge M (2017) Engaging communities in social learning for inclusive management of native fruit trees in Central Western Ghats, India. *Forests Trees and Livelihoods*, 26(1): 65-83.
- Herold M, Skutsch M (2011) Monitoring, reporting and verification for national REDD+ programmes: two proposals. *Environmental Research Letters* 6(1): 1-10.
- Institute of Marketecology (2005). *Guidance manual for organic collection of wild plants* (SIPPO, Zurich)
- Izurieta A, Sithole B, Stacey N, Hunter-Xenie H, Campbell B, Donohoe P, Brown J, Wilson L (2011) Developing indicators for monitoring and evaluating joint management effectiveness in protected areas in the Northern Territory, Australia. *Ecology and Society* 16 (3): 9.
- Jalonen R, Lamers HAH, Elias M (2018) Guidelines for equitable and sustainable non-timber forest product management (Bioversity International, Rome)

- , Lamers HAH (2016) *Diagnostic Study: Vision and action plan*. Innovations in Environmental Conservation and Management, Technical Report. (Bioversity International, Selangor, Malaysia).
- Lamers HAH (2016) *Diagnostic study: Diversity assessment of non-timber forest products using four cell analysis*. Innovations in Environmental Conservation and Management, Technical Report. (Bioversity International, Rome, Italy).
- Mosse D (1994) Authority, gender and knowledge: Theoretical reflections on the practice of participatory rural appraisal. *Development and Change* 25, 497-526.
- NCDD (2010) Resource guide on public engagement. Available at: http://www.ncdd.org/files/NCDD2010_Resource_Guide.pdf
- Ostrom E, Nagendra H (2006) Insights on linking forests, trees, and people from the air, on the ground, and in the laboratory. *Proceedings of the National Academy of Sciences*, 103, 19224-19231.
- Ottke C, Kristensen P, Maddox D, Rodenburg E (2000) *Monitoring for impact: lessons on natural resources monitoring from 13 NGOs*. (World Resources Institute and Conservation
- Rist L, Uma Shaanker R, Milner-Gulland EJ, Ghazoul J (2010) The use of traditional ecological knowledge in forest management: An example from India. *Ecology and Society* 15(1): 3. Available at: <http://www.ecologyandsociety.org/vol15/iss1/art3/>
- Setty RS, Bawa K, Ticktin T, Gowda CM (2008) Evaluation of a participatory resource monitoring system for nontimber forest products: the case of amla (*Phyllanthus* spp.) fruit harvest by Soligas in South India. *Ecology and Society* 13(2): 19. Available at: <http://www.ecologyandsociety.org/vol13/iss2/art19/>
- Southwood TRE, Henderson PA (2009) *Ecological methods*. (Blackwell Science Ltd)
- Stephen P, Triraganon, R (2009) *Strengthening voices for better choices: A capacity needs assessment process* (IUCN, Gland Switzerland)
- Sthapit B, Lamers HAH, Rao VR, Bailey A (2016) Community Biodiversity management as an approach for realizing on-farm management of agricultural biodiversity. In: eds. Sthapit et al. *Tropical fruit tree diversity. Good practices for in situ and on-farm conservation* (Routledge, Oxon, UK), pp 31-66.
- University, C. U. P. S. (2009). Environmental Inquiry. Available at <http://ei.cornell.edu/ecology/invspec/plotsample.html>
- UNU-IAS, Bioversity International, IGES, UNDP. (2013) *Toolkit for the indicators of resilience in socio-ecological production landscapes and seascapes* (United Nations University Institute of Advanced Studies).
- WWF (2015) *Community-based monitoring, reporting and verification know-how: Sharing knowledge from practice*. Available at: <https://www.globalcanopy.org/publications/community-based-monitoring-reporting-and-verification-know-how-sharing-knowledge>



Bioversity International is a CGIAR Research Centre.

CGIAR is a global research partnership
for a food-secure future.

www.bioversityinternational.org

ISBN: 978-92-9255-121-6