Chapter 1 - Introduction and Overview

Why a manual on multiparty monitoring for forest restoration projects?

Multiparty monitoring and assessment of forest restoration work is increasingly included as a requirement of federal programs such as the Collaborative Forest Restoration Program (CFRP) and Stewardship Contracting Pilots. Increasingly, foundation grants such as The Ford Foundation's Community-based Forestry Demonstration Grant Program are also requiring self-monitoring processes. Yet forestry practitioners and scientists have been given little guidance on how to monitor their projects.

In Spring 2002, six organizations came together to address the lack of monitoring guidance specific to forest restoration projects. The six sponsoring organizations included the USDA Forest Service - Collaborative Forest Restoration Program, the National Forest Foundation, the Ecological Restoration Institute, the Four Corners Institute, the Pinchot Institute for Conservation and the Forest Trust. These six organizations agreed to sponsor a collaborative group process with the objective of *generating a framework and guidelines for multiparty monitoring and assessment of forest restoration projects in Ponderosa pine ecosystems that will provide useful information at the project level and facilitate regional interpretation.*

Forty-three ecological scientists, social scientists, Forest Service employees, and community-based restoration practitioners agreed to help develop the framework and guidelines. These individuals worked together for over six months to develop this manual.

How to use this manual

The information in this manual is divided into three sections.

Chapter 1, *Introductions and Overview*, and Chapter 2, *Multiparty Monitoring Process*, provide a basic framework for multiparty monitoring of forest restoration projects. Users of this book are encouraged to read these first two chapters and use them to guide their own multiparty monitoring processes.

Chapters 3 and 4 provide specific examples and explanations of several monitoring goals, indicators, and measures relevant to forest restoration projects in Southwestern ponderosa pine ecosystems. These chapters contain many more indicators than any single monitoring group can use. Multiparty monitoring teams are encouraged to view these chapters as reference tools that can help them identify the goals, indicators, and measures that are most applicable to their project and feasible within their resource limitations.

Chapters 5 and 6 and Appendix I detail specific data sources and monitoring methods for each of the indicators listed in Chapters 3 and 4. These chapters should be consulted for specific instructions on monitoring methods after the group has selected its indicators.

Bolded and larger text is used to point readers to chapters that provide more information or instructions on the topic being discussed, e.g.: See Appendix I for a glossary of technical terms used in this manual.

Note: This manual is intended to assist multiparty groups with monitoring forest restoration projects, particularly in Southwestern ponderosa pine ecosystems. It is a first draft and should be revised and updated as appropriate. The information included in this document is advisory only; none of it is mandatory for CFRP grant recipients or any other restoration program.

What is forest restoration?

Ecological restoration means regaining the natural characteristics of ecosystems that have been negatively affected by overuse, pollution, or neglect. The Society for Ecological Restoration has defined it as "the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed." (Society for Ecological Restoration 2002)

Southwestern ponderosa pine forests have changed dramatically since the late 1800's. Typical ecosystem changes seen in ponderosa pine forests include:

- Decreased cover of grasses and wildflowers
- Decreased wildlife diversity
- Increased densities of small, stunted trees
- Decreased numbers of large old-growth trees
- Increased old-growth mortality rates due to competition with thickets of small trees
- Increased threats of large-scale insect infestation of trees
- Change low-intensity ground/grass fires to increasingly large catastrophic "crown" fires
- Increasing threats to property and human lives

Most people agree that these changes are due to drastic changes in land use and land management, particularly fire exclusion and fire suppression. Without surface fires to remove small trees, and because overgrazing removed many of the grasses and forbs from forest openings, by the early 1900's small ponderosa trees were colonizing what had been grassy areas. As these trees have grown, they have created dense Ponderosa pine forest thickets that typically have a lack of understory plant community and little biological diversity.

The dense pine forests we see today have in turn changed the nature of wildfire in the ponderosa pine ecosystems. Instead of surface fires, forest fires in ponderosa pine forests are now crown fires, capable of burning many thousands of acres in a very short amount of time. For example, the 2002 Rodeo-Chediski fire in eastern Arizona burned 70,000 acres in one day and 480,000 acres total. Until about 15 years ago, a 5,000-acre wildfire was considered big. The average size of a large wildfire tripled in the 1990's.

There is no commonly accepted set of guidelines for restoring ponderosa pine forests, although virtually all ponderosa pine restoration projects involve some amount of tree thinning and some use of prescribed burning.

Why monitor forest restoration projects?

Resource management often follows an "adaptive management" approach, which is designed to allow frequent review and feedback on progress toward project goals while the project is being implemented (Figure 1). This feedback allows project managers to take corrective action when faced with changing ecological, economic, or social conditions. Feedback is particularly important to ecosystem restoration projects to help forest managers, scientists, and practitioners can learn more about how restoration treatments change the forest and modify the treatments to better meet project goals.

Effective monitoring is an essential element of adaptive management, because it provides a *reliable* feedback on the effects of project actions. Monitoring involves the repeated measurement of variables over time to determine if actions have caused changes or trends-either expected or

unexpected. As opposed to casual observation, monitoring is designed to help us identify what changes are occurring in the system *and whether or not these changes are due to our actions*.

Why multiparty monitoring?

A multiparty process is one that involves a heterogeneous group of individuals from community-based groups; local, regional, and national interest groups; and public agencies in an effort to be responsive to diverse interests and objectives. In many ways, multiparty monitoring reflects a national trend toward broader participation in environmental policy and management, especially on public lands.

A diverse group of interests is more likely to develop a comprehensive list of issues to be monitored. Engaging diverse parties in the multiparty monitoring process can also help avoid duplication of efforts and unnecessary competitions among interests, may promote greater efficiencies, and could help build beneficial relationships among those involved.

The underlying premise of multiparty monitoring is that potentially conflicting stakeholder views are more likely to be resolved when each party is given the opportunity to independently identify what needs to be monitored, and when these concerns are integrated into a jointly developed monitoring program (Kusel et al., 2000, Bliss et al., 2001). Bringing diverse parties into the process early on, therefore, can help a group avoid potential conflicts later on.

One should keep in mind however, that this process approach is not just a way to promote "buy-in" or reduce conflict. Rather, multiparty monitoring should be used to:

- Identify the right questions to ask;
- Assess how well a project is meeting desired outcomes and responding to diverse concerns; and
- Identify how management can be adapted to improve results.

The multiparty approach is designed to promote a mutual learning, as participants work together to better understand project efforts and impacts. Participants can expect to gain a greater understanding of ecological health, the local community's economic and social well-being, and the interconnections between the environment, the economy, and social conditions. They will also learn more about others' perspectives on the project and its potential outcomes.

A multiparty process is not easy, however. Participants will have to work hard to make sure diverse interests are represented, that all stakeholders have access to the same information, and to develop a common understanding of the issues. It is not safe to assume that everyone means the same thing when they use words like "restoration," "monitoring," or even "forest." It will be necessary to spend time discussing different understandings of these and other concepts. It is especially important to develop a common definition of what "success" looks like, so that the team can agree when it has reached its goals.

See Chapter 2, *The Multiparty Monitoring Process*, for guidance on:

- identifying and engaging stakeholders,
- building a common understanding,
- defining goals and indicators,
- developing a monitoring plan,
- assessing and using monitoring results, and

- the skills and tools needed for multiparty processes.

What to monitor?

Multiparty monitoring groups are faced with the challenge of choosing the indicators of change that they will monitor. This guidebook includes dozens of sample indicators, many more than anyone could use for any given project. Monitoring groups will be faced with limitations of time and money, and they will have to carefully consider which indicators will provide them with the most useful information.

A good place to start is by examining project goals, as defined by the local community and other interests, including project funders and managers.

For example, Collaborative Forest Restoration Program grant recipients might start by looking at the program goals outlined in the Community Forest Restoration Act (Public Law 106-393):

1. To promote healthy watersheds and reduce the threat of large, high intensity wildfires, insect infestation, and disease in the forests in New Mexico;

2. To improve the functioning of forest ecosystems and enhance plant and wildlife biodiversity by reducing the unnatural high number and density of small diameter trees on federal, tribal, state, county, and municipal forest lands;

3. To improve communication and joint problem-solving among individuals and groups who are interested in restoring the diversity and productivity of forested watersheds in New Mexico;

4. To improve the use of, or add-value to small diameter trees;

5. To encourage sustainable communities and sustainable forests through collaborative partnerships, whose objectives are forest restoration;

6. To develop, demonstrate, and evaluate ecologically sound forest restoration techniques.

Even more specifically, the CFRP legislation states that every Collaborative Forest Restoration Program grant recipient must “include a multiparty assessment to:

1. Identify both the existing ecological condition of the proposed project area and the desired future condition; and

2. Report, upon project completion, on the positive or negative impact and effectiveness of the project, including improvements in local management skills and on the ground results.”

At a minimum, then, CFRP grant recipients will want to set monitoring goals related to determining (1) whether the project has helped achieve their stated desired future ecological condition in the project area; and (2) whether the project has helped achieve stated social and economic goals or social and economic conditions necessary to the project.

Once the group has identified the goals that it wants to monitor, it must select one or more indicators that can be used to measure change in that goal. An *indicator* is a unit of information

measured over time that documents changes in a specific condition. A good indicator is measurable, precise, consistent, and sensitive to changing conditions.

When selecting indicators, multiparty monitoring groups will want to ask themselves whether a proposed indicator is:

- Relevant for the site and treatment?
- Sensitive to change so that it can detect change within the monitoring timeframe?
- Measurable with available methods that multiparty groups can use to generate accurate, standardized data?
- Defensible and not subject to individual or organizational bias?
- Able to be measured by methods that are professionally accepted and understood?
- Integrated so that the whole suite of indicators provides a reasonable picture of ecological change?

Often there is more than one way to measure an indicator; in these cases, monitoring teams need to determine the specific *measures* they will use to track changes in the indicator. Selection of indicators and measures will depend on the availability of monitoring resources and the level of detail that the group needs.

Table 1 lists an abbreviated version of all the monitoring goals and indicators that are included in this document, along with the page number where more detailed information and possible measures may be found.

See Chapter 3, Ecological Goals and Indicators, and Chapter 4, Socioeconomic Goals, Indicators, and Measures, for more information on

- choosing goals and indicators and
- for examples of goals, indicators, and measures recommended for groups monitoring forest restoration projects.

How to gather defensible data?

It can be difficult to make claims beyond the very concrete accomplishments of a restoration project (e.g., cut 212 cords of wood). Yet, to justify the project , and to receive public and private support, monitoring teams need to show some degree of *causality*—that the project caused the changes they are measuring. There are three rules for "proving" causality. *(Note: It is never possible to prove direct causal agents, but through monitoring it is possible to identify whether specific activities appeared to make a difference on the indicator we are measuring.)*

1. **Time order: document baseline conditions**.
   The first rule is to show that changes occurred at the same time as the project was being implemented. It is therefore important to document the condition of the factors you are trying to improve **before** beginning the project, in order to have some basis for comparison later. Documenting baseline conditions means gathering data about those things the monitoring team is concerned about right away, before the starting the project. This is often called *baseline data.*
2. **Co-variation**.
   The second rule is to show that changes in measures are actually associated with project activities. To do this, record project activities and perform repeat measurements to assess how activities are affecting the conditions being monitored. Thus, one subtracts initial (baseline) values from final values to determine change during the project.

3. **Elimination of other possible causes of the outcome**.
   There are many factors other than project activities that could influence project outcome. For example, a law or regulation could change; new markets could develop for a given product; or a wild fire could destroy our project site. It is always possible that observed changes have little to do with the project and a lot to do with outside forces. It is impossible to control all external influences in a field project, but it is helpful to think about these external influences and their possible relationship to project results.

Most restoration projects can only claim a small portion of the credit (or blame) for positive or negative change. Unless the monitoring team has good baseline data, clear information on what the project did, and measures the same thing the same way during and after the project, the team can neither defend themselves nor show reasons why efforts should be expanded.

It is a good idea to identify other monitoring efforts currently underway or previously conducted in the project area or community. Most resource management agencies and many community and regional governments periodically conduct natural resources and socioeconomic surveys. There may be information available from previous research or monitoring that can be used as baseline data for your effort. Or it may be possible to coordinate data collection with another monitoring effort in the area. When doing so, however, be careful to assess the quality of the other group's data and data collection methods.

See Chapter 5, *Ecological Monitoring Tools and Methods*, and Chapter 6, *Socioeconomic Monitoring Tools and Methods*, for specific techniques for gathering and interpreting monitoring data.

See Appendix II for tables linking indicators and measures to monitoring methods and data sources.

What's really feasible?

Monitoring is costly in terms of dollars, but even more so in terms of the time commitment required by participants to develop and implement a monitoring plan. As with any venture, resource availability (e.g., finances, skills, and time) may directly impact the indicators and measures that are selected, how often data are collected, or even the realistic level of analysis. For instance, it may be necessary to collect trends in data, rather than absolute numbers.

Too often, monitoring programs set out to gather too much data, with the result that little, or the less critical information, is gathered. The monitoring team should be realistic about its financial, technical, and human resources when developing the monitoring plan.

Figure 1. Adaptive management model.

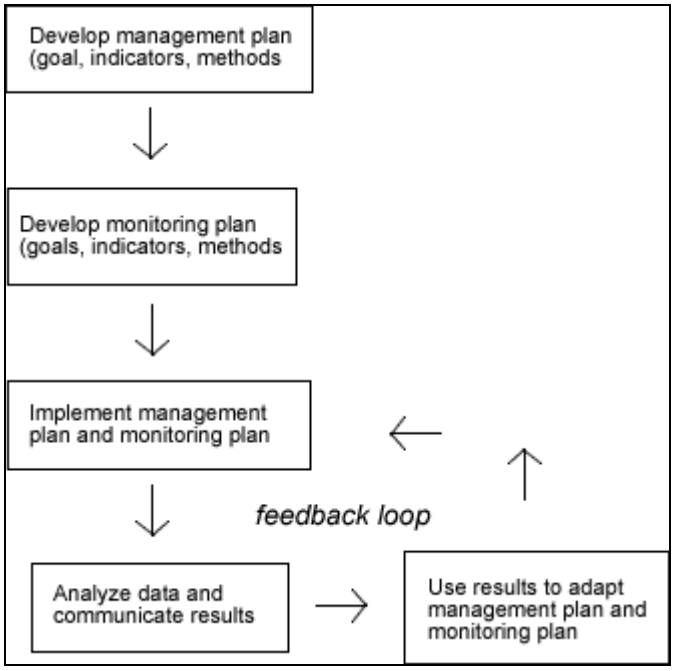

Table 1. Sample goals and indicators for monitoring ponderosa pine forest restoration.

Sample Goals	Sample Indicators	Page Number Reference
Reduce threat of large, high-intensity wildfire and re-establish low intensity surface fire regimes	• Tree stem density and area • Canopy closure • Height from the ground to tree crown • Surface fuels cover and depth • Spatial distribution of canopy closure and breaks	23
Preserve old and large trees, both living and dead	• Density of large trees, old trees, and large dead trees	24
Enhance native plant populations and reduce invasives	• Understory plant species cover • Understory plant species richness	25
Conserve wildlife populations and their habitats	• Bird relative abundance and species richness • Wildlife presence indices • Habitat attributes	26
Conserve soil resources	• Surface bare soil • Soil loss from small watersheds Soil compaction	28
Conserve and protect watersheds	• Riparian community health	28
Increase economic vitality	• Business retention and growth • Community sustainability • Financial capital • Local infrastructure	31
Local industry and workforce capacity	• Workforce capacity • Organizational competency • Value-added forest products industry • Market for local restoration products • Supply of and access to forest resources	34
Increase the equity of social and economic opportunities	• Distribution of work • Distribution of projects across communities • Traditional forest users' values	36
Improved quality of life	• Employment conditions in restoration-related industries for local and mobile workforce • Restoration workers' ability to participate in family and community life • Community access to forest resources • Risk of catastrophic wildfire • Locally important quality of life values	38
Improved community connection to the forest	• Community understanding of forest health issues • Community understanding of connections between community health and forest health	40

Sample Goals	Sample Indicators	Page Number Reference
	• Educational and training opportunities in forest restoration • Opportunities for families within the community to appreciate a healthy forest • Level of community participation in forest restoration • Youth opportunities in forest restoration • Cultural ties to forest ecosystems and traditional lifestyles	
Increased capacity for collaboration	• Communication skills and techniques • Communication resources • Representation and understanding of diverse community perspectives and interests • Extent of community participation in restoration-related activities • Quality and timeliness of USDA Forest Service communication • Community involvement in decision-making • Community understanding of the political context around forest restoration	43
Support for multiparty monitoring	• Commitment to monitoring • Balance of perspectives on monitoring team and in monitoring plan • Technical assistance in forest ecology, fire behavior and monitoring methods • Adaptive management orientation • Sense of collaborative learning	46