# INTRODUCTION

Creating monitoring programs may seem easy, but actually isn't. There are three primary impediments: money, credible data, and communication skills. We emphasize communication skills because the best data in the world is useless if it lies fallow. But credible data is also critical to convince skeptics and engender trust. We emphasize money because there is never enough and because credible data must be collected and communicated using available resources. Without these three ingredients, a monitoring organization's efforts are wasted and the opportunity to affect policies and events is squandered.

NGOs play a vital role in society. They provide important information to governments in development of their natural resources management plans. Good, independent information provided by NGOs on the status of natural resources and government and private industry activities—that is, *monitoring data*—helps societies improve their natural resources management.

# THE CASE STUDIES

Thirteen environmental monitoring NGOs provided case studies for this handbook. (*See Table 1.*) Abridged versions highlighting specific points about the development and execution of monitoring programs of the case studies can be found at the back of this volume. The full text of each case study is printed in volume II of this handbook and is available through the Global Forest Watch (http://www.globalforestwatch.org/) and Conservation International (http:// www.conservation.org) Web sites.

The NGOs were selected using three criteria: 1) They have monitoring programs that are aimed at influencing environmental policy; 2) they are independent; and 3) they collectively represent experience from around the world. (See Figure 1.)

There are many approaches to successful monitoring. These guidelines can be altered to meet local needs. The 13 NGOs above demonstrate successful monitoring using diverse intentions and can take many forms. We present them as a guideline that can be altered to meet local needs.

Successful NGO monitoring programs typically include a variety of smaller projects, each focused on a different aspect of the NGO's mission. Examples include counting logging trucks leaving a harvest site; interviewing citizens or officials; reviewing a company's application for an oil concession; collecting field data on an endangered species; or analyzing satellite photos. Each of these activities can be found among the 13 case studies. All examples 1) include a project that monitors a specific and relevant issue; 2) includes some form of intentional data collection; and 3) provides timely and effective communication of important results.

<u>CS</u>	<u>Name</u>	Priority Activities	<u>Area of focus</u>
1	Association for the Protection of Environment and Culture	Effective use of a broad volunteer base to monitor resources and people's perceptions of resources.	Nepal
2	Centre for Environment and Development	Structured plan for monitoring program planning and implementation.	Cameroon
3	CODEFF	Conducting airplane surveys to help plan fieldwork; tools and approaches to improve fieldwork effectiveness, and use of good government relations in their communication strategy.	Chile
4	Conservation International— Bolivia	Developing a monitoring program around questions. Threshold monitoring to track conditions and change.	Bolivia
5	Conservation International— Guatemala	Using remote sensing data and Geographic Information Systems to create maps that clearly illustrate a large-scale problem.	Guatemala
6	Conservation International— Washington DC	Using secondary research to graphically show trends and state of extractive industries.	International
7	Environmental Rights Action	Effective use of a variety of approaches to monitor development and its effects on local people. Community networks are its particular strength.	Nigeria
8	Forest Watch/ Sierra Legal Defence Fund	Using benchmarks to assess whether government and industry are meeting their own stated goals, as well as ecological sustainability.	British Columbia province of Canada
9	Friends of the Earth— Amazônia Programme	Comparison of government laws and regulations with field-level data to show lack of law enforcement.	Brazilian Amazon
10	Global Witness	Covert investigative monitoring and long-term continuous communication at high levels for eventual impact.	Mostly Cambodia, also Angola
11	Institute for Social and Environmental Studies of Southern Bahia	Using knowledge from monitoring and a long-term communication strategy to implement a workable conservation strategy.	Brazil
12	Le Pou d'Agouti	Creating a network of people and NGOs to monitor and to communicate. Working with government in creating policy and enforcing laws.	French Guiana
13	Telapak	Utilizing a broad network of NGOs to conduct extensive fieldwork. Using imaginative and varied communication strategies.	Indonesia

# Table 1: Case Study organizations represented in this Handbook.



# WHY MONITOR?

The collection and communication of accurate information can lead to government and industry policies and behaviors that advance an NGO's mission. Every organization has its own information needs and must design specific and targeted monitoring programs to meet them.

Monitoring allows NGOs to promote better management of the environment in a number of different ways, including:

• Assessing the status (healthy, in danger, or degraded) and trends (improving, stable, or declining) of natural resources. This infor-

mation can help set levels of appropriate harvest levels or identify activities that are not sustainable.

- Assessing the regulatory and legal systems enacted by corporations and government and whether they are being enforced.
- Assessing the quality of environmental management.
- Checking government- or corporatesupplied information for accuracy.
- Revealing dangerous or illegal practices. If they continued unchecked, such practices could lead to the permanent loss of a resource.

Ultimately, monitoring can be used to assess whether governments, companies, and society are fulfilling their obligations to manage natural resources according to laws and the best public good.

## Advantages Of Monitoring

NGOs choose to monitor because they can influence government and public policy by gathering and providing good information. At least seven mission-oriented and political benefits accrue to an organization that conducts effective monitoring:

1. Evaluation of the Health and Status of Natural Resources

To raise awareness among the public and other groups, NGOs generally need an assessment of the existence and extent of a problem. Monitoring data may also be critical in helping an NGO assess whether a resource is improving or declining.

2. Political Influence and Legal Standing

In many societies, information is not freely or easily available to those with little political and economic power. Those without access to information are less able to influence the policies that govern environmental matters. Monitoring gives NGOs the power to challenge inappropriate natural resource management with accurate data. In its discussions with the British Columbia (BC) government about the ineffectiveness of the BC code in protecting the forest ecosystem, Sierra Legal Defence Fund has used data to successfully illustrate their position.

# 3. The Ability to Foresee and Prevent Problems

NGOs can use monitoring to raise concerns and prevent problems. By issuing alarms to the public, to government agencies, and policymakers, NGOs can sometimes inspire corrective action that prevents future problems. Telapak used this strategy when they monitored a company's logging plans in Indonesia. By looking at concession plans and their projected implications over a five-year period, Telapak can seek to stop problems from continuing or escalating.

### 4. Watchdog Status

A house with a "Beware of the Dog" sign is a warning to potential thieves. An organization that monitors serves a similar function. If environmental abuse occurs, the abusers know they will be challenged. Potential wrongdoers may choose to avoid this exposure. The mere existence of a credible NGO with solid information, such as Global Witness or Environmental Rights Action, can limit flagrant environmental abuses because potential transgressors know their violations will be noticed.

# 5. Providing Allies with Needed Information

Many organizations are not able to gather their own monitoring data. Sharing good information enables NGOs to mount a stronger challenge against poor policies. Le Pou d'Agouti found that they possessed the best-developed data in French Guiana. They set up a network and circulated information and expertise among local and regional environmental and social organizations.

### 6. Recognition

Recognition is built over time as governments, industry, journalists, and the public come to trust the findings of a monitoring organization as accurate and useful. As this trust is earned, NGOs increasingly become a source of information. For example, Global Witness has noticed an increase in their status over the years. Initially, they were information gatherers. After gaining recognition as experts, governmental officials, newspapers, and other NGOs sought their expertise and advice. Now their reputation has earned them an appointment as the official forest monitoring body for the Cambodian Government.

### 7. Self-assessment

Monitoring helps NGOs to assess whether they are meeting their goals and having an impact.

# OVERVIEW OF MONITORING

# A CREDO FOR ANY MONITORING PROGRAM

There are four general characteristics of good monitoring.

- 1. Know what you are doing and why;
- 2. Keep it simple and direct;
- 3. Obtain credible, bias-free information that can be used for management action; and
- 4. Communicate the results to have impact.

The details of any specific monitoring program tend to be idiosyncratic—that is, monitoring programs need to be designed with the context clearly in mind. No exact prescription exists.

## WHAT IS MONITORING?

In this book we define monitoring as the collection and analysis of repeated observations or measurements to evaluate changes in condition and/or progress toward an objective (Spellerberg 1991). It is a process of paying attention over time to a specific issue. Four features of this definition are critical. Monitoring:

- 1. Is a process of multiple measurements;
- 2. Measures aspects of specific issues or concerns;

- 3. Measures progress relative to specific objectives or goals; and
- 4. Communicates the results to guide or correct management or enforcement actions.

In this handbook, we are interested in monitoring as a way to answer *specific* questions about *particular* entities. Monitoring is a system of focused data collection designed to answer questions. Unfocused monitoring activity is a waste of resources.

# MONITORING AND RELATED ACTIVITIES

Monitoring sources often incorrectly group numerous related activities under the heading "monitoring" (Goldsmith 1991). Some of these activities are listed below. While any of these may be appropriate for particular problems, not all are necessary to a successful monitoring program.

*Natural history studies* consider the basic biological and ecological understanding of the sites and resources in question. Understanding the natural history and conservation importance of an area can set the stage for monitoring, but such studies are not the same as monitoring.

*Research* involves scientific and perhaps experimental work to understand "cause and effect" relationships. Like natural history studies, research may be an important underpinning and justification for the details of the monitoring program (see the section below on monitoring), but is not monitoring itself.

*Inventory* (sometimes called survey or census) is typically a one-time collection of data on species composition or resource status. Inventories are often appropriate or necessary in the preliminary, planning stages of monitoring because they can help identify what to measure against in the future. Repeated "inventories" can qualify as monitoring.

*Implementation monitoring* is data collection on actions. Was the agreed action taken? Several of the case studies presented in this handbook include implementation monitoring studies, tracking whether mandated management actions were implemented. These can be relatively easy studies since the data are clear (activity *did* or *did not* occur).

There are three related types of monitoring that are well-suited for NGOs conducting monitoring for impact: baseline monitoring, change/trend monitoring, and threshold monitoring.

#### Baseline monitoring

Baseline monitoring measures the status of a target to establish a regular or "normal" value. Baseline monitoring is often performed in advance of an anticipated event (e.g., the construction of a dam or extensive logging) in order to document the change caused by the event. While baseline monitoring is important for resource managers and governments implementing development projects, it is typically an ineffective use of NGO money and time. Such studies lack a clear and specific question or objective and therefore do not easily translate into impact. It is preferable to identify a specific question (or set of questions) and design a monitoring program to address it.

However, baseline monitoring should not be ignored. Because baseline monitoring conducted by others often identifies "normal" or "natural" (pre-disturbance) biological values, these studies can be of value to NGOs seeking thresholds against which to monitor. Figure 2a shows an example of baseline monitoring in a study of bird species richness in the (hypothetical) "Mzee" forest from 1992-1995. This study was undertaken in anticipation of significant harvesting in the area to take place in 1995. These data identifies the 31 "normal", or pre-disturbance, number of species. This baseline could be used to assess the impact of harvest activities started in 1995.

#### Change/trend monitoring

Change/trend monitoring is used to assess change in the resource. Are the measurements increasing or decreasing over time and what does this say about the resource? Is the situation getting worse or getting better?

#### Figure 2a. An example of baseline monitoring





This approach to resource assessment provides an effective illustration. But requires a significant amount of data—it takes at least three data points (i.e., samples) to identify a line.

Figure 2b depicts bird-species richness in the Mzee forest after disturbance began in 1995. The monitoring is designed to determine whether there is a trend (i.e., slope) in species richness.

### Threshold monitoring

Threshold monitoring compares a monitoring result to a predetermined value. Thresholds are best used when they are stated in advance of monitoring and based on some rational or scientific judgment. Threshold monitoring can be very efficient and effective—once a target or threshold is set, single observations can be used to compare current status to the target.

Figure 2c. continues the Mzee forest example. In this case the pre-disturbance baseline data collected from 1992-1995 was used to identify a threshold value of 31 bird species for Mzee forest. Subsequent post-disturbance measures of richness are compared to the target or threshold. As species richness is less than 31, we can infer that the habitat value for birds in the forest has declined.

Another example of a threshold could be an agreement with local people living in a national park buffer zone that they keep forest clearing to less than 2% of secondary forest per year

Figure 2c. An example of threshold monitoring



and that there be no clearing of primary forest. If your NGO measures secondary forest loss at over 2%, you have evidence that the community is not managing the resource as they agreed to. This same approach can be applied to industry or government commitments.

## Project or Performance Monitoring

Project or performance monitoring assesses whether the monitoring activities and communication strategy were implemented and are having an impact.

# **PROJECTS AND PROGRAMS**

An individual monitoring project is directed at a particular question of importance. One or more monitoring projects make up a monitoring program. (See Figure 3.) A monitoring program is organized around some broad need for information or action, perhaps related to the NGO's mission statement. Monitoring projects are the focused data collection tasks that address components of the larger question. Thus, monitoring occurs in a continuous observation-evaluation cycle. (See Figure 4.) The CI-Bolivia case study provides an example of the hierarchical structure of monitoring programs and projects. CI-Bolivia's monitoring program seeks to assess the status of biodiversity in the Madidi National Park, the threats to the ecosystem's health, and the management of the park. To arrive at these ends, numerous projects were developed. One project was to collect

#### Figure 3: The monitoring process: structure of a monitoring program with one to several individual projects



baseline data on biodiversity and the state of resources in the park by gathering population data on scarab beetles, antbirds, lake reptiles, and several species of large mammals. A second project assessed the extent of resources extraction such as hunting and logging in the park. And a third project monitored the level and impacts of ecotourism by tracking the number of visitors, the condition of the trails they used, and trash accumulation and disposal.

# MEASURES OF SUCCESS

Both monitoring projects (*see Figure 4*) and monitoring programs (*see Figure 3*) have a component called "performance evaluation"— meaning an internal evaluation of the program or project's effectiveness — which asks, are we being successful in our work? Such an evaluation has four components, or key questions:

- 1. Did we successfully implement the monitoring we set out to perform?
- 2. Did we reach the intended audience? For example, did the fliers reach the village? Were the radio spots aired? Was the report written and mailed?
- 3. Did we reach the intended audience? Were the communication efforts effective? Were management actions improved?
- 4. Most importantly, was the conservation of the resource changed by our actions? Were destructive behaviors reduced or eliminated? Is the status of the resource improving?

Performance evaluations are important for both individual projects and whole programs.

# THE IMPORTANCE OF SETTING TARGETS IN THE MONITORING PLAN

Targets are a clear, ideally quantitative description of a measurable standard, desired state, threshold value, amount of change, or trend. They may also set a limit on the extent of an undesirable change. Monitoring targets should have the following traits:

- 1. Setting targets requires that you focus on a goal for the desired result. This target does not have to be perfect, only your best estimate, and can be revised.
- 2. Describe to others the desired result. Targets are valuable because they set a

# Figure 4: The monitoring process: the stages of an individual monitoring project.



clear goal for the entire team and allow for easy and open discussion on creating a successful monitoring project. Targets show how far there is to go to reach the desired result.

- 3. Determine the management structure, and create an alternative management plan in case objectives are not met.
- 4. One of the hardest things in monitoring is knowing when to stop. Reaching a target shows whether we have succeeded and can move on to other projects or if we have failed and need to act before the resource has reached a critical level.
- 5. Having clear targets can help identify the intensity of the situation, and thus can help clarify the resources needed for the project.

Developing a foundation of good monitoring targets is probably the most critical stage in the monitoring process (MacDonald et al. 1991). Targets must be realistic, specific, and measurable and should be clearly written. Targets must not be ambiguous or vague. Their power emanates from their specificity.

## MEASUREMENTS AND INDICATORS

One of the many decisions to make in a monitoring plan is what to measure. Once you have identified the purpose of the monitoring—say, to estimate the amount of logging in a given forest-there are two choices: 1) measure the amount of logging *directly*, or 2) choose an *indicator* or "correlate" of logging. In the logged forest, we can measure the actual number of trees cut, or if this is impossible, "indicate" logging intensity by counting the number of logging trucks leaving the area. Clearly, the quality and usefulness of logging trucks as a measure of logging intensity depends on the correlation between trucks and trees cut. This is true for all indicators- they must be evaluated carefully.

Well-crafted indicators tend to have a number of general attributes (Cairns et al. 1993, Noss 1991), provide summaries of various indicators and the uses to which they can be put. See Box 1 for an examples of indicators used by Sierra Legal Defense Fund (SLDF) in British Columbia, Canada.

# HIGH-QUALITY, CREDIBLE DATA

Credibility and trust are essential to a NGO's reputation. Both are built over time by the provision of trustworthy information. It must be clear that *data* are driving the claims made in advocacy and not the other way around. Objective, non-sensational and defensible analysis and communication of the results are crucial for *longterm* success of the NGO.

# MONITORING PROJECT STAGES

NGOs cannot afford to waste their assets through poorly planned or executed monitoring projects — money is scarce, staff is stretched thin, and reputations are fragile. Poor project planning threatens the natural resources they are designed to protect, and squanders the opportunity to collect useful data and might damage the NGO's reputation. To avoid these pitfalls, we suggest three stages for a successful monitoring project: planning, implementation, and evaluation/ communication. (*See Figure 4*.)

## STAGE 1: MONITORING PROJECT PLANNING

- 1. Outline the purpose, audience, objectives, and targets.
- 2. Gather information and materials (background knowledge).

- 3. Establish measurements and indicators.
- 4. Determine the methodology, including the scale, indicators, data collection methods, and analysis methods.
- 5. Audition (test) the methods.
- 6. Develop a communications strategy.
- 7. Create a budget.

# STAGE 2: MONITORING PROGRAM IMPLEMENTATION

- 1. Collect the data.
- 2. Organize the data.
- 3. Analyze the results.

# STAGE 3: EVALUATION AND COMMUNICATION

- 1. Decide on your target audiences.
- 2. Determine how to reach and influence those audiences.

To begin a second round of monitoring, return to Stage 2 to repeat the cycle. Or, if the methods are not working, return to Stage 1 to develop a new plan and correct methodological problems. Finally, if the goals and objectives of the monitoring program have been reached, stop the monitoring and communicate the results. Then move on to something else. Plan for every phase of the project in advance — include plans for "worst-case scenarios," but even with careful planning, unforeseen problems can occur. Auditioning or testing the proposed methods cuts down on the number of problems in the implementation stage, but is not always possible. course when things do not work. Telapak stresses to its monitors the need to be flexible in their thinking. If the established plan is not effective, gather the pertinent information and determine the next, best course of action. Flexibility is most helpful in undercover and observational studies. However, for studies that depend on consistent scientific data, modifications during the implementation

Be prepared to modify plans and change

## Box 1: Indicators and direct measurements applied in British Columbia, Canada

In a study of landslides and forestry management practice in British Columbia, SDLF<sup>\*</sup> used the frequency of steep slopes (>60% incline) to *indicate* unstable terrain. The measure assessed two things: (1) how much of the landscape was steep (i.e., unstable), and therefore unsuitable for logging, and (2) whether the logging company plans were accurate. "Although we realize 60% slopes do <u>not</u> (*emphasis in original*) correlate directly with potentially unstable terrain, it does give some indication of both the amount of logging on steep terrain and the accuracy of terrain mapping submitted by the logging companies. This is reinforced by the fact that a large percentage of the [forest] blocks we reviewed were on slopes in excess of 70%!"

% Blocks logging

#### The data:

	% Blocks	SDLF	companies identified		
<b>District</b>	<u> # Blocksid</u>	lentified as steep	<u>as "landslide prone"</u>		
Chilliwack	114	63%	$28\%^{-1}$		
Port Alberni	174	80%	9%		

Two issues should be noted:

1. Steepness is an *indicator* of unstable ground unsuitable for logging. The use of this indicator is based on previous logging experience in the literature and generally agreed practice.

2. As a measure of the accuracy of logging company plans, the % of steep blocks is a *direct* measure, since SDLF measured the same thing the companies did. SDLF used these data to question the quality of the companies' logging plans.

\*Sierra Legal Defence Fund, "Going Downhill Fast: Landslides and the Forest Practices Code", June 1997.

stage of the project can preclude clear analysis.

# STAGE 1: MONITORING PROJECT PLANNING

Every NGO in the case studies recognize and advocate careful planning before beginning a monitoring program. Planning helps to ensure the success; you avoid problems and capitalize on opportunities that would otherwise be missed. The planning process takes the project from the conceptual stage (what you want to achieve) to the specific (how you will achieve it), giving clear direction to everybody involved in the project. At the end of the planning process, you should have a detailed work plan.

We've included forms to be used in planning phase. In the planning description below, each table is filled out with examples from the case study NGOs and does not represent a single example. Some fields that require personal information, such as names of who will collect data, have been left blank.

Blank tables can be found at the back of the handbook or downloaded from the Internet at (*http://www.globalforestwatch.org*).

The Purpose, Audience, And Objectives Of A Monitoring Project

#### **Identify the Purpose**

Identifying the purpose is the first step in any monitoring activity. It gives focus to the rest of the monitoring program. The purpose should be straightforward, specific and attainable. Note that the purpose is typically an action or change that will be implemented or enacted by someone else. For example, it may be a behavior change in government agencies, the improved management practices of extraction companies, or increased income of local residents. (See Planning Form 1 below for an example of a monitoring purpose.)

#### **Identify the Target Audiences**

Once the purpose of the monitoring program has been determined, you should choose the target audiences. This will allow you to further focus your planning. Deciding on the target audience demands thinking through who you want to influence. Who has the power to intervene and make changes that satisfy your objectives and serve your mission? Who is most likely to use their influence for you? Possible audiences are the general public, academics, international donors, local residents, other NGOs, the media, politicians, bureaucrats, and business people. Many monitoring programs will target more than one audience. After you have decided on your target audiences, fill in a line of the planning tables for each one.

Monitoring	Audiences	Objectives
Purpose		
Stop the illegal	Thailand's and Vietnam's	Quantify the extent and/
logging in	governments (purchase	or destination of illegal
Cambodia	the timber)	logging
	International donor	Identify the actors and
	agencies: World bank,	quantify the extent of
	SIDA, USAID	legal logging
	U.S. State department	Quantify the number of
	(denies the trade's	arrests or citations for
	existence)	illegal logging
	Cambodia's government	Document the
	_	publication of the law
		prohibiting the logging in
		question

#### **Planning Form 1: Monitoring Purpose**

The communication section later in the handbook provides more information on how to identify and reach target audiences.

## **Identify Objectives**

Creating objectives serves to focus planning on what kinds of data are needed to document the situation and convince the audience of your purpose.

# BACKGROUND KNOWLEDGE

Background information and materials must be gathered next. While you will surely have some initial knowledge of the situation, this effort is required to gather information that will specifically help you plan and implement the monitoring program. This information enhances your ability to understand appropriate strategies for gathering data, choose audiences to target, and recognize problems to avoid.

Five sources of preliminary information exist:

- 1. Previously collected data, including pilot studies.
- 2. Published papers, books, and manuscripts.
- 3. The experience of other experts.
- 4. Interviews with interested parties.
- 5. Your own experience and intuition.

Use a wide variety of sources in gathering background information. Examples include

interviews with government and company officials, local people, trips to the field, newspaper articles, trade journals, management plans, ecological studies, law books, and whatever else will tell you something relevant. Planning Form 2 provides a format to record the sources and the information they provide.

Examples of important background topics to investigate include:

- The ecology of the resource, the history of its use, and the social history and situation of the people living around the resource.
- The politics and law surrounding the resource, including current legislation and legal battles.
- Management plans and/or environmental impact assessments submitted by the company.
- The economics of the resource and the specific situation that will be investigated
- The history and reputation of the companies.
- The strengths and weaknesses of partners in the monitoring effort.
- Cultural and language issues between the local people and the company.
- An understanding of different monitoring approaches, including which approaches have worked in that resource in the past.
- Approaches that have achieved results in previous efforts to improve resource use.

Source of Background Information	Value Added by Background Information
Trade Journals	Gives an idea of how much and where illegal timber is crossing the border
Legal codes	Provides information on what activities are illegal and why—what to look for
Newspapers	Gives general information, for example what different ministers are doing and whether there is a change in political climate
Reports on the location and status of government and rebel troops	Allows planning of where the monitoring should take place safely.

#### **Planning Form 2: Summary of background information**

Opportunities should be incorporated into your monitoring program when possible. These include special political opportunities such as a policy debate on particular resource issues, locating a local university with graduate students who need field or NGO experience to graduate, or a donor who wants a topic of common interest monitored. You may also encounter constraints that demand altering the monitoring program.

# DETERMINE THE VARIABLES AND INDICATORS

#### Variables

You must decide what variables are to be measured (sometimes called measurement instruments). These variables follow directly from the monitoring objectives previously identified. Choose measurements that are as simple as possible—that get the job done-because these tend to be easiest to collect, analyze, understand, and communicate. Some simple studies may involve only one variable; others may require the collection of several variables. Collect as few as possible that together answer the relevant questions. Which measurements are ultimately chosen for a particular monitoring study depends on questions asked and the resources available. No fixed prescription can be made. See Planning Form 3 for examples of some indicators used by case study NGOs.

Most of the case studies used simple measurements and indicators. SDLF used a variety of indicators to identify the

prevalence of steep-slope logging in British Columbia. (See Box 1.) Telapak, to investigate the legality and quality of logging being carried out on timber concessions, measured the size of harvested trees, the steepness of slopes in harvest areas, and the geographic location of the logging activities relative to neighboring protected areas, communities, and watersheds. Together these variables document patterns of illegal and poorly managed resource use. Conservation International collected more complicated data in their study of land use change in Guatemala. Using extensive satellite photos, they measured detailed aspects of land use over wide geographic areas. Which measurements are finally chosen has an important bearing on later decisions concerning data collection methods, scale, and analysis.

# DATA COLLECTION APPROACH

There are many ways to collect data: journalistic or detective investigation, acquisition of administrative records, ecological site assessments, interviews, remote sensing with airplanes or satellites, and others. The most appropriate methods for a specific project depend on the project's goals, the monitoring question at hand, the staff's expertise, the availability of partner organizations with additional resources, cost, time, the level of accuracy needed, and the working conditions. Taking these factors into account as you plan data collection will ensure the best methods for your study. The following is a

#### **Planning Form 3: List of indicators and measurements**

# NOTES

Indicator	Approach	Geographic Area	Scale	Precision/Ac curacy	Target
Illegal log stockpiles	Visit areas where logging is suspected				No log stockpiles
Documents showing timber sold with no permits or expired permits	Acquire documents				No logging without proper paperwork.
Trucks carrying illegal logs	Set up manned monitoring stations at two primary road. Count logging trucks.				50% reduction in illegal logging traffic within 5 years

review of major classes of data collection methods.

### Investigation

In this handbook, investigation is defined as specific monitoring methods using:

- 1. The tools of an investigative journalist or detective to gather data.
- 2. Interviews with citizens or officials sharing government information.
- 3. Undercover activity to gain access to sensitive or protected information.

In some situations, investigation is the most effective way to gather data, especially where political and social situations are not open. The tools investigative monitoring programs apply depend on the needs of the monitoring program and the political situation in which the monitoring is conducted. Investigation, like all monitoring methods, is most powerful when similar techniques are used over time in order to illustrate a trend.

Investigators compile and document hard-toget information on the "what, where, when, who, and how" of activities. Investigators use a variety of means to get their information: interviews, observation, photography, videography, and the acquisition of documents in and out of the public record. Undercover action or impersonation is sometimes useful. See Box 2 for examples of investigative monitoring from the case studies.

## Box 2: Examples of investigative monitoring

#### FRIENDS OF THE EARTH-AMAZONIA PROGRAMME (FOE)

Investigative Journalists: FOE found that hiring reliable investigative journalists can often prove a very cost-effective way to run a project. Journalists also can often create synergies for outreach activities. For example, this technique often led to impressive, exclusive articles that stimulated interest for their reports.

#### TELAPAK:

Telapak uses investigation and observation extensively as data-gathering tools, using the techniques to gather varied data. Employees of logging companies, local villagers, and government officials all serve as informants. Information is written and recorded using cameras and videos both openly and covertly. Monitors will sometimes sign on with a company as day laborers, working for them for a number of weeks, taking pictures and notes while they are in the back country.

While some of these undertakings need to be quite covert, this is not always the case. Many of the people they interview are very happy to talk. Villagers talk because they have grievances to voice due to the loss of traditional land. Workers talk because they feel resentment toward their company. Government officials talk because they feel the government's actions are immoral. Knowing how to present yourself to people in different situations is an important aspect of this work.

Gathering data from informants: There are many people in Indonesia with knowledge of illegal and unethical company and government activities. Depending on who they are, the approach in gaining this information takes different forms. There are however, general principles that apply across the board. Informants give the investigators information because they want to tell someone and because they trust the investigators. The need to nurture the relationship is stressed by Telapak in training its investigators. In talking with potential informants, they stress the fact that they will not mention names in association with the data. Investigators also try to bring a letter of introduction or a card from a local villager as a means of establishing trust. If the investigators assume an identity, they will, of course, assume one that is not threatening to the people they are speaking with. Whistle-blowers can be valuable sources of information. Many people are frustrated by poor management in their government or company. Frustrated ministry or corporate staff can sometimes be a valuable source of information.

Because investigative monitoring seeks to obtain information that is viewed as sensitive by governments or corporations, the activities can be dangerous even though your monitors are careful to avoid breaking laws. Your NGO should therefore take care to recognize potentially dangerous situations and avoid them. Monitors should be prepared for these situations by knowing the law, so they may stay within it, and by training to recognize and avoid dangerous situations.

Many NGOs profit from interviews with local citizens. Often, though not always, these people are excellent sources of information about local land use. Environmental Rights Action uses "participatory research" conducted with villagers to gain extensive intelligence about the local ecosystem and land use. (*See Box* 3.)

# **Secondary Sources**

Every case study used secondary sources to some degree in their monitoring programs. The paper trail left by government and corporate activity, as well as newspapers, statistical compendia, the Internet, scientific and trade journals, and various

# NOTES

### Box 3: Using local people as informants

There are different ways of tapping the extensive knowledge that local communities have about local resources and development. Some methods, such as Rapid Rural Assessment or Participatory Rural Assessment, are specialized methods that provide standardized data. These tools are used by ERA and APEC case studies. They are useful when an NGO plans to rely on local groups for information. See the Tips, Tools, and Examples section for more on these methods. All the case studies use local knowledge on a less formalized basis as a means to gather background information and focus their fieldwork. Telapak will often carry a letter of introduction from a local contact and train its monitors to be non-threatening. They always start their questioning by stating that the identities of those interviewed will not be revealed.

#### ERA's use of participatory research:

Participatory research (research in which local people provide monitoring data) is used by ERA for data-gathering. ERA field officers try to immerse themselves into local life when conducting participatory research. This helps them understand the perspectives of local people.

The data acquired through participatory research are valuable to ERA because rural communities usually have a good understanding of activities in their area. Political connections, changes in land ownership, and activity by non-locals are all noticed and discussed by local people. In addition, if ERA is looking at impacts from a development project already completed, the capacity of local people to understand and see changes in the natural world they have grown up in is a great asset. Participatory research is an effective way to tap local knowledge.

Participatory research helps to build trust between ERA field workers and the communities and helps the community to articulate its own experience and ideas. Also, participatory research provides information that helps to plan locally relevant and acceptable activities. Most importantly to ERA, monitoring through participatory research enables communities to have a platform to make themselves heard by a wide audience.

In addition to the benefits that accrue to ERA, participatory research also benefits the local community. It is empowering to know that somebody is concerned with what happens in their local area and is working to stop harmful development. Passing on their knowledge helps people to feel that they have some control and can inspire them to continue monitoring.

other sources is often a powerful starting point for a monitoring program, and sometimes the basis for entire monitoring programs.

Secondary sources give monitoring teams a number of advantages. The data uncovered are often a source of valuable information. In other situations, the data provide direction and purpose to field monitoring. Finally, the sources can give legal, social, ethical, or ecological context to the planning, data collection, analysis, and communication stages of the project.

Using secondary sources is simpler in countries in which access to government information is protected by law and where that law is respected and enforced. However, NGOs working in countries where access to information is not generally easy make extensive use of secondary information. (*See Box 4.*) Examples from the case studies include ERA, Global Witness, and Telapak.

Secondary sources useful to research include government and company documents recording contracts, financial transactions, management plans, and environmental impact statements, among others. These sources provide information about the ownership of subsidiary logging companies, where they have logging concessions, whether they have submitted a management plan, if they have ever been charged with violating government regulations, and so on. These documents may be available on demand from the ministry or department responsible for the management of the resource in question. However, it is often difficult to get this information and a variety of additional approaches may be necessary. CODEFF uses an approach in which they establish close contacts with people in ministries who are willing to give information. Global Witness looks for disgruntled company employees willing to share information.

Other important secondary sources are the laws governing resource harvest and use. Comparing what monitors find in the field with the logging laws and regulations is a basic strategy in many of the case studies. Knowing the regulations and the standards governments and corporations set for themselves sets a threshold to monitor against. International treaties or trade agreements regulating resource use and protected areas management, as well as ecological recommendations for appropriate harvest and use in the ecosystem in question, are also pertinent. These sources are all part of the public record and should be available from libraries and universities where legal codes are stored. Information on treaties can be found at the appropriate government agency or with the international body in charge of the treaty.

# Box 4: The importance of secondary sources

#### TELAPAK:

Secondary research is an important part of Telapak's investigation and monitoring strategy. Before beginning study of a logging concession, for example, investigators obtain the company's annual work plans for cutting blocks, maps, and other data that clarify the company's planned and actual activities.

#### APEC, NEPAL:

Secondary sources are also used to inform APEC, especially about larger areas where APEC has a hard time gathering its own information. Topographic, climatic, soil and vegetation data are gained in this manner. Hard copy maps made by the survey department, and soil and forest departments are examples of data providers. Other secondary sources used include scientific journals, research by other NGOs, dissertations by university students, and newsletters.

#### LEGAL CODES AND REGULATIONS:

Most of the case study NGOs also study relevant logging legal codes and regulations. Telapak teaches the codes that are relevant to monitors before they commence with field work. This information gives the monitors a clear idea of violations to look for in the field.

#### **Field Observation**

Field observations generally involve documentation of actions. This approach is ideal for monitoring illegal activity or poor management activities and, in conjunction with secondary sources, is used by many case study NGOs (see the case study texts at the back of this document and on the Handbook's Web site). Photographic documentation is especially useful.

#### **Repeated Site Assessments**

This is a method in which researchers gather data at the same site repeatedly over time to assess change. If used correctly, this approach can be very accurate and have strong scientific and statistical validity. The level of detail employed by ecologists can be greater than that needed by NGOs monitoring for policy impact. See the Tools section for additional information on repeated site assessments.

#### **Remote Sensing**

Aerial photographs, video, and satellite images can be used to monitor resources over large areas. These tools can be very powerful, allowing changes in land cover to be detected and convincingly illustrated. While some remote sensing techniques require specialized training to use and are also expensive, these barriers to their use are becoming less and less prohibitive. Remote sensing data, especially satellite data, is not for everyone, but it can be a superb tool if an NGO has the need and the resources to process imagery and interpret results. The Tools section lists sources for additional information.

There are two commonly available types of remote sensing data: airplane-based (aerial) and satellite-based (*see Table 2 and 2.1*). Aerial data are usually based on visual, photographic, or video collection. Satellite data can also be photographic, but they are usually measures of solar radiation reflected from the earth. The amount of radiation reflected in different bands of the electromagnetic spectrum (i.e., blue, green, red, near-infrared and thermal infrared) can allow for accurate interpretation of the status of the vegetation in the area being measured.

Aerial data is useful because it allows data collection over a much greater space than onthe-ground collection. Flights are frequently used to track change in ground cover over time, and can simultaneously be a means to locate areas where on-the-ground research should be conducted. CODEFF provides an example of one way to use the data from the flights to plan field work. (See Box 5.)

Data from satellites allow looks at even larger areas. And as images for most areas of the world are constantly generated, getting data for your area of concern is easily accomplished by purchasing the data. The spatial resolution of many of these images is very good, allowing sophisticated analysis of land cover change over time. This is the kind of analysis conducted by the Conservation International case study in Guatemala.



 Table 2.1: Web Sites Where Satellite Data Can be Obtained.



Table 2 lists many of the remote-sensing platforms commonly used to monitor threats and changes in land cover. Ideally, when designing a study using remote-sensing data, the analyst will decide what data are necessary to allow for the purpose of the study. In reality, though, we are usually limited by which data are easily available and which are most affordable. While this is still the situation now, it should become less of a problem with the advent of Internet data ordering and as more satellites compete for our business and continue to bring prices down. For now, however, it is

# Box 5: CODEFF's use of pre-monitoring aerial reconnaissance to identify sites for on-the-ground field work.

CODEFF conducts aerial reconnaissance previous to ground-based field monitoring. The purpose of the flights is to gather coarse-scale information on forest disturbance in order to set the scene for finer-scale monitoring conducted by field crews who visit the areas identified from the air as deserving further attention.

- 1. The first step involves identification of air monitoring circuits using 1:250,000 scale Military Geographic Institute Maps. Two areas were identified.
- 2. Two flights were conducted with the support of the US Lighthawk organization.
- 3. During flight, the most relevant areas to monitor were identified and marked with a Global Positioning System (GPS). The areas were also marked on a map and photographs taken. Also, clearcut areas and fire-damaged areas were marked.
- 4. Preparation for field study to collect data on the ground.
- 5. Terrestrial travel: 13 sites, previously identified during air reconnaissance, were visited by car.
- 6. After field visits, data were processed and analyzed.
- 7. Reports and press conferences prepared and delivered.
- 8. Internal evaluation of this monitoring campaign plainly demonstrated the importance of the pre-monitoring flights. Based on this evaluation, a methodology to collect data during flights was developed and ground methodologies were improved.

common to use those satellite data that are most easily obtained for whatever reason. When contemplating the use of remote sensing data, you should make sure that you have the expertise to conduct the analysis and to make meaningful conclusions. Remote sensing is a specialized science that requires training and experience. That said, if your monitoring objectives are well served by using remote sensing, finding analysts who understand it and/or groups to partner with is becoming easier all the time. Table 2.1 lists some of the Internet sites where you can learn more about the sensors and where you can order the data.

When considering the use of remote sensing data, be sure to consider the return on the investment. Depending on the monitoring question asked, a low-tech approach may be as effective for your purposes as a more expensive, high-tech, and time-consuming approach using aerial photography or remote sensing.

# DETERMINE THE METHODS

After deciding on what to monitor, the next step is to devise the methods that will be used to collect the data. This involves identifying the how, where, who, when, frequency, resolution, and duration of data collection. Planning Form 4 provides a way of systematically tracking this information. If there is more than one sort of data being collected for the project, record the specifics for each sort of data. Data collection sheets must be designed (see the section below on data collection, and also the Tools section for some examples of data sheets). Responsibility for recording and storing data, for inputting data to the computer, and for setting up the systems and processes of checking data should all be assigned.

Making final decisions about measurements constrains later decisions regarding data analysis. It is therefore important to give thought to data analysis even before collecting any data. Keep in mind that you monitor in order to document; you document in order to report and influence. Thus, it is useful at every stage of planning to imagine what the final results will look like. Be explicit about how the planned data will be analyzed and presented.

Refer to the data analysis section for discussion of different analysis methods. After choosing a method or methods, record the people expected to perform the analyses. *(See Planning Forms 5 and 6).* Are these people available to you? Of course, the exact method may change once the data are in.

# AUDITION THE METHODS

Whenever possible, conduct a pilot study to assess whether data collection methods work. This is especially true for studies involving sampling and statistics. The best plans may be unworkable in the field. It is best to find this out in advance, before time and resources are invested. Plans and methods may fail in unanticipated ways, but it is important to be as informed as possible in order to reduce this chance. This is why we refer to this phase as an "audition" rather than a test—there can be no absolute test of the methods, only an audition of what appears to be the best fit.

# DEVELOP A COMMUNICATIONS STRATEGY

At this stage it is useful to imagine the communication strategy. How will the data be used? Will you have all the information you need to make a convincing and credible case to your target audience? Clearly it is better to think about this issue early. Years later, when you find that you should have collected an additional supporting piece of data, it will be too late. Planning Form 7 will help you plan ahead.

#### **Planning Form 4: Data collection responsibility**

Data Collection								
How	Where	Who	When	Frequency	Resolution	Duration		

#### Planning Form 5: Data management responsibility

Collection Sheet	Metadata		Data Input		Checking	
Design						
Who?	Who Records	Where Duplicates Stored	Who	When	Who	

## Planning Form 6: Data analysis responsibility

Data Analysis						
How	Who	When	Resolution	Duration		
Produce map using GIS overlays of forest area, protected areas and concessions						

### **Planning Form 7: Communications plan**

Communicating						
How	Who	When	Duration			

More details about planning and implementing a communication strategy can be found in the section "Communicating and Influencing."

# CREATE A BUDGET

Can you afford this monitoring plan? If you cannot, it must be redesigned. If the planned design is the only one possible or sufficient, then you must secure additional money. There are no alternatives to these hard realities. Beginning implementation with a design for which there is not enough money will inevitably result in 1) poor data, and 2) no money left for communication and outreach. Always implement a plan that you can afford and avoid a lot of hard work resulting in no impact. Planning Form 8 provides a generic framework in which to think about budgeting.

# STAGE 2: MONITORING PROJECT IMPLEMENTATION

Once the monitoring project is planned it must be implemented. We present here information on how to collect data, maintain high-quality data, and analyze information. We focus on the major problems and issues of particular concern to small NGOs. For more information about individual topics, please refer to the list of references.

# Ensuring High-quality Data And Results

Advance planning is an essential ingredient

#### Planning Form 8: Form for creating a rough budget

Budget					
	Duration	Cost	Total		
Data Collection					
Equipment					
Staff					
Data Analysis					
Hardware					
Software					
Staff					
Communication					
Materials					
Staff					
Total					

for gathering credible data. Ensuring highquality data collection and analysis involves careful attention to every step of the data handling process. These steps are listed below:

Data collection phase:

- 1. Document the planned methods (i.e., write it down);
- 2. Work out the logistics of the field work before setting out;
- 3. Use a check-list of necessary equipment; and
- 4. Make sure the equipment is in good working order.

Data management and analysis phase:

- 1. Store and archive the data safely in multiple locations;
- 2. Use appropriate analysis techniques; and
- 3. Draw conservative conclusions.

# Avoiding Errors

Errors noticed by your audiences are corrosive and give you a reputation for sloppy work or bias. Errors can be introduced at any point between the collection of data and its inclusion in a communication document. Care must be taken to exclude them at each point. There are four basic types of errors.

#### **Gross Error**

Gross errors are those introduced by people making mistakes. Typical examples include mistakes while recording data, faulty entries into the computer, misreading an instrument, or misapplying a mathematical calculation. Unfortunately, gross errors are very common, but they can be avoided by careful and systematic crosschecking and verification. The checking process needs to go beyond having each person look over their own work. A system in which data are checked systematically at different stages in the process between gathering and analysis is necessary. Moreover, more than one person should be involved in the checking, as familiarity can inhibit one's ability to check carefully. The data management section of the handbook discusses some systems.

# **Errors of Method**

Errors of method are caused by poor planning or incorrect implementation. Examples include using the wrong method to gather data, using the planned method incorrectly, or applying inappropriate analysis tools. Like gross errors, errors of method can be avoided through careful planning and implementation. Avoiding errors of method in the field requires training so that field crews and analysts apply the methods correctly.

### Systematic or Equipment Errors

Systematic errors result in consistently high

or low values (i.e., bias), and are usually due to faulty equipment. Errors of this kind can be avoided only by careful use and frequent calibration of your instruments.

#### **Random Error**

Random error, also called sampling error, is a statistical issue. It is the inevitable result of sampling from a larger population in order to make inferences about that larger population. If statistics are to be used in your analysis, then random error must be acknowledged. For example, perhaps we cannot count every logging truck that leaves a forest. Instead we sample to create an estimate of the true number of trucks. Our estimate is exactly that—an estimate of the true number of trucks. The difference between our estimate and the true value is random. or sampling error. Random error is unavoidable and a standard part of statistical analysis. It can be minimized through careful planning of sample size and sampling method. Many texts discuss these issues at length (Zar 1987, Cochran 1956). This topic is discussed briefly in the Statistics section below.

## COLLECTING DATA

# Data Gathering Techniques in the Field

The techniques used to gather information depend on what sort of information you are collecting. Remote-sensing data, ecological field data, interview transcripts, and other types of information each require specific techniques. After making a decision about the type of data, you should collect examples of this kind of work to see how others have done it. We recommend that you contact case study NGOs for advice on their techniques.

Three general guidelines for field data collection exist. First, have a plan and stick to it. Second, prepare clear and useful datasheets in advance. Third, transcribe the data from your field sheets as soon as possible, while your memory is fresh.

### **Recording Data**

Three options exist for recording data in the field: 1) field data forms; 2) tape recorders and video cameras; and (3) portable computers. Of course, these methods are not mutually exclusive. They can easily be combined both for greater flexibility and to serve as back-ups.

#### 1. Field data forms.

Advantages:

- Field forms or notebooks are inexpensive and lightweight.
- They can be made of waterproof paper, and are unlikely to "fail" in the field.

#### **Disadvantages:**

• Data transcription back in the office can be time consuming.

• Handwriting can be smudged or otherwise difficult to read.

Tips for improved data collection using field forms:

- Print blank sheets on waterproof paper. Numerous paper companies supply waterproof paper that can be used in standard copiers and printers.
- Design forms to facilitate easy use in the field and during data transcription. For example, minimize text entry in favor of check-off boxes and numeric entries.
- Write legibly!
- Pre-print as much relevant information on the forms as possible. This eliminates repetitive writing and reduces the opportunity for mistakes.

#### Data sheets:

Several types of information should be on every data sheet used in a project. This includes:

- 1. Project title
- 2. Date
- 3. Location
- 4. Observer (person or persons collecting the data)
- 5. Page number \_\_\_\_ of \_\_\_\_ total pages

6. Room for additional comments

This information makes the data sheets easier to use and interpret later. Time passes and memory fades. Dates, titles, and observer identifications are all critical for reconstructing confusing data sheets.

Not all requirements for a data form can be anticipated, and some observations will be made on the fly in the field. Some of these will inspire changes to future data sheets. Others will be observations unique to a particular field trip.

How does an observer decide what information is important to include as a comment? Clearly, data sheets should not be cluttered with editorial comments or information unrelated to the project at hand. These simply make the job of data transcription more difficult. However, any comment or observation that is important to the study, especially those that effect the data analysis and interpretation, should be included in an appropriate space.

2. Tape Recorders and Videography

Advantages:

- Portable tape recorders can reduce the amount of time spent in the field by reducing the amount of time spent writing.
- Voice-activated tape-recorders are easy to use and reduce button-pushing.

- Detailed descriptions can be orally recorded in less time that it takes to write them down.
- Video, especially with voice recording, can be an excellent documentary device and is useful for future communications documents.
- Data transcription can occur in the relative comfort of the office.

**Disadvantages:** 

- Data must be transcribed before they can be used.
- These machines are more expensive than paper and require batteries.
- Machines will occasionally fail, with the loss of data or the loss of data collecting opportunity.
- Since there is no data form, "empty" fields cannot be seen, so categories of data can be forgotten.
- Voice-activated tape recorders can sometime be faulty. Several NGOs report difficulties, including lots of blank tape (after activation by a random loud sound) or a failure to activate (due to a soft voice, for example). Make sure the tape is running, although this negates somewhat the advantages of voice activation.

Tips for improved data collection using tape recorders or videography:

- Tapes should be transcribed as soon as possible, ideally within hours of returning from the field.
- Carry a blank field form that serves as a check-list of information that needs to be recorded.
- Record data in the same sequence. Otherwise data transcription is a nightmare!
- Carry field sheets as a backup, in case the machine fails.
- Speak clearly!
- Carry plenty of spare batteries.
- On each tape or tape section, record the same basic information.
- Label each tape uniquely and completely with project title, date, observer.
- In the field, periodically spot check the recording to make sure it is functioning properly.
- 3. Portable Computers or Data Loggers Advantages:
- Improves efficiency by minimizing transcription of data in the office.
- Some data can be entered directly into appropriate software.
- Position can be directly determined from a GPS receiver.

Disadvantages:

- Portable computers are very expensive to buy.
- Requires batteries; time may be limited in the field
- Computers can be awkward in the field because of their weight or the small screen size.
- Loss in the field as a result of rain damage, theft, or confiscation can be catastrophic.

Tips for improved data collection using computers or data loggers:

- Palmtop computers can be used in the rain inside a large plastic bag.
- Be sure to make some kind of backup of the data, even while in the field.
- Carry a spare battery, if possible.
- Develop electronic forms with parameter ranges to speed data recording.

# DATA MANAGEMENT

It is important for monitoring programs to carefully maintain and manage the data they collect. Misplaced, forgotten, destroyed and perhaps most common and frustrating, poorly documented data are common problems. It is important that your NGO institute procedures for data management for every step from the data gathering stage through the completed document stage.

The following suggestions concentrate on computer-oriented data archiving systems. However, file-cabinet storage of data and interview transcripts follow a similar set of guidelines.

## Data Entry and Storage in the Office

If there is only a small amount of data, or it is very simple, it may be possible to summarize it right off the data sheets. In most situations, however, including those in which you have used recording devices, data entry is required (Stafford 1993). There are five steps to the data entry and management process:

- 1. Selecting a computer software program;
- 2. Entering data using appropriate file names;
- 3. Documenting the data;
- 4. Proofing and verifying entered data; and
- 5. Making back-up copies of the data files and keeping them in a safe place.

It is important to continue to store the original field forms after the computer versions have been entered. In that way, the original data can be accessed should the computer files be lost or some question arise about the data.

#### Selecting a Computer Software Program

Word processors: Word processors are

generally poor places to store data. This is because their focus on text makes dealing with numbers awkward. Modern word processors are better at handling tables of numbers. However, you should investigate how well numbers can be exported in formats you require. For text-based data, such as interviews, word processors are the software of choice.

*Spreadsheets:* Microsoft Excel and Lotus are examples of spreadsheet programs that manipulate tables of numbers or text. Spreadsheets are not flexible about text, so interview data is not appropriate for spreadsheet programs. These programs can also do some statistical analysis, such as the calculation of means and variances, and have some graphical abilities. Their statistical capabilities are not as great as those of the programs designed specifically for that purpose, but they may be powerful enough for the needs of your NGO.

Spatial analysis software: Geographic Information Systems (GIS) are the most commonly used spatial analysis software. They are powerful but can still be run from a desktop computer and are increasingly popular and easy-touse. Environmental Systems Research Institute's (ESRI) ArcView and ArcInfo, Clark University's Idrisi, and MapInfo are examples of common GIS software packages. The price can be prohibitive, ranging from a few hundred dollars to more than \$10,000, but as spatial data are already common and becoming more so, GIS may prove to be a worthwhile investment. This is especially true if there is a trained user on staff.

Other spatial analysis software includes image analysis software such as ERDAS Imagine, ESRI Image Analysis, and IDRISI. These programs are used to process rough satellite imagery and are very demanding both in terms of expertise and hardware requirements.

*Statistical programs:* A variety of statistical programs are available, such as SYSTAT and SAS. They offer powerful options for analyzing data, graphics and, in recent years have become better at storing data. They are not strong as devices for text. Most statistical programs readily import data from spread-sheets and relational databases. The programs tend to be expensive (\$500-\$1,000), but may be required if you plan to do any sophisticated analysis.

*Relational databases:* A variety of programs are designed to organize and display large amounts of numeric and textual information. Examples include Dbase, Microsoft Access, and Oracle. Data screens can be designed to fit your needs. It is an excellent way to enter and store large amounts of interview (i.e., text) and associated numerical data. They offer limited graphic capabilities and are more complex to use than spreadsheets.

#### Using appropriate data file names

Appropriate names for computer files full of monitoring data are essential. As the number of projects and data files increase, haphazardly named files will be at best a headache, and at worst, an opportunity for misplaced and lost data.

We have two tips for naming computer files:

- 1. Create a standard naming system for files (*See Box 6*); and
- 2. Place data files in computer directories dedicated to individual projects. A standard protocol should be devised to distinguish the types of files specific projects will generate.

Instituting standard protocols for file and directory naming behavior will save lots of heartache and frustration, especially if there is any staff turnover in your NGO.

#### Documenting the Data

Documentation should start with a description of the project and the data collection methods. Examples of the data collection sheets themselves should be archived, as well as other important information associated with the method being used. This includes all methods, dates, relevant contacts, and sources. If there is confusion later in the process, it will be possible for each data collection team to look at their collection sheets and discover the source of the confusion.

# Proofing and Verifying the Data Illegible or smudged periods may result in a

number such as 9.9 being entered as 99, with dramatic consequences. If field sheets are transcribed or entered into a computer, then the entered data must be checked against the datasheets for accuracy. Once the data are entered, one person should read the computer file while another verifies the number on the field form.

## Making Back-up Copies—Avoid Catastrophic Data Loss

As the data are being collected, care should be taken that duplicates of the data sheets are made and that both sets are kept in safe, separate locations. The process of making back-ups should be continued until the completion of the project, at which time the files containing the final computer files, all the raw data sheets, and a clear explanation of the entire process should be archived in a safe location. Many countries have companies that will store your data for you. This is not necessary, however, and there are procedures to protect your own data.

# SHARING AND RECEIVING DATA

In addition to maintaining and managing your data files for your own safety and use, it is important to manage the data so that others may use it as well. Your data may be unique and the only existing information on a given subject. By making this information available to other organizations, you can greatly increase the impact of your monitoring.

# NOTES

# Box 6: A sample standard for naming computer files. This is an example only; design a system to fit your own needs.

DOS file names use eight digits, a period, and a three-digit extension. Windows-based programs allow more characters, but you should be consistent across programs. MZL9909A.XLS is an example of a file name with only eight characters that contains all the information needed to keep data organized.

Characters 1-2 are a code identifying the project,

Character 3 is a code identifying the type of data, e.g., I = interview transcripts, L = logging data, S = species surveys,

Characters 4-5 represent the year of data collection,

Characters 6-7 indicate the month of data collection,

Character 8 distinguishes which data collection within the month above are contained in this file,

Character 9 is a period (as required by the computer program)

Characters 10-12 is a software-specific extension (again, this is automatic based on the computer program)

Thus, the file MZL9909A.XLS "means"

MZ is data from the Mzee forest preserve,

L indicates logging data,

9909 indicates that the data were collected in September, 1999,

<u>C</u> indicates that this is the third data set from this month.

<u>XLS</u> indicates that the data are stored in an Excel spreadsheet.

#### Computer Files

Most organizations wanting to use your information will be able to accept it in standard computer program formats. Standard file naming and data documentation is critical.

#### The Internet

The Internet is a superb means of sharing data as well as the final reports based on the data. As the process of creating an Internet Web page becomes simpler, using the Internet to share data and reports is increasingly common. It is possible to create a Web page using a word processor or a common program like Netscape Composer. Companies that provide inexpensive sites for Web pages, such as at http://www.geocities.com/, are increasingly common. The Web sites of many of the case study NGOs can be found in the case studies section at the end of the handbook. References with detailed information on how to create a Web site can be found in the Tools and references section.

#### Networking

Networks of organizations that share common interests can be important ways of sharing information, experience, and political influence. WRI's Global Forest Watch Network, CI's Network of field sites, Rainforest Action Network, and others are networks with international experience and influence. These organizations can help with the process of network creation, use of the Internet, and other technical issues.

# DATA ANALYSIS AND INTERPRETATION

Use appropriate analytic methods and draw conservative conclusions. It is hard work to design and implement an effective monitoring study, but the numbers alone do not become powerful information until they are analyzed and interpreted. Objective and transparent data analysis methods are necessary in order to draw conclusions. Although it is outside the scope of this publication to discuss data analysis in any depth, developing a monitoring system requires an understanding of the analytical capacity the ensuing analysis will require.

There are four broad classes of data we discuss in this handbook: interview data, photo or otherwise qualitative data; quantitative ecological data; and remotely sensed mapping data (GIS). To analyze and interpret these types of data, four broad analytic approaches are available:

- 1. Descriptive (documentary style) analysis (for interview and photo data);
- 2. Graphical analysis;
- 3. Statistical analysis; and
- 4. Mapping.

Simple, direct, and logical analyses and

interpretations are best. Data should be analyzed, interpreted, and presented in ways that make a compelling case. Statistics may be required for marginal or subtle situations, but in many cases direct and thoughtful presentation will suffice.

There are also more complicated analytical methods available. Examples include using geographic information systems (GIS) to map the data you gather or to analyze remote sensing data and sophisticated statistics (Snedecor and Cochran 1980, Sokal and Rohlf 1980, Zar 1989). Because analytical methods can be specialized, it is critical to plan data collection methods with analysis in mind.

#### **Descriptive Analysis**

Interviews, photos, and other qualitative data are appropriate for descriptive, or documentary-style analysis. Such analysis tend to take the form of a story or brief narrative (either text-based or photographic). Well presented, such analyses can be quite compelling.

Descriptive analysis is especially useful when a specific situation needs to be publicized. For example, perhaps laws prohibiting logging in a certain area are being broken. Using documentation derived from interviews or photos, it is possible to generate public support for action against the violators. Photographs may be used for descriptive analysis in two ways. First, photos can be used to document events such as illegal or denied acts. (*See Box* 7.) The ability to use photos as evidence depends on the deniability of the photo. Whenever possible, date and location should be clear in the photo itself. It is common for cameras to have date and Global Positioning System (GPS) stamps that can be activated so that the current date and location is automatically imprinted on the photo. Cameras with these features are affordable and good investments for monitoring programs.

Second, a time series of photos can be used to document habitat change, especially if the change is significant. Subtle habitat changes may require actual measurements. Larger changes may be clearly documented. For example, one can clearly demonstrate clearcutting using "before and after" photos. The same date and place markers discussed above should be used. If "before" shots that demonstrate an uncut forest do not exist, satellite images may provide critical (and undeniable) evidence.

### **Graphical Analysis**

Pictures convince. Thus, we strongly recommend analysis strategies that include graphics and figures. A particularly useful graphical "analysis" uses *comparisons* to make a point. SLDF uses this technique well to point out that stream protection in British Columbia, Canada, is poor compared to that of the United States (*See Box 8*).

Graphing your quantitative data is always recommended, even if you plan further statistical analysis. Thus, graphics software is a good investment for any NGO. Pictures are evocative and commonly reveal patterns in data that standard summary statistics (means and variances) conceal. Several excellent discussions of graphical or exploratory data analysis exist (Ellison 1993, Tukey 1977). Ellison (1993) includes a valuable discussion of the strengths and weaknesses of various kinds of graphs.

Of course, it is best to design graphics that help convince viewers of a legitimate conclusion. But you should beware of graphics that mislead or are falsely manipulative. Graphs are easy to manipulate to make the same data appear different. Ultimately, misleading graphs undermine your purpose as much as faulty data.

### **Statistical Analysis**

The type of statistical analysis should be determined during the initial planning stages of the monitoring study. The effectiveness of certain types of statistical analysis is strongly determined by the amount of data and the details of sampling. If enough of the right kind of data are not collected, then certain analyses are precluded. For example, analysis of variance, a common technique to compare groups,

Box 7: Photo document of an illegal logging: Bokor National Park entrance.



Note clear cut hillside; February 1998. The physical evidence of the gate to the national park makes this photo good evidence of illegal logging activity inside the park. The photo would be improved with a data stamp. A Global Positioning System (GPS) stamp would serve in stead of the gate as evidence of location. Such a camera is recommended for the flexibility it will accord your monitors.

Source: Global Witness Special Report, 1998. "Going Places: Cambodia's Future on the Move"

cannot be conducted with less than two observations per group. In practice, at least 10 observations per group are required. If these limitations are not identified in advance, insufficient data may render the statistical analysis impossible. Although statistical analysis is not rocket science, it requires some skill and training. We recommend several excellent texts (Zar 1986, Snedecor and Cochran 1980, Sokal and Rohlf 1980, among many others) and encourage you to seek advice from statisticians or statistically savvy partners.

Certain monitoring studies will require statistical analysis—for example, those based on ecological data derived from sample-based data collection. In samplebased data collection, you collect data from a limited number of locations within the overall study area with the intention of making inferences about the entire area. The quality of your inference depends on the extent of the sample (what proportion of the total area was sampled) and the amount of variation among samples (were the samples varied or similar to each other). There is a large and important literature on ecological sampling and methodology. See Cochran (1976) for a complete text. Basic statistics texts such as Sokal and Rohlf (1981) also review sampling.

The first step in a statistical description of data is to calculate summary statistics. In some cases, summary statistics and graphs will suffice. Two general types of data can be collected: frequency data (i.e., counts) and "continuous" data.

## **Frequency and Continuous Data**

In continuous data, values do not fall into distinct categories. Examples of continuous data are estimates of the abundance of a rare species in a forest, or the total area of clearcut in a forest. Frequency data represent counts of occurrences in discrete categories. Typical NGO data may be of both types. Count data are typically Box 8



BC Stream Classification S1, S2, S3, S4 = fish streams

SDLF uses a graphical comparison to make a point about stream protection in British Columbia. The BC number alone would not have been so compelling because it does not compare BC with a comparable country. Data are percent of streams of various sizes that are protected under existing regulations

(Source: SLDF, 1998, "British Columbia Forestry Report Card 1997-1998").

displayed in what are called contingency tables. Table 3 shows (invented) data from a sample of 300 households. The study classified each household on two characteristics: whether the household had access to mass media (radio or TV) and whether the head of the household was aware of illegal logging occurring in their district. Thus, each household may be classified (placed) in one of four cells in the contingency table. Analysis, typically by visual comparison or a chi-square test (Sokal and Rohlf 1981, Zar 1989, and performed by all basic statistics software) asks whether the two characteristics are correlated. The data in table 3 suggest that access to mass media increases the household's awareness of illegal logging. Table 3: Example of a contingency table of frequency data showing the relationship of mass media access and awareness of illegal logging. (The data are invented.)

Total sample = 300 households among three villages	Head of household aware of illegal logging	Head of household not aware of illegal logging	ROW TOTAL
Households with access to television or radio	44	7	51
Households <u>without</u> access to TV or radio	125	124	249
COLUMN TOTAL	169	131	300

Table 4: Example of a data table containing both frequency and continuous data from a study investigating the impact of park rangers on illegal logging and peccary populations. (Data are real)

	1995	1996	1997	1998
Encampments of loggers	23	38	45	0
Estimated extraction of logs (in thousands of m <sup>3</sup> )	50	80	30	0
Incursions of hunters	Common and widespread	12	3	0
Area patrolled by San Jose Univ. (in thousand hectares)	0	10	50	50
Area patrolled by Madidi National Park staff	0	0	200	400
Observations of Tayassu pecarri	0	3	8	4

Table 4 shows continuous data from an example for a program designed to monitor logging and conservation in Madidi National Park, Bolivia. The data simply represent the amount of each type of data—that is, the number of encampments. The data suggest a decrease in the illegal logging and coincident increase in peccary populations when the number of patrols increased.

When continuous data result from multiple samples in the landscape, it is customary to describe the data with summary statistics that include sample size, mean, standard deviation, minimum/maximum, and 95 percent confidence interval. Table 5 shows data from a forest in the fictitious Rio Verde National Park. The study sampled twenty 500-hectare areas within the larger forest. These samples were used to create an estimate, or "picture" of the entire 1 million hectare forest. The strength of such an approach is that the data can be objectively analyzed using statistical techniques. (See below).

Once these summary statistics are in hand, how do you determine whether there has been a change in the amount of clearcutting? In general, two types of analysis are possible, depending on how the original monitoring project was designed: 1) threshold or target analysis, and 2) detection of change.
#### Thresholds

Monitoring against thresholds, as described earlier in the text, is a good approach when there are clear ecological and/or political limits to measure against. When comparing your field-gathered data against a threshold, however, it is necessary to be careful that the numbers you have gathered are statistically meaningful. A good way to do this is to use a 95% confidence interval (see a statistics *book*). A graphical representation of the error range is seen in the example of the hypothetical Mzee forest in figure 2.c. In 1995 and 1996, there is statistically no difference between the threshold value that was gathered through surveys before the forest was disturbed and the monitoring data gathered in those years. In 1997 and 1998, however, as the threshold value was above the error bars, the data analyst can be 95 percent certain that the difference between

the monitoring data and the threshold is real. In this case, the forest bird habitat value is lower than the threshold. Please refer to the texts recommended above for further information on statistical testing.

### Detection of Change

Detecting change in more than 2 years of data requires analysis of variance to separate real change from statistical noise. This can be done using a simple statistical test called ANOVA, among others. These tests for detection of change over time can easily be done using standard statistical packages (e.g., SYSTAT and SASS). Again, please consult a statistics text for more background.

## **Spatial Analysis**

Spatial analysis uses data on natural and political patterns of the earth's surface, subsurface, and atmosphere. Types of fea-

Table 5: Summary statistics for continuous data from a study investigating the area of clearcuts within Rio Verde National Park. (Data are invented)

	<u>1995</u>	<u>1997</u>	<u>1998</u>
Sample size (N)	20	20	20
Mean area of clear cut (ha)	65.5	97.1	64.2
Standard Deviation	32.1	49.2	18.1
Minimum area (ha)	0	50	50
Maximum area (ha)	180	220	250

tures used in spatial analysis are socioeconomic and political as well as physical. As discussed in the data management section, almost all spatial analysis by NGOs uses GIS software. GIS allows the relationships between different spatial data—forest type, land ownership, population density, political boundaries, roads, oil pipelines, and mineral deposits, to name a few examples—to be compared and analyzed. Observation of these different elements over time facilitates analysis of temporal trends in land cover and how they relate to other spatial and temporal elements. A product of this type of analysis might be identification of land cover change and analysis of the factors driving change. GIS is a powerful tool in conservation and natural resources management. It can reveal large-scale patterns of change that are very difficult to detect through other means. Spatial analysis often incorporates remotely sensed data such as satellite imagery or aerial photography and videography. Doing so can allow analysis of change over a scale that would otherwise be impossible.

Some typical analyses relating to forests are overlaying forested areas and logging concessions or other types of development to see what percentage of a certain forest area is in danger of degradation. Adding data on protected areas or biodiversity hotspots allows one to see how these areas fit into the picture. Egregious problems, even illegal acts such as protected areas being included in logging concessions, can be detected and convincingly communicated using GIS. When these analyses are conducted prior to logging, monitoring can effectively stop these activities from happening.

While spatial analysis can be expensive and difficult, the technology is increasingly accessible. Many small NGOs may find it useful to initially work in collaboration with partners. In particular, satellite imagery can be very effective at 1) revealing landscapescale patterns of change in habitat or land use, and 2) identifying particular habitat features, such as the appearance of new roads or logged areas. Moreover, the resulting picture can be quite compelling as a communications document.

Analysis of such data can be qualitative, quantitative (and therefore statistical), or both. The analysis of spatial data operates in an interregnum between descriptive and statistical modes. The kind of analysis will depend on the type and quality of the spatial data, the length of the time series being analyzed, and the message to be conveyed.

Discussion of remote sensing and the analysis of mapping data is beyond the scope of this book. Some basic and illuminating texts include Willie and Finn (1996) and Turner and Gardner (1991). Please refer to the Tools and Resources section for further information.

# STAGE 3: COMMUNICATION AND INFLUENCING

An NGO gathers good data on an important topic and performs a sophisticated analysis. But they have no impact and do not improve the prospects of the natural resource because they do not effectively communicate their findings. They have wasted their money and squandered an opportunity to improve the management of a natural resource they care about.

An NGO begins a monitoring project for no other reason than to improve the status and management of a natural resource. Using monitoring data to achieve this improvement is the final (albeit ongoing) step of the monitoring process. One of the important messages in this handbook is communicating credible data to make a difference.

Influencing the world with monitoring results has two phases: 1) creating a communications strategy, and 2) implementing it. In the data-collection phase of monitoring, making a plan and sticking to it is critical. In communications, it is important to be flexible, pursuing strategies that work and abandoning those that do not. Nevertheless, plan ahead as much as possible in order to identify strategies that could work. And make sure to create the budget to pay for them.

# COMMUNICATIONS STRATEGY

To devise a communications strategy, you must:

- 1. Decide on your target audience; and
- 2. Determine how best to reach and influence them.

It is common for monitoring programs to have more than one target audience and different strategies for approaching each. For example, in their campaign to stop illegal logging, Global Witness targets a variety of governments, international NGOs, and the wider Cambodian public. Their communications strategies involve personal briefings, reports, and e-mails distributed to interested parties. The reports are produced for distribution to every group. The personal briefings are given to Cambodian, Thai, Vietnamese, U.S., and other government officials that have some influence on logging within Cambodia or the cross-border trade between Cambodia and its neighbors. (See Box 9.)

Laying out a strategy this comprehensively has two important benefits. First, the strategy is open and available for comment and revision by staff and interested parties. Inappropriate materials are more likely to be identified and modified when the entire strategy is laid out. Second, an explicit strategy statement makes creating a budget possible.

# COMMUNICATION TONE

Part of developing a communication strategy is understanding how to give your publications an appropriate tone. Communication must effectively balance a simple and compelling message with careful credibility and objectivity. It is easy to upset this balance by stating your message too stridently, appearing unwilling to compromise, or by taking the message beyond what the data indicate. Sierra Legal Defence Fund found that appearing unwilling to compromise reduced public receptiveness to their message, while changing their tone improved public receptiveness. In general, conservative and reasonable language opens more doors and ears.

It is also important to give credit where it is due. Government sources and contacts are important to cultivate, and it may be costly in the long run to relentlessly publicize wrongs and ignore rights.

# CHOOSING AUDIENCES

Audiences should be chosen based on two primary criteria. The first is the ability of the potential audience to influence change based upon an NGO's information. The second must be the group's receptivity to your message. If the group you are targeting could change the nature of logging in your country, but clearly has a strong disinclination to do so, they are not a very good choice as an audience. Some good audiences to consider are listed below.

Box 9: Global Witness identifies their target audiences and the strategies				
for reaching them.				
Target Audience	Why Targeted	Materials "directed" at target		
Cambodian	The government allows the	• Report		
Covernment	illegal logging	D 11 1 0		

Government	illegal logging	<ul><li> Personal briefings</li><li> News conference</li></ul>
Neighboring Governments	Neighboring countries buy the illegal logs	<ul> <li>Report</li> <li>Personal briefings</li> <li>News conference</li> </ul>
Governments of donor countries	U.S. and other countries could pressure Cambodia to act, but they deny that illegal logging occurs	<ul><li> Report</li><li> Personal briefings</li><li> News conference</li></ul>
International aid organizations	Profile raising, fundraising	• Report • Film
Cambodian public	Increase awareness, build community support	<ul><li> Posters</li><li> Leaflets</li><li> Film</li></ul>

### Allies

Groups fighting for the same goals can often put your data to additional good use. These groups can be among your most effective audiences. Several case study NGOs found that networks of other NGOs were both important audiences for their monitoring work as well as potential sources of data and partnership.

## **Domestic Government**

The country's domestic government is typically a critical audience for an NGO's information. Governments tend to be the most important managers of natural resources, and they enact and enforce the laws and regulations that control corporate and private resource use. Thus, an NGO's credible information about the status and management of natural resources can, when directed effectively at the government, have a large impact.

# **Resource Extraction Companies**

The actions and behavior of natural resource extraction companies (e.g., logging companies, mining companies, etc.) are of great interest to NGOs com-

mitted to appropriate conservation. Their actions have a large impact on natural resources. In many cases the land from which they extract is privately held, in others it is public land. In either case, stewardship of the land they use can be improved by NGO communication. NGO publications can alert companies to their own poor stewardship and provide information on better management practices. Bad publicity to a broad audience can also inspire companies to improve their image by improving their resource management. To do this most effectively, be sure to also publicly commend companies for good stewardship.

# **Foreign Governments**

Foreign governments may be appropriate targets for communications. Foreign governments or corporations may be purchasing natural resources harvested from poorly managed areas. Alerting these governments may make them less inclined to purchase the resources or to advocate for better management by internationally registered corporations. Second, foreign governments may leverage for better resource management through donor programs and diplomacy simply for environmental reasons.

# Media

The news media—newspapers, radio, and television—can spread information far and fast. The media are not audiences themselves, but rather are a means to reach the public and other target audiences. Useful media typically include local press, radio, and television media, as well as the international media of the same types. Press releases, news conferences, and film clips are all effective. Develop personal contacts within these media. By doing so, you can often get tips about the kinds of stories they are looking for and the best ways to pitch them.

### **International NGOs**

International NGOs can be a great leveraging tool. They can use your data to gain unprecedented attention from your target audience. For example, the consumer campaigns sponsored by Rainforest Action Network and Greenpeace are a powerful way for your information to reach consumers. Other international NGOs would be suitable for additional target audiences.

# International Donor Organizations and Corporations

These groups, exemplified by the World Bank, are very important because they often provide the funding for natural resource development and extraction projects. They are typically concerned about the local effects of these projects and thus are appropriate targets for the communication of monitoring results.

### The Public and Consumers

Public opinion can be a profound agent of change, even in societies that are not democratic. Domestic public opinion can be

shaped by NGO information. Many types of information may be relevant. For example, local populations may not be aware of the value of certain forests or natural areas. Likewise, they may be unaware, or misinformed, about the stewardship and management of their country's natural resources. Campaigns to convince consumers to boycott certain goods or stores can also be very effective. Rainforest Action Network (RAN), with other NGOs, recently led a successful consumer campaign against a large North American home-improvement lumber retailer. After months of protests and boycotts, the retailer committed to phasing out lumber from old-growth forests. Other home improvement companies soon followed suit. Using similar tactics of negotiation backed by threats of demonstration, RAN and their partners recently convinced two of the USA's largest home builders to stop using wood from old-growth forests.

# COMMUNICATIONS PRODUCTS

A variety of communications materials are available for use. Such materials vary in their effectiveness for different audiences. In addition, some are more expensive than others. When designing a communications strategy one must carefully match the approach to the audience, while keeping costs clearly in mind. Remember, the goal is to create a strategy that is effective. Five different poorly produced materials may be less effective that two welldesigned documents.

As the materials are produced, build a con-

stituency that expects to receive the next installment. Once the constituency is created, keep them informed. This is especially true of the media. Media contacts will use your materials more often as they come to know you, and eventually will call you for news.

All of the case study NGOs produce many types of documents. Some of these are discussed in this book, but we encourage you to contact NGOs directly for other examples of their communications documents.

# **Personal Briefings**

Personal briefings can be a valuable means of exchanging information for both the monitoring organization and the group being briefed. The target group can include ministers or other government employees, representatives of international NGOs or bilateral donor agencies, interviews with media reporters, as well as other groups. The monitoring NGO gets the undivided attention of an influential person, while the person being briefed gets insight that may be unavailable through other means. Generally NGOs must prove themselves to be providers of excellent, credible, and unbiased information before they secure meetings with important people. Initially, it will be difficult for organizations to obtain meetings of this sort. In any case, it is a worthwhile goal and a strategy to supplement other approaches.

Personal briefings are frequently employed by CODEFF. The Chilean forestry department has come to believe in the good intentions and high quality of CODEFF's information. The department uses the information to determine whether landowners that CODEFF monitored broke the law and also whether the law is accomplishing its original aims.

#### Advantages:

- Briefings build personal relationships with influential people.
- They put monitoring conclusions in the hands of people who can effect change.
- They help build a constituency for your other communications products.

Disadvantages:

- Meetings are difficult to obtain, especially for young organizations.
- Dispersion of information is narrow.

Tips:

- Do not be confrontational.
- Have some brief written materials on the topic to leave after the meeting (i.e., "briefs").
- Solicit feedback to engage your audience.

# **Press Releases**

Well-written press releases are a vital part of every communications strategy. They are an effective means to communicate results to all branches of the media and, through them, to the public. It is important that the press releases contain the information journalists need. See Box 10 for an example of an NGO press release.

The technical information and pages of analysis must be boiled down to pithy, easy-to-grasp messages. The goal is to get people's attention—to make them realize there is a problem and take it seriously.

By nature, press releases are brief summaries, so they must be part of a wider communications strategy.

Advantages:

- Press releases are easy to create.
- They are easy to distribute via fax and E-mail.
- They can result in wide exposure if the release is picked up.
- They are fast. The NGO can respond quickly to new information.

## Disadvantages:

- Since they are easy, it is tempting to release a flurry of bad ones.
- Bad releases can make an NGO seem opportunistic.

# FOR IMMEDIATE RELEASE

ADB CONCESSION REVIEW PUTS CAMBODIAN FORESTRY REFORM AT RISK

Box 10: Example of a press release.

The Asia Development Bank (ADB) funded concession review, one of the most crucial elements of forestry reform in Cambodia, has been crippled by time and financial constraints resulting from shortcomings in the ADB management process. The review, a major recommendation of the World Bank funded TA Projects in May 1998, was intended to identify those concessions which should be terminated for repeated infractions, and those which should remain, with re-negotiated contracts.

The Royal Government of Cambodia (RGC) expected the concession review to be scheduled for January 1999, but the concession site inspections did not commence until October 1999.

This resulted in:

- Site inspections being carried out in the wet season. Consequently, the review team have not witnessed any harvesting
  operations or log movements. Access to the concessions was affected by bad road conditions, limiting the time available
  to carry out the inspections.
- Only 12 out of 21 concessions are scheduled to be visited, just 57% of the total.
- The site inspectors spend one day in each concession. Concession sizes range from 60,000-766,000ha.
- Only year 1999 and 2000 coupes (2 out of 25+ cutting areas per concession) are inspected. Thus, the majority of concession area is not inspected.
- Concessionaires' forest management practices are judged purely on the basis of the one-day inspections. Therefore, 'one the ground' compliance with contracts, a crucial part of the review, are also judged on the basis of a snapshot oneday visit.

It is likely the review's recommendations will err on the side of caution. This, coupled with the fact that none of the concessionaires' historical records, including illegal activity and poor forest management, are being taken into account by the review, means that concessionaires who have severely depleted their own and other concessions are likely to enjoy impunity for their actions.

The review team have found that all of Cambodia's concession land will be exhausted within seven years (some are currently logged out) and that current cutting levels cannot/should not be sustained. Also, every concessionaire has breached their contract for failing to achieve the required investment targets. "These findings are shocking enough," said Patrick Alley of Global Witness. "The whole future of concessions in Cambodia needs to be reviewed-the forests cannot sustain 21 concessions-period."

Global Witness discussed these issues with the ADB on 1st December 1999. The ADB stated that the site inspections of concessions had been extended by four weeks and that they would advise the review team to utilise all available information. They also confirmed that they will not recommend termination of any concessions. If the former two actions are carried out, it will be an improvement. The latter point confirms that the reviews findings will be bland. In any event, unless urgent changes are made, the review will still be far short of the 'intensive' inspections described in Fraser Thomas' inception report.

For further information contact Global Witness at:

Tel: + 44 171 272 6731; Fax: + 44 171 272 9425; e-mail: mail@globalwitness.demon.co.uk http://www.oneworld.org/globalwitness

#### Tips:

- Study the format and content of other press releases.
- Keep the central messages clear and at the beginning of the release.

#### **Press Conferences**

Press conferences can be a good means for communicating with the press. They provide an opportunity for questions and answers and may gain more attention than a press release alone. Press releases should always accompany press conferences.

Getting the press to attend can be difficult. Press conferences should be reserved for the most conspicuous issues, or issues about which the NGO has compelling data of generally recognized importance. Joining with a more famous organization may be a way to attract press, and may be a good strategy for young NGOs trying to move up. Once again, though, your information must be credible and compelling. You will not get the press to show up more than once or twice for a bad show.

CI's case study "Land Use / Land Cover Change Detection" provides an example of the value of an effective press conference.

#### Advantages:

- Press conferences provide direct access to journalists and media.
- They can result in wide exposure if the release is picked up.
- Questions and answers can result in media interest.
- They allow journalists to develop tailored articles and stories.

#### **Disadvantages:**

- It can be difficult to attract press to a press conference.
- Bad releases can make an NGO seem opportunistic.

#### Tips:

- Have press releases ready for distribution.
- Pay close attention to timing and venue to ensure attendance.
- Do not overuse.

#### Posters

Posters can be an effective way to reach a small, local audience such as the inhabitants of a village, town, or small city. They must be well-designed, eye-catching and compelling. It is a mistake to try to include too much information on a poster. It is better to state a clear, defined, preferably visual message. ERA in Nigeria makes extensive use of posters and pamphlets as a way of getting information to villagers.

#### Advantages:

- Posters are a good way to reach the public.
- They can be widely distributed.
- They can help create a strong visual identify for the NGO.

#### **Disadvantages:**

- Posters must be simple, therefore information-poor.
- They must distributed and mounted.
- They can be expensive to produce in quantity.

#### Tips:

- Design posters well, with a strong visual identity.
- Make sure you have effective places to put the posters.

### **Pamphlets and Fliers**

These small documents are best suited to publicizing the whole NGO and its mission. Occasionally, however, they may be valuable for presenting detailed information about specific projects to the public that is, "briefs" in a glossy package.

## Web Sites

Web sites can be an excellent mix of the best features of a pamphlet and a report. They can be visually impressive, detailed, and rigorous. Visitors to a well-designed site can delve as deeply as they wish, with a brief visit to get basic information or a longer visit to gather the complete story. For example, see FOE-Amazonia's Web site at *http://www.amazonia.org.br/amazon.htm* for an example of a well-designed Web site that successfully conveys large amounts of information.

Many on your target list will have access to the Web, although not all. It is not a substitute for other, more proactive communications methods, but it can be very useful. Many if not most organizations now have Web sites; in fact, having one is becoming an expectation.

### Advantages:

- Many of your international targets have Web access.
- Web sites can be both a visually impressive "pamphlet" and a detailed report.
- Web sites can generate some passive visits by people who were not on your target list.
- Web sites allow for multi-media presentations.
- Web sites can reach huge audiences.
- Web sites can be easily updated or revised.

## Disadvantages:

- Web sites must be kept up-to-date and "fresh," so that visitors will see something new each time they visit
- They require some computer skills (although not especially difficult ones), and perhaps a dedicated staff member for upkeep.
- They require access to a computer.
- The site must be promoted and advertised in order to attract users.

### Tips:

- Design Web sites well, with a strong visual identity.
- Keep them fresh and up-to-date.
- Advertise their existence to your target audience.

# **Publications**

For most NGOs, publications are the mainstay of a communications strategy. Publications allow for the communication of rich detail, allowing you to fully describe the complexity of a situation. There are a few common types of publications produced by monitoring organizations.

## Briefs

Briefs are relatively short and concise documents with a focused subject. Usually they are directed at specific organizations or people you want to influence.

Briefs can be vehicles for moderately detailed information in a format that is less daunting than a full report. Briefs can also be very useful if you are working on a long-term monitoring program but want to make periodic (e.g., annual) progress reports. In this situation, you can plan a series of briefs leading up to the report.

Advantages:

- Brief summaries of important issues are attractive to busy people.
- Briefs can be released quickly.
- Briefs are inexpensive.

# Disadvantages:

• Briefs necessarily lack detail.

Tips:

- They may be quick, but make sure they are written well, with critical points clearly identified.
- Clearly distinguish between fact and interpretation.
- Use graphics when possible to make them eye-catching.

# Newsletters and Serials

Familiarity, along with reliability, breeds trust. Thus, newsletters are valuable parts of a communications strategy. These products are generally too large and regular to focus on a single monitoring project. (See Box 11.)

Advantages:

- Regular publications such as newsletters breed trust and a constituency.
- Newsletter formats allow a mix of brief and detailed articles, including photographs.
- Newsletters are relatively timely.

Disadvantages:

- A single monitoring project may not generate enough information to support a large newsletter.
- The persistent load of producing a frequent document may distract staff from the work of monitoring.
- Periodic newsletters may be costly.
- If there is not enough material, newsletters may seem "lightweight."

Tips:

- Consider an organization-wide newsletter, or one that combines several projects.
- Consider less frequent reports (perhaps annual).

# Box 11: Cover page of Le Pou d'Agouti's serial publication.



# Reports

Longer and with a broader intent than briefs, reports usually are based on a single monitoring project or several projects investigating the same topic. Reports often end up being a series, with succeeding reports updating the audience.

# Advantages:

- Lengthy reports allow space for details.
- Publications can be "flashy" and impressive.

• Publications permit careful documentation of data and methods.

**Disadvantages:** 

- Lengthy publications may reduce readership.
- Reports can be expensive and timeconsuming to write, print, and distribute.
- In a rapidly evolving situation, reports may quickly become dated.

Tips:

- Save reports for work that is nearing completion or needs a big splash.
- Given their length, reports can be stultifying. Use graphics and photos to liven up the document.
- Include an executive summary.

## Radio, Video

Radio:

Radio is a medium that reaches many people at relatively low cost. Radio advertisements may be bought in areas where a message is needed. At a larger scale, Friends of the Earth has developed their own radio network, Radio Amazônia, which is "the largest nongovernmental communication network in Latin America." Video:

Video "press releases" can be effective and easy to produce. Such video press releases are especially good for TV media because you provide content and video material for airing. By providing "ready-to-go" material to busy TV journalists who are constantly looking for material, you dramatically increase your chance of air time.

A longer-form film or video can be effective in certain situations, but requires more money and expertise. Such videos can be released to TV, used as parts of mailings or briefings, or used in publicity events. Recruiting well-known people to help with the production as narrators (on- or off-camera) or producers can raise the video's profile and impact. Telapak, for example, has recruited numerous film stars to help with their publicity events. In general, though, carefully consider the specific needs and uses of such videos before making the substantial investment.

Advantages:

- Visual and audio stories can have large impact.
- They can help create a strong visual identify for the NGO.
- They can reach a wide audience.

Disadvantages:

- They can be expensive (especially film).
- They require specialized equipment and experience.

Tips:

- Partner with larger organizations, or obtain in-kind donations or services.
- Concentrate on short forms such as video press releases.
- Recruit famous people as on- or offcamera narrators.

# ANTICIPATING AND PREPARING FOR REACTIONS AND RESPONSES

When you are preparing to communicate the findings of a monitoring program, you should try to anticipate the potential reaction to and uses of the findings.

Of course, having credible data is critical. By anticipating and preparing, you can plan how to meet negative reactions and satisfy requests for information. For example, Conservation International was caught unprepared after the release of maps showing the increased deforestation in the Petén of Guatemala. They were inundated with requests for data. Government agencies were suddenly criticized as a result of CI's press release, causing previously good relationships to sour. Other parts of your organization also should be prepared to take advantage of anticipated success. Here is a list of points to keep in mind when releasing the results of a monitoring program:

- Don't embarrass partners and stakeholders—warn them an event is coming and give them an idea of the message.
- Have enough printed materials on hand for distribution.
- Plan for sufficient staff time to answer questions and phone calls.
- Prepare to take advantage of the increased name recognition. For example, it is a good time to pursue fundraising, submit requests for personal briefings, offer to give interviews to media, etc.

# THE REVIEW PROCESS

After drafting your communication piece, it is important to have the draft reviewed before you consider it a finished piece of work ready for publication. Review is a process of submitting your draft manuscript to colleagues who are familiar with the topic of your publication and who will critically read the manuscript and provide comments.

There are two primary reasons for a formal review process. First, the actual quality of the publication will, almost certainly, be greatly improved by feedback from experts in your field. Second, the perceived quality and trust accorded the document by your audiences will also be improved. For these reasons, your NGO should develop a formal procedure detailing the review steps an author must go through before the manuscript is considered ready for publication.

There are commonly two levels of review: internal and external. Internal review is conducted by colleagues within your organization; external is conducted by individuals outside your organization. Internal reviews are usually solicited from four or five colleagues. Ideally, you should receive from six to ten external comments, although a few more may be desirable if you have a very broad audience. A response rate around 50 percent is customary, requiring solicitation from 10 to 20 potential reviewers. Internal colleagues are chosen based on their expertise and their experience in the publication process. External reviews should come from three primary groups:

- 1. Data providers;
- 2. Scientific experts; and
- 3. Representatives of key audiences of your publication.

There are four types of potential problems with the manuscript that the review process is meant to catch:

- 1. Factual errors;
- 2. Incorrect or problematic interpretations of data;

#### 3. Methodological problems; and

#### 4. Political issues.

These potential problems are important to raise when soliciting feedback from reviewers. You should write a list of questions to provide guidance on focus areas. Tell them where should they be particularly attentive in looking for factual errors or potentially questionable data interpretations. Which statements might make your document unpalatable to certain audiences for political reasons? Guidance along these lines gives reviewers an initial focus and ensures that your most important questions will be addressed. In addition, your letter requesting that the individual review the manuscript should stress that when raising concerns, the reviewer will be most helpful if they also provide potential solutions to the problems they raise.

It is customary to allow four weeks for review to give the reviewers sufficient time to fit the review work into their normal work schedule. Ideally, a stipend is promised if the party is able to provide a review. It is a good idea to plan for this expense when budgeting your project.

Upon receiving the review comments, you should prepare an memorandum summarizing the comments and outlining a plan for implementing the comments. This memorandum should be shared internally with a superior and, by including it as an annex to the final published document, with your readers. For example, due to the political

nature of its publications, GFW has chosen to include review comments in its publications. This is very helpful to readers because they are usually able to find their questions and the authors' response to them among the summarized review comments. Some comments will be implemented as suggested, others will be dismissed, and others will force you to change the document to fall between what your manuscript states and what the reviewer suggests. This third option is usually the approach taken for comments of a political nature. Contradictory comments often force you to make a decision about which reviewer you agree with, or to make the statement less controversial.

# WHEN TO STOP MONITORING?

You need to know when to stop. This handbook has emphasized the importance of thorough planning and organized execution of monitoring projects. Ultimately, however, designing effective monitoring depends on having a clear idea about your conservation goals. What is it you are trying to achieve?

Goals need to be specific. For example, if the goal is to reduce illegal logging in a nation's forests by changing government behavior, it is important to define success in a measurable way so we can 1) actually measure progress and 2), know when to stop or reduce effort.

Open-ended goals (e.g., "reduce logging") are ineffective. Define the successful reduction

rate of logging in terms of quality, quantity and time. For example, the monitoring program will reduce illegal logging by 25 percent within 5 years or bring about a 15 percent increase in the number of forestry police assigned to permit enforcement by the year 2005. Whatever the benchmarks are—and they may evolve with new data you must have them.

Some monitoring may require continuous low level monitoring even after the major battles have been won (or lost). But every monitoring project must have clearly defined benchmarks for success, action, and cessation. They provide a quantifiable measure. It is critical to understand that monitoring alone does not measure success and failure. Rather, it is the union of monitoring and benchmarks that allows you to evaluate success.

# NEXT STEPS

We have presented an overview of monitoring and a framework outlining how to conduct monitoring programs and projects. We have offered guidelines, advice, and places to look for additional resources.

The central message of this handbook is that monitoring is conducted to answer questions about specific natural resource management issues. But there can be no prescription about how to conduct a monitoring project. Monitoring projects tend to be idiosyncratic affairs run by organizations whose resources are stretched thin over a variety of activities. Monitoring needs to be efficient, simple, to the point, and effective at answering the critical questions. Moreover, monitoring projects and programs need to have clear communications goals planned from the outset. Money is wasted when it is spent on monitoring results that are not communicated. Worse, such lost opportunities imperil the very natural resources NGOs seek to protect.

It is monitoring's essential idiosyncrasy that guided the structure of this handbook. We cannot prescribe details, only a way of thinking. The devils, and all the evocative examples, lie in the details of actual monitoring programs. This is why the best teachers of monitoring activities are the organizations that conduct them. So, we offer these 13 case studies as examples of real-world NGOs that conduct monitoring for environmental conservation. They are not perfect-they are evolving organizations doing their best in complicated situations. Nevertheless, we urge you to look for your own image in these examples-to find yourself in them so that you can see how others have solved similar problems. The message of all of these NGOs is the value of community and networks.

Brief versions of the case studies appear in the next section of this handbook. Full versions of the case studies are on the handbook's Web site.

# FEEDBACK

This is a living document. We will be updating it as we learn better methods of monitoring and find more examples to share. And we will update it as we learn our communication failings and devise new ways of communicating knowledge to you. You therefore have a vital role to play in this document.

When you find a topic to which you can add some information, or read a section that needs to be better explained, please report these situations to us. More than 20 people have worked on this handbook. We can improve it further by adding your voices.

Please forward your comments to:

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# CASE STUDY SUMMARIES

# About The Summaries

This handbook is a synthesis of information extracted from 13 case studies of conservation NGOs. Each case study prepared for this handbook has many stories to tell. Unfortunately, we are unable to include the entire case studies in Volume 1 of this handbook. We have therefore extracted those stories that are most central to the handbook as a whole and those that best illustrate specific points included in the handbook.

Each case study has many lessons to teach that we could not include here. The entire case studies are available as Volume II of the handbook and on the Internet at the following addresses: http://www.globalforestwatch.org and http://www.conservation.org.

# ASSOCIATION FOR THE PROTECTION OF ENVIRONMENT AND CULTURE (APEC)

Address: APEC-Nepal; GPO Box No. 12822; Katmandu; Nepal. Telephone: 977 1 277969 Fax: 977 1 277969 or 977 1 261497 E-mail: medini@enet.com.np Internet Address: http:// www.geocities.com/RainForest/Vines/9998

### Background

The Association for the Protection of Environment and Culture (APEC) was founded in 1988.

They initially concentrated on reforestation and other local environmental initiatives and gradually broadened their scope of work to include monitoring.

# Monitoring Approach and Data Gathered

APEC monitors two broad topics:

- The state of Nepal's ecosystems.
- Popular attitudes toward the environment and their impact on local environments.

Please see Box 3 for more detail on these monitoring programs.

## **Methods**

APEC uses the following methods to gather data:

- Field Surveys
- Rapid Rural Appraisal/Participatory Rural Appraisal (RRA/PRA)
- Interviews
- Secondary Sources

RRA and PRA are methods appropriate for learning local peoples' attitudes about different subjects. These are important tools for APEC's monitoring of people's perceptions about resources as well as the resources themselves.

APEC plans its data collection, calculation, and analysis methods carefully to minimize error. Precautions against error include minimizing preconceptions and biases in their research through techniques such as baseline surveys, random sampling, and Rapid Rural Appraisal (RRA)/ Participatory Rural Appraisal (PRA). Remote Sensing and Geographic Information Systems (GIS) are also important for corroborating fieldcollected data. APEC uses *Research Methods and Designs for Education* by J.H. McGarth as a book to help inform its data collection methodology.

#### Lessons Learned

APEC finds that it has many more potential projects than capacity to implement them. They have therefore devised the following criteria to decide which projects should be implemented:

- How does the project fit APEC's mission and objectives?
- How well can APEC handle the project? Is it affordable?
- What is the specific time frame; how does this fit with current projects?
- Will volunteers and staff have time to work on the project?
- Have similar projects worked?

# CENTER FOR ENVIRONMENT AND DEVELOPMENT (CED) CAMEROON

Address: BP 8451 Yaoundé; Cameroon. **Telephone:** (237) 22.38.57 **Fax:** (237) 22.38.59 **E-mail:** ced@cedcam.org **Internet Address:** www.cedcam.org

### Background

The Center for Environment and Development (CED) was established in 1994. By monitoring infringements against the environment and breaking the silence to challenge them, CED intends to provide the information and engender the public discourse needed to create an accountable society.

# Monitoring Approach and Data Collected

In this case study, CED monitored the effects of the construction of a logging mill that threatened the Dja Nature Reserve. The construction project also threatened to destroy a village belonging to ethnic pygmies situated near the boundaries of the preserve.

In monitoring the road construction, CED applied their 9-step process for designing and implementing their monitoring programs and communication of results. The steps are as follows:

1. Decide what issues to monitor.

- 2. Determine the desired outcomes of the monitoring campaign.
- 3. Analyze the problem, the parties involved, and how they operate.
- 4. Choose targets and allies.
- 5. Choose the methods of action and how to implement them.
- 6. Gather the data.
- 7. Analyze the data and write the reports.
- 8. Communicate the results of the campaign and advocate for better environmental and social policy and management.
- 9. Conduct a self-analysis.

In this case study, CED used a combination of secondary and field monitoring to determine the legality of company and government actions in planning and building the sawmill. The initial secondary information was a matter of gathering general information about the project to get a sense of problems. Further secondary research focused on two particulars: 1) the laws regarding natural area buffer zones; and 2) the laws regarding the taking of property, including notification, provision of a forum to be heard, and required compensation.

#### Methods

Secondary source documents were requested from pertinent government agencies, the

company building the sawmill, and gathered through various informal sources such as newspapers and colleagues. Field research was conducted by going to the site and measuring the distance between the sawmill and the Dja reserve and the rivers bordering the reserve. By comparing this data against the laws specifying required buffer areas, CED was able to show that the mill was in violation of the law. The physical impacts of construction to the Baka pygmy village was also observed visually and documented. The social impacts were monitored through interviews with the residents of the former village.

# COMITE NACIONAL PRO DEFENSA DE LA FAUNA Y FLORA (CODEFF)

Address: Av. FCO. Bilbao 691 Providencia; Santiago; Chile. Tel: 2-2510262 Fax: 2-2518433 E-mail: bosqueaustral@codeff.cl Internet Address: www.chiper.cl/codeff/ index.asp

### Background

CODEFF was founded in 1968 and works toward the conservation of Chile's forests. Forest monitoring is a major component of CODEFF's work toward this end.

# Monitoring Approach and Data Collected

CODEFF monitors the legality and ecological appropriateness of logging in Chile. They also track the loss of native forests to plantations and to non-forest land uses.

CODEFF has developed a formalized process of planning and implementing monitoring. They first use flights to identify areas for field-level monitoring and then send teams into the field for more detailed information. During the flights, CODEFF staff visually assess the areas they are flying over, using the color and texture of the land they are flying over to determine which areas should be visited on the ground. Areas to be visited are photographed and marked on maps using Global Positioning Service technology. Field crews then visit those areas requiring more information.

The field crews gather the following information:

- 1. Name of the location and how it is accessed.
- 2. Name of the property.
- 3. Name of the proprietor and enterprise involved in the area.
- 4. Type of intervention: whether area has been clearcut to establish a plantation or rangeland, clearcut for timber, selectively cut for lumber, etc.
- 5. Kind of vegetation and fauna effected.
- 6. Amount of wood and species harvested.
- 7. Topography of the area.
- 8. A description of the bodies of water and estimated impact of logging on them.
- 9. Design of the logging roads.

Photographs of the field sites are always taken as a visual supplement to the measured data.

# Methods

In preparing for the flights, CODEFF uses maps ranging from 1:50,000 to 1:3,000,000 scales supplied by the Chilean military geographical institute. They select the areas to fly over based on the amount of native forests left in different areas and how much pressure these forests are experiencing.

Field work is conducted by sending crews to the sites identified in the flights. They gather the data using typical field methods. The kind of vegetation and fauna effected are estimated based on the remaining forest surrounding the cut area. Within the cut areas, the tree species and amount of wood harvested are established using inventory plots and counting stumps. Accessing the stumps can be very difficult if the logging slash has not been burned. It can also be difficult to identify tree species using only stumps. If it proves impossible to establish plots within the cut areas, plots in adjacent intact forest areas can be established if they contain similar vegetation. The topography is recorded visually and with a camera as well as by using a clinometer to measure slopes.

# Communication

CODEFF has also developed a template for their monitoring reports. These reports include:

- Name and location of the landed property.
- Where access to it exists.
- Name of the owner.
- Name of the contractor responsible for the work in the plot.

- Characterization of damage from the logging job.
- Legal codes broken, if any.
- Recommendations to be implemented by the state, the firm, or the proprietors involved.

As CONAF (the Chilean governmental body responsible for forest policy and enforcement) is serious about their responsibilities, CODEFF has carefully maintained good relations with them. This has enabled CODEFF to present their findings to CONAF to consider policy and law-enforcement issues.

# CONSERVATION INTERNATIONAL— BOLIVIA (CI-BOLIVIA)

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http://www.conservation.org

## Background

Conservation International—Bolivia is a part of the Conservation International (CI) network, which seeks to preserve biodiversity "hotspots" around the world. This case study by CI—Bolivia concentrates on their monitoring efforts in Madidi National Park and Integrated Natural Area, which was established in 1995.

# **Monitoring Approach**

When CI established a program in the Madidi region, they developed a list of questions to guide the creation of their monitoring program. Among the questions CI-Bolivia asked were:

- How do we monitor the status of the park and our work?
- What trends describe the health of the ecosystems under study?
- What time-frames adequately portray natural versus human-induced trends?
- How do we establish threshold values for future monitoring?

• How do we expand the capacity of our partners who will continue the monitoring?

These questions led CI-Bolivia to establish threshold values for different variables associated with the ecological health of the park. Over time, they were then able to monitor against these thresholds to assess the trends in the park's ecological health.

The primary threshold was species richness at the time the park was created. Most of the forest inside the park and in the surrounding areas were in pristine condition when the park was created. The amount of biodiversity present at this time therefore serves as a good benchmark indicator of forest health.

#### Methods

To establish the thresholds for different areas, CI undertook a number of studies, including Rapid Assessments of Biodiversity (RAPs), species inventories, aerial overflights, and a needs assessment of local human communities.

To measure whether the level of biodiversity stayed in pristine health, CI—Bolivia continued to monitor the streams and forests within the park, especially in areas near logging and hunting activities and ecotourism concessions.

# CONSERVATION INTERNATIONAL— GUATEMALA (CI-GUATEMALA)

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## Background

Conservation International—Guatemala (CI— Guatemala) is a part of the CI international network, which seeks to preserve biodiversity "hotspots" around the world. This case study demonstrates the power of using remote sensing to monitor forest cover change and the value of remote sensing analysis as a communications tool.

CI-Guatemala joined the Maya Biosphere Reserve Project in 1991. Totaling 1.6 million hectares, the Maya Biosphere Reserve is an enormous area. Only anecdotal information regarding the location and rates of deforestation in the reserve was available.

# Monitoring Approach and Data Collected

Because of the enormity of the reserve, CI-Guatemala opted to use remote sensing to monitor trends in forest cover. They anticipated that using remote sensing would be the best tool to fulfill the following objectives:

- Improve overall and site-specific understanding of the deforestation phenomena.
- Establish forest cover baselines on specific dates for use in trend monitoring.
- Create a powerful communications tool for use with policymakers and the general public.
- Provide a management tool for the Maya Biosphere Reserve project.
- Assess protection effectiveness by comparing deforestation rates in the reserve to those in the buffer zone.

CI-Guatemala acquired Landsat imagery for 1986, 1990, 1993, 1995, and 1997 that covered about 90 percent of the Maya Biosphere Reserve. For each period, they calculated the Normalized Difference Vegetation Index (NDVI), which is an indicator of "greenness." Changes between periods were then compared. Field visits were also conducted to observe ground conditions and confirm the sensitivity of the change detection classification method.

## **Results and Communication**

Monitoring with remote sensing gave a clear picture of total deforestation from 1986 to 1997, as well as an indication of spatial and temporal trends in deforestation rates. The robustness of the study allowed these comparisons to be made with a high level of certainty.

The "wow factor" is one of the strengths of mapped remote-sensing data. Politicians and decision makers almost always have a strong reaction when they see an objective illustration of what the situation looks like from space. This case was no different; the release of the maps depicting deforestation in the Maya Biosphere Reserve had a dramatic impact on the management of the reserve. When CI-Guatemala and CONAP (Guatemala's Commission on National Protected Areas) and CONAMA (Guatemala's National Commission on the Environment) released the maps, the news made the front page of major Guatemalan newspapers.

# CONSERVATION INTERNATIONAL— WASHINGTON, D.C. (CI)

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#### Background

Conservation International (CI) seeks ways for conservation and economic development to coexist in highly threatened ecosystems, especially those with high levels of tropical biodiversity. In 1993, CI created a policy department to concentrate on a number of global-level issues that effect every region in which they work. This case study focuses on the extractive industries project, which monitored resource extraction in the tropics.

The objective of the project was to promote the best practices possible by extractive industries. This required understanding the industries and monitoring trends in resource exploitation. It allowed CI to become informed participants in the debate over whether and how extraction should proceed in certain sensitive ecosystems.

# Monitoring Approach and Data Collected

The approach CI used varied based on economic, technical, and political factors. The timber industry, for example, has comparatively low impact over very large areas, while oil development has very severe impacts on much smaller areas. CI therefore chose to document the overall trend in large-scale logging, particularly by multinational firms, while tracking and encouraging the oil industry's use of lowerimpact technologies.

This monitoring project relied wholly on secondary data, including bids, environmental impact statements, and development plans submitted to governments for oil or timber leases, annual reports, investor documents, trade data, legal incorporation, and other financial documents filed by corporations.

#### Methods

Analyzing these documents allowed CI to track the location of active companies and to make a qualitative assessment of their activities.

Gathering the different kinds of information varied in complexity. Logging and oil concession bids were easily obtained from governments. Oil companies, especially large multinational ones, were forthcoming about where they were active, as this information is important to shareholders and stock value. Many oil companies even had Web sites and annual reports indicating where their active concessions were located. Despite the ease with which governments provided logging concession data, uncovering a meaningful picture of logging activity on the ground proved to be difficult. The large companies were secretive, often hiding behind local company fronts. However, extensive research using corporate documents usually exposed these covers. Sources such as the United States Library of Congress Databases, electronic information services such as Lexis/Nexis, annual reports, and other materials were instrumental in uncovering most major foreign logging companies active in conservation areas in the tropics.

### Communication

Maps were chosen as the most effective and simple way to communicate findings on these extractive industries. CI developed two mapping techniques to show both the rate and scale of increase in oil, mining, and timber concessions. These techniques were 1) a map with all the locations of current extractive industry activities in biodiversity hotspots; and 2) time-series maps to show how the situation has changed over time.

# ENVIRONMENTAL RIGHTS ACTION (ERA)

Address: Environmental Rights Action [Era]/Friends Of The Earth Nigeria; #214, Uselu-Lagos Road; P. O. Box 10577; Uselu-Lagos; Benin City; Nigeria. Telephone/Fax: 234 52 600165 E-mail: oilwatch@infoWeb.abs.net

# Background

Environmental Rights Action (ERA) is a Nigerian environmental advocacy organization established around the principle that any activity that threatens the integrity of the natural environment violates the basic right of people and communities to survival.

# **Monitoring Approach**

ERA monitors private and government activities associated with environmentally detrimental development. This includes monitoring whether and where development is occurring, whether it is legal, and the impacts on the ecology and human population in these areas.

For the watchdog role to be fulfilled, ERA believes that local communities must be actively involved in monitoring. As logging, plantation development, and oil and gas extraction activities are mainly carried out in rural areas, local populations have onthe-ground knowledge of these activities. Their participation makes monitoring more effective.

# **Data Collection**

Secondary data, such as government legislation, policy statements, maps (obtained from government departments and companies), or corporate documents provide most of the information ERA uses. However, they also use primary data such as photographs, video, and interviews. Members of communities provide ERA's most important information through the process of participatory research.

# **Participatory Research**

ERA field officers immerse themselves into local life to learn the perspective of the effected people. Rural communities usually have a deep knowledge of the ecosystems they depend on. They usually have a clear understanding of changes in these ecosystems. Tapping this local knowledge is the aim of participatory research.

## **Field Research**

Field visits help draw a general picture of the threat to the natural environment and local populations posed by a development activity. Field research is usually conducted by volunteers with knowledge of the local language, the road or creek network, and with some technical knowledge of the exploitation activity and/or the ecology of the area.

### **Secondary Data**

Data are also collected from sources within corporations or government agencies responsible for the development activity. Collection of such data in a country like Nigeria, where the state does not encourage openness, is difficult. However, concerned sources within companies and government agencies are often willing to make papers available.

# FRIENDS OF THE EARTH— AMAZÔNIA PROGRAMME

**Address:** Av. Brigadeiro Luis Antonio, 4442 CEP; 01402-002 - Sao Paulo- SP; Brazil. **Tel:** (55-11) 38.87.93.69 **Fax:** (55-11) 38.84.27.95 **E-mail:** foeamaz@ibm.net **Internet Address:** www.amazonia.org.br

#### Background

Friends of the Earth—Amazônia Programme (FOE-AP) was started in 1989 as a unit within the Friends of the Earth International network. Since then, FOE-AP has progressively changed from being a unit of an international NGO into an active Brazilian NGO.

In 1993, FOE-AP devised a new strategy for their monitoring program. Logging was becoming the primary degrading force in the Brazilian Amazon forests and many environmental groups were advocating limiting or banning logging. However, the laws already in existence were not being enforced; passing new laws only gave the illusion of solving the problem. FOE-AP's new approach was to monitor forestry law enforcement to show the extent of illegal logging and the need for improved enforcement.

## Monitoring Approach and Data Collected

FOE-AP uses a combination of legal and other secondary source research and field monitoring. The legal research involves building an extensive understanding of existing legislation, forestry codes, and previous judicial decisions. Other secondary source monitoring involves management plans and government authorization of such plans. This is vital since illegal logging is facilitated by either intentional loopholes or misuse of official licenses. The information gathered from secondary sources is then used to plan field monitoring activities.

The field monitoring investigates the overlap between where secondary sources indicate logging is occurring with the reality on the ground. Inconsistencies between the official information and the reality indicate potential illegal activity. Data collected through field monitoring include photographs, interviews, and ecological data indicating whether the level and type of logging matched the government license.

### Methods

FOE-AP has found that it is sometimes difficult to get the documents needed to

conduct research. Transparency in public administration is not universal, and no specific "freedom of information" regulations exist to make the release of information mandatory. FOE-AP found that different government bodies could be either very forthcoming or very secretive.

FOE-AP used two primary approaches in collecting data from the field. Photographs and written field records record logging, burning, logging roads, and other activities. Flights were used in remote areas where distant observations could provide enough information. The other collection method was interviews, mostly conducted at sawmills.

# **GLOBAL WITNESS**

Address: PO Box 6042; London N19 5WP. Tel: 0171 282 6731 Fax: 0171 272 9425 E-mail: gwitness@gn.apc.org Internet Address: http://www.oneworld.org/globalwitness/

# Background

Global Witness is a British-based NGO that uses pioneering monitoring techniques to investigate the links between environmental and human rights abuses.

# Monitoring Approach and Data Collected

Global Witness collects documents showing illegal logging including expired permits, documents granting permission to log in areas that are out-of-bounds, and others. Other data collected include evidence of logging from the field, such as photographs and video with GPS coordinates and counts of logging trucks. Finally, they also use information from interviews.

# Methods

Global Witness uses a two-stage monitoring strategy: extensive review of secondary sources followed by investigative field work. The secondary-source research begins in London using official trade statistics, journalists, NGOs, donor agencies, and others. This process is repeated in the country where monitoring is taking place. Governments also become important secondary sources here. The secondary sources help to focus field monitoring.

Global Witness' investigative approach uses interviews, leaked documents, photography, video footage with GPS coordinates, and simply observing and recording information. Data is often brought to them; when Global Witness arrives, they announce themselves and arrange meetings with ministers, hoping that people and NGOs will supply them with documents. These data are important coups, but most data come from field monitoring.

The strategy for field monitoring is to go to areas indicated by secondary sources and find and record evidence of illegal logging.

# **Lessons Learned**

Sometimes the monitors go undercover to get difficult data, but often this is not necessary. Global Witness has found that they don't have to be secretive as often as they expected. They often film or photograph openly, as people in Cambodia often enjoy having their photographs taken. When they do go undercover, they generally pretend to be in the logging business, journalists, or researchers. When conducting field monitoring, the monitors always gather the following information: Global Positioning System (GPS) coordinates, film and/or photographs, documentation that people are willing to give them, and personal testimony. The GPS information has proven invaluable as a means of making their information credible to wary audiences.

Global Witness also gathers data by other means, such as counting trucks in order to estimate logging intensity in an area. This involves physically counting trucks, asking locals how many trucks go by, and asking truck drivers how many trucks they know about. As truck drivers know exactly where they go with how many logs and how often, they usually can provide valuable information.

The years of careful monitoring and attention to providing solid information have paid off for Global Witness. The government of Cambodia recently appointed Global Witness to officially monitor Cambodia's forests.

# INSTITUTE FOR SOCIAL AND ENVIRONMENTAL STUDIES OF SOUTHERN BAHIA (IESB)

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# Background

IESB works to protect the remnants of forest in Bahia, Brazil with the goal of preserving the large number of endemic species present in the area.

# Monitoring Approach and Data Collected

IESB's case study concentrates on their experiences monitoring the success of a project seeking to conserve private lands around the Una Biological Preserve in Bahia.

The initial goal of this case study was to track how well efforts to encourage local landowners to preserve their forested land were working. IESB was assessing the project's success in keeping land in forest.

In this case study, IESB chose to monitor two main aspects of Bahia forest policy. The first was whether policies advocating ecotourism helped to increase the value placed on forest areas. The second was whether policies advocating diversified agriculture were helping to maintain forest cover.

## Methods

The monitoring for this project was primarily secondary-source monitoring. The policy documents, laws creating incentives, and programs developing ecotourism were obtained and examined for their appropriateness and their impacts on the forest areas.

## **Lessons Learned**

IESB had designed a meaningful project when they began monitoring Bahia forest policy and preservation by local landowners for either ecotourism or diversified agriculture. However, an opportunity to create a new reserve—a much bigger impact—presented itself. IESB therefore had to abandon their initial project to capitalize on the new opportunity. This can be difficult to do, for reasons of funding and desire to follow through on a project already underway. It is important to keep your eyes on the broader goal.

# LE POU D'AGOUTI

Address: Le Pou d'Agouti; B.P. 194; 97393 St. Laurant du Maroni Cedex; Guyane Francaise. Tel: (594) 34 20 97 Fax: (594) 34 18 87 Internet Address: http://www.mdiguyane.fr/pouagouti/Index.asp

### Background

The Pou d'Agouti (a local word for chiggers) is a French Guianese environmental protection NGO founded in 1990 to promote sound and sustainable resource development in French Guiana and the Guiana Shield region as a whole.

# Monitoring Approach and Data Collected

The Pou d'Agouti's approach focuses on tracking the quality of local and federal government development planning and implementation. In addition, they also have set up an informal information clearinghouse network and are also diversifying into field work.

Most of the data needed in tracking government development planning are secondary sources. These are usually government planning documents or environmental impact documents. In addition, other sources' assessments of the same projects are used. In their capacity as a data clearinghouse, members and associates feed them information about poorly implemented development projects and illegal activities such as unlicensed gold mining. The Pou d'Agouti generally passes this information to the authorities.

### Methods

The Pou d'Agouti uses its secondary sources to conduct threshold monitoring against environmental standards and laws. Planning documents often do not meet legal standards and can be challenged. Occasionally, the planning documents will be compared against field work to see if the plans are being correctly implemented.

When gathering secondary sources, the Pou d'Agouti gets information from three sources: the government, members or associates, and the NGO networks they belong to. Getting documents from the government is a combination of knowing and demanding their rights of access to government information under French law and using contacts and cunning to get documents that the government doesn't care to share. Partner organizations often share relevant documents and government employees will also leak documents.

The Pou d'Agouti's monitoring by members and associates is an informal system relying on interested parties taking note of illegal activities and passing the information to the Pou d'Agouti. The Pou d'Agouti compiles this information as a means of tracking illegal activity and to get a sense of where inappropriate development is taking place. Instances of egregious illegal activity, such as large groups of gold miners, are passed on to the government, which will sometimes send the army to disperse the miners.

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# SIERRA LEGAL DEFENCE FUND (SLDF) AND BRITISH COLUMBIA FOREST WATCH

Address: Suite 214; 131 Water Street; Vancouver, B.C.; Canada, V6B 4M3. Tel: 604.685.5618 Fax: E-mail: sldf@wimsey.com Internet Address: http://www.sierralegal.org/main.html

### Background

Sierra Legal Defence Fund's (SLDF) mission is to use legal remedies to protect the natural environment through the promotion and enforcement of the laws of Canada. To reach this goal, SLDF created the British Columbia Forest Watch Network (Forest Watch). Forest Watch is a network of concerned citizens who gather information on the implementation of forestry in their communities.

### **Monitoring Approach**

SLDF and Forest Watch primarily use threshold monitoring. They monitor the level to which forestry in British Columbia complies with the law and harvesting plans submitted by companies. Thus, SLDF measures compliance against the government and industry's own regulations. They have focused on this strategy because 1) laws exist to hold violators accountable; 2) these issues resonate with the public; and 3) these problems have ecological significance and can be objectively measured and documented using available resources.

A few key issues form the bulk of Forest Watch's activities: roads, stream protection, cutting boundaries, terrain and soil issues, planning, and compliance with plans during logging. All of these issues have clear thresholds associated with them and can be easily measured in the field.

# **Data Gathering**

SLDF begins its preparation for an investigation by examining relevant laws, regulations, and policies to clarify which activities are legal and which are not. In addition, SLDF reviews the planning documents that logging companies are required to submit as part of the planning process. Gaining this information demands knowing what information exists, who has it, where it is located, and the various options for getting it. These are skills that are gained with experience.

SLDF and Forest Watch then analyze the laws and planning documents to see where they should expect to find inconsistencies between the thresholds provided by the documents and the reality on the ground. If the anticipated irregularities are great enough to justify the expense and time of a field investigation, the next step is to go into the field to record how logging was conducted on the ground.

## **Lessons Learned**

Then it is decided what resources are available and how many are needed to gather the relevant information. How many people? How many days? What kind of transportation? How much money for expenses? This entire process of planning is a vital step, as Forest Watch and SLDF have learned that fieldwork is dangerous and expensive. It should therefore only be undertaken after complete background research and planning has been conducted.

# TELEPAK

Address: Jl. Semput Kaler No. 16; Bogor 16154; Indonesia. Tel: (62) 251 320-792 Fax: (0251) 351069 E-mail: telapak@indo.net.id

# Background

Telapak was founded in 1995 by NGO activists and natural resources management specialists.

# Monitoring Approach and Data Collected

Telapak monitors biodiversity conservation, natural resource extraction, and the livelihood security of resource-dependent communities. This monitoring encompasses all aspects of the land and seascape from remote forest and reefs to farmers' fields.

This case study describes how Telapak and their partners monitor logging company concessions to assess whether the logging is in accordance with the law. As indicated by Telapak's generic monitoring approach outlined below, this effort involves gathering both secondary and primary data. Telapak plans their monitoring projects using the following steps:

- 1. Identify the purpose of the investigation.
- 2. Collect and understand the secondary information.

- 3. Develop the data collection methodology and train the data collection crew.
- 4. Conduct data collection.
- 5. Analyze and disseminate the data.
- 6. Take necessary action.

The secondary data include company annual work plans for cutting blocks, company maps, and other data from the companies on plans for the concessions in question. In addition to the plans, the monitors need to understand the laws and regulations regarding logging so that field monitoring can be targeted to present clear evidence of violation. Telapak's secondary data not only backs up fieldwork looking for past or present illegal logging. In addition, they assess five-year plans in order to try to prevent imminent destruction.

Data collected in the field include the nature of any infraction as well as the date and time, a GPS coordinate, photographs, videos, audio recordings, written documentation, the names of informants, and parties involved in the investigation.

# Methods

While the secondary data that Telapak gathers from companies is meant to be public information, they are often kept secret by both logging companies and forest ministry officials. Accessing the data therefore frequently demands establishing contact with sympathetic individuals in either the company or government. These contacts are often fruitful far beyond gaining access to these documents, since these officials can provide leads on other illegal activity.

The field data mostly involves investigation and observation. Investigation includes interviews with villagers, company officials or employees, and government officials. Another form of investigation is to sign on with a logging company as a day laborer. The information is gathered either openly or covertly depending on the situation. Being covert is often not necessary even with government officials, as they sometimes have frustrations regarding government inattentiveness to illegal activity. Data gathered through observation includes visits to concessions to gather data about how well the cuts meet the harvesting regulations, as well as activities like counting logging trucks to estimate the amount of timber leaving a concession.

Telapak stresses the need for a formal planning and training process in order to maximize the effectiveness of the monitoring process. The training ensures that all monitors gather data using the same approaches.

# TOOLS AND RESOURCES

Internet Resources 67
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Communication Tools 80
Monitoring Planning Forms

This sections provides a compilation of Internet links, tables, and examples that we hope can inspire you and your NGO to conduct better investigative research and effective monitoring.

# INTERNET RESOURCES

The amount of resources available on the Internet has increased tremendously over the past few years. In particular, a monitoring NGO can benefit from the Internet in the following fields:

- Access to data that can be used for monitoring purposes;
- Explore Web sites to learn who is doing what;
- Search for people or organizations;
- Discuss with others via newsgroups, or listserves; and
- Shop for equipment.

# NGOs Involved in Environmental Monitoring

ASEAN BioAtlas: http:// www.cyberct.com.my/arbec/art\_com.htm

Association for Biodiversity Information: http://www.abi.org/

Biodiversity Conservation Information System (BCIS): http://biodiversity.org/

Biodiversity Conservation Network: http://bcnet.org/

Conservation International, USA: *http://www.conservation.org* 

Conservation International, Brazil: *http://www.bdt.org.br/bdt/cibrasil* 

HydroNET: http://www.r-hydronet.sr.unh.edu/

Global Forest Watch: http://www.wri.org

International Development Research Centre (IDRC): http://www.idrc.ca/

International Institute for Environment and Development (IIED): http://www.iied.org/

International Organization of Biological Field Stations (IOBFS): http://www.capital.net/com/iobfs/

Interrain Pacific: http://www.interrain.org/

Organization of Biological Field Stations (OBFS): http://www.obfs.org/

Rainforest Action Network: *http://www.ran.org/ran/* 

The Nature Conservancy (TNC): *http://www.tnc.org/* 

US Long Term Ecological Research Network: http://lternet.edu/

Wildlife Conservation Society: http://www.wcs.org/

World Bank - Community-Based Natural Resource Management: http:// www.worldbank.org/html/edi/conatrem/

World Conservation Monitoring Centre (WCMC): *http://www.wcmc.org.uk/* 

World Rainforest Movement: *http://www.wrm.org.uy/* 

World Wildlife Fund, US: http://wwf.org/

World Wide Fund for Nature, International: http://www.panda.org

Environmental Monitoring and Information Management Programs of International Organizations. *http://www.gsf.de/ UNEP/blue1.html* 

Center for Conservation Biology Network. Virtual Library of Ecology and Biodiversity. *http://conbio.rice.edu/vl/* 

EcoNews Africa analyses global environment and development issues from an African perspective. *http://www.Web.net/* ~econews/

Natural Heritage Network. Standardized data on endangered species and communi-

ties. http://www.heritage.tnc.org/ oth\_svrs.html

International Development and Research Center (IDRC) *http://www.idrc.ca* 

The World Conservation Union (IUCN) *http://www.iucn.org* 

#### Forest

CIDA Forestry Advisers Network (CFAN): http://www.cfan-rcfa.org/

EU Tropical Forestry Sourcebook: http://www.oneworld.org/odi/tropics/ Sourcebook/index.html

European Forest Institute: http://www.efi.fi/

Forestry at About.com: http://forestry.about.com

Forestry Forum: http://www.delphi.com/ ab-forestry/messages/

FORS Institute: http://www.forsonline.org/

Gaia Forest Conservation Archives: http://forests.org/

International Union of Forestry Research Organizations (IUFRO): http://iufro.boku.ac.at/

Non-timber Forest Products (Virginia Tech Univ.): http:// www.sfp.forprod.vt.edu/special\_fp.htm US Forest Service - International Programs: http://www.fs.fed.us/global/news/

World Bank Forestry Policy: http://wbln.worldbank.org/ESSD/ FORESTPOL-E.NSF/MAINVIEW

World Forestry Center: http://www.worldforest.orgl

WRI Forest Resources: http://www.wri.org/biodiv/foresthm.html

WWW Virtual Library on Forestry: http://www.metla.fi/info/vlib/Forestry/

# Geographical Information Systems and Cartography

Cartography Specialty Group: http://www.csun.edu/~hfgeg/csg/

ESRI - GIS for Forestry: http:// www.esri.com/industries/forestry/ forestry.html

ESRI Conservation Program: http://www.esri.com/conservation/

Geographer's Craft Project: http://www. utexas.edu/depts/grg/gcraft/contents.html

GeoPlace: http://www.geoplace.com

GEOSOURCE: http://www.library.uu.nl/ geosource/index.html

GIS Dictionary at AGI: http:// www.geo.ed.ac.uk/agidict/welcome.html GIS Frequently Asked Questions (FAQ): http://www.census.gov/ftp/pub/geo/www/faqindex.html

GIS Master Bibliography: http:// thoth.sbs.ohio-state.edu/osugisbib/

GIS Short-Course at the Cyber-Institute: http://www.ngdc.noaa.gov/seg/tools/gis/ referenc.html

GISPortal - Great GIS Net Sites: http://www.gisportal.com/

GPS (John Beadles): http://galaxy.einet.net/ editors/john-beadles/introgps.htm

GPS - US Forest Service: http://www.fs.fed.us/database/gps/

GPS World Magazine: http://www.gpsworld.com/

Map Projections: http://everest.hunter.cuny.edu/mp/

Mercator - catalogo de cartografia (Univ. Madrid): *http://www.mercator.org/* 

Oddens bookmarks: http://oddens.geog.uu.nl/index.html

Society for Conservation GIS: *http://www.scgis.org/* 

Spatial Analysis conference: http://www.ncgia.ucsb.edu/conf/ sa\_workshop/papers/ncgia.html Virtual Geography Department Project: http://www.utexas.edu/depts/grg/virtdept/ contents.html

#### **Global Environmental Datasets**

Center for International Earth Science Information Network (CIESIN): http://www.ciesin.org/

ESRI ArcData Online: http://www.esri.com/ data/online/index.html

Geo-Spatial Datasets (Univ. Texas): http://www.utexas.edu/depts/grg/virtdept/ resources/data/data.htm

Global Land Information System (GLIS): http://edc.usgs.gov/Webglis

Global Terrestrial Observing System (GTOS): http://www.fao.org/gtos/Web site/default.htm

TerraServer (Microsoft): http://terraserver.microsoft.com/

Tropical Rain Forest Information Center (TRFIC): http://www.bsrsi.msu.edu/trfic

UNEP-GRID (Geneva): http://www.grid.unep.ch/gridhome.html

World Climate: Weather rainfall and temperature data: http://www.worldclimate.com/

# **Biodiversity and Ecology**

Biodiversity Information Network (BIN21): http://lorenz.mur.csu.edu.au/bin/

California Academy of Sciences Biodiversity Center (CASWeb): http://www.calacademy. org/research/library/biodiv/

Center for Conservation Biology (RICE Univ.): http://conbio.rice.edu/network/

Convention on Biodiversity Clearinghouse Mechanism URL Database: http://www.biodiv.org:/relinks/search.htm

Convention on Biological Diversity (CBD): http://www.biodiv.org/

Ecological Society of America: *http://esa.sdsc.edu/* 

Ecology at About.com: http://ecology.about.com/

Fish and Wildlife Information Exchange (Virginia Tech Univ.): http://fwie.fw.vt.edu/

Indigenous Peoples Biodiversity Information Network: http://www.ibin.org/

Inter-American Biodiversity Information Network (IABIN):*http://www.nbii.gov/iabin/* 

International Association of Fish & Wildlife Agencies: http://www.conservation.state.mo.us/iafwa/

WWW Virtual Library on Ecology & Biodiversity (Rice University): http://conbio.rice.edu/vl/

# **Species Monitoring**

Andean Botanical Information System: http://www.sacha.org/

CITES-listed Species Database Fauna: http://www.wcmc.org.uk/CITES/english/ fauna.htm

MABFauna (Univ. California Davis): http://ice.ucdavis.edu/MAB/

Missouri Botanical Garden: http://www.mobot.org/

New York Botanical Garden: http://Websun.nybg.org/

Royal Botanical Gardens: http://www.rbg.ca/

Smithsonian MAB: http://www.si.edu/ organiza/museums/ripley/simab/start.htm

Species Survival Commission: http://www.iucn.org/themes/ssc/

## Indicators

US EPA Biological Indicators of Watershed Health: http://www.epa.gov/ceisWeb/ ceishome/atlas/bioindicators/

US Forest Service - Indicators & Monitoring Institute: http://www.fs.fed.us/institute/

# **Monitoring & Evaluation**

Environmental Impact Assessment database (IIED): http://nt.oneworld.org/ iied/search/index.cfm?type=eia

International Association for Impact Assessment: http://www.ext.nodak.edu/ IAIA/

International Association for Landscape Ecology (IALE): http:// www.crle.uoguelph.ca/iale/main.htm

Land Use Modeling Workshop: http://www.ncgia.ucsb.edu/conf/landuse/

UNGANISHA — IDRC Connectivity Project: http://www.idrc.ca/unganisha/

US EPA Environmental Monitoring and Assessment Program (EMAP): http://www.epa.gov/emap/

US EPA National Environmental Monitoring Initiative: http://www.epa.gov/ cludygxb/

WCMC Handbooks on Biodiversity Information Management: http:// www.wcmc.org.uk/information\_services/ publications/handbooks.htm

Team Technologies Inc., a company that is specialized in teambuilding, organizational development. Has literature and software for logical framework approach. *http://www.teamusa.com/*  Designing Projects and Project Evaluations Using the Logical Framework Approach. Bill Jackson. http://www.iucn.org/themes/eval/ english/lfa.htm

Conservation International's M&E Program: http://www.conservation.org/Web/ aboutci/monitor.htm

IDRC. Planning, monitoring and evaluation of programs. Download the publication. http://www.idrc.ca/evaluation/documents/ rebk1512.pdf

### **Internet Research Methods**

Eldis : gateway to development information: http://nt.ids.ac.uk/eldis/eldis.htm

Environmental data interactive exchange (EDIE): http://www.edie.net/right\_frame.cfm

Environmental Organization WebDirectory: http://www.Webdirectory.com/

ID21 Development Research reporting service: *http://www.id.org/* 

Natural Resources Research Information Pages: http://www.ncsu.edu/~leung/nrrips.html

Great resource for searching on the Internet: http://alabanza.com/kabacoff/Inter-Links/

WWW Virtual Library Environment: http://earthsystems.org/Environment.shtml

Search engine that uses several search engines at one time:

http://www.go2net.com/search.html

# NOTES

#### **Online Publications**

AGRICOLA Home Page: http://www.nal.usda.gov/ag/ag.html

Bioline Publications: http://www.bdt.org.br/bioline/

Conservation Ecology: http://www.consecol.org/Journal/

Earth Alert at Discovery Online: http://www.discovery.com/news/earthalert/ earthalert.html

Earth Times Daily: http://www.earthtimes.com/

Ecology: http://www.open.ac.uk/OU/Academic/Biology/J\_Ecol/JEmenu.htm

Environmental News Network: *http://www.enn.com/* 

Globo Terraqueo: http://www.interbook.net/personal/jigonsa/

International Development Network: *http://www.idn.org/* 

Lycos Environment News: http://ens.lycos.com/

Nature. International News on the *Environment. http://www.nature.com/* 

# **Protected Areas**

Journal of Park and Recreation Administration: <a href="http://www.rpts.tamu.edu/jpra/">http://www.rpts.tamu.edu/jpra/</a>

Natural Areas Association: http://www.natareas.org

US National Park Service - Park Science Bulletin: http://www.aqd.nps.gov/natnet/ nrid/parksci/

WCMC Protected Areas Virtual Library: http://www.wcmc.org.uk/protected\_areas/ data/pavl.html

World Commission on Protected Areas (WCPA): http://www.iucn.org/themes/wcpa/

### **Rapid Appraisals**

US Natural Resources Conservation Service Social Sciences Institute: http://people.nrcs.wisc.edu/socsciinstitute/

Rapid assessment program Conservation International: http:// www.conservation.org/Web/fieldact/cc\_prog/science/rap.htm

## **Remote Sensing**

American Society for Photogrammetry & Remote Sensing (ASPRS):*http:// www.asprs.org/* 

Centre for Earth Observation: *http://www.ceo.org/* 

ForNet (Univ. Minnesota): http://www.gis.umn.edu/fornet/ Landsat 7: http://landsat.usgs.gov/

Remote Sensing and Photo Interpretation Tutorial: http://mercator.upc.es/tutorial/ table.html

Courses in remote sensing: http://code935. gsfc.nasa.gov/tutorial/tofc/coverpage.html

### Software

BioRap Project: http://www.erin.gov.au/ epcg/erin/biorap/biorap.html

Biota - The Biodiversity Database Manager: http://viceroy.eeb.uconn.edu/biota

CRES Software and Data Web site: *http://cres.anu.edu.au/software/* 

EcoSolve: http://ecosolve.sdsc.edu/

EMDS: knowledge based decision support for ecological assessment: http://www.fsl.orst.edu/emds/

ICONS Home Page: http://www.iucn.org/icons/

Integrated Taxonomic Information System: http://www.itis.usda.gov/

MetaMaker (NBII): http://www.emtc.nbs.gov/http\_data/ emtc\_spatial/applications/nbiimker.html

Podolsky Software Tools for the Management and Visualization of Biodiversity Data: http://www.sdnp.undp.org/biod/ bio.html

Program Distance: http://www.ruwpa.stand.ac.uk/distance/

RAMAS: http://www.ramas.com/

Richard White: http://www.soton.ac.uk/ ~rjwhite/

Robert K. Colwell's lab: http://viceroy.eeb.uconn.edu/

Software for Population Analysis: http://canuck.dnr.cornell.edu/misc/cmr/

Specify Project (Univ. Kansas): http://www.usobi.org/specify/

Tools for Conservation Projects: http://www.stanford.edu/group/CCB/Eco/ resources.htm

Wildlife Ecology Software (Univ. Florida): http://nhsbig.inhs.uiuc.edu/

Wildlife Society Bulletin (software): http://www.im.nbs.gov/tws/cse.html

#### **Computer Resources**

Desktop Assistance: http:// www.desktop.org/

Microsoft Support: http://www.microsoft.com/support/

ONE-Northwest: http://www.onenw.org/

PC MAGAZINE: http://www.pcmag.com/
#### PC World Online: http://www.pcworld.com/

Technology Project: http://www.techproject.org/

Virus Hoaxes (CIAC DOE): http://ciac.llnl.gov/ciac/CIACHoaxes.html

Ziff-Davis University Homepage: http://www.zdu.com/

Online shopping for computer equipment: http://www.cdw.com

### INTERNET DISCUSSION GROUPS

An Internet discussion group is an automated distribution of E-mail to a defined group of subscribers. They are also sometimes called imailing listsî or just ilists.î Subscription can be obtained by contacting the moderator of the discussion, or by sending an E-mail message to the computer distributing the messages.

Three sites allow you to search for mailing lists on specific topics:

Mailing list directory: http://www.liszt.com/

Mailing list network: http://www.metalist.net/query?acc=000en%2Dus

Search the List of Lists: http://catalog.com/ vivian/interest-group-search.html. There are different software programs used for managing discussion groups, including Listserv, Listproc, and Majordomo. Each of these require different commands for operation, as indicated below:

### How to Use Listserv Discussion Groups

- Subscribe: subscribe [listname] {firstname lastname}
- Unsubscribe: unsubscribe [listname]
- Receive digest version: set [listname] digest
- Get list of subscribers: review [listname]

## How to Use Majordomo Discussion Groups

- Subscribe: subscribe [listname] [e-mail-address]
- Unsubscribe: unsubscribe [listname]
- Digest: subscribe [listname]-digest
- List of subscribers: who [listname]

# How to Use Listproc Discussion Groups

- Subscribe: subscribe [list] {firstname lastname}
- Unsubscribe: unsubscribe [list] {firstname lastname}
- Digest: set [listname] mail digest
- List of subscribers: recipients [listname]

Following is a list in alphabetic order of a number of discussion groups relevant for the theme of this handbook. For each discussion group, the following is provided: the name of the list, the E-mail address to which you send your request for subscription, and in parenthesis a few words on the topic of the discussion group.

Theme of Discussion Group	List Name	Address to Request Subscription
Biodiversity - large predators	predator_watch	listserv@home.ease.lsoft.com
Biodiversity - ornithology	ornith-l	listserv@uafsysb.uark.edu
Biodiversity networking	biodiv-l	listserv@bdt.org.br
Biological scientists' newsgroups	bionet	http://www.bio.net/
Biological systematics and collections	taxacom	listserv @cmsa.berkeley.edu
Bioregional issues	bioregional	listproc@csf.colorado.edu
Climate change	climate-l	listproc@mbnet.mb.ca
Conservation biology	consbio	listproc@u.washington.edu
Conservation ecology electronic journal	conservation-	subscribe@journal.biology.carleton.ca
Conservation issues	conslink	listserv@sivm.si.edu
Ecological Society of America	esanews	listserv@umdd.umd.edu
Ecology	ecolog-l	listserv@umdd.umd.edu
Ecology & economics	ecol-econ-d	listserv@csf.colorado.edu
Ecology in Latin America	ecologia	majordomo@mit.edu
Ecosystems - wetlands issues	eli-wetlands	majordomo@igc.org
Environment	biosph-l	listserv@listserv.aol.com
Environment - global issues	infoterra	majordomo@cedar.univie.ac.at
Environment in Latin America (Spanish)	natura-l	listserv@uchcecvm.bitnet
Environment in Latin America	elan	listproc@csf.colorado.edu
Environment on the Net	eon	majordomo@world.std.com
Environmental conferences	envconfs-l	listproc@environment.harvard.edu
Environmental impact assessments	eia	listproc@pan.cedar.univie.ac.at
Environmental information	envinf-l	listserv@hearn.nic.surfnet.nl
Environmental job listings	envjobs-l	majordomo@cedar.univie.ac.at
Environmental news	environews	listproc@envirolink.org
Environmental publications	envpubs-l	listproc@environment.harvard.edu
Environmental studies	envst-l	listserv@brownvm.brown.edu
Fish and wildlife information management	fwim-l	listserv@listserv.vt.edu
Forest Practitioners National Network (USA)	nnfp-fen	majordomo@igc.apc.org
Forest resources inventory & monitoring	iufro-402	mailserv@cgnet.com
Forestry (Society of American Foresters)	saf-news	majordomo@igc.org
Forestry information management (IUFRO)	iufro-wp-s41103-l	majordomo@metla.fi
Forestry newsletter (NCSU)	sylvanet	listserv@ncsu.edu
Forests & biodiversity (GEF)	susfor-l	susfor-l@ces.iisc.ernet.in
Forests & forestry	forest	listserv@listserv.funet.fi
Forests - rain forests	rainforest	listserv@gdarwin.cox.miami.edu
GIS	gis-l	listserver@geoint.com

Theme of Discussion Group	List Name	Address to Request Subscription
GIS (in Spanish)	sig	listserv@listserv.rediris.es
GIS - Clarklabs Idrisi software	idrisi-l	mailserv@clarku.edu
GIS - ESRI ArcView software	arcview-l	listserv@esri.com
GIS - image processing & remote sensing	imagrs-l	listserv@cesnet.cz
GIS - spatial statitics	space-l	listserv@wvnvm.wvnet.edu
GIS - temporal topics	tgis-l	listserv@ubvm.cc.buffalo.edu
GIS for conservation	consgis	listserv@uriacc.uri.edu
GPS	gps-l	majordomo@avenza.com
Groundwater issues	groundwater	majordomo@ias.champlain.edu
Inter-american water resource network	dialog-agua-l	listserv@centauri.ces.fau.edu
Land tenure issues	tenure	listproc@relay.doit.wisc.edu
Landscape ecology	usiale-l	listserv@uriacc.uri.edu
Natural resource librarians	nrlib-l	maiser@library.lib.usu.edu
Newsletter of the ID21 development research	id21news	idnews@ids.ac.uk
Non-profit management	ecotalk	ecotalk-request@earthsystems.org
Non-timber forest products	ntfp-biocultural	majordomo@igc.org
Park rangers	worldranger	worldranger-subscribe@listbot.com
Politicas de proteccion ambiental y desarrollo	ambiental	listserv@listserv.rediris.es
Population & environment	popenv-l	listserv@info.usaid.gov
Resource economics	res-econ	listserv@unixg.ubc.ca
Sampling survey methods	distance-sampling	mailbase@mailbase.ac.uk
Science & Engineering Scout Report	srscieng	listserv@cs.wisc.edu
Sustainable development issues	sustainable-	majordomo@civic.net
Technology - Internet help (in Spanish)	ayudanet	listserv@vm.temple.edu
Technology assistance to US NW conservation	onelist	majordomo@onenw.org

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### Examples of Field Data Recording Sheets

Note that these are examples only. Data sheets for any particular project must be designed for that project, organizing the specific information on the page in a way that eases data collection. See the section on "Data Collection" for more details.

## Example Field Data Recording Sheet 1: Monitoring local people's extraction of tree species (Ankarafantsika National Park, Madagasacar)

Forest Se	ctor:			Date:			
Species	Use	Annual Consumtion per Household	Mean distance (km) between Household and and extraction site	Name of Forest From Which Species are Extracted	Size of Individuals Extracted	Market Value	Data Collecter
n⁰1							
n⁰2							
nº3							
n⁰4							
n⁰5							
n⁰6							
n⁰7							
n⁰n							

Example Field Data Recording Sheet 2: Giraffe Monitoring Project, Niger.

FIELD OBSER	Sheet I	No					
Observer	Date	Time AM PM	Area				
Weather (circle one) rainy cloudy sunny extremely-cold normal extremely-hot wind no-wind							
Giraffe Identification Number	Herd Affiliations						
Reaction to Observers Presence							
Observations		Reference #					

### Managing Programs and Projects Using the Logical Framework Approach

The health of a forest and the people who depend on it, as well as the physical conservation of the forest, is the ultimate measure of success of a forest monitoring program. To be successful in this urgent call for forest conservation, we must ensure that we dedicate our resources in the best possible way. To do so demands a management process that includes a regular internal evaluation of your NGO's performance. By examining your activities and their impact, you can learn whether you are doing the right types of interventions and whether you need to drop some or add others. Although it may not be possible to draw a direct line between your NGO's activities and the ultimate purpose of the NGO (wise management of a forest, for example), there are ways you can measure whether your NGO's interventions are successful in accomplishing their piece of the whole.

A chain of cause-effect events is a good way to think about these measures. If an NGO monitoring trends in forest degradation effectively communicates a negative trend to appropriate decision makers, they can convince them to change laws that allow inappropriate forest management. The next link in the chain of cause-effect events should be that management of the forest is improved, resulting in the final effect of the preservation of forest cover and health.

Applying the logic of cause-effect relationships is necessary in planning your projects to ensure that the efforts you undertake can have the eventual impact you intend. If you design your monitoring program using this thought process, you will also provide yourself with performance indicators to assess the success of your monitoring program. See the accompanying table for examples of the measurable indicators identified during project planning.

One tool many people find useful in designing projects along these lines is the logical framework approach (LFA). The LFA can serve as the backbone for managing your project, because:

- It allow you to distinguish between the expected impact of the NGO's work and the actual interventions.
- It takes into consideration the external environment of the NGO or project.
- It can track interventions and enable you to manage the project toward its intended impact.
- It forms the basis for determining the human and financial resources required

to successfully implement the project, and subsequently to prepare a work plan and determine roles and responsibilities of project staff.

The logical framework is a management tool that can also be set up to manage a portfolio of several projects. It is not a substitute for strategic analyses, but can help you get organized. The section on resources on the Internet refers to a few Web sites describing the methodology (for example *http://www.logframe.com*).

The following logframe illustrates how the

### Example of LFA Methodology

Hierarchy of objectives	Performance Indicators	Means of Verification	Assumptions
Goal Forest of provides long-term benefits for people and biodiversity Purpose	Long-term indicators for conservation 1. Rate of deforestation 2. State of biodiversity Monitoring project success indicators	<ol> <li>Change detection analysis performed by my NGO</li> <li>Compilation of existing biodiversity information collected by XX NGO</li> <li>Decree, interviews, official</li> </ol>	No new extractions are
Government adopt improved concession mechanism	<ol> <li>Law changed</li> <li>Oil company apply rules and regulations</li> </ol>	journal of government 2.1 Extractive industries concessions analysis	<ul> <li>initiated in the forest</li> <li>Gov. Agency practice regional development project in the region around the forest</li> </ul>
Outputs 1. Trends in deforestation documented 2. Information management system operational 3. Communication campaign effected 4. Interventions evaluated	Indicators of interventions         1.1       Forest change detection performed by 5/2000         2.1       1 part-time staff hired         2.2       Baseline maps integrated by 12/1999         3.1       One press conference organized by 5/2000         3.2       5 radio spots produced and aired by 3/2000         4.1       1 survey of decision-makers completed by 12/2000         4.2       Analysis of official journal and interviews completed by 12/2000	1.1.1 Map 2.1.1 Employment contract 2.2.1 Map 3.1.1 Press release 3.2.1 Tapes 3.2.2 Survey results 3.2.3 Report	Gov. grant permit to convene press conference
Activities 1.1 Acquire remote sensing data (aerial photos and satellite imagery) 1.2 Perform analysis of rates of deforestation 1948-1958-1968 (from existing aerial photos), and 1985-1990- 1995-2000 using satellite imagery 1.3 Prepare interpretive maps and analytical tables 2.1 Purchase computers, digitizing tablet, and software 2.2 Compile maps in geographic information system 3.1 Clarify the problems to communicate 3.2 Identify the audience for campaign 3.3 Develop the communications products 3.4 Design campaign 3.5 Develop evaluation plan for "monitoring project success indicators"	Input • 2 staff (one analyst, one communicator) • U\$\$ 100.000 • Office space • Vehicle		

LFA methodology would apply to a monitoring project

### PREPARING A WORK PLAN

There are several computer program packages that can be used to manage a project. If your NGO is involved with complex projects that require frequent adjustment, it might be worthwhile to invest in training and software for management. However, spreadsheets and word processors can also be used to write project plans.

The following is an example of a work plan for a research monitoring project on land tenure in the Selma Lacandona, Chiapas, Mexico.

### Communication Strategy Tools

Conservation International has developed a methodology for planning a communication strategy called the 4-P workshop. This methodology analyzes and prioritizes the problems affecting a particular ecosystem, the audiences to be targeted, and the products and communication tools necessary to reach an audience.

This information is refined and incorporated into a comprehensive action plan. The methodology is described in the pamphlet "The 4-P Workshop - Designing Communications Strategies for Conservation Projects, August 1999" and can be Work plan for a research monitoring project on land tenure in the Selma Lacandona, Chiapas, Mexico.

	M E S E S											
	1998 1999											
Activities	J	Α	S	0	Ν	D	Ε	F	Μ	Α	Μ	J
Establish an information baseline												
1. Official land tenure map.	Х											
2. Database on land tenure.	x											
3. Institutional coordination with partners		X										
3. Workshop on agricultural M&E (?) Definition of specific indicators and create monitoring project.			X X									
Data Collection												
<ol> <li>Review of satellite imagery and aerial photography.</li> </ol>	x	х	х	x								
2. Systematic flights to collect data.		x			x		x		х		x	
3. Field trips							Х	Х	Х			
Data Analysis												
1. Integrate data into Geographic Information Systems and databases.			х	х	х			X	X			
<ul> <li>4. Spatial analysis.</li> <li>Update land tenure map</li> <li>Classification and definition of critical areas and those of attention for their agricultural situation.</li> <li>Elaborate a proposal for an agricultural strategy.</li> </ul>										X X	X	
Information Dissemination												
1. Workshop on Agricultural Evaluation. Presentation of the Agricultural Strategy for RIBMA to the pertinent governmental institutions												X X
2. Workshops on information and agricultural definitions with local communities working with RIBMA.												X

ordered from Conservation International at http://www.conservation.org/intercom/ workshop/4p.htm.

### EXTERNAL REVIEW COMMENTS

We received comments from:

Patrick Alley (Global Witness), Medini Bhandari (Association for the Protection of Environment and Culture-Nepal), Will Horter (Formerly of Sierra Legal Defence Fund), Kevin Kavanagh (WWF-Canada), Michael Linddal (DANIDA), Yahya Msagani (Franklin Conservation Trust - Tanzania), Samuel Nguiffo and Francois Abessolo (Center for Environment and Development-Cameroon), Aran O'Carrol (Sierra Legal Defence Fund), Roger Sayre (The Nature Conservancy), Jennifer Shopland (The Field Museum/Chicago), Hernan Verscheure (CODEFF-Chile). Roberto Smeraldi (Friends of the Earth-Amazônia Programme), and Jinhua Zhang (UNEP).

# Comments and How They Were Addressed

The overall tone of reviews was very positive. It was perceived that this handbook will help to fill a hole in the monitoring literature. In the words of Roger Sayre (The Nature Conservancy's Director of the Conservation Science Department, International Conservation Program): "While there are a few books out there on the concept of monitoring, there are few primers or manuals, and in this regard you have done the conservation community a service. This book should help first-time monitors overcome what has been called monitoring dysfunction - the inability to implement (or even conceive of) monitoring programs due to confusion about what it is and how it should be incorporated into management strategies."

In addition to this consistent comment, there were also numerous thoughtful comments on how the handbook can be improved. The noneditorial comments included the following:

• The concept of the case studies was universally appreciated. However, there was a concern, shared by the authors, that the intent of the case studies is not fulfilled. There is a disconnect in quality between the front section and the case studies, with some case studies lacking sufficient material to reflect the front section.

In response to these comments, we: 1) Separated the case studies into an appendix that will be printed, bound, and disseminated separately. 2) Explained more clearly that the case studies are not meant to provide a mirror-image example of the front section, but rather are real-world examples that provided information needed to synthesize an idealized vision of NGO monitoring. Each case study will contain elements of the handbook, but as real-world organizations that pre-date the handbook, they are not parallel examples of the handbook. 3) Summarized each case study into a short synopsis

for inclusion in the main body of the handbook. 4) Published the case studies on both WRI's and CI's Web sites so readers may access the case studies.

• There should be a summary or reader's guide to orient the reader and to help them find specific information again in a rapid manner.

Our response took a three-pronged approach. We: 1) Included a "road map" with page numbers before the introduction to serve as both a summary of the document and a visual depiction of the path NGOs follow in monitoring. 2) Incorporated an index in the handook, and 3) Included symbols indicating tips, warnings, and ideas in the margins where appropriate.

• Responses on the definitions section ranged from "excellent" to confusing.

The definitions were made more concrete by examples of how groups use the different approaches for different reasons. Editorials regarding the usefulness and appropriateness of the different types were added. Three illustrative figures were added next to the paragraphs defining major types of monitoring.

• The handbook contained an adversarial

tone between NGOs and Government and Industry.

There were various sections where the tone was unneccesarily tense; these were replaced with non-hostile language. We retained the approaches and data collection methods as disseminated in the draft version. These are the methods reported by the case studies with examples of how NGOs actually get the data they need. It is not our intent to imply that NGOs and government and industry must or should be at odds. We rather prefer the opposite situation. However, forest monitoring has and will sometimes demand that NGOs collect data on governments and industry activities and this is reflected in the data collection methods we passed on to the readers of this handbook.

• Don't treat illegal logging to the exclusion of ecologically unsustainable logging.

This was a problem of language, which we addressed by changing our language where necessary. However, we continued to advocate the use of government and industry standards as convenient and powerful indicators to measure against when conducting threshold monitoring.

• Lengthen Statistics Section.

As we did not have sufficient space to deal with statistics at any length, we decided that it would be most appropriate to address why it is important to include statistical analysis in monitoring. We therefore left the statistics section as a basic-level introduction and provided references for statistical texts and software where readers can find more information when they need it.

• Stress that the document is general and needs to be adapted to each reader's situation.

This is a vital point. We clarified it in the introduction.

• Good data is not the end point, convincing people to change is the end point.

This to be a basic theme of the document. Hence the title *Monitoring for Impact*.We added a short paragraph to the introduction to clarify the point.

• Make title clearer and exclusive to forestry.

We decided not to make the title more specific to forests because the handbook itself is generic. However, we did add a short section to the introduction on why we named the handbook as we did.

## Planning Form 1: Monitoring Purpose

Monitoring Purpose	Audiences	Objectives	
			İ

## Planning Form 2: Summary of background information

Source of Background Information	Value Added by Background Information

### Planning Form 3: List of indicators and measurements

Indicator	Approach	Geographic Area	Scale	Precision/Accuracy	Target

## Planning Form 4: Data collection responsibility

Data Collection	Data Collection							
How	Where	Who	When	Frequency	Resolution	Duration		

### Planning Form 5: Data management responsibility

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Collection Sheet	Metadata		Data Input		Checking	
Design Who?	Who Records	Where Duplicates Stored	Who	When	Who	

## Planning Form 6: Data analysis responsibility

Data Analysis							
How	Who	When	Resolution	Duration			

## Planning Form 7: Communications plan

How	Who	When	Duration	

## Planning Form 8: Form for creating a rough budget

Budget						
	Duration	Cost	Total			
Data Collection						
Equipment						
Staff						
Data Analysis						
Hardware						
Software						
Staff						
Communication						
Materials						
Staff						
Total						