TECHNICAL MANUAL 3

August 2009

Measuring our effectiveness— a framework for monitoring

Why measure our impact?

Measuring the impact of our conservation actions is universally recognized as a vital yet challenging task. Measuring effectiveness should be a core component of conservation projects because it helps to: (1) determine whether or not the project is meeting its objectives and having a positive conservation impact; (2) identify which actions lead to the success or failure of a particular conservation approach; (3) evaluate and revise our assumptions of *why* and *where* conservation efforts are needed; and (4) ensure that all participants in the project, from international NGOs to government staff to local residents, learn from the experience and can use this knowledge to improve their implementation of future conservation programs. Without monitoring our progress and assessing our impact, we run the risk of pouring considerable resources into ineffective activities that do not succeed in conserving wildlife and wildlands.

How do we show that we are effective?

So, how do we know that conservation education or hiring poachers as eco-tourism guides will conserve elephants? How do we know that teaching ministry staff to use a Geographic Information System will enhance the conservation status of the national parks? How do we know that the journal article we published has influenced fishing policies and practices? More broadly, how are we to gain confidence that any of our conservation actions are reducing threats and conserving wildlife?

All project managers envision how each activity they undertake is intended to change someone's behavior or improve their capacity to reduce one or more threats to the wildlife and wildlife habitat that they want to conserve. These causal linkages between our actions, the prevailing threats, and our conservation targets not only represent the core hypotheses that underlie why we believe our conservation efforts will be successful, but they also offer a clear framework for measuring and demonstrating the effectiveness of our conservation activities.

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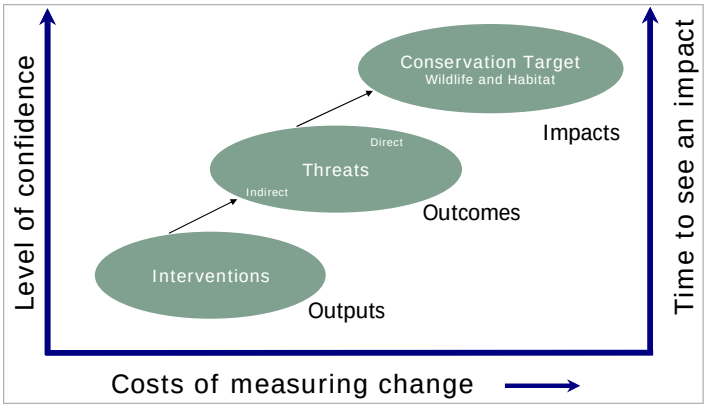
If conservation of wildlife and wildlands is the ultimate objective of our efforts, then to measure our impact we need to track their changing conservation status. But should we focus on this alone? Field experience tells us that, even in the absence of human pressures, exogenous factors outside our control (e.g., floods, disease, and drought) affect the "natural" variation in wildlife populations and habitat quality that we observe over time. How wildlife and their habitats vary over space and time will determine the effort we must invest in monitoring to detect those changes which directly result from the human activities that are considered threats. Although improved status of wildlife populations and their habitats is the ultimate objective of our conservation projects, we may need to monitor for 5–20 years before we can detect population trends with confidence. This timeframe extends far beyond typical donor funding cycles and may not provide sufficiently regular information in the short-term to make effective management decisions. That said, if we are to ever truly evaluate the effectiveness of our conservation actions and investments, we should consider putting in place such long-term monitoring systems.



To measure conservation progress and success over the short- to medium-term, it is useful to identify additional measures of effectiveness that are likely to change rapidly, and that in some manner reflect the changing status of wildlife and their habitats. Given the assumed causal connection between our interventions, specific threats, and our conservation targets, the effectiveness measures we can monitor over the short- to medium-term are our interventions (i.e., the activities that we implement) and the threats they are designed to abate. When we decide to use **performance** or **outcome** measures as estimates of our progress toward conserving our conservation targets, we must be aware of the trade-offs. Both the time frame needed to see results and the costs of monitoring decline as we move from directly monitoring changes in wildlife and their habitats, to monitoring reduction in threats, to monitoring the implementation of our interventions. However, using measures that change within short timeframes also, typically, lowers our confidence in whether the information tells us anything meaningful about our ultimate conservation success.

Monitoring progress at all levels

To demonstrate that our interventions are reducing threats and conserving wildlife and their habitat we need to monitor at all three levels: interventions, threats and targets. We must monitor our interventions to make sure that they are being implemented as we planned. As our interventions were chosen to reduce levels of threat to wildlife and their habitat, we also need to monitor the level of threats to assess whether or not our interventions helped abate them. Lastly, we must verify that the status of the wildlife species or habitats that we are concerned about does indeed improve when our interventions are implemented successfully, such that the threats are reduced.

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By monitoring the components that we believe are causally connected to one another within our project conceptual model, we are able to trace our impacts from intervention to threat to conservation target. If we did not monitor all components along each causal chain in our model, it would be difficult to know conclusively, for example, that an observed change in the number of fish at the spawning site was in response to the reduction in illegal gill netting due to the increased coast guard patrols that were organized; all that we would know for certain is that more fish appeared at the spawning site. We may never know with absolute assurance that our actions are responsible for reduced threats and improved wildlife conservation, particularly in large, complex landscapes and seascapes where multiple actors and agencies are working. However, unless we monitor our progress along these causal chains from interventions, through threats, to conservation targets, we will not be able to test our assumptions nor evaluate the effectiveness of our conservation investments.

Before you start— create a conceptual model for your project

Monitoring the cause-and-effect relationship between your interventions, the threats that concern you, and the status of biodiversity that you want to conserve is the key to measuring effectiveness. Given this, we assume that you have already selected conservation targets, identified key threats, and prioritized interventions. We also assume that you have developed a conceptual model for your project that explicitly defines what components of biodiversity you want to conserve (***conservation targets***), characterizes what human activities threaten these targets (***direct threats***), the roles that resource users, managers and policy-makers play that lead to or facilitate these direct threats (***contributing factors*** or ***indirect threats***), and the ***strategies*** (or ***interventions***) that you plan on implementing to reduce threats and improve the status of your conservation targets. Instructions for selecting targets, ranking and mapping threats, prioritizing interventions and creating project conceptual models are available in a set of LLP Technical Manuals. To request any of these in PDF, please write to llp@wcs.org.

Miradi is a great resource to help you build conceptual models and monitoring frameworks. Learn more at the Miradi website (www.miradi.org).

Figure 1: Conceptual models clearly illustrate the causal links between our actions, the key threats and the targets of our conservation efforts.

Setting priorities and allocating scarce resources to monitoring

Given our limited personnel and money, we rarely have the luxury of monitoring every intervention, threat, and conservation target at the same intensity or with the same precision. At present, the only realistic way to approach the challenge of deciding how much effort, in terms of staff time and financial resources, we invest in monitoring each intervention, threat and target in our conceptual model is to get the consensus of a knowledgeable group of field staff. Then, using a Delphi process (i.e., an expert group's consensus best guess), decide: (1) which monitoring information the project requires and must allocate resources to gathering; (2) what level of precision is needed to feel confident in making a management decision; (3) what information would be extremely useful but would require new funding to obtain; and (4) what information would be interesting but is, in reality, a luxury. When deciding how to monitor, it is worth discussing the tradeoffs in cost, precision and confidence associated with different qualitative and quantitative approaches to collecting monitoring information.

Hint: It makes sense to number each component of your conceptual model sequentially, starting with the conservation target(s), then the direct threats and contributing factors, and finally the strategies. If you decided to create multiple models to clearly depict the logic of your project, use one sequential number system across all models.

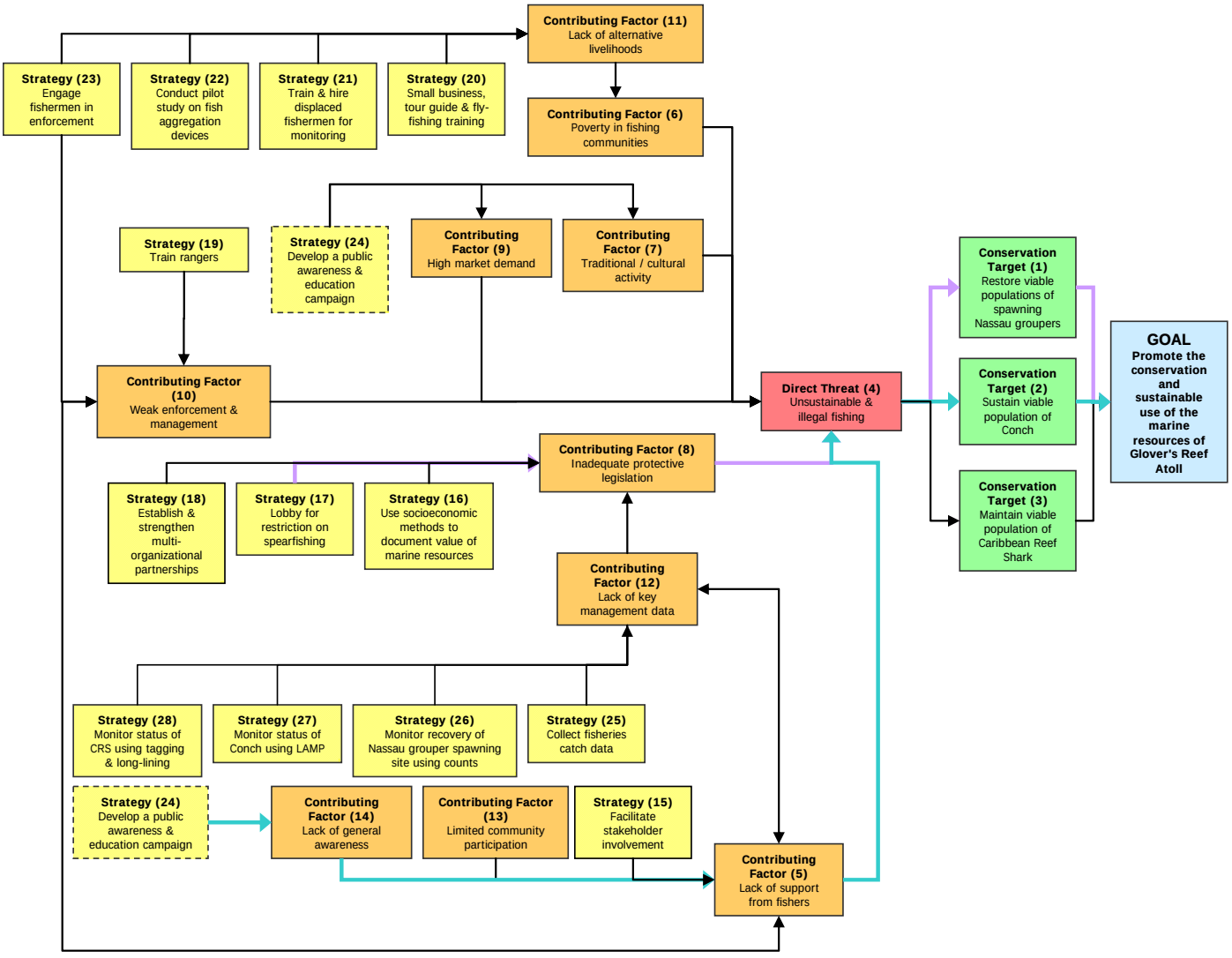

Figure 2: An example of a conceptual model, created using PowerPoint. Two causal chains are highlighted with blue and lavender arrows.

Information for decision making

Monitoring is useful only if it leads to improved management decisions. Therefore, managers must have a clear and explicit understanding of how the monitoring information that they can obtain is going to help them make wildlife management decisions and influence their conservation actions. In other words, we need to have thought about what our management response will be if monitoring shows that our efforts are not having the intended effect on conservation. We need to consider what our response will be if, for example, our monitoring shows that the total weight of fish landings at the local port is much less than we expected; or that the number of snares encountered by ecoguards has increased rather than decreased as we hoped.

A key component of any monitoring plan is an explicit process for using the new information obtained through strategic information gathering to guide management decisions. As monitoring data are obtained, project staff should get together at least 2-3 times per year to: (1) review the monitoring information; (2) compare the results to the explicated goals that they had stated they would achieve; and (3) decide what, if any, management response is needed given the new information.

Specific questions to ask during each monitoring data assessment meeting include: Do the data suggest that our conservation interventions are being implemented well, that the threats are being reduced, and that the status of our conservation targets is improving? If not, is this because we were unable to implement our interventions as planned and thus need to adapt our workplans? Or do the monitoring data suggest that our interventions were implemented well but that they did not result in the expected outcomes and impacts, and thus we need to rethink the assumptions inherent in our conceptual model?

Hint: Recording how well we implement interventions is often referred to as **performance monitoring** (i.e., how many training sessions we performed or how many ecoguard patrols were completed). Documenting changes in threats is often called **outcome monitoring**, and tracking changes in the status of conservation targets is called **impact monitoring.**

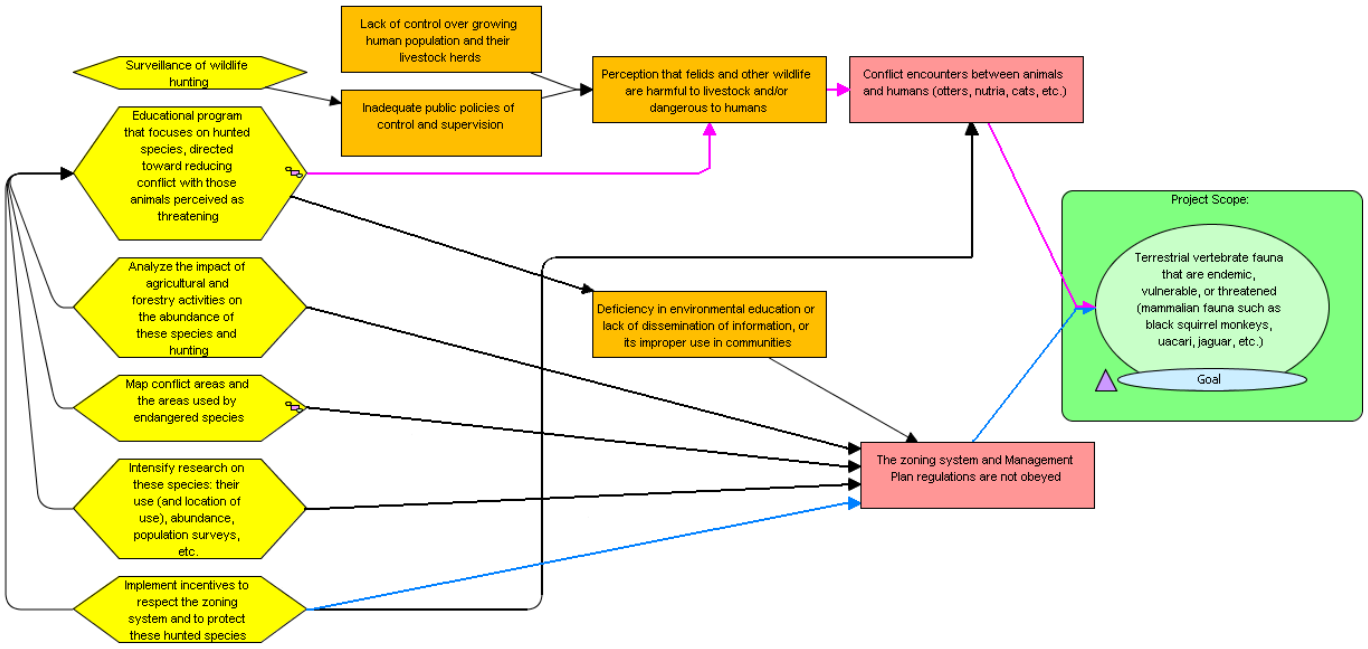

Figure 3: An example conceptual model created in Miradi, with two causal chains (highlighted with pink and blue arrows).

Institutionalizing monitoring

One key to ensuring that monitoring actually happens, and that information obtained from monitoring is used to guide future management decisions, is to include plans for monitoring in the annual budget process, and to include a review of monitoring information when preparing annual reports and annual workplans.

Converting a conceptual model into a monitoring framework

Setting quantitative objectives and choosing indicators

For each element in your project conceptual model (i.e., conservation target, direct and indirect threat, and intervention) you need to describe: (a) a quantitative objective (often referred to as the *desired state*) that you want to achieve within a given time frame; and (b) the variable or parameter (i.e., indicator) that you will measure over time and use to determine whether or not you are making progress toward your quantitative objective.

Objectives are statements that describe what you intend to achieve during a specific time period. For conservation targets, they describe the status of the wildlife population or habitat that you want to attain (e.g., hatchling survival increases 5% each year over 5 years). For threats, they specify by how much the threat will decline if your interventions are successful (e.g., number of snares discovered in the national park declines by 50% by 2006). For interventions, they note what you intend to implement over a given time period (e.g., thirteen predator-proof corrals installed at livestock producers' homes in 2005).

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Ideally, each objective should be: (1) impact oriented – representing a desired change in condition or state; (2) measurable – definable in relation to some baseline and along some standard scale; and (3) time limited – achievable within a specific period of time.

For example:

- Grouper numbers at the spawning aggregation increase to 10,000 by 2014 (quantitative objective or desired state for a conservation target);
- Illegal trapping of macaws reduced by 50% within five years (quantitative objective for a direct threat);
- By 2007, 80% of restaurant owners in Portland can correctly identify 5 species of sustainably harvested seafood (quantitative objective for an indirect threat); or
- Mobile patrols conduct five 24-hr road blocks each month (quantitative objective for an intervention).

Indicators

Indicators are the actual measurement units that you will use to quantify the impact of your conservation efforts. Examples of indicators might include the number of snares found per person/day of patrolling (threat indicator), or the number of radio programs aired per year about the new wildlife laws (intervention indicator), or the number of jaguars seen by a rancher in the past month (conservation target indicator), or the number of natural resource conflicts adjudicated by the community council each year (indirect threat indicator).

Creating a monitoring framework

At its most basic, you can create a monitoring table in Microsoft Word or Excel with six columns. First, type 'Component Type' in the top of the left-most column. Then, enter into the top of the succeeding columns 'Component Description,' 'Objective,' 'Indicator,' 'Method' and 'Who', respectively. 'Component Type' refers to the elements in your project conceptual model (i.e., Conservation Target, Direct Threat, Indirect Threat, and Intervention). 'Component Description' is a short phrase describing each target, threat or intervention. 'Obective' is what you want to achieve in a given timeframe. 'Method' describes very briefly how you will gather the monitoring information and 'Who' identifies the individual or institution responsible for gathering the information. Enter a single row of monitoring information for each component in your conceptual model starting with the conservation targets, then the direct and indirect threats, and finishing with the interventions. For clarity, you may wish to color-code the text in each row as in the conceptual model: blue for conservation targets, red for threats and green for interventions.

For each causal chain you can also create a separate monitoring table in Microsoft Word or Excel using the same 6 columns. Starting with the Conservation Target and progressing down through Direct and Indirect Threats to Interventions, cut and paste the relevant information from the model component table into the appropriate causal chain table.

The major drawback to using a simple table in MS Word or MS Excel is that you have to duplicate information if you want to see a monitoring framework for each causal chain in your conceptual model. In addition you will need to add a new 'Progress' column each year to record and track monitoring results over time. To overcome these limitations, the Living Landscapes Program has developed an easy-to-use Access Database that is available on our website.

Hint: While you are putting together a framework for monitoring, it is a good time to review the logic of your project's conceptual model and your choice of priority interventions. For each causal link between a conservation target and a direct threat, or between two threats, or between a threat and an intervention, ask yourselves this question: do we believe that the causal relationship between A and B is sufficiently strong that if we are able to alter A we will likely see a change in B? If not, then the causal relationship may be too weak to observe as we monitor our project's progress. If indeed the causal relationship between, say, an intervention and a threat in the model appears to be very weak, we then need to ask: should we delete the threat from our model (since it is unlikely to be influenced by our actions) or do we need to rethink our interventions to more effectively influence the threat?

For example, suppose that we are working with local farmers to develop a cooperative to market their crops because we believe this will: a) significantly raise the crop prices that they can negotiate from buyers and thus reduce the incentive to harvest and sell endangered wildlife, and b) help develop governance skills that will also enhance their capacity to manage community natural resources. Suppose also that within our conceptual model we argued that enhanced governance skills might help counter outsider interference in community resource use. But now as we think about monitoring, we realize that there is only likely to be a very weak relationship between improving local farmers' governance skills and management of community natural resources, as the influence that politically and economically powerful outsiders have over access to and use of community natural resources is very large.

We would therefore question whether, even if we are able to show that improved governance capacity within the farmers' community has influenced community management of natural resources, we may not see a change in outsider influence over community resource use. Given this, we would likely decide to remove the causal link between governance capacity and outsider influence within our model. However, we must not then neglect to explore which other interventions our organization might implement to help counter unwanted outsider interference in local resource management.

Table 1: You can create causal chains in MS Excel or Word. Below is an example created in MS Word.

Component Type	Component Description	Objective	Method	Indicator	Who
Conservation Target	Maintain present density of red grouse in the Pentlands	Density of red grouse maintained at 1-3 birds/km2	Complete transect surveys for numbers of red grouse/km2	Grouse density (birds/km^2) in survey plots	Students from Edinburgh University
Direct Threat	Dogs chase brooding birds off their nests	50% reduction in dog attacks on nesting birds by 2006	Predation surveys of nesting sites throughout season	Number of dog attacks on nests during breeding season	Students from Edinburgh University
Contributing Factor (Indirect Threat)	Dog owners unaware of their pet's impact on birds	90% of dog owners using the Pentlands aware of impact by 2006	Survey dog owners upon entering the Pentland Hills	Percent of surveyed owners aware of pets' impact on birds	Students from Edinburgh University
Strategy (Intervention)	Outreach to dog owners that use the Pentland Hills	Dog impact posters on all 15 entrances to Pentland Hills by 2005	Simple count of entrances with posters	Number of entrances with dog impact posters	National Trust Staff
Strategy (Intervention)	Research link between dogs and nesting success	Complete research assessment of dog impacts by April 2004	Collect predation survey and nesting success data	Completed research report received	National Trust Staff

Some factors to consider

- Monitoring data should explicitly help us make conservation decisions.
- Monitoring data do not have to be perfect; we just need to feel confident in them.
- Gathering data to make a management decision may not require the same rigor as gathering data to publish in a peer reviewed journal.
- To be sustainable, monitoring data collection methods should be kept as simple and low-cost as possible.
- Better data are needed:
    - When the consequences of making a decision with inadequate or inaccurate information are severe (e.g., altering reservoir discharge rates without an assessment of avian botulism risk);
    - When the political burden-of-proof is high (e.g., because wolf reintroduction in Yellowstone was so politically charged, managers needed to radio-collar most of the wolves, at huge expense, to ensure that information on wolf pack movement patterns and hunting behavior was both accurate and defensible).
- We should be willing to invest more effort in monitoring when:
    - The cost of the intervention is high;
    - The threat could result in irreversible change;
    - No one else is doing it;
    - Gaps in our knowledge are large.
- We should triangulate using easy-to-monitor proxies, if monitoring a target or threat directly is very difficult or expensive.

Table 2: An example of a Miradi-created Monitoring Framework for an aquatic turtle project.

Item	Details	Methods	Priority	Who	Budget Total
Aquatic Turtle species in the National Park	3 *Podocnemis* species and 1 *Peltocephalus* species				
Long-term recovery of larger populations and increased natural abundance of the 4 species of turtle					
Population size of the 4 species of turtles		Turtle population surveys in the park, conducted 4 times a year	Medium	University Students	$20,000
Increase the use of surveillance throughout the area		Hire 6 additional park guards to patrol turtle beaches by the end of 2010	High	Park Service	$30,000
Number of unlawful acts committed		Count number of illegal activities per year	Medium	Park Guards	$1,000
Number of surveillance actions		Count number of patrol days per year	Medium	Park Guards	$1,000
Decrease the unmanaged collection of turtle eggs at the nesting sites		Increase patrol of nesting sites during laying and incubation	Very High	Park Guards	$2,500
Number of eggs collected		Annual census of turtle egg collection by polling collectors as they exit the park	High	Park Service	$1,000
Decrease the number of adults captured/killed by at least 40%		Lobby to make the collection of live turtles illegal; increase patrols; increase fines for killing turtles within park borders	High	NGOs, working with gov't	$3,500
Number of individuals captured/killed		Annual census of slaughter/ collection of turtles	High	Park Service	$1,000

Legend
Target
Goal
Objective
Indicator

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Quantitative and qualitative approaches to gathering monitoring information on conservation targets, threats and interventions

	Quantitative	Qualitative
Wildlife	Transects Scent and fur trap stations Camera trapping DNA capture-recapture Radio-telemetry	Ranger or tour operator sighting records Hunter assessment of prey density Opinions of park guards
Habitat loss	Vegetation transects Satellite image analysis Sample plots Km to gather fuelwood	Forester estimate of logged area Farmer estimate of field area Villager elders' judgment
Species depletion	Consumption surveys Catch per unit effort Age and body size Market surveys	Hunter card sort of species biomass Hunter or fisher catch diaries Species ranking of fish catch by fishers Market trader estimate of scarcity Customs confiscations
Pollution	Transects Satellite image analysis Aerial photography Sample plots	Oilwatch web reports Complaints to the Environment ministry
Invasive exotic species	Transects Aerial photography Sample plots Necropsies	Park staff ranking Ranger log book records
Awareness raising	Attitude surveys Behavior observations Nielsen ratings	Local teachers' perceptions Media reports Focus groups
Economic alternatives	Household income surveys Consumption surveys Behavioral observation	Community meetings Family interviews Health worker diary
Law enforcement	Court records Police reports Camera trapping	Park staff ranking Community meetings
Training	Skills tests	Needs assessment
Capacity building	Financial audits Staff evaluations	Peer audits Work-plan reviews Institutional ranking
Policy reform	Regulatory code reviews Budget for enforcement Court cases held	Lunch with a policy maker
Constituency building	NGO contributor lists Donations	Constituent interviews

Please note: The approaches listed above are illustrative of the range of methods that can be used to gather monitoring information. The list is neither comprehensive nor exhaustive.

Good and poor examples of a monitoring framework

Poor objective: it does not state how many cattle should be removed from the area by what time. Also it is the stocking rate (cattle-days) that determines overgrazing not just the number of cattle

Poor method: this states how you will reduce stocking rates but not how you will monitor that cattle grazing has been reduced

Good objective: it states what level of change is to be achieved, by which date

Good method: simple and cheap way to check if the new policy has been signed

Poor indicator: it is really stocking rate (# of cattle-days) not just the # of cows that determines grazing impacts.

Conceptual model causal chain | **Monitoring Framework**

Component Description	Objective	Method	Indicator
Maintain wild cattle density in management area	Sightings of wild cattle per unit effort do not decline from 2004 levels	Annual waterhole surveys of wild cattle	# of sightings per person/hour
Overgrazing by domestic cattle	Reduce # of domestic cattle grazing in management area	Work with local cattle owners to change stocking rates	# of cattle in the management area
Lack of appropriate grazing policy	Grazing policy reformed based on forage productivity data by 2006	Talk with the Agriculture Minister each year	Appropriate grazing policy signed by the Minister
Lack of awareness of impact of cattle on banteng and kouprey	Cattle owners understand that stocking rates threaten wild cattle survival	Interview cattle owners once per year	Cattle owners aware of threats to wild cattle
Lobby government to reform grazing regulations	Project staff have discussed grazing policy reform with all Ministry staff by 2005	Check project staff appointment calendars	% of officials lobbied by project staff
Build popular support for wild cattle conservation	Community shows more interest in wild cattle	Hold 6 community meetings to raise interest in wild cattle	# of community members who attended the meetings

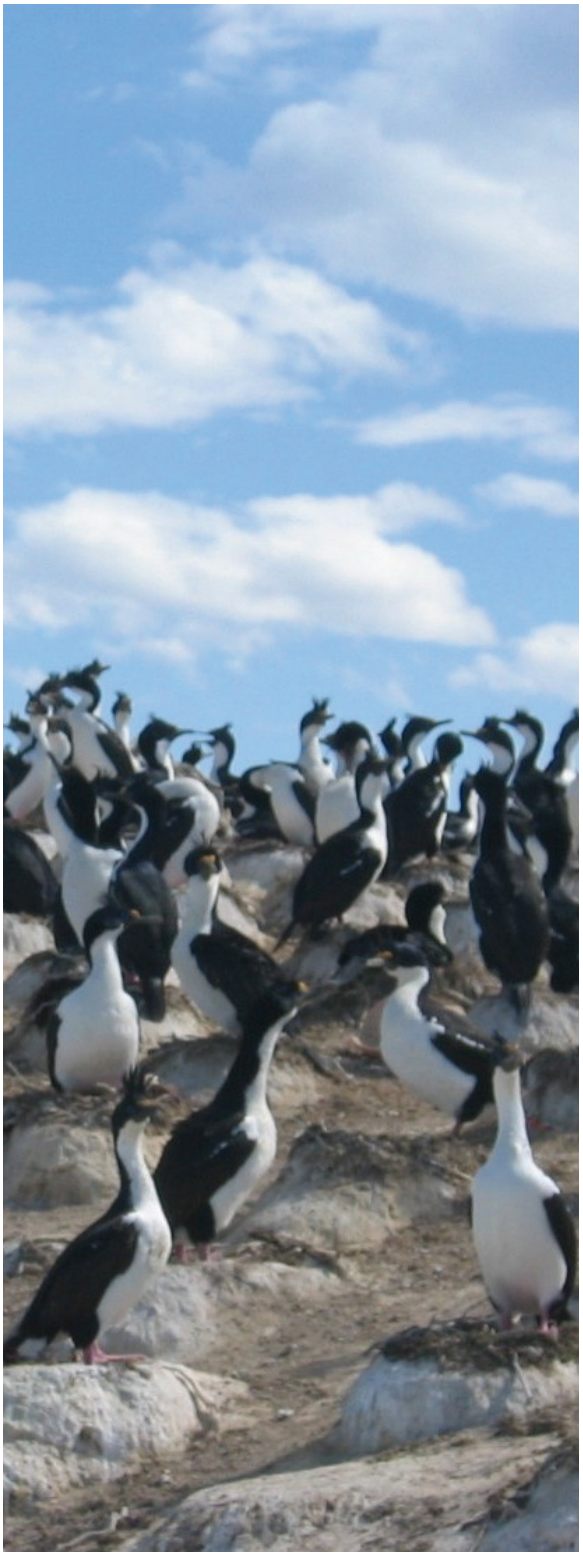
Good objective: it states what level of change is to be achieved, by which date

Poor method: this is how you want to raise popular support, not monitor if support has increased

Poor objective: it does not state what % of all cattlemen will become aware, nor when the target will be achieved

Poor objective: too passive. Better to say something like—20% of people who attended the wild cattle conservation workshops lobbied their policy makers in 2005

Poor indicator: just knowing how many people attended the meetings does not tell you how many of them support wild cattle conservation



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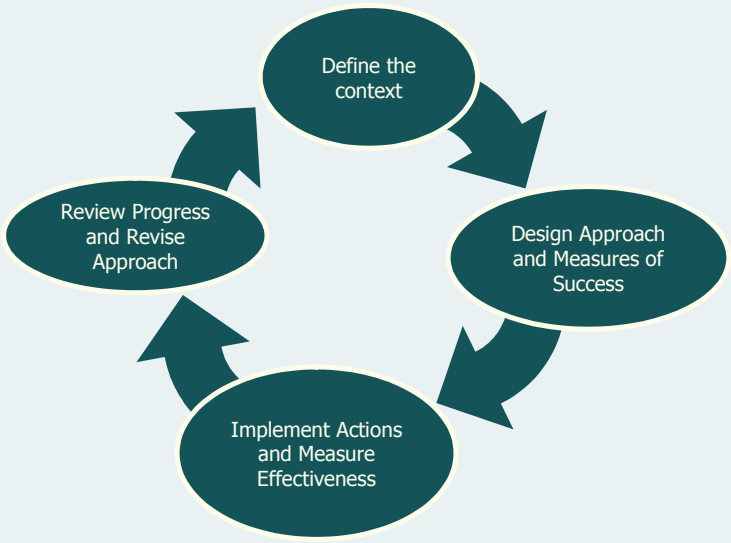
Living Landscapes Program Manuals

WCS's Global Conservation Programs work to save wildlife and wildlands by understanding and resolving critical problems that threaten key species and large, wild ecosystems around the world. Our field staff make decisions about what causes the needs of wildlife and of people to clash and take action with their partners to avoid or mitigate these conflicts that threaten wildlife and their habitat. Helping our field staff to make the best decisions is a core objective of the Living Landscapes Program.



We believe that if conservation projects are to be truly effective, we must: (1) be explicit about what we want to conserve, (2) identify the most important threats and where they occur within the landscape, (3) strategically plan our interventions to help abate the most critical threats, and (4) put in place a process for measuring the effectiveness of our conservation actions, and use this information to guide our decisions. The Living Landscapes Program is developing and testing, with our field programs, a set of decision support tools designed to help field staff select targets, map key threats, prepare a conservation strategy, and develop a monitoring framework.

The application of these tools is described in a series of technical manuals which are available by email from conservationsupport@wcs.org. These how-to guides are designed to provide clear and practical instructions. If you have any suggestions as to how we might improve the instructions please let us know.

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