Performance Monitoring of USAID Environmental Programs

An Introduction to Performance Monitoring

and a Review of Current Best Practice

Environmental Indicators Working Group

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Forward

This "primer" summarizes some lessons learned by missions, regional bureaus, the Global Bureau, and our partners in a collaborative effort to improve the performance monitoring of environmental programs. Since improving the Agency's efforts to monitor performance is a work in progress, this document is intended to highlight what we have learned so far. It is not intended to be directive or to be interpreted as official Agency policy. Since we are all learning by doing, we thought it would be useful to share some promising approaches to performance monitoring. We hope that the dissemination of these ideas will ultimately lead to the development of even better monitoring systems.

For more information, please refer also to the Agency's supplemental guidance contained in the TIPS series produced by CDIE, including "Selecting Performance Indicators, Preparing a Performance Monitoring Plan, and Establishing Performance Targets."

So far, these efforts to improve performance monitoring have occurred independently of the "common indicators" initiative. However, since the first step in developing good "common" indicators is to develop good performance indicators, the material presented here is relevant. We expect that innovative approaches will become more common if they are broadly useful.

This paper is divided into two sections. The first provides an introduction to the performance monitoring of environmental programs. It discusses the relationship between performance monitoring and strategic planning, provides several frameworks for environmental indicators, and illustrates the characteristics of good indicators.

The second section reviews the indicators which are currently in use (or are being considered) which best meet our criteria for good indicators. This review is structured along Agency's the five environmental objectives plus one cross-cutting theme: environmental education and communication.

This paper is a collaborative effort of the Environment Sector Council and technical staff from the Natural Resources, Energy, and Urban Offices of the Global Bureau's Environment Center, the Latin America Bureau, the Africa Bureau, and the Asia and Near East Bureau. Key contributors include Doug Mason, Mike Colby, Bill Sugrue, Eric Fajer, Christine Wegman, Andra Tamburro, Bob MacLeod, Mike McGahuey, Bill Moseley, Tom Rhodes, Kate Barba, and Michelle Zador. Useful comments were also provided by David Gambill, Sarah Wines, and Steve Gale. The natural resources section of the global climate change (GCC) chapter was produced by a separate working group headed by Cynthia Gill and Alicia Grimes. Judith Barry, Maurice Crawford, Christine Wegman, and Mike Colby led the production of energy section of the GCC chapter.

While this paper focusses on our environmental programs, we hope that it may also be relevant to efforts in other sectors. We very much welcome your comments and reactions, which should be sent directly to Doug Mason.

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Part I. Introduction to the Performance Monitoring of Environmental Programs

The 1994 U.S. Government Performance and Results Act (GPRA) requires all US government agencies to develop strategic plans and performance monitoring plans with measures of actual *results*, as opposed to traditional indicators of *inputs* (budgets, full-time employees) or *activities* (regulations promulgated, training sessions held, etc). Over the past couple of decades, several different frameworks for environmental information have been developed by agencies such as the US Environmental Protection Agency, Environment Canada, the OECD, etc. Some background on these will be provided below to facilitate thinking by USAID program managers regarding the types of indicators they need to report on in a re-engineered, results-oriented, GPRA-responsive Agency.

This paper will focus on USAID program results indicators at the *strategic objective (SO) and intermediate result (IR) levels*. Unlike the high-level indicators of Agency goals and objectives or lower-level indicators of activities, *program* indicators are intended to be useful both as management tools for operating units and for USAID/W (see Figure 1, the middle shaded row). Operating units are more directly accountable for showing results at the SO and IR level.

Figure 1: Levels and Uses of Indicators

Type of Indicators	Primary Users	Primary Uses	Examples
Indicators of Agency Goals and Objectives	Congress, public, USAID/W	To track national progress in USAID-assisted countries	National data on the area (ha) in protected areas (IUCN categories I - IV)
Program indicators (at the Strategic Objective and Intermediate Result levels), Agency Approach indicators	Both mission managers, USAID/W, and eventually Congress and the public	To track the results of USAID programs for adaptive management, performance-based budgeting, and to demonstrate results	Deforestation rates in targeted protected areas, number national parks with adequately patrolled boundaries
Activity indicators	Mission managers	To track the execution of activities by an operating unit and its partners	Completion of annual workplans, number of training sessions held, number of people trained

Strategic Planning and Performance Monitoring

Developing indicators is only one step in the process of monitoring performance. While this primer focusses on the indicators themselves, it is important to consider their development in this larger context. Here we place performance monitoring in the context of a four step process: strategic planning, development of a performance monitoring plan, implementation of the work plan (including the performance monitoring plan), and adaptive management (which uses the information generated to make decisions and then iterates the entire process described above). We will focus on the first two steps.

Step 1: Strategic Planning

Strategic planning -- the development of program goals, objectives, and workplans -- is the first and arguably most important step in developing a performance monitoring plan. Often, objectives are far too vague or broadly defined. Good objectives should be impact-oriented, measurable, time-limited (achieved within a defined time period), specific (so that it can be understood by all program participants), and practical (see Margoluis and Salafsky 1998). When objectives meet these criteria, developing appropriate indicators is relatively straightforward. On the other hand, monitoring progress is difficult if the objectives of the program are overambitious, vague, or misstated.

USAID divides the planned program accomplishments into two broad categories: strategic objectives and intermediate results:

(a) **Strategic Objective (SO)**. The SO is the highest level developmental impact that a program aspires to achieve in 5-8 years, and it is also the highest level result for which an operating unit is accountable. For example, the SO of a program to improve the management of protected areas may be"Targeted Latin American parks effectively protected."

We have noticed that many operating units have high-level SOs with two, three, and sometimes even four distinct environmental sub-sectors (Agency Objectives) below them. For example, one Mission has an SO entitled "Strengthened urban environmental management," which includes IR packages related to urban infrastructure, industrial pollution (Agency Objective 5.3), and energy (Objective 5.4). These IRs could easily be viewed as quasi-SOs in their own right, contracted as distinct activities with quite different approaches, separate budgets, and incomparable indicators. While the Agency's official guidance, the Automated Data System (ADS, section 201.5.10a), allows for strategic objectives to represent more than one dimension of a development problem, it states that this should occur only when component intermediate results are: (i) implemented in an integrated manner; (ii) achievable by a common set of intermediate results and causal linkages in the results framework; and (iii) the component results are inseparable and mutually reinforcing (i.e. achievement of each facilitates the achievement of the other). Furthermore, bundling such different objectives together can mask poor performing programs (IRs) and bring down the good ones when the overall SOs are ranked in performance-based budgeting systems. Therefore, it would be preferable from a performance-based strategic planning/monitoring/budgeting perspective to break out a multi-faceted objective such as the one mentioned above into 2 or perhaps even 3 strategic objectives. Alternatively, it would be necessary to have a full suite of performance indicators and budget data for each IR reported in each R4, so that cost-effectiveness can be adequately judged.

(b) **Intermediate Results (IRs).** Intermediate Results should be necessary and sufficient steps to achieve the corresponding SO. Unlike SOs, which are achieved in 5-8 years, IRs can be achieved in a few months or a few years. In the national park example above, to achieve effective protection (the strategic objective), several intermediate results may be necessary, such as the development of a management plan for each park, development of adequate physical park infrastructure, sufficient personnel staffing in each park, secure long-term financing, *etc*.

Step 2: Development a performance monitoring plan

Measures of performance are commonly called "indicators." Once the objectives of a program are clearly articulated, it is possible to develop indicators which assess progress toward them. The distinction between SOs and IRs is important because the Agency often uses different types of indicators to measure progress toward each:

(a) **Strategic Objectives (SOs).** Where possible and appropriate, SO performance indicators should reflect the environmental impact/outcomes of our programs (*e.g.* the *biophysical* changes in the state of the environment itself and/or its socio-economic impacts; see Figure 5 below), rather than the inputs or processes that lead to these results. Data for these indicators should be reported annually, where possible, although in some cases it is more appropriate to report every few years.[1]

(b) **Intermediate Results (IRs).** Data for IR indicators should almost always be reported annually. Indicators for these lower level results may reflect the impacts, outcomes, or outputs of our programs (see Figure 5 below for examples). Mission managers may also develop activity indicators (input/output indicators, such as budgets spent and the number of training sessions held), however these are generally not reported to Washington and are not discussed here.

The monitoring plan describes how information on these indicators will be collected and used, and helps ground-truth the feasibility of the plan. It lists the indicators themselves, by whom the data for each indicator will be collected, when the information will be collected, the data source, frequency, *etc*. A sample of a performance monitoring plan is provided below (Figure 2).

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[1] Note that the ADS (section E203.5.5) requires that, to the extent possible, data for at least one indicator at the SO level to be collected every year.

Figure 2: Sample table from a performance monitoring plan

Result (SO/IR)	Indicator	Indicator Definition	Unit	Data Source	Data Collection		Analysis and Reporting	
					Who is Responsible?	Schedule/ frequency	Reporting Schedule	Responsible Office

Step 3: Implementation of management activities (including the performance monitoring plan)

This means setting performance targets, collecting baseline data, collecting future data, comparing it to preset targets, and modifying programs (as needed) to achieve their ultimate goals.

Step 4: Adaptive Management

The key to adaptive management is to use the information generated by the monitoring plan to inform decisions taken by program managers. What actions are working well and why? What is not working and should be changed? While development programs have always strived to learn from experience, adaptive management places new emphasis on strategic planning, regular testing of assumptions, systematically tracking and analyzing progress, and the subsequent modification of workplans and objectives. When it is tied to program objectives and provides timely, relevant, and cost-effective information, monitoring enhances program successes by allowing managers to make better decisions. Iteration is the key to the entire management cycle. Programs must be repeatedly modified as new information becomes available about the effectiveness of management actions, the assumptions under which they were designed, or the environment in which the program operates.

The performance monitoring plan itself is not exempt from this process. As operating units learn which types of information are useful and cost effective and which are not, the monitoring plan should be modified. New information needs will also continue to arise, while some types of information previously collected may become less relevant to decision-makers.

Frameworks for Environmental Indicators

It is usually helpful to have a conceptual framework to guide the selection of the most useful indicators. Several systems are presented below to give you some understanding of how USAID's efforts related to those of other governmental agencies. As you will see, while the details of our performance monitoring systems are unique to USAID, the overall approach is not. Examples from the US Environmental Protection Agency (EPA) and the Organization for Economic Cooperation and Development (OECD) show where some of the ideas presented above evolved, and also how USAID's efforts fit in to those of other organizations.

Prior to GPRA, the EPA used a "hierarchy" indicators to determine which type should be used in a given situation. Most indicators focussed on pollution. There were two types of activity indicators, two types of "Program Outcome" indicators, and three types of environmental or "ultimate outcome" indicators (Figure 3). The closer one could get to the top of this list the better, because indicators higher in the list describe the consequences of a program's activities rather than simply tracking the activities themselves (USAID has a similar this hierarchy of activity and program indicators). Higher level indicators attempted to answer the "so what?" question.

Figure 3. US EPA's pre-1994 Hierarchy of Environmental Indicators

Environmental Outcomes:	Human Welfare (us. socio-economic)
	Human Health or Ecological Conditions
	Pollutant Uptake/Body Burdens
Program Outcomes:	Pollutant Ambient Concentrations
	Pollutant Emissions
Activity Indicators:	by Pollution Sources
	by Regulatory Agencies

The Pressure-State-Response Framework

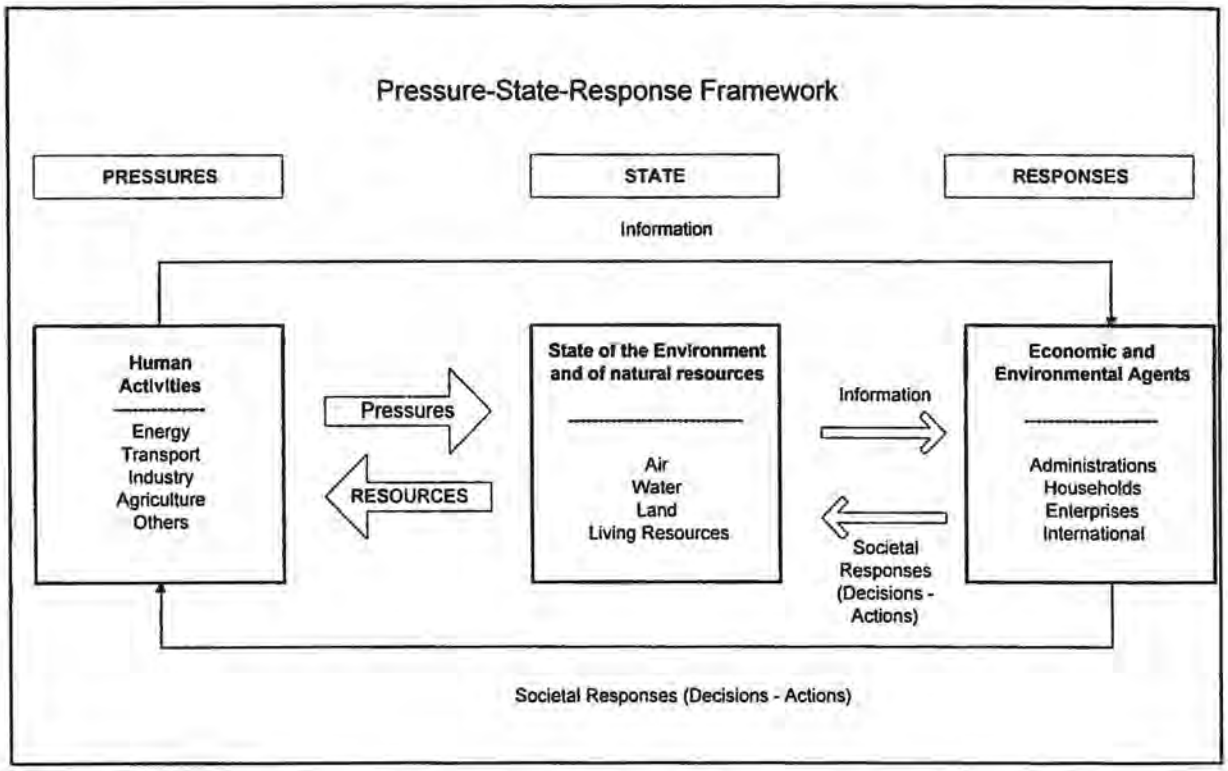
More recently, many organizations (including the World Bank and OECD, and USG Agencies such as EPA and US Department of Interior) have adopted variations of what is called a Pressure-State-Response framework for their environmental monitoring and information systems (Figure 4). Under this framework, three broad types of information are needed to assess performance:

- "**Pressures**" are usually human actions which affect the environment (e.g., pollutant emissions, land-use changes).

- "**State**" refers to the actual biophysical condition of the environment (e.g., forest cover, animal or fish populations, water quality) and/or the well-being of local people (e.g., blood lead levels, incidence of waterborne disease), depending on the objectives of the project.

- "**Responses**" are interventions by people – governments, NGOs, firms, individuals, etc. – to reduce, prevent, or repair the impact of human activities ("pressures") on the "state" of the environment, or to improve its state.

Figure 4: The OECD Pressure-State-Response Framework



Response indicators are typically "activity" indicators of the types mentioned in the old EPA hierarchy, above. They answer the questions like "what are we doing to deal with the problem?" and "did we complete our activities as planned?" *USAID and most other USG agencies traditionally monitored responses.*

With the current emphasis on demonstrating results as required by the Government Performance and Results Act, *"state" indicators should become more common.* Unfortunately, "state" indicators are often the most difficult to develop (and expensive to monitor), as natural systems are complex, large scale, and often slow to respond to human changes. *As a proxy for state indicators under conditions of limited budgets and timeframes, the use of "pressure" indicators may often be necessary* (e.g., avoided carbon dioxide emissions for reducing the threat of climate change). Changes in pressure indicators would suggest that our activities (responses) appeared to have an impact on peoples' attitudes and actions, which will in turn have a positive impact on the State of the environment indicators.

Process Versus Results Indicators

By now, readers have probably detected a common theme across the three indicator "frameworks" discussed above: all of them make a basic distinction between (a) "process" indicators (which track activities and social processes, such as participation) , and (b) "result" indicators: which track changes

in peoples behaviors[2] and the biophysical impacts of these changes in the "state" of the environment.

It is important to distinguish between these two types of indicators (see Figure 5 for examples of both):

(1) **Process indicators.** Process indicators tell us whether we completed our planned activities and how social processes (such as participation) are proceeding (*e.g.* were park staff trained?; did they feel the training was useful? Was their adequate public participation by all stakeholders in planning park management?). Process indicators are useful for tracking day-to-day management and the early stages of long-term processes. Programs can take years to produce on-the-ground results, and process indicators help track progress along the way. They can also be used to indicate how socially sustainable the process will be after the program ends, capturing information about gender equity and participation, etc.

(2) **Results indicators.** Results indicators tell us what "outcome" or "impact" these processes had (*e.g.* is there evidence that staff training has led to better management of the park? Has participatory planning led to improved park conservation?).

Process indicators continue to be useful, but they should complement (rather than substitute for) results indicators. In implementing GPRA, USAID is emphasizing the development of results indicators, which attempt to assess the development impact of our programs measured against our goals (such as biodiversity conservation, park protection, the well being of rural people, etc.). Most USAID monitoring plans contain a suite of indicators. Taken together, they measure this causally-linked hierarchy of results and can be a valuable tool for adaptive management.

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[2] Behavioral change is a result, and it can be a proxy for future biophysical changes. For example, the objective of a coastal management program may be to change the behavior of fisherman, so that they respect no-catch areas and cease using damaging fishing practices. Monitoring the fisherman's behavior allows manager's to assess progress toward their objective. If the program meets its objective and fisherman do change their behavior, we would expect a biophysical change -- improved fish stocks -- in the future. Despite the difficulties in measuring biophysical impacts, it is often still important to try. Doing so allows managers to determine whether the behavioral changes they promoted are having the intended impact on the environment.

Figure 5: Examples of Process vs. Results Indicators

	Process Indicators		Results Indicators	
	Inputs	*Outputs*	*Outcomes*	*Impacts*
Examples	In general: Dollars spent by USAID, full time employees assigned to a task, etc.	In general: Activities completed, people trained, etc.	In general: Changes in peoples' behavior, *e.g.* adoption rates of environmentally-friendly practices	In general: on-the-ground impact of these changes in the environment and peoples' welfare (where appropriate)
	Number of irrigation training sessions held for farmers	Number of farmers trained in improved techniques	Number of farmers adopting improved irrigation practices	Volume of freshwater saved, volume of topsoil conserved, crop productivity/income gains
	Community natural resource mapping and training events held	Area mapped by communities and indigenous groups	Area in which communities gain improved resource tenure after mapping their resources.	Deforestation rates, area of old growth forest, forest cover/biomass, percent healthy coral, etc.
	Technical assistance completed to develop water standards	Development of technical wastewater effluent guidelines	Adoption of wastewater guidelines, % total wastewater treated	Incidence of water-born diseases, biological oxygen demand levels in water
	Successful establishment of working group on pollution policy	Pollution policy analysis completed	Improved pollution policies adopted, improved implementation of pollution policies (e.g. policy index)	Reduction in pollution emissions, reduction in ambient pollution levels/ health impacts
Uses	Most appropriate for internal management by the operating unit	Appropriate for performance monitoring at IR level when results indicators are not feasible	Most appropriate for performance monitoring at the SO level, and where possible, at the IR level	
Frequency of reporting	Frequency varies depending on need and type	Annually or more frequently depending on need	Annually, where possible. At least every 2-3 years.	

Characteristics of Good Indicators

Keeping the above general "frameworks" for indicators in mind, the first step in developing a monitoring plan is to seek appropriate indicators for a project's particular objectives. Good indicators share a number of characteristics, which are summarized below. In practice, good indicators may not share all of these characteristics, but in general they should be:

Results-oriented

Program level indicators should aim to measure *results*. If not, it is impossible to determine whether a program is having the ultimate impact that was intended. Programs should aim for SO-level indicators that would fit under one of the two columns on the right of Figure 5.

Direct

Direct indicators should be used whenever possible. Proxy indicators should be used when: (i) it is not practical to gather data for a direct indicator on a regular and timely basis, or (ii) when the proxy is a more reliable and valid indicator than an available but flawed direct measure. When proxies are used, they should be as timely and relevant to the result as possible. Examples:

Result:	Reduced air pollution from the power sector
Proxy indicator:	Percent of companies which have installed scrubbers
Direct indicator:	Metrics tons of SO_2 emitted/year (if available, his direct indicator is a better measure of reduced air pollution)
Result:	Biodiversity effectively protected in national parks
Poor proxy:	Number of national parks declared
Better proxy:	Number of biologically-important national parks that have successfully passed The Nature Conservancy's Parks-in-Peril Scorecard criteria (see pg. 16): (1) immediate conservation threats deterred; initiation of long-term management plan through a participatory process; (2) institutional strengthening of local NGOs to implement and/or assist in the management of the park; (3) long-term financial management plan in place and funding ensured for recurrent operation costs; and (4) local constituency actively participating and supporting site protection (background information on participation is often disaggregated by sex).

Objective

The indicator should be defined in precise and objective terms so that the indicator can be understood by a wide audience and is not open to varying interpretations. Examples:

Result:	Increased sustainable trade in non-timber forest products (NTFP) by small firms

Vague indicator:	Number of successful firms specializing in NTFPs (problem: "successful is not defined")
Better indicator:	Number of NTFP firms which maintain extraction rates at or below regeneration rates.

Unidimensional

An indicator should measure only one phenomenon so it can be clearly understood and useful for decision makers.

Multi-dimensional:	Number of well fed, happy, and better educated children.
Uni-dimensional:	Number of well fed children.

(These examples are only meant to illustrate the difference between multi-dimensional and uni-dimensional indicators; neither are particularly objective)

Quantitative

In most cases, quantitative indicators are preferred for performance monitoring. In some cases, however, qualitative indicators are acceptable or even preferred. Or a simple (easy-to-understand) hybrid indicator, such as a **"policy, institutional, or enabling condition index"** can be created, whereby one or more points are awarded whenever each of several pre-defined qualitative benchmarks is achieved. One example is the "water resources information system development index" designed by one mission to track a ministry's institutional development:

- management information system (MIS) designed
- MIS installed
- MIS operational
- water quality laboratory #1 upgraded
- water quality laboratory #2 upgraded
- lab technicians trained
- new monitoring network designed
- new monitoring stations operational
- existing monitoring stations rehabilitated
- selected databases made compatible

Note that each of these benchmarks is a qualitative but fairly objective "digital" (Yes or No) step - either it happened, or it didn't. When it does, a point is awarded. In some cases, it might be desirable to "weight" the index, for instance, if one particular policy among several possible ones is agreed to be most important, a mission might choose to weight its index by attaching multiple points to that particular element of the index, while still awarding only one point for each of the other elements. In the above example, if one point is to be awarded for each level of achievement, the index has a total possible score of 10. The mission would set increasing cumulative targets for each year of the program; e.g., 1 for year one, 3 for year two, 5 for year three, 7 for year four, 9 for year five. This type of index can be very useful as an IR progress indicator when it may be years before biophysical data (e.g., overall water quality) can be obtained.

Disaggregated Indicators should be disaggregated whenever disaggregated information is necessary to track and adjust project performance, particularly indicators that report on individuals, populations, and households. Possible disaggregations include by gender, ethnicity, age, urban/rural people, *etc.*

Result:	Increased use of soil-preserving agricultural techniques among targeted population
Possible indicator:	Percent of farmers adopting contour plowing, windbreaks, or green manures
	If it is important for managers to know whether the farmers are male or female, a better indicator would disaggregate the two:
Better indicators:	Number of male\female farmers adopting contour plowing, windbreaks, or green manures

Feasible Indicators should be identified for which data are regularly available and/or permit cost-effective collection. Data collection, analysis, and reporting should be feasible within management decision-making time frames and budgets.

Interpretable The data should be understandable by its target audience. Also, it should be possible to establish criteria to distinguish acceptable from unacceptable progress.

Result:	Increased compliance with environmental regulations
Possible indicator:	Value of fines collected/year
Potential problem:	Fines collected may rise because of (1) increased enforcement of existing rules (which may lead to increased compliance) or (2) increasing illegal activities (e.g. a reduction in compliance). A better measure would measure compliance itself. For example, if implementation of logging regulations were a key issue;
Better indicator:	the area (hectares) harvested illegally.

References

Margoluis, R. and N. Salafsky. 1998. Measures of Success: Designing, Managing, and Monitoring Conservation and Development Projects. Island Press.

Schulze, I and M. Colby, 1995. "A Conceptual Framework to Support Development and Use of Environmental Information in Decision-Making." US Environmental Protection Agency, EPA 230-R-95-012, April 1995 (43 pp.), Washington DC.

Part II. Review of Good Indicators, by Agency Objective and Approach

Introduction

The following section highlights some of the best environmental indicators which are either currently in use or are being considered for use. This review is illustrative rather than comprehensive, as there was simply not space to list all the good indicators. This section does, however, review the current state of the art and share some promising approaches.

The review of indicators is structured by the most recent version of the Agency's Strategic Framework. All of the indicators reviewed monitor programs which contribute to Agency Goal 5: "The world's environment protected for long-term sustainability." Contributing to this Goal are five USAID objectives:

5.1 Threat of global climate change reduced
5.2 Biological diversity conserved
5.3 Sustainable urbanization including pollution management promoted
5.4 Use of environmentally sound energy services increased
5.5 Sustainable management of natural resources increased

Since many USAID programs contribute to more than one objective, readers may find it useful to read all the sections relevant to their programs. One cross-cutting theme -- environmental education and communication -- is discussed separately in the very last section, beginning on page 67. Please note that in the following sections, **all indicators are in bold and are proceeded by a bullet.**

Important Caveats to this Review

When reading the following review, it is important to keep in mind several important caveats:

(1) The following indicators appear to be useful for the programs the were designed to monitor. Many are relatively new, and their actual utility will become clear as they are tested through their use.

(2) While these indicators appear useful for the programs they were designed for, it is unlikely that they would be useful for all similar programs across the Agency. Therefore, we recommend these indicators for consideration by USAID operating units, but we do not advocate that they necessarily be adopted as mandatory "common indicators." The one exception is the global climate change indicators developed by separate working groups, but reproduced here for your information.

(3) While we have attempted to identify indicators which meet the characteristics of good indicators outlined in Part I, not all indicators included will necessarily meet all of the "characteristics." Context is key in determining if an indicator is ultimately "good" or not.

(4) Each of the following sections covers a single Agency objective and was produced by a separate working group. You will find a diversity of approaches to performance monitoring.

We believe that the indicators below are good ones, but would note that our experience in measuring

program results using some of these indicators is extremely limited. We encourage missions to use other indicators in addition to those listed below as long as they meet the criteria of "good" indicators.

General Observations and Lessons Learned

A number of general observations became apparent during the review of indicators:

Patterns in outcome and impact indicators. Outcomes and impacts are both results. Outcome indicators often measure changes in a target populations behavior, while impact indicators measured what effect these changes had on the environment itself (see Figure 5 on page 9 for examples of outcome and impact indicators).

Use of program vs. national indicators. Most USAID indicators track processes and results closely and narrowly related to activities that we fund. A few indicators track national progress in areas where USAID is active. The choice of using program vs. national level indicators should depend on whether or not the Strategic Objective has a national impact. If the program is designed to have a national impact, then a national indicator may be the most appropriate measure, if the data are available. Conversely, if the program is designed to have a localized impact, or if national data are not available, than a program level indicator would be appropriate. Whichever level is chosen, national and program indicators should not be combined, since they are measured differently and may overlap.

Manageable interest. Clearly, achieving results on the ground requires a partnership between USAID and many other groups and individuals. Many factors that affect our ability to achieve environmentally sustainable development are beyond our control. Virtually every indicator in use by missions therefore measures a result that is partially outside USAID's manageable interest. We endorse this approach, since a performance monitoring system that focussed exclusively on what is narrowly within our manageable interest would measure inputs and outputs, and not results. We would add a cautionary note, however, that wherever an indicator measures a result that is broader than the USAID manageable interest, this should be specifically noted in the performance monitoring plan and the R4. Sometimes this can take a form of the assumptions we make for each indicator (e.g. achievement of this result is based on the following assumptions: (1) the host government will....).

The use of scorecards or indices. A number of operating units are experimenting with "scorecards" or "indices" to track program performance. While these indices vary greatly, all define a series of sequential benchmarks for program performance. Programs earn points as they achieve these benchmarks and achieve a "score." This document contains several examples of indices: the "Policy, Institutional, or Enabling Index" on page 11, the Nature Conservancy Scorecard on pages 32 - 35, and a series of indices for the urban programs on pages 39 - 48, and two indices for integrated coastal management on pages 63 - 64.

These examples illustrate the strengths and limitations of using an "index" to monitor performance. The strengths are: (a) if a index is closely tied to the objectives of a given program and is clearly defined, it can provide a useful accounting system for providing detailed information to program managers; (b) scorecards can be fairly comprehensive and can track incremental progress from year to year; and (c) information can easily be aggregated from individual sites to higher program levels. Weaknesses include: (a) scorecards can be more complicated to understand than simpler indicators; (b) aggregate scores (all the numerical scores added together) are not very meaningful; (c) distinctions between some categories can be subjective (although if well written, they can be more objective than simpler alternatives with defined benchmarks); and (d) scorecards often emphasize processes more than

results. Since indices are complex, the simplest way to report results to Washington can be to report the number of sites/activities that achieve a given threshold or average score.

It is important to remember that indices are simply tools for reporting complex information. As such, their utility depends on how well the index is defined, the quality of the information that goes into the index, and how easily the results can be communicated to others. As is true with all indicators, if you put garbage in, you get garbage out.

Direct versus catalyzed results. Some programs (and corresponding performance monitoring plans) distinguish between direct and catalyzed results. A direct result is usually defined as a direct consequence of USAID technical or financial assistance; usually it is something that we directly fund. A catalyzed result occurs when USAID funding does not directly cause that result to occur, but our technical assistance played helped creating the conditions that made that result possible. In other words, we did not pay for the result, but in all likelihood it would not have occurred without our involvement. For example, USAID may have helped create the legislative or regulatory system which reduced unsustainable activities. Or USAID may have financed the introduction of new natural resource management practices. If these practices are spontaneously adopted by other natural resource users, independent of USAID assistance, this could be considered a catalyzed result.

Integrating catalyzed results into a performance monitoring system poses certain challenges. One is deciding under what conditions it is reasonable to count results which the Agency did not directly finance. One possible rule is to count those activities when it is fairly certain that they would not have occurred had USAID not been active in the area. A second challenge is that USAID performance monitoring plans require managers to set targets, which can be very difficult for catalyzed results. Thus, catalyzed results are sometimes best captured in narratives in the R4 process, rather than as separate indicators.

Disaggregation of social indicators. Many indicators that monitor social processes, attitudes, and behaviors should be disaggregated by key social groups (such as by men and women, the old and young, by key ethnic groups, etc.) to ensure that our programs are socially sustainable. What disaggregations make sense depend on the program and its context. But it is clear that management of natural resources cannot be sustainable if the processes that underlie it are not.

Typically, for management to be successful, broad participation is required. Involvement must not exclude any groups because of their power or lack of it, their ethnicity, or their gender. Without special care, groups that can be excluded because of their lack of power include indigenous people and ethnic minorities, women, and the poor. Thus, special emphasis must often be placed on ensuring their participation. Program managers therefore often need disaggregated information to inform them about the attitudes, participation, and behaviors of people that fall into different key groups. Performance monitoring systems should reflect this need.

Agency Objectives:

Global Climate Change
(USAID Objective 5.1: Threat of global climate change reduced)

General Notes
The proposed indicators for tracking USAID's efforts in combatting global climate change are listed below, both for natural resource management and for energy. These indicators were developed through a separate process focussing exclusively on global climate change (the format of this section differs slightly from the rest of the report for this reason). An abridged version of these indicators and their definitions is reprinted here, for your information. Please refer to correspondence from the Global Climate Change Working Group for a more complete description of all the indicators.

It is important to distinguish this chapter from the rest of this primer. The rest of this document highlights indicators which are suggested for your consideration, but are not required. The indicators for global climate change are the one major exception. As described in other Agency correspondence, all relevant programs that attribute their results to combatting global climate change will be required to report on any of the following GCC indicators that apply to their program. These indicators will be reported through the Global Bureau/Environment Center's special objective in global climate change. Thus, the Agency will have one set of truly common indicators.

The USAID climate change results framework includes four intermediate results. For each intermediate result, indicators have been developed to measure the Agency's impact. Missions and Bureaus are only required to report on indicators for which they have related programs:

IR 1: Increased participation in the Framework Convention on Climate Change
IR 2: Reduced net greenhouse gas emissions from the land use/forest management sector
IR 3: Reduced emissions from the energy sector, industry and urban areas
IR 4: Reduced vulnerability to the threats posed by climate change

IR1: Increased participation in the Framework Convention on Climate Change

In order to measure USAID's contribution to encouraging and facilitating meaningful participation by developing countries in the Framework Convention on Climate Change (UNFCCC), we have created a list of activities that would constitute "meaningful participation". Using a single indicator, the Agency can report on its contribution to U.S. diplomatic goals.

One point should be given for each achievement in any of the following areas. More than one point can be awarded in a given area if, for example USAID can be credited with helping generate more than one joint implementation project:

- Signature and Ratification of Kyoto Protocol
- Integration of climate change into national strategic, energy, and sustainable development strategies;
- Design and completion of national emissions inventory;
- Design and completion of national mitigation and vulnerability analysis;
- Design and implementation of climate change National Action Plan;
- Preparation and submission of national communication to UNFCCC;
- Establishment of procedures for receiving, evaluating, and approving joint implementation (JI) or CDM (Clean Development Mechanism) proposals;
- Development and approval of JI/CDM projects
- Establishment of procedures for monitoring and verifying greenhouse gas emissions;
- Development of growth baselines for pegging greenhouse gas emissions to economic growth;
- Development of legally binding emission reduction targets and timetables;
- Participation in emissions trading regime; and
- Institutionalization of national capacity to assess and respond to climate change impacts at the economic, social, and political level.

IR 2: Reduced net greenhouse gas emissions from the land use/forest management sector

Indicator 1: Area (hectares) where USAID has initiated interventions to maintain or increase carbon stocks or reduce their rate of loss.

Please report on areas where USAID activities are making progress in protecting carbon stocks through preliminary interventions (on-the-ground impacts may or may not have been realized) in the following:

- Resource or land management plans developed,
- Community or household participation engaged in program implementation,
- Resource management initiated,
- Monitoring and evaluation system in place,
- Site specific policy constraints being addressed.

Indicator 2: Area (hectares) where USAID has achieved on-the-ground impacts to preserve, increase or reduce the rate of loss of carbon stocks.

Please report under 2a and 2b. Measurement and monitoring of biomass or carbon are not required for this indicator. However, a justification for including the area in this category must be available if requested during an audit (e.g. for 2a - a partner's assessment that an area has met rigorous criteria for protection, or documentation of the stabilization of forest area; for 2b - a partner's report documenting an area that has been converted from degraded agricultural land into a functional agroforestry plot).

2a. Area (hectares in each habitat type) of natural ecosystems where carbon stocks are preserved and/or increasing (areas with *minimal or no* harvest of biomass). Areas included under this indicator are those without significant harvest of biomass. This includes protected areas, areas used for the extraction of non-timber forest products, and community managed forests with minimal timber extraction. Please report the number of hectares for areas where on-the-ground impacts have been realized and documented or where improved management techniques have been comprehensively adopted.

2b. Area (hectares) of managed forest, rangeland, and agricultural lands with reduced rate of loss of carbon or increased carbon (areas with *moderate or high levels* of harvest of biomass). Please report hectares in the areas you are working where reduced rates of carbon emissions or increased carbon stock are apparent (e.g., through an increase in standing biomass, decrease in decomposition or fire risk, etc). Please report under the following categories:

- Sustainable forest management for timber using reduced impact harvesting,
- Agroforestry,
- Reforestation/afforestation,
- Sustainable agriculture.

Unit: Hectares in each land use category and by habitat type. A list of possible habitat types was included in the information packet distributed by the Global Climate Change team.

Indicator 3: Carbon stored through land management and conservation *[Data for indicator 3 will be compiled by the Global Bureau]*

G/ENV will convert the areas reported under indicator 2 into an estimate of tons of carbon stocks. This conversion will be based upon biomass estimates for different habitat types and land uses. Unit: Tons of CO_2 equivalent.

Indicator 4: National/sub-national policy advances in the land use/forestry sector that contribute to the preservation or increase of carbon stocks and sinks, and to the avoidance of greenhouse gas emissions.

For this indicator, please report only on USAID-assisted major national or sub-national policies that are not captured by site specific activities reported on through indicators 1-3. For example, include key policy achievements related to national, state or provincial law (e.g., Bolivian Forestry Law) or significant far-reaching private sector policy reforms (e.g. National Environmental Action Plans) but

not those affecting a specific site (e.g., legal demarcation of individual site or granting of community access to single location)

One point is given for each of five steps completed towards the adoption of legislation or administrative action that:

- facilitates improved land use planning,
- facilitates sustainable forest management,
- facilitates establishment and conservation of protected areas,
- improves integrated coastal management,
- decreases agricultural subsidies or other perverse fiscal incentives which hinder sustainable forest management,
- corrects protective trade policies which devalue forest resources,
- clarifies and improves land and resource tenure.

Indicator 5: Forestry and Land Use Policy Index

Climate Change: Forestry and Land Use Policy Matrix				
Primary Policy Category Code (letter)	**Secondary Policy Category Codes (letter)**	**Policy Description**	**Scope (N or S)**	**Policy Stages Achieved as of FY 97 (Stage #)**
s	t,r,x	Eden's forestry law	*S*	*2,3,4*

Instructions for Data Collection Table: policy matrix
These indicators are being used to help USAID convey the climate change-related impact of policy efforts. In the land use/forestry area, this indicator focuses on policies that are intended improve carbon stocks either directly by protecting land or improving its management, or indirectly by creating economic incentives for better land use practices and trends. The development and implementation of a policy is a process that can take many years, therefore the policy indicator is indexed to record progress in this continuum.

Policy Categories: Please choose the policy category below which most closely describes your policy intervention.

r Facilitates improved land use planning
s Facilitates sustainable forest management
t Facilitates establishment and conservation of protected areas
u Improves integrated coastal management
v Decreases agricultural subsidies or other perverse fiscal incentives which hinder sustainable forest management
w Corrects protective trade policies which devalue forest resources
x Clarifies and improves land and resource tenure

Scope:

S Subnational - policies that affect a tribal nation, province, state or region that are neither national nor site specific in impact.
N National - policies that influence issues on a country-wide level.

Policy Stages:

1. Problem identification/diagnosis: Problem definition, identification of cross-sectoral linkages, data collection, consulting stakeholders as to impacts, needs and perceptions, etc.

2. Pre-formulation and development: The full development of policy interventions to address the problem identified. Formulation/development would include cost/benefit analyses of various alternatives; modeling and constructing the policy intervention. Vetting draft policy intervention(s) with relevant stakeholders in government, non-government, the private sector and civil society, broadening participation through round table discussions, seminars and workshops.

3. Finalization of policy intervention: Vetted policy intervention with all its components and clauses is finalized for final adoption and approval by appropriate administrative agency.

4. Adoption: Policy intervention is approved and adopted by the appropriate administrative agency or legislative body. Can take the form of the voting on a law; the issuance of a decree, etc.

5. Implementation and enforcement: Actions that put the policy interventions into effect: agency personnel trained in procedures, appropriate institutions created or strengthened, operatives of the legislation widely disseminated.

IR 3: Decreased net greenhouse gas emissions from the energy sector, industry and urban areas

Indicator 1: Emissions of carbon dioxide (CO_2) equivalents avoided (carbon dioxide, methane, and nitrous oxide)

USAID/W will calculate the value of Indicator 1 by converting and summing the greenhouse gas emissions avoided through the results Missions achieve and report in the following areas:

1.a. MW renewable energy installed
1.b. MW fossil fuel based energy saved through energy efficiency
1.c. Tonnes of CO2 saved through switching to cleaner fossil fuels
1.d. Tonnes of methane (CH4) captured from solid waste, sewage, coal mining
1.e. Tonnes of nitrous oxide saved through improved agricultural soil or fertilizer management

Unit: metric tonnes of carbon dioxide equivalent

Indicator 2 (OPTIONAL): CO_2 equivalents emitted per MW-h of energy produced (a *national*-scale indicator for use in those countries where national data is available). Unit: metric tonnes CO_2/MW-h.

Indicator 3: Policy advances that contribute to the avoidance of greenhouse gas emissions

One point is given for each of two steps completed toward the adoption of legislation or administrative action that:

a) facilitates improved demand side management or integrated resource planning
b) promotes market based energy prices or decreases fossil fuel subsidies
c) facilitates the installation of energy efficient or other greenhouse gas reducing technologies
d) facilitates the use of renewable energy technologies
e) facilitates the use of cleaner fossil fuels (cleaner coal or natural gas)
f) facilitates the introduction of cleaner modes of transportation and efficient transportation systems
g) promotes the use of cogeneration.

The two policy steps are:

1. Policy preparation and presentation: Draft bill, policy or regulation introduced for debate in appropriate legislative, regulatory, or governmental body.
2. Adoption: Policy intervention is approved and adopted by the appropriate administrative agency or legislative body. Can take the form of the voting on a law; the issuance of a decree, etc.

Unit: One point for each step achieved

Indicator 4: Institutional capacity to develop greenhouse gas emissions reduction strategies or audits in industrial firms, municipalities or utilities

4.a. Number of strategies or audits completed.
Unit: One point for each strategy or audit completed

4.b. Number of strategies or audits implemented
Unit: One point for each strategy or audit implemented

Indicator 5: Value of national investment in energy efficient, renewable energy and cleaner fossil fuel technologies

Unit: U.S. Dollar value of imports and sales of domestic technologies

Indicator 6: Value of public and private investment leverage by USAID for activities that reduce greenhouse gas emissions

6a. Value of funding leveraged directly in support of USAID activities and programs. This would include: (i) funding leveraged from partners for joint USAID activities; (ii) funding for activities in which USAID developed enabling policies, regulations, or provided pre-investment support (pro-rated); (iii) obligated or committed funding for direct follow-on MDB loan programs (pro-rated); or direct follow-on private-sector funded programs that reach financial closure (pro-rated).

Unit: U.S. Dollars

6b. Value of funding generated to replicate USAID-pioneered programs

Unit: U.S. Dollars

IR 4: Reduced vulnerability to the threats posed by climate change

The preliminary indicators to monitor USAID programs that reduce vulnerability to the threats posed by climate change do not measure performance. Rather, they are created to identify Agency programs that are reducing vulnerability to climate change (even if they were not conceived of as climate change programs) in several key areas: coastal zone management; disaster preparedness; agriculture and food security; and biodiversity and forestry. [DATA TO REPORT ON THESE INDICATORS WILL BE COLLECTED BY USAID/W IN FY 1998.]

We recognize that there will be some overlap. That is, some activities will fall into more than one category. Please include each activity in only one place and include a reference to other relevant categories in your brief description.

<u>Key Area</u>

(i) **Coastal Zones** - Number of programs that are reducing the vulnerability of coastal populations, infrastructure, habitats and living resources to accelerated sea level rise or other environmental changes associated with climate change (eg. water availability, resource availability, temperature)

(ii) **Emergency Preparedness** - Number of programs that are increasing ability to cope with and minimize the damage from natural disasters (eg. drought, famine, disease outbreaks) through surveillance, early warning, emergency preparedness, capacity building, etc.

(iii) **Agriculture and Food Security** - Number of programs that are increasing adaptability and resilience of agriculture and food systems to changes in temperature, water availability, pest and pathogen presence or prevalence, soil moisture and other changes in environmental parameters (eg. crop diversification, water conservation and delivery, flexible market and trade systems).

(iv) **Biodiversity/Natural Resources** - Number of programs that are increasing the adaptability of natural ecosystems and levels of biodiversity to changes in temperature, water availability, pest and pathogen presence or prevalence, soil moisture and other changes in environmental parameters (eg. establishment of biological corridors, habitat conservation, preservation of ex situ germplasm).

(v) **Human Health and Nutrition** - Number of programs that are reducing vulnerability to climate change through improved access to and quality of health services, vector control, nutrition and environmental health interventions.

Biodiversity
(USAID Objective 5.2: Biological diversity conserved)

General Notes
The following section briefly describes some promising indicators for themes common to many biodiversity programs. The indicators mentioned are meant to be illustrative, not comprehensive. Many activities undertaken to promote biodiversity conservation -- such as education, outreach, and institutional strengthening -- are common to many environmental programs but are not discussed here. Please refer also to the Natural Resource Management and Environmental Education sections of this report.

This chapter discusses all three types of indicators typical of the Pressure-State-Response Framework discussed on page 6. State indicators measure the actual biophysical condition of the environment. In its efforts to become more results-oriented, USAID is trying to develop more of these impact indicators, although they can be difficult to use over short time periods. They are discussed below in section 1.

Response indicators track the interventions by people to reduce the impact of human activities on the environment. USAID has considerable experience using response indicators, and several new approaches are described in section 2.

USAID has little experience using pressure indicators. Pressures are human actions which threaten the environment, such as careless logging, deforestation, and excessive hunting. A new method for monitoring pressures is discussed in section 3.

(1) *State Indicators (Results/Impact Indicators):*

At the Strategic Objective level, performance indicators should strive to measure the results (outcomes and impacts) of our programs. When the ultimate goal is biodiversity conservation, in many cases it is appropriate to measure the programs' impacts on the environment itself.

In theory, biophysical monitoring could occur at any one of the three levels of biodiversity -- genes, species, and ecosystems. However, due to the intrinsic difficulties in measuring genetic diversity, it is not a practical indicator for USAID programs.

Measuring the impact of our programs on species can be appropriate, under particular circumstances. These include:

(a) When programs target the conservation of specific charismatic species (e.g., elephants, tigers, condors, etc.). Direct measurement of the maintenance of the population of species can be appropriate when this is the objective of a program. For example, a USAID program in Uganda is designed to conserve two parks harboring some of the last remaining populations of mountain gorillas. As one of their performance indicators, the mission tracks changes in the populations of mountain gorillas. This indicator can be generalized as the:

- **Population size/reproductive success of a targeted (e.g. endangered or**

threatened) species

(b) When program activities could adversely impact a particular species. For example, many integrated conservation and development programs promote the harvesting of one or more commercial species. Usually the rationale is that by sustainably using wild products to generate income, these programs provide an incentive for local people to conserve these species and the ecosystems on which they depend. When harvesting a species is promoted as a means to conserve it, it is obviously very important to ensure that over-harvesting does not occur. For this reason, all sites in the Biodiversity Conservation Network monitor populations of target species.

- **Population size of a targeted (e.g. harvested) species (or evidence that growth in the population meets or exceeds the rate at which that population is harvested)**

Activities that involve harvests of wild resources (wildlife, non-timber forests, timber, etc.) need to be carefully monitored, including:

(1) Collection and analysis of baseline data on the current occurrence and density of the resource (e.g., forest inventories), the species demography (e.g., birth and death rates, age at first and last reproduction), and its habitat requirements should occur prior to USAID-supported extractive activities. As with all performance monitoring, in some cases detailed information and sophisticated analyses will be possible, and in other cases simpler procedures will be necessary. But there should always be an effort to determine whether extractive activities are sustainable and a mechanism to adjust them if they are not.

(2) Yield studies to estimate the productivity of the resources.

(3) Regeneration surveys to monitor how population densities fluctuate in response to different harvest levels and their resilience to human disturbances and habitat changes.

(4) Assessments of cultural, economic, policy, and legal factors affecting the use of the resource (e.g., market characteristics, elasticity of supply and demand, economic property relationships).

(5) Monitoring of the actual impact of harvesting, and a mechanism to adjust harvesting levels and harvesting methods to minimize impacts.

In many cases, however, monitoring indicator species is not be the most effective way to assess performance. Often, it is very difficult to understand what causes populations of a particular species to change. It is also difficult to establish long-term trends in species populations during the 5-7 year time frame of Strategic Objectives. Lastly, monitoring the populations of one or two indicator species probably does not reflect the impacts of USAID programs on biodiversity of an ecosystem.

Very often, a good proxy for measuring biodiversity conservation is to monitor the extent of intact ecosystems. Ecosystems serve as habitats for a diversity of species, and loss of habitat is the primary

cause of species' extinctions. For these reasons, most USAID site-based programs are directed at overall ecosystem conservation. Examples of these ecosystem indicators include:

- **Area of intact ecosystems (which could be expressed as hectares of forests, mangroves, coral reefs, etc.).** "Intact ecosystems" refer to those habitats which are, to a large degree, still structurally intact, maintaining most of their original species. They may not be absolutely pristine, as few if any places truly are. It is possible to combine measures of the extent of a particular habitat with biophysical indicators of the health of an ecosystem. For example, several missions are developing indices to track the extent and health of coral reefs (see Natural Resources section).

- **Rates of habitat conversion (which could be expressed as rates of deforestation, coral reef destruction, etc.).** To be useful for performance monitoring, conversion rates where our programs are active should be compared to (a) recent historical rates for the same areas and/or (b) recent rates of conversion in similar areas where the program is NOT active (this would serve as a control). By projecting historical trends and then comparing the actual conversion rate, some missions are reporting the area that was saved from conversion.

The most objective biophysical indicators can be expensive to collect, even over relatively small areas (i.e., they require satellite imagery, aerial photography, complex and extensive sampling regimes). For projects with smaller budgets, or those that work in extensive areas, it may not be feasible to use these types of biophysical indicators.

Some USAID operating units are experimenting with less expensive alternatives to collect biophysical information. For example, community-based mapping activities could potentially be used to analyzing changes in forest cover. Rapid ecological appraisals, while developed primarily as a diagnostic tool, may also be useful for performance monitoring. The utility of these alternative approach will only be determined with more experience in the field, however.

Monitoring the area of structurally intact ecosystems does not guarantee that the ecosystem is healthy. For example, a forest may look intact but overhunting may have removed all the large mammals and birds. These animals may be responsible for dispersing the seeds needed to form the next generation of trees. There can therefore be important reasons to monitor species or groups of species. However, monitoring the extent of the habitat is the first step, and more systematically monitoring the extent of intact ecosystems would be a significant advance for the Agency.

(2) *Response Indicators (Results/Outcome Indicators):*

Response indicators track interventions directed at conserving biodiversity, often through improvements in natural resource management. Response indicators can be very useful compliments to state indicators. For one thing, managing programs on a monthly or even yearly basis would be difficult if the only information available were biophysical. Even when people improve the practices they use to manage the environment, it can take years before these improvements translate into biophysical changes. The physical and biological environment also has its own rhythms and patterns which can, over short periods of time, swamp the impacts of human actions.

There are more practical constraints as well. Some strategic objective teams lack the resources to

measure biophysical indicators. As part of their development hypothesis, these SO teams assume that the process of improving the management of biodiversity-rich areas, will lead, in both the short- and long-term, to the biophysical result of improved biodiversity conservation. While this assumptions should be tested, where possible, there is no doubt of the need to monitor management and peoples actions.

Broadly speaking, the Agency uses two approaches in its site-based work: the improved management of protected areas, and the sustainable use of key biodiversity areas outside of protected areas.

Improved Management of Protected Areas

Many programs improve the management of protected areas, such as parks and reserves. Useful indicators to track performance include:

- **Number and area of targeted parks and reserves which have increased protection**
- **Number and area of targeted parks and reserves which have adequate management**

Note that it is very important to use rigorous operational definitions of "increased protection" or "adequate management" -- these usually include elements of (a) improved on-site capacity (e.g., demarcated boundaries, trained park guards, adequate infrastructure); (b) strengthened partner NGOs and/or Government organizations; (c) community participation in park management, including appropriate consideration of all social issues, such as gender; and (d) acquiring non-USAID funds for park management.

An excellent example of defining "adequate management" is the Parks in Peril (PiP) Scorecard developed by The Nature Conservancy (which is included at the end of this section). A number of categories describing adequate management have been developed, and individual parks are rated on a scale of 1-5 to track performance.

This scorecard is also a useful example of the strengths and limitations of using an "index" to monitor performance. The strengths are: (a) if a scorecard is closely tied to the objectives of a given program, it can provide useful detailed information to program managers; (b) scorecards can be fairly comprehensive and can track incremental progress from year to year; and (c) information can easily be aggregated from individual sites to higher program levels. Weaknesses include: (a) distinctions between some categories can be subjective (although they are more objective than simpler alternatives, because the definition of "adequate management" is much more detailed); (b) scorecards often emphasize processes more than results; and (c) scorecards can be more complicated to understand than simpler indicators, and aggregate scores (all the rating numbers added together) are not very meaningful. However, progress can be explained in terms of the number of parks or other sites that have reached a given threshold, as the Latin America and Caribbean Bureau reports in its regional park protection strategic objective.

Sustainable use of key biodiversity outside of protected areas

To improve biodiversity conservation outside of protected areas, USAID engages in a number of activities to sustainably use natural resources in ecosystems harboring extensive biological resources. Types of activities include community forest management, the use of non-timber forest products,

ecotourism, and fisheries management. These activities are designed to give economic value to intact natural areas, thereby providing incentives for their sustainable use in perpetuity. Examples of appropriate indicators include:

- **Number of people (gender disaggregated) adopting "best practices" on areas critical for conserving biological diversity.** For any indicator of "improved" or "best" practices, it is very important that the program be very specific about which management practices will be counted (see the forestry example in the Natural Resources section).

- **Percent of target population adopting "best practices."** Providing only information on the number of people adopting a practice is not sufficient to assess progress, as success depends on a substantial portion of the overall target population depending on these practices. Therefore, operating units are encouraged to report both the number and the percentage of the target population that adopt these improved practices.

- **Area where people or communities are adopting "best practices" in areas critical for conserving biological diversity.**

- **Employment (gender disaggregated) generated by activities which support the conservation of key biodiversity areas**

(3) *Pressure Indicators: The Threat Reduction Approach*

In the context of this chapter, pressures are human actions which threaten biodiversity. Traditionally, USAID has rarely measured pressures in performance monitoring plans, so we have little experience to draw upon. The Biodiversity Support Program has developed a new method to measure pressures, which they call the Threat Reduction Approach (TRA). The following section, which is adapted from Salafsky and Margoluis (in preparation), describes how the method works.

The technique is new and somewhat subjective, so we do not yet know how broadly applicable it will be as a performance monitoring tool. TRA has been tried experimentally in several sites, however, where it appears to be a useful tool for tracking threats and focussing attention upon them.

TRA involves several steps, which are listed below and illustrated with an example. In the first series of steps, the site is precisely defined and all direct threats to the site are identified. These threats are then ranked in terms of their importance, because TRA places greater weight on the more important threats. Following this, people familiar with the program estimate the percentage reduction in each individual threat since the program began. In the last step, these individual estimates are translated into an overall assessment of the reduction in threat for that site.

These procedure is described in great detail below. To better understand the rankings and calculations described in these steps, please refer to the example provided in Figure 1:

i. **Define the project area spatially and temporally**. Identify the exact project area and the start and end dates of the assessment period.

ii. **List all the direct threats to biodiversity at the project site at the start date**. Direct threats

are those which immediately impact the biodiversity of the site. As you identify each threat, you should also define what it means to meet this threat 100%.

iii. **Rank each threat based on three criteria: area, intensity, and urgency**. Area refers to the expanse of habitats at the site that will be affected by the threat. Intensity refers to the impact of the threat where it occurs -- will it completely destroy the habitat or cause only minor changes? Urgency refers to the immediacy of the threat -- will it happen tomorrow or in ten years? Count the number of threats (n), and assign the greatest threat a rank of (n). The next most important threat would be assigned a rank of (n-1). The least important threat would receive a score of 1.

iv. **Determine an overall rank to each threat**. Add columns B through D to produce an overall score for each threat.

v. **Estimate the degree to which each threat has been met**. These assessments are based on the estimate that you made in ii (above) about what it means to counter 100% of the threat. With this information in mind, the extent to which a particular threat has *actually* been met can be estimated either quantitatively (e.g. calculating the area which was not logged by logging firms) or qualitatively (e.g. ranking the intensity of clearing for agriculture). The reduction in threat should be expressed as the percentage change in the original threat identified at the start of the program.

vi. **Calculate the raw threat reduction score for each threat.** Multiply the overall point total by the percentage threat reduction (recall that when doing the math, percentages are expressed as fractions of 1; thus, 50% is expressed as 0.50).

vii. **Calculate the final threat reduction index score.** Add up all the number in column G, which in this example is 13.3. Divide this number by the total number of points available (45), and multiply this by 100 to calculate the final threat reduction score, which is 30%.

Again, referring to Fig. 1 (below) should make this process clearer. The two most difficult steps are identifying all the key threats to biodiversity at the site and estimating the extent to which each threat has been addressed.

Figure 1: Sample Calculation of a Threat Index for the Crater Mountain Wildlife Area in Papua New Guinea

A Threat	B Area Ranking	C Intensity Ranking	D Urgency Ranking	E Total Points	F Estimate of Threat Met	G Raw Threat Reduction Score	H Threat Reduction Index
Hunting (subsistence)	5	3	4	12	15%	1.8	
Corporate logging	2	5	1	8	50%	4.0	
Expansion of gardens	4	1	5	10	5%	0.5	
Market hunting	3	2	3	8	0%	0	
Mining	1	4	2	7	100%	7.0	
TOTAL	15	15	15	**45**		**13.3**	**30%**
How to calculate the numbers in each column	Rank from 1 to the number of threats. Higher number represent greater threats. Here 5 is the greatest threat.			E = B+C+D	Estimate percentage change in original threat	Multiply E (as a percentage) x F	Total the scores for all threats (13.3), divide by the total possible number of points (45), and multiply by 100.

Explanation of Threats

Hunting (subsistence) Harvesting of birds and mammals by local people for their own consumption. 100% reduction involves harvesting animals on a sustainable basis by setting up and implementing hunting regulations

Corporate logging Timber harvesting by multinational firms. 100% reduction involves eliminating logging and any plans for logging in the program area.

Expansion of gardens Cutting primary forest to make subsistence agricultural plots. 100% reduction involves eliminating expansion of gardens into areas of primary forests.

Market hunting Harvesting of selected bird and mammals that are commercial commodities. 100% reduction involves harvesting animals on a sustainable basis by establishing and implementing hunting regulations.

Mining Mineral extraction by multinational firms. 100% reduction involves eliminating mining and any plans for mining from the program area.

Biological indicators still provide a more direct, subjective measurement of the impact of a project on biodiversity. However, the TRA approach: (a) is less expensive to implement that biophysical monitoring (since it can rely on biological data or data produced through key informant interviews, etc.); (b) can be useful to assess changes that occur over short time periods (which can be very difficult with biological data); (c) information can be analyzed by project staff and community members, generating useful discussions about the program and future adjustments to make; and (d) can be used to analyze projects, even if an existing baseline does not exist.

This approach is new and still experimental. But it has been useful where it was tested by the Biodiversity Conservation Network. Given its potential, it could be a useful *compliment* to the state and response indicators described above.

References

Salafsky, N. and R. Margoluis. In prep. The threat reduction assessment (tra) approach to measuring conservation success: a practical and cost-effective framework for evaluating project impact. Biodiversity Support Program, Washington, DC.

Attachment: An example of a scorecard from The Nature Conservancy's Parks-in-Peril Program

This scorecard was originally developed to determine when national parks supported by the Parks-in-Peril Program had made sufficient progress to "graduate" from the program. Protected areas in the program are annually rated on a scale of 1 - 5 by each of the categories listed below. The tool is also proving useful to track progress towards results, and is now being modified for use in performance monitoring.

Since raw scores are not easy to interpret, information from the scorecard can be reported as the number os sites which reach a certain threshold, such as a score of at least 4 all categories, or the average score for a particular site. Here are several examples of indicators which summarize information from the scorecard at the SO and IR levels:

SO: Effective protection of parks and reserves important to conserve biological diversity

Indicator: Number/area of national parks that have successfully passed The Nature Conservancy's Parks-in-Peril Scorecard criteria: (1) immediate conservation threats deterred; initiation of long-term management plan; (2) institutional strengthening of local NGOs to implement and/or assist in the management of the park; (3) long-term financial management plan in place and funding ensured for recurrent operation costs; and (4) local constituency actively participating and supporting site protection.

Indicator: Sites with adequately demarcated and patrolled park boundaries

IR: Non-USAID funding sources attained or created for parks and reserves

Indicator: Annual government and NGO contribution for park and reserve protection at targeted PiP sites

The full scorecard is presented below:

A. Minimum Protection Activities

1. Physical infrastructure

5= All physical infrastructure necessary (as defined by PiP partner and including boundary demarcation) for reserve mgmt in place
4= Most physical infrastructure for reserve mgmt in place, one or more of components listed in 5 missing or inadequate
3= Some physical infrastructure for reserve mgmt in place, but significant gaps exist
2= Little physical infrastructure for reserve mgmt in place
1= No physical infrastructure for reserve mgmt in place

2. On-site personnel

5= Number of on-site personnel sufficient to perform all planned protection activities
4= Number of on-site personnel adequate to perform most planned protection activities
3= On-site personnel able to perform some protection activities
2= Some on site personnel, not enough to adequately perform protection activities
1= No on-site personnel

3. Training

5= Training needs identified, training program begun
4= Training needs identified, some basic courses provided
3= Training needs identified, no training yet initiated
2= Training needs being identified
1= No indication of personnel training needs

4. Land tenure issues

5= Land tenure information mapped and in use by site manager
4= Some land tenure information available and being used by site manager
3= Land tenure information available but not being used by site manager
2= Inadequate access to land tenure information
1= Land tenure information not available from any source

5. Threats analysis

5= Threats identified, ranked, and being addressed through management actions
4= Threats identified and ranked; specific strategy drafted to address specific threats
3= Threats analysis done; no specific strategy yet drafted to address threats
2= Threats analysis under way
1= No analysis of threats

6. Official declaration of protected area status

5= Official declaration of protected area obtained at appropriate level with reserve boundaries correctly demarcated
4= Proposal for official declaration with reserve boundaries correctly demarcated submitted to proper authorities, no declaration yet obtained
3= Proposal for declaration being prepared with reserve boundaries correctly demarcated
2= Protected area decree exists; boundaries incorrectly demarcated
1= No protected area decree exists

B. Long-Term Management

1. Reserve zoning and buffer zone management

5= Reserve zones defined; land-use patterns conform to usage standards established for zones
4= Reserve zones defined; land use patterns mostly conform to standards established for zones
3= Participatory process underway to develop use zones and allowable uses within buffer zones
2= Studies underway to determine appropriate use zones
1= No division of usage zones within the reserve

2. Site-based long-term management plans

5= Long term mgmt plan completed, landscape-scale management plan guiding actions
4= Long term mgmt plan completed, guiding reserve management
3= Long term mgmt plan completed but not yet implemented
2= Long term mgmt plan preparation in progress
1= Long term mgmt plan not yet begun

3. Science and information needs assessment

5= Local/international scientific/research organizations and individuals coordinating with reserve mgmt to address reserve information needs

4= Conservation science needs identified, ranked, and distributed; contact made with science/research organizations and funding sources to address these needs

3= Conservation science needs identified and ranked

2= Needs generally known

1= Needs essentially unknown

4. Monitoring plan development and implementation

5= Timely monitoring information and analysis in site manager's hands; being used for management purposes

4= Accurate, threat-related monitoring variables being monitored

3= Accurate, threat-related monitoring variables identified, baseline info being collected and classified

2= Some baseline information being gathered, but with no clear relation to monitoring needs

1= No environmental monitoring of any significance under way

C. Long-Term Financing

1. NGO self-sufficiency plan

5= NGO implementing strategy for achieving operational self-sufficiency

4= NGO has completed strategy for operational sustainability and has begun implementation

3= NGO completing strategy for operational sustainability

2= NGO beginning strategy for operational sustainability

1= NGO has no strategy for achieving operational sustainability

2. PiP site long-term financial plan

5= Long-term financial plan completed; diversified portfolio of funding sources available to cover operational expenses at PiP site

4= Long-term financial plan near completion; recurrent/sustainable sources and mechanisms identified

3 = Draft financial plan completed, recurrent/sustainable sources and mechanisms for park operations identified

2 = Financial planning under way

1 = No financial planning or diversification of funding sources in evidence

D. Site Constituency

1. Broad based management committee/technical advisory committee (MC/TAC)

5= MC/TAC includes reserve-area communities, actively participates in reserve management decisions

4= MC/TAC includes some community representation and occasionally participates in management decisions

3= MC/TAC exists but doesn't participate in management decisions

2= MC/TAC being formed

1= MC/TAC non-existent

2. Community involvement in sustainable resource use

5= Well-documented pilot projects for sustainable resource use undertaken in cooperation with major community organizations

4= Well-documented pilot projects for sustainable resource use involve community organizations

3= Well-documented pilot projects for sustainable resource use involve individual communities or residents

2= Pilot projects for sustainable resource under way but don't involve communities

1= No pilot projects for sustainable resource use under way

3. Policy agenda development at national/regional/local levels

5= Conservation policies that promote park security in place at all appropriate levels

4= Plan for conservation policies that promote park security completed, policies being actively pursued at some levels

3= Plan for securing appropriate conservation policies completed

2= No formal plan developed for promoting appropriate conservation policies; however, action being taken on as-needed basis to develop policies that promote park security

1= No action being taken to develop or promote conservation policies for park security

4. Environmental education programs contributing to local support and conservation of reserve

5= Measurable positive impact of environmental education programs

4= Environmental education programs well-established but formal assessment of impact not completed

3= Environmental education programs being conducted

2= Environmental education programs being developed by PiP partner

1= No environmental. education programs under development by PiP partner

Urban and Industrial Pollution (Objective 5.3 - Sustainable urbanization including pollution management promoted)

Program Approach 5.3.1 - Access to water and sanitation services increased

Results/Outcome Indicators:

The Urban Common Indicators team recommends the use of the results level indicator, cited below, at the Strategic Objective level.

- **Number and/or percentage of households with access to urban environmental services.** These services include water and/or sanitation services.

The data for this indicator can be collected at the national level through secondary sources such as the World Bank and the United Nations. A national level indicator would apply when a Mission affects access to water and sanitation at the national level. This indicator can also be measured at the program level or on any other appropriate level (a few RUDOs have been able to collect data for the number of people with access to urban environmental services at the local level). Missions or other appropriate operating units would be responsible for collecting the data.

When using this indicator, the Missions can choose to measure the number of households with access or to measure the percentage of households with access to urban environmental services By measuring the percentage of households with access to urban environmental services a Mission would be measuring the magnitude of the impact of its program. By measuring the number of households with access to urban environmental services, the Mission presents a number without showing the impact the program has in relation to the problem being addressed.

Output/Process Indicators:

As most operating units will recognize, this "access" indicator described above measures the final outcome of a multidimensional process that includes key elements such as the introduction of policy changes at the local and central government levels, the financing of urban infrastructure, and the privatization of key urban services. To measure these other essential processes so that households will have access to urban environmental services, the team provided a set of indices that measure the progress of these activities.

Although the following indices are not direct measures of access to water and sanitation, the urban team submitted them to show some of the key elements USAID must consider to affect a population's access to water and sanitation. Examples of these selected elements are: policy frameworks that address urban investment needs; policy and regulatory regimes supportive of infrastructure and shelter privatization; the availability of financial instruments and financing vehicles; the expansion of private and financial sector involvement in the financing of urban environmental infrastructure; and the use of non-distortive strategies for central/local government funding of infrastructures. It should be noted that these indices do not measure the construction process for urban service facilities, nor the management or the distribution of these urban environmental services, which are also key output/process level indicators that can be measured for this Approach

G/ENV/UP developed the indices to monitor and report on progress financing of urban environmental services. The indices describe the progression of stages (enabling conditions) that operating units will most likely encounter.

The strengths and weakness of indices are briefly highlighted in the introduction of Part II on page 14. Like all indicators, indices can be easiest to use when they are objective, with mutually exclusive categories, and when each element of the index attempts to measure one thing at a time. As one example, see the sub-IR "Citizens' confidence in local government capacity" contained in the Local Government Accountability Index (listed under Agency Approach 5.3.2).

Parts of the urban indices are more complex, whose multiple elements (the individual boxes in the index) are not always mutually exclusive. One example is the sub-IR "Policy and regulatory regimes that support infrastructure and shelter privatization," part of the "Service Expansion/Policy Regulatory Index." The stages in this index are intended to mark a generic pathway (or roadmap) form least complex systems of policies to a higher complexity. Each stage contains multiple steps, or elements, or indications of achievement, which require an operating units professional, albeit subjective assessment of performance. Although objectively applying this type of an index can be more challenging, the Office of Environment and Urban Programs believes that in some cases a more complex index can best portray policy and institutional results in urban service expansion.

Operationalizing an index. These are the steps to follow when using the indices:

1st: the operating unit determines a baseline stage (and submits a written justification) for each of its activities.

2nd: the operating unit determines future stages it will achieve for its annual targets (and submits a written plan for how it is going to achieve its targets).

3rd: after the 1st and 2nd steps are determined, the operating unit then ranks itself on an annual basis. If there is any change in the level of the index, the change will be accompanied by a narrative discussion of how the change occurred.

Note that each operating unit ranks itself under each of the sub-intermediate results where they are working. The operating unit does not have to score itself on sub-intermediate results that it is not implementing. The following is an example of how an operating unit measured itself using the "Service Expansion/Policy Regulatory Index."

First Sub-IR: Integrated planning and policy frameworks are in place to address municipal investment needs.

Indicator: Extent to which an integrated policy framework is in place and is used to guide the system whereby municipal infrastructure is financed.

FY97baseline:	Stage:	2
FY98target:		2
FY99target		3-
FY00target		3
FY01target		3
FY02target		3+
FY03target		4

Narrative Justification:

- The Government has acknowledged the need for an integrated policy framework for municipal investment needs, but the framework is still not in place **(Baseline=Stage 2 in the index)**

- In FY98, our RUDO expects aspects of this framework to be developed, through work at the central government level by the CLEAN-Urban Project but also through the increased donor coordination efforts that our office is engaged in. The framework will be meaningless without participation by the World Bank and Asian Development Bank. In FY99 efforts will be made to bring these institutions on board. A completed policy framework done through effective donor coordination and acceptance by the GOI, will indicate a shift to **Stage 3** in the index.

IR 2.1.1 Service Expansion Policy/Regulatory Index

Sub-Intermediate Results	Indicator	Stage/Level				
		1	2	3	4	
Integrated planning and policy frameworks are in place to address urban investment needs.	Extent to which an integrated policy framework is in place and is used to guide the system whereby urban infrastructure is financed.	No policy regime in place. Financing needs not being systematically addressed at policy level.	Government acknowledges need for policy framework and has entered into dialog with local government and/or private sector.	Policy framework under development or partially in place. Multiple aspects of a finance system for municipal and infrastructure requirements are being addressed simultaneously	Transparent municipal finance policy in place and understood by all parties. Monitoring activities exist to evaluate and adapt system as requirements change.	
Policy and regulatory regimes support an effective process of infrastructure and shelter privatization.	Timeliness and effectiveness of government in facilitating and managing the privatization process.	No policy/regulatory oversight in place. Privatization taking place on an ad hoc basis.	Government acknowledges need for rational privatization policy. Key constraints being identified and analyzed.	Privatization policy being refined Transparent procedures being established and used. Number/value of privatization activities successfully carried out is increasing. System for addressing public concerns, and monitoring performance being developed and/or in use.	Privatization activities taking place where desirable on timely basis with appropriate level of gov't oversight. System for incorporating/addr essing public concerns are well established. Performance of previously privatized activities being monitored and found satisfactory.	

IR 2.1.1 Service Expansion Policy/Regulatory Index						
Sub-Intermediate Results	**Indicator**	**Stage/Level**				
		1	**2**	**3**	**4**	
Appropriate financial instruments and financing vehicles available for municipal and shelter finance and other urban investment requirements	Degree of choice among appropriate, affordable financial mechanisms for municipal and other urban investments.	No selection of funding sources, only gov't or quasi-gov't funding available	Need for more diverse range of funding channels and instruments acknowledged. Private sector involved in identifying, designing and developing expanded funding options.	One or more new funding channels in use on pilot basis by targeted areas. Development of additional vehicles or instruments continues. Private sector initiative in serving urban investment needs is evident.	Range of appropriate financing vehicles and instruments available to targeted areas. Choice of mechanisms made primarily at the local level.	
Expanded private sector and financial sector involvement in municipal finance and the financing of urban environmental infrastructure.	Level of financial sector and other private involvement in municipal finance and urban infrastructure finance in targeted countries.	No financial sector interest or understanding of needs of the municipal sector or for urban environmental infrastructure investment.	Evidence exists of private sector interest in financing of municipal services and urban environmental infrastructure. Private sector and public sector have established dialog on these issues.	Private sector initiatives and marketing to the municipal sector and to urban infrastructure providers are increasing. Share of private financing is increasing. Ongoing forum is established for public/private dialog on municipal finance and urban environmental infrastructure finance.	Competition exists in financing of municipal services and urban infrastructure. Innovation is increasing and costs of financing declining as a result of broader private involvement. Municipal finance industry organization are emerging in private sector.	

IR 2.1.1 Service Expansion Policy/Regulatory Index						
Sub-Intermediate Results	**Indicator**	**Stage/Level**				
		1	**2**	**3**	**4**	
Non-distortive strategies used for central government funding of infrastructure	Government funding for infrastructure is provided according to a policy agreeable to local government and the private sector, and allocated to minimize competition with private finance.	Government funding for infrastructure provided on ad hoc basis. No predictability and/or prioritization of purposes by government or coordination with municipal sector or other providers.	Gov't acknowledges need for strategic funding and allocation of concessionary resources and has begun to examine alternatives. Appropriate use of soft loans under discussion.	Plan in development for predictable gov't transfers for infrastructure investments. Transparent priorities for use of concessionary funding and/or grants being established and implemented. Strategy for increased credit discipline on gov't lending being implemented.	Gov't transfers occur according to plan. Priorities for use of concessionary funding and grants are established and followed. Credit discipline exists in gov't lending programs.	

Program Approach 5.3.2 - Urban management improved

Results/Outcome Indicators:

The Urban Indicators Team does not suggest one single quantitative result level urban management indicator that can be applied across all operating units. "Improved urban management" is a broad issue that covers many different aspects such as the management of urban services, effective financial management of urban financial resources, citizen involvement with local government practices, and the introduction of policy to facilitate more municipal autonomy. The Team therefore developed a set of indices, under the Output/Process level, that measures the progress of selected urban management activities.

Output/Process Indicators:

The indices were developed by G/ENV/UP to be used in their performance monitoring plan to report on the progress of local government activities. The indices are separated into four sub sections:

- improved financial management by local governments;
- improved local government capacity;
- increased local government autonomy; and
- enhanced local governmental accountability.

Under each sub section is a list of sub-intermediate results and a series of benchmarks. For obvious reasons, operating units only track progress for sub-intermediate results that they are working toward. It should be noted that these indices do not measure all aspects of the above elements of urban management. Additional indices can be developed to monitor other elements.

The indices describe the progression of stages (enabling conditions) that operating units will most likely encounter concerning these elements. These are the steps to follow when using the indices:

1st: the operating unit determines a baseline stage (and submits a written justification) for each of its activities.

2nd: the operating unit determines future stages it will achieve for its annual targets (and submits a written plan for how it is going to achieve its targets) .

3rd: after the 1st and 2nd steps are determined, the operating unit then ranks itself on annual basis. If there is any change in the level of the index, the change will be accompanied by a narrative discussion of how the change occurred.

For an example of how one of the RUDOs ranked their baselines and targets according to the sub-Intermediate Result in the "Service Expansion/Policy Regulatory Index," refer to the example the last section (Approach 5.3.1).

Financial Management Index - IR 2.2.1						
Sub-Intermediate Results	**Indicator**	**Stage/Level**				
		1	**2**	**3**	**4**	
Municipalities able to act autonomously (with citizen input) to make investment decisions	Degree of independence municipalities and their citizens have to make investment decisions	Investment decisions are dictated, directed or carried out by central governments	Central gov't recognizes need to grant autonomy to local gov't. Central gov't has expanded level of consultation with local gov't and degree of LG decision-making.	Local gov'ts exercise significant autonomy in investment decisions. Commitment by central gov'ts to expand autonomy is incorporated into national local gov't policy.	Local gov'ts act autonomously in making investment decisions with support from central gov't, consistent with national policy	
Systematic integrated capital budgeting systems used for investment planning	Extent to which systematic integrated capital budgeting systems are used in targeted areas	No systematic integrated capital budgeting systems are used	Local gov'ts have identified integrated capital budgeting systems as a needed practice. Local gov'ts have begun development of systems	Systems for capital budgeting are in place. Local gov'ts have transferred capital expenditure information into budget format and/or completed one capital budget cycle.	Systematic integrated capital budgeting systems are in use by the majority of local govt's	
Effective financial management practices in use	Extent to which municipal services and other municipal functions are well managed financially in targeted areas, using annual-budgets, program-based budgets, performance reporting, industry's benchmarking	Minimal or no financial management practices employed	Local gov't recognizes need to implement financial management. Development of tools in progress	Targeted areas have implemented one or more financial management tools. Systems are gaining standardization in targeted areas	Majority of targeted areas have implemented at least two core financial management tools	

Financial Management Index - IR 2.2.1						
Sub-Intermediate Results	**Indicator**	**Stage/Level**				
		1	**2**	**3**	**4**	
Effective and fair rate making accounting, cost recovery regimes and financial reporting in place	Degree to which rate-making accounting, cost recovery regimes, and financial reporting are implemented in targeted areas	No cost recovery or rate-making regimes in place	Need for rigorous cost recovery regimes, user fees and/or refined rate-making systems acknowledged by local gov't sector. Elements of new systems and administrative policy and regulatory measures needed to implement systems have been identified.	Use of cost recovery and rate-making systems expanding in targeted areas. Enabling policy, regulatory and administrative measures are well understood and being put in place.	Use of cost recovery and rate-making systems is widespread in targeted areas	

IR 2.2.2 Local Government Capacity Index

Sub-Intermediate Results	Indicator	Stage/Level				
		1	2	3	4	
Local Governments using best practices to improve technical capabilities	Extent to which local gov'ts are utilizing best practices from databases or regional/national exposure	No formal mechanisms in place for exchange implementation of best practices	Local gov'ts are connected to databases or are part of a network that exposes them to best practices	Local gov'ts are implementing best practices	Local gov'ts are implementing best practices and see impact on technical capacity.	
Improved management of urban service delivery	Extent to which local governments are managing the delivery of urban services efficiently	Local gov'ts using systems with limitations.	Local gov'ts have identified ways to improve the efficiency of urban service delivery	Local gov'ts are adopting more efficient measures to change their delivery of urban services	Local gov'ts have adopted managerial changes and as a result less leaks occur in the water systems (or other similar results)	
Disaster mitigation	Extent to which municipalities are implementing disaster mitigation practices	No disaster mitigation or preparedness policies in place.	Policies and or pilot projects being introduced into disaster prone areas	Disaster mitigation projects being implemented. Programs being replicated.	In the event of a disaster, new projects and/or policies have assisted in the mitigation of the disaster	
Better trained local government officials	Extent to which local gov't officials are being trained in modern management practices	Existing training programs for local gov't officials need updating.	Appropriate training programs are being developed	Local gov't officials are attending training sessions as part of their career management plans	Local gov't officials trained are training others in practices learned from training sessions	

IR 2.2.3 Local Government Autonomy Index						
Sub-Intermediate Results	**Indicator**	**Stage/Level**				
		1	**2**	**3**	**4**	
Inter-governmental transfers of funds	Extent to which transfers are predictable, reliable and equitable	Transfers do not occur between central and local governments	Grants and project finance are provided to local gov'ts based solely on individual lobbying efforts and political favors	Ministry of Finance or Interior has public and explicit policy outlining criteria for transfers to local gov'ts	Transfer formulas are considered progressive and equitable and based on a country's explicit strategic policy	
Policy, codes and practices to facilitate municipal autonomy	Extent to which policies, codes and practices are implemented to facilitate autonomy in decision-making and revenue generation	Policies in place are inadequate for providing minimal autonomy	Key autonomy issues by local governments are identified and working groups established that include NGOs and the public	Policies are being voted or agreed upon by central governments to allow for more municipal autonomy	Autonomy policies implemented and enforced	
Municipal government networks	Extent to which municipalities are implementing network activities	No networks established	Networks established and common agenda are agreed upon that point to specific actions	Action plans being implemented throughout municipalities	Network activities are sustained over time	

IR 2.2.4 Local Government Accountability Index						
Sub-Intermediate Results	**Indicator**	**Stage/Level**				
		1	**2**	**3**	**4**	
Dialogue between citizen groups, NGOs and local governments on key urban environmental issues and/or shelter	Extent to which the public has access and is able to influence local governments on key environmental issues	No public meetings or open forums for discussion	Public meetings are scheduled and occur on an as-needed or regular basis	Evidence of public input to the budget changes is due to either citizen pressure; planning changes; or infrastructure investment changes	Evidence that public has influence over city policies would be linking public meetings to budget preparation; or investment plans; or changes in management at city hall	
More transparent budget and decision-making processes	Degree to which the budget and decision-making processes are open to the public	No public meetings or printed materials on budgets	Budgets are printed in newspapers, available at local or central gov't ministries	City councils include one citizen-at-large seat and/or other formal community representation mechanism at annual budget hearings	Citizens initiatives or positions are evidenced in budget document	
Citizens' confidence in local government capacity	Degree to which citizens feel confident in their local government's capabilities	No citizens' confidence	30% of the public has confidence in local governments	50% of the public has confidence in local governments	70% of the public has confidence in local governments	

IR 2.2.4 Local Government Accountability Index						
Sub-Intermediate Results	**Indicator**	**Stage/Level**				
		1	**2**	**3**	**4**	
Women and/or disenfranchised groups are being represented in local governments as elected and appointed officials	Extent to which women and/or disenfranchised groups are represented in local governments and other decision making bodies	No elected or appointed women and/or disenfranchised group officials are represented in local government	A need has been identified by NGOs or the public that women and/or disenfranchised groups are under represented in local governments	Women and/or disenfranchised groups are on the ballots to be elected as local government officials	____ percentage of women and/or disenfranchised positions represented in local government positions and other decision making bodies	

Program Approach 5.3.3 - Pollution prevention and control improved

Results/Impact and Outcome Indicators:

The recommended indicator for this Approach would be to measure the amount of reduction of a specific pollutant. This can be difficult in many cases when not all industries have the technology or capitol to investment in the time or technology needed to measure the baseline and subsequent future recordings. In an ideal world, the following would be the most telling and quantitative of indicators:

- **Metric tons/percent reduction in emissions of various air and water pollutants: Particulate Matter, Lead, VOCs, Chromium, COD, BOD, etc**

Because conditions are not ideal in all countries, the following indicator has been used to capture the aggregate results from a variety of activities used to reduce pollution.

- **Number and/or percent of municipalities/industries that are reporting reduced pollution from implementing an environment management system (EMS) or other appropriate technologies**

Missions vary greatly on the funding of their activities and to choose an indicator that can measure the myriad activities across the Missions for this Approach was difficult. Some industries do not have the funding or the equipment to measure baseline and or annual data, so that collecting the specific amounts of pollution being reduced is difficult to aggregate. The above indicator does not capture the magnitude of pollution being reduced as a result of implementing pollution reduction or prevention technologies, but instead captures the results of the implementation of activities that range from holding seminars on pollution prevention technologies to the results of passing pollution prevention policies to implementing these technologies.

The following list recommends more specific indicators that measure the results of process level or output level activities. These indicators are meant to be more specific and measure the actual amounts of specific pollutants being reduced or prevented. In addition, other recommended indicators measure policies and institutional capacity that also lead to reduced pollution.

Process Indicators:

- **Number of municipalities/industries that adopt policies for environmental management systems (EMSs).** EMSs represent an integrated approach to reducing pollution through the implementation of pollution prevention and mitigation practices.

- **Number of municipalities/industries implementing EMS audits or related environmental management plans**

- **Number of municipalities/industries investing in pollution prevention/mitigation technologies (also can be measured by the dollar amount being invested in these technologies).**

- **Number of institutions established/strengthened to promote EMS**

- **Value of environmental technology imports/investments as a percentage of total industrial imports and investment**

Energy
(USAID Objective 5.4: Use of environmentally sound energy services increased)

General Notes

Linkages to Objective 5.1, Global Climate Change. Several of the indicators listed below can be linked to (used to derive) the indicators proposed under Objective 5.1, reducing the threat of global climate change. For example, megawatts (or MW-hours) saved or produced with renewables (indicator 5.4.3.A) or through efficiency improvements (5.4.2.A) can be translated into avoided carbon dioxide emissions.

Process (Input/Output) Indicators. The working group decided not to include *policy* or other *process* indicators for Energy at this time for two reasons. First, although we recognize that policy interventions are the largest portion of our development work in the energy sector, we have been unable to develop a policy indicator that captures policy reform and institutional strengthening *globally*. We are attracted to the idea of a policy index, but have neither seen one or been able to develop one that captures the rather broad array of USAID interventions in this area. Second, the group decided that, policy falls most naturally into the category of enabling conditions, and as such is more appropriate to the Intermediate Result level than to the Agency Approach level to which we have been directed for the purpose of this exercise.

Thus, the lists below focus on **results-level** indicators: mostly <u>outcome</u> indicators, but also a couple types of higher-order <u>impact</u> indicators for consideration at the overall Agency Objective level.

Energy Indicators

Overall Objective-level: Use of environmentally sound energy services increased

Results/Impact Indicators:

- **I. Ambient concentrations of: ozone, lead, sulfur dioxide, nitrogen oxides, particulate matter, carbon monoxide, volatile organic compounds/hydrocarbons (7 different indicators).**

- **II. Avoided emissions (tons and/or %) of: lead, sulfur dioxide, nitrogen oxides, particulate matter, carbon monoxide, volatile organic compounds/ hydrocarbons), carbon dioxide (7 different indicators).**

Results/Output Indicators:

- **III. Cumulative number of Megawatt-hours of "dirty energy" (e.g., coal) production saved (avoided) through implementation of energy efficiency, renewable energy, and other clean technologies.**

Indicator type I vs. type II vs. type III. Note that one could go even further along a chain of causality to an higher-level *impact* indicators relating pollution data to human health and economic impacts writ large (an important issue when one is trying to build awareness and constituencies for "environmental" programs). The type I and type II indicators, however, are examples of more immediate biophysical impacts (reductions in pollution) of increasing the use of cleaner energy (Indicator type III). It is generally preferable to monitor ambient concentrations (type I) of criteria pollutants rather than end-of-pipe emissions (type II). In pressure-state-response framework, type I are *State* indicators, type II are *Pressure* indicators, and Type III might be considered *Response* indicators. This may or may not be more feasible in a given situation/program.

A direct investment program such as plant-by-plant construction or auditing/retrofitting program would probably lean toward emissions monitoring. A more indirect, policy-oriented program might focus on establishing a system to monitor ambient concentrations and changing incentives such as subsidies so that releases will decrease in general. Ambient indicators tend to cover geographic areas such as *cities*, while emissions indicators are more site-specific, such as for a specific industrial or power plant. Both can be aggregated up to a national level if desired, albeit in different ways.

Approach-level

5.4.1 Private Power (Provision of energy services by the private sector increased)

Results/Outcome Indicators:

- **Megawatts (MW-hours) of power produced by the private sector.**
- **Percentage of [a country's] power produced by the private sector.**
- **Private funds ($$) invested in sector energy services.**

The connection between increasing the proportion of private power in an energy system and more environmentally sound energy production and use is difficult to demonstrate and quantify. Notwithstanding, it is generally accepted among energy analysts that increased private power production, transmission, and distribution leads to greater fuel efficiency, which, by virtue of the fact that it uses less fuel per kilowatt of energy produced, means avoided emissions of pollutants, which in turn means less damage to human and ecosystem health and a more efficient economy. The introduction of private power production into a parastatal energy sector creates the need to rationalize the pricing structure within the sector, in order to determine what is a fair price to pay for the privately produced power. Price rationalization in turn opens the door to competition, which leads all power producers to attempt to reduce operating costs. While the first opportunities for cost reductions are often workforce reductions, further efficiencies will generally be realized by maximizing the technical efficiency of the system, i.e., using less fuel to produce and distribute the same amount of energy.

5.4.2 Energy Efficiency (Higher levels of energy efficiency achieved)

Results/Outcome Indicators:

- **Megawatt-hours (MW-h) of avoided additional electric generation capacity or of energy saved due to gains in energy efficiency.** "Avoided capacity" and "energy saved" are two ways of saying essentially the same thing, using the same unit of measure (megawatt-hours). Energy savings can come from reducing transmission and distribution technical losses (as distinguished from pilferage losses), or from increasing the technical efficiency of energy production (supply) or use (demand) through technological innovation or incentives for behavior changes.

- **Plant load factor (percent increase) of base-load powerplants.** Plant load factor is the percentage of plant capacity in use over a period of time. It is essentially a measure of a power system's maintenance condition, and therefore, one could say of the financial efficiency of capital investments in the base-load power system. In any given system, some plants will be designed to supply the base demand for energy and are designed to operate continuously at capacity, except when off-line for maintenance. The greater the time they are online, the better. Other plants in a system will be designed to serve peak energy demand, and will operate only during peak demand, which will change seasonally and over time, and therefore are inappropriate for measuring within this indicator of a system's overall efficiency. Therefore, plant load factor should only be used as a measure of efficiency for base load plants.

- **Transmission and distribution losses: percentage reduction or difference between kw hours produced and kw hours billed.** There are two general types transmission and distribution losses: technical and pilferage. Reducing the first increases the technical efficiency of a power system, therefore directly saving energy and reducing the need for additional capital investments on the supply side. Reducing the second type of loss improves the system's financial viability and provides incentives for improving energy efficiency from the demand side.

- **Energy conversion efficiency of power plants (percent increase in Kilowatt-hours output/Gigajoules input).** Conversion efficiency measures the ability of a particular power production process to convert fuel to usable energy. Conversion efficiency differs widely by type of power plant. The state of the art for cogeneration (producing electric power and heat from the same fuel) is 52%, as compared with a gas turbine plant which is about 20% efficient.

5.4.3 Renewable Energy (Use of renewable energy efficiency increased)

Results/Outcome Indicators:

- **Megawatts (MW-hours) of renewable energy produced, as a direct and a catalyzed result of USAID intervention.** A ***direct result*** is defined as a situation in which new renewable energy production was made possible either through USAID technical or financial assistance. A ***catalyzed result*** is defined as a situation where USAID, provided technical assistance or played an instrumental role in creating enabling conditions that made the production of renewable energy possible. Enabling conditions could be legislative or regulatory reform, assistance provided to multilateral organizations that provided the basis for loan evaluation, or the development of a power purchase agreement that served as a model for subsequent agreements.

- **Firms/households served by renewable energy services, both as a direct and catalyzed result of USAID intervention.**

- **Funds ($$) invested in renewable energy services, both as a direct and a catalyzed result of USAID intervention.**

5.4.4 Cleaner Technology (Use of clean technologies increased)

Results/Outcome Indicators:

- **Imports of environmental technologies (national level- measured in $$ and as a % of total industrial imports and investments).** It may be even better (if possible) when aggregating to distinguish between several general categories of technology investments. In particular, for Objective 5.4 (energy), it might be useful to *distinguish between big ticket investments that benefit large populations*, such as energy production, (natural gas, renewables, fluidized bed boilers, co-generation, coal-washing, power plant scrubbers, etc), *versus smaller, more specifically targeted and more diffuse investments* on the energy consumption side (e.g., efficient motors, light bulbs; transportation-related equipment such as CNG conversion kits for buses, catalytic converters; and other consumer technologies such as efficient appliances.

Note that this indicators will also be relevant to Agency Objective 5.3, where categories such as municipal infrastructure (such as a sewage collection or treatment system construction) and industrial equipment (e.g., end-of-pipe treatment, process retrofitting equipment such as chemical waste recapture/reuse systems, etc.) may be appropriate.

- **Percent of unleaded gasoline in a country's transport fuel mix.** This and the following indicators relate to the adoption of transportation/energy-related technologies.

- **Number/% of vehicles in compliance with emission standards (could be at a city or national level).**

- **Number/% of alternatively-fueled vehicles (CNG, electric batteries, fuel cells, or other more environmentally sound alternative to gasoline or diesel; city or national level).**

Natural Resource Management (USAID Objective 5.5: Sustainable Management of Natural Resources Increased)

General Notes

This section provides examples of reliable, commonly-used indicators for USAID Objective 5.5 and the three contributing Program Approaches. In addition, it discusses ways natural resources management (NRM) indicators are used by SO teams in reporting and managing for results. It also discusses the distinction and linkage between the Agency Objective and the three Program Approaches as well as among the Program Approaches.

The three Program Approaches contribute to USAID Objective 5.5 Sustainable Management of Natural Resources Increased:

5.5.1: Management of forests, water resources and coastal zones improved.

5.5.2: Use of sustainable agricultural practices increased.

5.5.2: Public and community level of awareness of natural resources sustainability issues and remedies enhanced.

For the purposes of this review, we divide our discussion between the overall Agency Objective, which covers all aspects of natural resource management, and the Approaches that focus on forests, water resources, sustainable agriculture, etc. Thus, more general guidance and indicators that apply broadly to NRM are discussed first, followed by more detailed discussions of individual elements on NRM. It is worth noting that in following the Agency Program Approaches, indicators for the first two approaches measure changes in natural resource management, while the third measures changes in awareness and knowledge. This third approach is a prerequisite for changes in NRM.

Challenges in performance monitoring. Strategic Objective (SO) teams face at least three challenges when monitoring the performance of NRM programs. These include:

(1) **Time lags.** While the impacts of poor NRM can be immediately apparent, it can take time for improve NRM to be visible. Considerable time lags can separate improvements in natural resource management and the resulting biophysical changes in the environment. For example, wide-spread adoption of agroforestry practices will not likely have measurable effects on soil qualities or biomass for several years. Consequently, these SO teams often select "Use of NRM practices increased" as the SO level result, which is monitoring by indicators of the "Area under better NRM practices" or "Percentage of people in a given area using better NRM practices." *Adoption rates of "best practices" can sometimes serve as a proxy indicators for future biophysical impacts.* This is particularly true where good data from similar sites demonstrate the biophysical changes that result from the improved practices.

(2) **Enabling conditions.** A second challenge is monitoring the social, environmental , and economic enabling conditions needed to improve NRM. These conditions can be stated as intermediate results (IRs) that contribute to a Strategic Objective (SO) -- e.g. NRM authority devolved to communities, increased NRM tenure security, increased knowledge about NRM options, improved roles of state institutions vis a vis other organizations, increased community-level natural resource management skills, improved community-level organizational skills, and

increased access to markets.

In the past, many NRM SOs were focussed on technical prescriptions or mandates. Now, most current SOs depend upon changing the incentives that affect how individuals and communities make NRM decisions. This focus requires a much more thoughtful approach to using indicators of enabling conditions. Since there is no universal set of incentives for all places and times, many SO teams and their partners must constantly confirm or update their hypothesis about the incentives necessary for achieving broad-based use of particular NRM practices in a particular area. Indicators are a tool in this process. They provide information to test the hypothesis that a given set of incentives will lead to adoption of improved NRM practices. The SO team and its partners must still analyze this information to determine what implications it has for the program.

(3) **Assessing prospects for sustainable and broad-based impacts.** Indicators also play a role in determining whether the results achieved are likely to be sustained and/or be widely adopted. For example, if in a pilot area, indicators show a strong trend in adoption of NRM practices, but other indicators show the trend is linked to subsidized inputs and other exogenous incentives, then the prospect for these results to be sustained or to become broadly used would be put in question. Similarly, if the positive trends are achieved by a privileged group of people or on the best agricultural lands in the country, then the prospects for spread would also be put into question. As described above, indicators should be used in this larger context to interpret and manage results. They are likely to produce few benefits if used mechanically.

Indicators for Objective 5.5: Sustainable Management of Natural Resources Increased

Two types of results indicators are the focus of the following discussion of NRM indicators. Results/impact indicators measure the condition of the natural resources themselves, whether they are coral reefs, forests, or agricultural fields. Results/outcome indicators tend to measure human actions that affect natural resources, particularly the adoption of improved NRM practices that reduce the impact of extractive activities or pollution. Process indicators are discussed primarily in terms of environmental awareness. For more information on results and process indicators, see Part I of this paper.

Results/impact indicators:

- **Area of USAID-assisted sites in which the condition of natural resources is stable or improving (parks, forests, coastal areas).** This measure would be based on the biophysical condition of the site. Some environmental criteria are required to determine the condition of resources at the site and whether they are deteriorating, stable, or improving.

- **Area (Km^2 or hectares) outside USAID-assisted sites in which the condition of natural resources is stable or improving due to replication of NRM best practices.** This indicator assesses the spread effect from USAID-assisted sites.

Results/outcome indicators:

- **Area of USAID-assisted sites in which NRM best practices are being applied.** For any operating unit using this generic form of the indicator, the qualifying "best practices" must be specified.

- **Implementation of National Environmental Action Plan (NEAP) covering forests, water resources, sustainable agriculture and coastal zones** (or fewer NRM sectors if they are not all relevant to a country). Tracking performance of this indicator may be most easily accomplished by listing a series of key benchmarks for NEAP implementation, developing targets for accomplishing these benchmarks, and then tracking progress using an index of benchmarks (see the introduction of Part II for a discussion of indices).

  Tracking NEAP implementation may be not be an appropriate measure of broad-based change in some countries. The SO team would have to show that the NEAP is having the intended effect. In some cases, countries have achieved progress without a NEAP and in other cases, countries with NEAPs have not achieved progress.

- **Percent and area of one or more large watersheds in country with integrated land and water resources management strategies being implemented.** Like the NEAP, the indicator should be accompanied by narrative on how the implementation of this strategy reduces degradation in the watersheds.

Program Approach Indicators

The following section addresses more specifically the different elements of natural resource management. It is divided into 5 sections: forests, freshwater resources, coastal zones, sustainable agriculture, and public awareness.

Forests

Results/Impact indicators:

- **Net change in forest cover in targeted areas.** Note that either a decline in the rate of deforestation or a rise in afforestation would be a positive trend.

Results/outcome indicators:

- **Area (and/or percentage of total) of certified forests.** In an effort to improve forest management, some forests are becoming independently "certified" to be well managed by third-party evaluators (such as the Smartwood Program of Rainforest Alliance, a conservation NGO based in New York). Certifiers adapt principles developed by the Forest Stewardship Council, an international body based in Mexico, to the conditions that apply in the countries worldwide. Criteria for certification are used to evaluate whether forest management is ecologically, socially, and economically sustainable. Because the certification process looks at all aspects of forests management and is conducted by outside evaluators, the process is quite rigorous. However, certification is such a high measure of sustainable forestry that few USAID programs will be able to achieve this standard (USAID/Bolivia's BOLFOR Program is one example).

- **Area (and/or percentage of total) of targeted forests under improved management practices.** Tracking the implementation of specific forestry practices is usually less comprehensive than the criteria used for certification (above). It can show incremental progress for a greater variety of USAID programs.

Defining which "improved" or "best" practices qualify is context specific, and these practices must be clearly defined. A promising approach is to define a handful of key practices, track their implementation, and then report those sites that implement all of these practices (or some other threshold defined by program managers, such as 7 out of 10 practices). An example for tropical logging is provided below:

First, the specific practices that the program seeks to promote must be clearly identified. In this example, the following practices are counted:

(1) tree inventory, marking and mapping,
(2) careful planning and marking of skidder trails,
(3) vine cutting prior to harvest, where appropriate,
(4) directional felling of trees,
(5) appropriate skidding techniques which employ winching and best available equipment (rubber tired skidder/animal traction) to minimize soil damage,
(6) proper road and log deck construction,
(7) a trained work force and implementation of proper safety practices,
(8) fire mitigation techniques (fire breaks),
(9) existence of a long-term management plan.

A simple table can help track incremental progress. Sites were the program is active are listed as rows, and the 9 practices are listed as columns.

Site	Area (ha)	Sustainable Management Practice				
		1	2	3	4	etc.
Site #1		✓	✓	✓	✓	
Site #2		✓	✓			
etc.						
Total area of sites implementing all 9 practices						

For the purposes of performance monitoring, a program could track and report the number and area of sites where either all the practices or some minimum number are implemented.

Additional outcome indicators include:

- **Number of forest user groups or forest enterprises effectively managing local forest resources.** The criteria for distinguishing "effective" management from "ineffective management" must be clearly defined, and some system must be in place to ensure that effective management is occurring on the ground. Using the example above, the number of managing groups could be reported in addition to the area that they manage. This indicator may be easier to calculate than forest area covered, but the area under effective management is important. Thus, it may be important to report both the area under improved management and the number of user groups.

- **Total value of forest products sustainably harvested.** Specific criteria must be developed to determine which forest products can be counted. Using the example above, the value of wood sold by producers that implement all 9 improved practices might be counted. An even more rigorous definition would be the value of wood produced from certified sources.

Water Resources

Results/impact indicators:

- **Volume of water savings in target areas (cumulative).** "Water savings" must be defined carefully according to local objectives, as newly available water will often be devoted to producing more crops or to other valuable purposes. Achievements in these areas will be different than environmental values of leaving more water in-stream. Instead of measuring water savings in terms of area, it may be more informative to measure efficiency of water use, in terms of value or weight of agricultural or industrial products. The additional costs of data collection and reliability must be weighed against the specific objectives of the activity.

- **Length of rivers, area of lakes, or number of wells in which the water quality index improving.** An index of water quality could be developed using standard measures, such as suspended solids, nutrient levels, biological oxygen demand (BOD), or concentrations of key chemicals. Alternatively, these any of these measures could be reported separately, as is described below.

- **Water quality in targeted areas.** Like the previous indicator, measures of water quality could include suspended solids, nutrient levels, biological oxygen demand (BOD), or concentrations of key chemicals. But in this case, the water quality itself is reported as the indicator, not the area, distance, or number of wells that met some water quality standard.

Natural variation can make interpreting biophysical indicators difficult if only a few years of data are available. For example, large year-to-year variation in rainfall could mask the achievements of a successful 5-year water project (e.g. if it were wet in years 4 and 5, no improvement in sediment load or nitrogen content would likely be seen, even if the program were quite successful). Unpredictable human factors pose the same risks.

If time frames are long enough or hydrologic models good enough to compensate for weather, monitoring will still have to cover a wide area to be reliable. This is because many local factors can affect any one monitoring point. Collecting and analyzing many samples over a wide area can therefore be necessary but expensive. One way around these problems is to employ citizen monitoring groups, building the work into a communications/education strategy.

Given this natural variation, the apparent consensus among U.S. water resources management agencies struggling to meet GPRA requirements is that outcome-level indicators -- such as number of people implementing an improved practice, or the area in which this practice is being applied -- can be more useful for making decisions over the short-term. Monitoring of biophysical indicators is more useful in assessing, over the medium- to long-term, whether the adoption of these practices does indeed have the anticipated impact.

Results/outcome indicators:

Several of the following indicators are based on the assumption that local control of water resources

will increase operating efficiency and reduce the diversion of revenues. Like all assumptions, this one should be tested. Potentially conflicting objectives can arise when a program tries to increase both local control and river basin or watershed management.

- **Area (hectares) of land or number of supply systems managed by local water user groups.**

- **Number of USAID-supported water policies implemented.** Implementing a policy may stop short of managing resources. If so, this indicator would not be a direct measurement of better management.

- **Percentage of recurring and/or capital costs of irrigation recovered in user fees.** As above, this may be an indicator for an IR subordinate to increases in better management. But, if there are good data showing the linkage, it may be a reliable proxy.

- **Number of households able to meet their water needs in less than x times and less than y dollars per day.** This index, used by WHO in the 1980s, requires that arbitrary thresholds be set. It should be effective if these decisions are based on adequate surveys of willingness to pay, etc. This indicator applies in urban as well as rural contexts.

- **Number of monitored wells with year-around water.** This indicator measures groundwater supplies, which can be improved by watershed management. Of course, this indicator assumes that new, deeper wells are not added to the set monitored here (since deeper wells are more likely to access water). A less direct indicator that avoids some of the statistical and sampling complexities of site-specific monitoring programs could count the number of villages or neighborhoods with seasonal interruptions of water supplies.

Process indicators:

- **Number or percentage of farmers who participate regularly in active water user associations.** Depending upon the type of participation (attending meetings vs implementing the plan), this may not be a direct measure of better use of water resources. It can be useful to track changing levels of participation as the program matures.

Coastal Zones

An excellent reference on indicators of coastal resources is the Survey Manual for Tropical Marine Resources. The 2nd edition was printed in 1997, and copies are available from the Australian Inst. of Marine Science, PMB No. 3, Townsville Mail Centre, Qld, 4810, Australia, or [http://www.aims.gov.aus].

Methods described in this text have been largely adopted by the Global Coral Reef Monitoring Network, which was established with the participation of USAID through the International Coral Reef Initiative. Methods were developed in the Indo-Pacific region, and best practices elsewhere may require modifications. Chapters are included on data management and design of surveys.

- **Area or length of coastline with an improving water quality index.** An index of water quality could be developed using standard measures, such as suspended solids, nutrient levels, biological oxygen demand (BOD), or concentrations of key chemicals. Alternatively, these any of these measures could be reported separately. Difficulties of monitoring fresh water quality (described above) all apply to marine systems as well.

- **Biophysical measures of coral reef health.** Coral reef habitat quality is indicated by the:

  (1) Area or percentage of living coral cover, as estimated by (a) a diver who records or films coral colonies that s/he observes while being towed behind a boat, (b) the number of points along a transect lying above living coral, or (c) by observations of permanent plots;

  (2) Diversity, abundance, and/or recruitment of reef fish; and,

  (3) Standard measurements of ambient environmental conditions.

  Each of these measures could be recorded separately, or together as part of an overall index of coral health.

Methods for measuring the condition of other coastal resources vary with the resource in question. Mangrove ecosystems are surveyed with close adaptations of standard forestry measurements, with special attention to soils and hydrology. Soft-bottom marine communities and seagrass beds are sampled with trawls or dredges, with special attention to biomass and the occurrence of juvenile fish and shrimp.

Coastal fisheries are extremely complex to monitor, both from sociological and biometric standpoints. Outcome indicators such as number of fishers using destructive techniques, average mesh-size used by the fishing fleet, or number of fishers participating in co-ops will often be more consistent and informative. When biometric measurements are necessary, managers may wish to consult a 1996 text on quantitative methods for small-scale fisheries that was produced by USAID's stock assessment CRSP.

Results/outcome indicators:

- **Area (Km^2) set aside as fish nurseries/reserves.** Criteria must be used to establish that the protected area is properly managed (see below).

- **Length (Km) of coastline under effective management.** Clear criteria for "effective management" must be set, e.g., by use of an index that demonstrates increasing institutional capacity and positive developments in environmental quality. Lower-level indicators of effectiveness include the level of community participation, which can be calculated as the percentage of key stakeholders engaged in resource planning, and by weighting their involvement on a simple scale. See also the water resources section above.

- **Development, adoption, and implementation of USAID-backed coastal policies.** This indicator could be most easily tracked using an index of steps in a policy process or of specific policies to be adopted and implemented.

Process indicators:

Some programs are also using indices to track the process with lead to integrated coastal management. Here, two indices from used by the University of Rhode Islands Coastal Resources Program are presented. For more information on indices, see the introduction to Part II of this primer.

Coastal Resources Management Index

Milestones		Initiated	Completed
Step 1: Issue Identification			
I.	Rapid assessment of environmental condition and trends		
II.	Rapid assessment of policy, institutional context		
III.	Rapid assessment of socioeconomic context		
IV.	Stakeholders identified and consulted		
V.	Consensus on major ICM issues achieved		
VI.	Program goals formulated		
Step 2: Program Preparation			
VII.	Priority issues to be addressed in the management effort selected		
VIII.	Landward and seaward boundaries defined		
IX.	Specific activities formulated to address issues and achieve objectives		
X.	Baseline data on ecosystem condition compiled on variables that relate to priority issues		
XI.	Baseline data on socioeconomic condition compiled on variables that relate to priority issues		
XII.	Research conducted on specific priority issues to assist in the development of management plan or strategy		
XIII.	Management plan prepared		
XIV.	Management plan undergoes public review, comment, and negotiation prior to approval		
XV.	Institutional structure to implement policies and plans formulated and/or established		
Step 3: Formal Adoption and Funding			
XVI.	Management plan is officially approved		
XVII.	Responsibilities of collaborating institutions and jurisdiction for implementation are specified		
XVIII.	Policies, actions, and implementing mechanisms of management plan are endorsed by proposed implementors		
XIX.	Funding is secured from domestic government, private in-country sources, or from external sources		
Step 4: Implementation			
XX.	Project monitoring plan is prepared		
XXI.	Activities specified in management plan are implemented		
XXII.	Existing regulations are improved		

Milestones	Initiated	Completed
XXIII. Conflict resolution and appeal procedures are developed		
Step 5: Evaluation		
XXIV. Internal evaluation/assessment of management effort in conducted		
XXV. Adjustments made to the management effort in response to assessment		
Score: Milestones		

Governance Capacity Index

Governance Capacity Building Activities	
1 Mass media (press, radio, TV) employed to deliver CRM messages	
2 Public education and awareness building program	
3 Early implementation actions/demonstration activities	
4 Training provided to CRM staff and/or staff from cooperating agencies	
5 Project monitoring plan is implemented, data on indicators collected	
6 Compliance with regulations is monitored	
7 Violation of regulations is prosecuted	
8 Program decisions are announced and made known to those likely to be affected	
9 Records on program decisions, violations and plans are open to the public	
10 Decision-making procedures are clear and understood by the interested public	
11 Funding flows are clearly documented	
12 Collaboration among local and national institutions	
13 Planning continues beyond implementation of the first management plan	
14 Public infrastructure is constructed/maintained	
Score: Governance Capacity Building Activities	
TOTAL SCORE	

Sustainable agriculture[3]

Results/Impact indicators:

- **Soil erosion (tons of soil lost/hectare/year) in target area.** This indicator measures decreasing soil loss, which is a positive outcome of sustainable agriculture practices. As direct measurement of erosion is expensive relative to measuring the area under better management or the number of people using better practices, the SO team should consider using these adoption measures as proxy indicators if they have the data to verify that the practices actually have the expected effects on soil quality.

- **Change in soil quality (pH, salinity, fertility levels--NPK) in target area.** As above, SO team should judiciously measure changes in soil quality to verify that better practices have the expected effects.

- **Ratio of yield to degradation in target areas.** Degradation could be measured in terms of soil loss or soil quality. An increasing ratio would be a positive trend.

- **Area (hectares) of USAID assisted croplands in which soil conditions are stable or improving.** The SO team will need to decide the most appropriate measures to determine "stable or improving" soil conditions.

Results/outcome indicators:

The following indicators are based on the adoption of improved agricultural practices. In all cases, missions and program staff must decide which techniques are counted, and how many must be applied for an area to be considered under "sustainable" agriculture. This decision should be based on a baseline study of the key problems making agriculture unsustainable in a particular country/province (e.g. soil erosion, overly extensive agriculture, unsustainable use of inorganic fertilizers, etc.) and the techniques that must be implemented to reverse these trends.

Sustainable agriculture techniques include, but are not limited to: contour plowing, rock lines, terracing, agroforestry (wind breaks, live fencing, etc), integrated pest management (IPM), crop rotation, range management, drip irrigation, composting, soil amendments (e.g. rock phosphorus), judicious uses of inorganic fertilizers (usually in conjunction with practices that increase fertilizer use efficiency).

- **Area and/or percentage of the total target area on which at least X number of sustainable agriculture techniques are being practiced.** This indicates what portion of the targeted crop area is being managed sustainably. This is a much easier indicator to measure than biophysical effects. As noted above, if there are research data which reliably show the biophysical effects of various practices, the SO team can more easily argue the merits of using this as a proxy indicator for biophysical impacts.

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[3] In order to avoid confusion with agricultural activities under the economic growth objective, it may be helpful to define the term sustainable agriculture. In the 1996 USAID publication "Agriculture and the Environment," sustainable agriculture was defined as "...agriculture that provides for human needs while conserving or enhancing rather than depleting natural resources."

- **Number and/or percentage of target population practicing at least X number of sustainable agriculture techniques.** It is often easier to measure the number of people adopting a practice than, for example, to estimate the number of hectares on which a particular technique is being practiced. However, if land distribution is unequal, a large proportion of farmers adopting sustainable agriculture practices may only be affecting a small proportion of the land area. From a biophysical standpoint, it is the proportion of the cropping area covered that ultimately matters.

- **Number of people adopting X number of sustainable agriculture techniques.** Which techniques qualify for inclusion must be clearly defined. This type of information is amenable to aggregation across several countries. However, numbers of people alone does not mean much until it is compared with the size of the target population. For example, one million people is significant in Senegal but not in India.

- **Number of agroforestry trees planted (and % surviving after x years).**

Public awareness

As noted above, program progress can be assessed by tracking the establishment of "enabling conditions" (i.e., the right incentives) for wider use of better NRM practices. This approach was recently added to emphasize the central importance of tracking progress in identifying and establishing the right conditions. Communications research has demonstrated that "awareness" does not necessarily lead to behavioral change. Nonetheless, enhancing awareness is usually necessary and often an initial step toward changes in behavior. See the following section on environmental education and communication for a more detailed discussion of awareness.

A few examples of awareness indicators specific to natural resources are provided here. Since this is a relatively new Program Approach, we will not distinguish between Impact and Outcome indicators. To collect data for these indicators, most SO teams would have to commission household surveys.

- **Percent of producers who know of x percent of relevant NRM options.** The SO team would have to identify relevant NRM options for each agroecological zone.

- **Percent of producers who are aware of relevant NRM policies and codes and the significance of those codes to their conduct.** Examples include the Rural Code, Forestry Code, Agricultural Codes, NGO Codes, Tenure Codes, and policies on micro-enterprise.

- **Percent of producers who have seen their peers use relevant NRM options.**

- **Percent of producers who are aware of the economic benefits of relevant NRM options.**

Environmental Education and Communication Indicators

General Notes

The human dimension of environmental issues and problems is frequently the most critical element of environmental action programs. Careful attention to this dimension will assure popular support for policy, as well as measurable behavior change in target audiences relating to specific environmental problems or issues. These components are most often reflected in SO frameworks and results packages as lower-level, outcome results such as "increased community [or stakeholder] participation" and "adoption of improved NRM practices", and incorporate indicators such as: "% of target group adopting a [specific] behavior or practice."[4]

These lower-level results and indicators provide a measure of human commitment and action that contributes to higher-level biophysical impact/results and long-term sustainability. As such, these indicators can be used to assess the impact of education and communication interventions. They do not replace higher-level results, they contribute to them.

Illustrative education and communication indicators can be found throughout this document, integrated by environmental sector or focus, such as in the sections on biodiversity conservation, water and coastal resource management and sustainable urban/municipal management, to name a few. This section provides a general context and highlights generic indicators for environmental education and communication, which must be adapted to specific programs and targeted behaviors, practices and awareness components of a given program.

Does increased awareness and/or knowledge lead to behavior change?

Communication research demonstrates that neither awareness nor knowledge leads directly to behavior change. In many cases, people are already aware of the environmental issues that involve them. They may know they should protect a watershed, but they do not or cannot act on that knowledge. Policies, lack of access to technology, a lack of economic alternatives, and other factors may prevent them from engaging in environmentally positive practices. Even if people know what environmentally sound practices should be used, and have access to technology and/or resources, they may not be adopted. Further, the adoption of a practice may be preceded by a trial period. The practice needs to be reinforced in order for it to be sustained over time.

Increased awareness and/or understanding can serve as proxy outcome indicators in programs where general popular support for environmental policies is the goal. In targeted behavior change interventions, awareness/knowledge indicators must be complemented with additional, behavioral change indicators to measure the adoption of specific behaviors and practices in target groups. In El Salvador, for example, communication indicators contributing to a low-level (awareness-based) result: "increased awareness of causes of insufficient and unclean water" might include:

- **Percent of target population (men/women) who can name a minimum of three causes of insufficient and unclean water.**

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[4] A behavior is a discrete, observable action that a person takes under specific circumstances. A practice is a series of several related behaviors, which, taken together, could have an impact on the environmental problem or issue.

Another low-level (knowledge-based) result: "increased knowledge of options/solutions for clean water" might include:

- **Percent of target population (men/women) who can discuss a minimum of three options/solutions for improving water quality.**

These lower-level results and indicators contribute to the higher-level intermediate (behavior/practice) result: "increased organized community demand for clean water" and include behavioral/practice indicators such as: *increased requests for action on water-related issues by organized groups received by Mayors and other selected entities...* Communication campaigns at the local level stimulate widespread awareness and understanding, ensuring broad-based popular support for changes in water supply and sanitation programs at the municipal level.

Gender Implications

Performance monitoring for environmental education and communication programs should be gender disaggregated. Analysis of these data should describe similarities and differences between the two groups. In many environmental programs, such as agroforestry, for example, both men and women are encouraged to adopt similar behaviors and practices, but different factors may influence whether men and women adopt these practices. Specific communication strategies may need to be developed for women and for men. Additionally, since many environmental programs focus on supporting the development and strengthening of grass-roots organizations to manage resources, program evaluations could assess the role that men and women have had in decision making within these organizations.

In Nepal, for example, communication support for strengthening user groups and promoting sustainable fuelwood extraction in community-managed forests included the use of community video to highlight user practices, issues and problems. Baseline data illustrated the need to focus on women and men and children separately in video development and promotion, since forest user practices varied greatly amongst these groups. The baseline provided information for program development as well as ongoing monitoring of change/improvement in user practices in each target group.

Measuring results/outcomes

In order to reduce costs, measuring the impact of education and communication interventions should be included in on-going project monitoring activities. Members of the target audience should be involved in developing the instruments and collecting and analyzing the data. A survey combined with structured observation could also be conducted with a random sample of the target audience to evaluate the impact of education and communication interventions.

In Jordan, for example, Ministry of Education staff were involved in the development and implementation of survey instruments for gathering baseline data on student/teacher behaviors/practices around water conservation in the school and home. Following a year-long program of water conservation education and action programs in the schools, these staff used similar instruments to measure changes in behavior and practices amongst the target group of students/teachers.

Results/Outcome indicators:

In environmental education and communication programs, educators and communicators should work closely with their technical and community-level partners to identify specific behaviors and practices the environmental program should introduce, teach and/or promote and support to reduce or resolve a specific environmental problem. Behavior change is a gradual process consisting of identifiable stages and long-term change occurs as people gain skills and increase self-confidence through repeated trials and reinforcement. Fig. 1 provides illustrative indicators in a framework that shows moment through these stages.

Figure 1: Stages of Behavior Change, Illustrative communication indicators for an environment program.

Exposure:	% of target population (men and women) exposed to [environmental] messages through interpersonal communication, print materials and/or mass media.
Knowledge:	% of target population (men and women) who know key [environmental] messages.
Trial:	% of target population (men and women) who have tried [environmental] target behaviors/practices at least once.
Adoption:	% of target population (men and women) who perform [environmental] target behaviors/practices on a regular basis.
Advocacy:	% of target population (men and women) who promote [environmental] target behaviors/practices to other members of the target audience.

Movement through these stages (and their sub-stages) will vary greatly from population to population and from individual to individual. Some people will remain somewhere between knowledge and trial for years. Others will cycle back and forth among stages. Everyone is vulnerable to relapse. Research has also demonstrated that there is attrition between each stage as members of the target audience move from exposure to advocacy. Only a certain percentage of the target audience exposed to education and communication activities will become knowledgeable or skillful. A smaller percentage of knowledgeable and skillful beneficiaries will agree with the benefits of the behavior promoted and even fewer will try the behavior. *This means that it when setting targets, it is necessarily realistic to expect increasing percentages of the target population being reported as they move from exposure to knowledge, trial, adoption, and finally advocacy.*