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Developing Environmental Compliance and Enforcement Indicator Programs, Pilot Project: Illegal Logging in Costa Rica

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Manuel Antonio, Costa Rica's Most Popular National Park
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Introduction

Environmental laws and treaties have been developed and enacted throughout the world at an accelerated rate over the last thirty years, yet global measures of environmental quality have continued to decline at alarming rates. Effective environmental enforcement efforts are necessary to give standing to laws and treaties and, ultimately, to protect natural resources.

The necessity of improved environmental compliance and enforcement mechanisms was officially recognized in 1992 by the nations participating in the Rio Earth Summit. Also arising from the 1992 Rio Earth Summit was the recognition of the need for "more and different" types of environmental indicators.0 in order to provide a standardized means for local, state, and global policymakers to assess environmental performance.[i] From the latter development, environmental enforcement and compliance indicators began to evolve. At the forefront of this field, the International Network for Environmental Compliance and Enforcement (INECE) has been working to advance the use of environmental compliance and enforcement (ECE) indicators on a global scale. To further these efforts, the Bren Team has worked closely with INECE to develop an ECE indicator pilot project focusing on illegal logging in Costa Rica. The experiences of this effort, and review of current literature in ECE, environmental, and sustainability indicator development, have been drawn upon to advance existing guidelines for developing ECE indicators. A brief history and background of ECE indicators follows.

ECE Indicator Background

Indicators provide information about a larger, typically more difficult to quantify or qualify, situation. If properly selected, indicators reduce the number of measurements or parameters required to give an accurate presentation of the situation. In turn, the desired information can be communicated more efficiently to the user. Thus, an environmental indicator program, when appropriately analyzed with background information, data, and interpretation, provides a mechanism of "feedback" to measure a country's environmental performance. ECE indicators provide information to compliance assurances program managers, and other stakeholders, in a similar manner. *ECE indicators* can increase the efficiency and value of environmental enforcement programs by identifying program strengths and weaknesses and focusing improvements. ECE indicators have three primary functions:

- Monitoring program operations
- Enhancing accountability
- Assessing program performance

For example, managers can compare outputs (number of inspections) with outcomes (compliance rates) to learn whether more inspections lead to greater compliance. Similarly, comparing the number of inspections by sector with corresponding changes in compliance rates can help management identify sectors in which inspections have the greatest impact. Managers can look for patterns and relationships between activities and results, and make improvements where necessary. Key ECE Indicator Terms follow in Box 1.[ii]

Box 1: Key ECE Indicator Terms

- **Compliance** - The behavior response to regulatory requirements.
- **Enforcement** - The application of all available tools to achieve compliance.
- **Inputs** - Inputs include time, staff, funding, materials, equipment and the like that contribute to an activity.
- **Outputs** - Outputs are activities, events, services and products that reach a regulated body.
- **Outcomes** - Outcome indicators measure the results of an agency's outputs, and are generally divided into three categories: immediate, intermediate and final outcomes.
- **Immediate outcome indicators -** measure changes in knowledge, skills, attitude, motivation, or awareness.
- **Intermediate outcome indicators -** measure progress toward a final outcome, such as a change in behavior or other results that contribute to the end outcome.
- **Final outcome indicators** - measure the ultimate result the program is designed to achieve, such as ambient concentrations of an air pollutant.

Approach

The Team's approach consisted of three primary phases: completing a literature review, designing the pilot project, and assembling the general guidelines for designing ECE indicator programs. These steps are summarized below.

Literature Review

A literature review focusing on the development and use of environmental and sustainability indicators was necessary to understand the context of ECE indicators. As an emerging application of indicators, with minimal available literature, guidelines for designing ECE indicators are in the early stages. Examining how past indicator programs have been constructed, and drawing upon these efforts, also supplemented existing guidelines for ECE indicator development. Gaps in the current guidelines were filled using these related indicator efforts.

In addition to examining environmental and sustainability indicator programs, the team completed a more comprehensive literature review on the development and use of ECE indicators. The team's methodology in designing the pilot project was primarily adapted from the more recent of the two existing "guidelines" documents for ECE indicator selection, the US EPA's *Performance Measurement Guidance for Compliance and Enforcement Practitioners* (Guidance Document). Finally, a list of ECE indicators was maintained throughout the review, in order to improve the team's understanding of the structure of indicator programs.

Pilot Project

This aspect of the project was initiated in a two-day, project-scoping conference in San Jose, Costa Rica and subsequent stakeholder meetings. The conference was attended by a diverse array of participants from the environmental field, including the Costa Rican Ministry of Energy and the Environment (MINAE) officials, the chief environmental prosecutor, various NGO and private sector representatives. Overall, the goal of the conference and stakeholder meetings was to select a sector for the pilot project focus and communicate the usefulness of ECE indicator programs to the attendees. In addition, the conference established goals and a course of action for the Team. The pilot project was generally organized in three phases: understanding and evaluating the legal framework and enforcement process, selecting indicators, and recommending practical steps for program implementation and use.

Best Practices

The lessons learned from the Costa Rica pilot project, and relevant practices identified from ECE and additional indicator literature, were incorporated into the Best Practices Document. The Best Practices Document is not a definitive set of rules; rather, it is a compilation of practical advice for designing and implementing ECE indicator programs. This document will be a menu of sorts, allowing interested regulatory agencies to review the elements most appropriate for their circumstances and follow a general framework for designing ECE indicator programs that suit their respective situations.

Project Phases and Results

Literature Review

The literature review yielded numerous practical considerations, or "lessons learned", that were incorporated into the development of the pilot project and best practices document. These lessons learned will be subsequently discussed under these respective headings, as both of these project components drew upon the literature heavily. Conceptually, indicator selection literature focuses on the use of conceptual frameworks and criteria for

indicator selection – both critical considerations in designing ECE indicator programs.

Thus far, ECE Indicator practitioners have relied upon the logic model as a conceptual framework for designing indicator programs. The Canadian Results-based Management and Accountability Framework defines the logic model as "a theoretical 'road map' of the policy, program or initiative upon which the strategic plan, ongoing performance measurement and evaluation strategies are based….It should clearly demonstrate a results chain from activities to outcomes." A sample logic model, from the Guidance Document, follows:

Inputs ***Resources***	**Outputs** ***Activities***	**Intermediate Outcome** ***Behavior change***	**Final Outcome** ***Environ-mental Impact***
Personnel	Inspections conducted	Greater understanding of how to comply	Reduced pollution emissions
Funds for salaries, contracts, IT, etc.	Enforcement actions taken	Improved facility management practices	Improved ambient water quality
	Fines assessed	Increased compliance	Reduced contaminant burden in wildlife species

Source: US EPA, *Performance Measurement Guidance for Compliance and Enforcement Practitioners*

The Team initially used the primary logic model categories (inputs, outputs, intermediate, and final outcomes) to categorize specific indicators being used in various enforcement and compliance monitoring programs. Analysis of this indicator catalogue revealed a number of sub-categories within each primary category that aided the pilot project development and can serve as a menu for future program design efforts. For example, investments, human resources, and training are sub-categories under the primary category of input indicators; indicators for each of these sub-categories were found to occur in the majority of existing ECE indicator programs.

The Team also drew upon a number of source documents for guidance in selecting criteria and evaluating potential indicators. Analysis of indicator selection literature reveals that the number of recommended criteria is quite large; however, this is primarily the result of the use of many synonymous criteria terms and varying methods of presenting criteria. Despite the abundance of recommended criteria, the lack of process recommendations for the practical application of criteria to potential indicators represents a significant shortcoming in indicator selection literature. The Organization for Economic Co-operation and Development (OECD) outlined the sole methodology the team encountered for applying criteria.

Pilot Project

Though the methodology for the identification of ECE indicators has been significantly advanced in recent years by INECE, the OECD, Environment Canada, and the USEPA, limited progress has been made within the context of developed nations. In March of 2004, INECE employed the Bren Team to develop an ECE indicator program for a developing country; INECE chose to focus the study on Costa Rica. After conducting the Conference in San Jose, the Team focused the pilot project on one of the country's greatest environmental concerns, deforestation.

Overall, Costa Rica provides an interesting case study of the dynamics between economic development and resource conservation. Deforestation is one of Costa Rica's greatest environmental concerns. In 1970 the government developed a National Park system, and in the 1990's Costa Rica enacted a range of progressive policies to combat deforestation. Yet, despite these past environmental achievements and its stable economic profile, there is still work to be done in the forest sector.

The Team defined the goal of the pilot project as follows: to provide valuable information regarding enforcement and compliance efforts within the Costa Rican forestry sector, specifically addressing illegal logging issues. In order to create an indicator program for Costa Rica, it was essential to first evaluate and understand the enforcement and compliance process. This stage in the process involved summarizing available data regarding the enforcement efforts of the key forestry actors: the National System of Conservation Areas (SINAC, a system of regional offices under the "umbrella" of MINAE responsible for forestry management), the Federal Prosecutor's Office, and the Forest Regents (non-government officials who design and execute federally required forestry management plans). In addition, the Team completed an analysis of Costa Rican forestry law with

the help of students participating in the UCLA environmental law clinic.

As the logic model forms the backbone of the indicator selection process, this conceptual framework was the focal point in planning the selection of indicators. Organizing enforcement process data into the logic model framework allowed the Team to understand the core components of the key actors' roles in the forestry law enforcement process. The next step was an inventory of existing data to identify potential indicators for each of these core components. Upon evaluating potential indicators from the data inventory, the Team produced partial indicator sets organized within logic model frameworks for the key actors: the "SINAC" framework for illegal logging without a management plan, the "Forestry Regents" framework for management plan violations, and the "Prosecutor's" framework for prosecuting all illegal logging violations. The inventory of existing data in Costa Rica did not provide a comprehensive indicator program for each framework; to address this limitation, the Team returned to the enforcement process research and the logic model. This information was drawn on to supplement each logic model with indicators necessary to construct a comprehensive program. This stage concluded in generating three logic models, or indicator sets, with explanations for indicator implementation and use.

The Team developed both specific and general strategies for Costa Rican Stakeholders to consider during the implementation and use phases of the pilot project. These recommendations are based on a combination of general knowledge of Costa Rican forestry and enforcement systems and practices that have been successful in other indicator programs. The intentions of these recommendations are to both provide a starting point for future stakeholder coordination of the pilot project and offer practical advice for pilot project implementation and use. This section serves as a menu, allowing stakeholders to select items that they find appropriate. A general example recommendation follows; this recommendation originated in the US EPA's Guidance Document and was subsequently applied to the pilot project:

Guidance Document Recommendation: Use "internal teams" for implementation design and analysis.[ii]

> *Costa Rica Application:* A team within SINAC will fill this essential role in Costa Rica. It would be useful to include managers from the regional offices on this team, so local expertise is utilized. In addition, the team should include staff with a wide variety of backgrounds. For example, the team will need technical experts as well as managers who provide decision-making abilities. This group of experts will carry the project through from beginning to end and will problem-solve when issues arise.

Best Practices

In any field "best practices" are ideas or concepts that have proven useful to practitioners and can serve as a guide for others in similar situations. Recognized best practices in the ECE indicator field are typically derived from the hands-on experience of experts who have completed work on the three main stages of ECE indicator program development.

The Team supplemented these ideas with best practices drawn from literature on other types of indicator programs, communications with practitioners via e-dialogues, and practical experience with developing the Costa Rica pilot project. The best practices section of the project is intended as a supplement to current ECE indicator selection literature. An example of a best practice for the implementation phase is described below:

Best Practice: Develop a "quality control" program[ii]

> Any ECE indicator program should be evaluated in terms of quality as it is being implemented. A "quality control" program can assure that useful, accurate data is being collected.[ii] In the long run a system of "checks and balances" will make the program more credible and useful. Data collection agencies should work together to set standardized methodologies for data collection and analysis. This will help to ensure that data are reliable and comparable. For example, data should be reported in similar units of measure. It would also be useful to have an outside consultant review the methods to prevent agency bias.

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[i] *Rio Earth Summit Agenda 21*. (1992). UN Conference on Environment and Development, Rio De Janeiro, Brazil. United Nations. Ch. 40.2. Retrieved November 29th, 2004 from: http://www.un.org/esa/sustdev/documents/agenda21/index.htm

[ii] Stahl, M. and Ferrell, R. (2004). *Performance Measurement Guidance for Compliance and Enforcement Practitioners*. Working Paper. USEPA/INECE. p. 16. Retrieved from the web August 20th, 2004 from: www.inece.org.