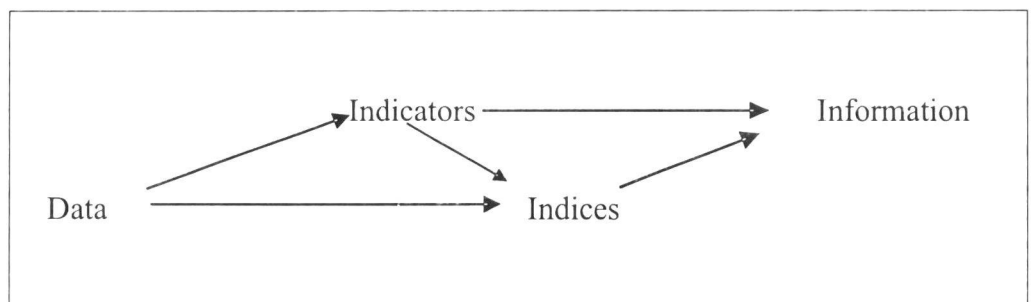# Development of Environmental Indicators and Their Importance

01.   Introduction

Environmental Indicators (EIs) are an efficient way on measuring the environmental performance in the country. Properly derived indicators can serve to highlight changes in environmental conditions that warrant further environmental investigation. An ongoing problem in the Environment and Natural Resources Sector in Sri Lanka has been the non-availability of a consistent dataset on which to, evaluate the status of Natural Resources. Agenda 21 also specially calls for the harmonization of efforts to develop sustainable indicators at the national, regional & global levels, including the incorporation of a suitable set of these indicators in common, regularly updated and widely accessible reports & data bases. The importance of environmental indicators has been highlighted in the National Environmental Policy as well. Hence a set of indicators from a macro perspective, need to be developed for the various programmes and projects implemented in the country. This would enable the measurement of the achievements of the environmental conservation programmes. Further the EIs reflect trends in the State of the Environment (SoE) and monitor the progress made in realizing environmental policy targets. As such environmental indicators have become indispensable to policy makers.

In working with indicators, there are several terms that figure frequently. The most common ones are data, indicator, index and information. How data, indicators, indices and information are most commonly linked to each other can be shown in a diagram.

2. The main objectives of developing environmental indicators

- To bring important environment and natural resources issues to the political agenda

- To help to identify main trends in the environment sectors

● To facilitate reporting on SoE to decision makers and the general public, both national and international

● To promote national dialogue on sustainable development

● To help to access the fulfillment of government goals and targets and in revision of these goals an targets

● To help assess the performance of both environment and natural resources policies and actions when implementing the plans

For effective use of environmental indicators in national policy formulation and decision-making, a reliable environmental statistics database is a necessary precondition. Such a database would be useful not only for measuring changes in the quality of the environment, but also for monitoring the effectiveness of the country's programmes on environmental improvement and sustainable development.

3.   Identification and selection of Environmental Indicators

The important characteristics of EIs are;

Policy Relevance:
The indicators should be related to the objectives of sustainable development. This also implies that the indicators should be policy relevant, and that the different needs at the regional, national and local levels due to different concerns, geographical scales, data availability and users are recognized.

Analytical Soundness:
It should be robust in technical and scientific terms also be able to incorporate them into models and forecasting systems. Assumptions or external factors, relating to indicators must be identified and well articulated.

Consistency:
The data should be of a quality that makes it possible to compare it both temporally (when changes in the natural resources base occur) and spatially (where the natural resources are and the changes in these resources).

Feasibility/Accessible Data:

EIs must provide timely information. They must give you information while there is time to act. For example, imagine a gas gauge that only gave you the amount of gasoline in the tank when the engine was started. After you have been driving for several hours, that reading is no longer useful. An indicator should consist of either available data or data that can be collected in a cost-efficient manner.

Measurability :

Must be readily available at reasonable cost and be of known quality and quantity. They must also be updated at regular intervals by reliable procedures.

Reliable:

EIs must be reliable. You must trust what the indicator shows. A good gas gauge and an accurate report card give information that can be relied on. A gas gauge that shows the tank is empty when in fact is half full would make you stop for gasoline before it is needed. A gas gauge that shows the tank is half full when in fact it is empty would cause you to run out of gas in an inconvenient place. Reliability is not the same as precision. An indicator does not necessarily need to be precise, it just needs to give a reliable picture of the system it is measuring.

Understandable:

An indicator must be understandable. You need to know what it is telling you.

In addition EIs need to provide a picture of the current state of the environment and society's response. They need to be simple, easy to interpret and show trends over time. They must also be responsive to change and have a threshold or reference value against which to make comparisons.

4.   Usefulness of indicators

Environmental Indicators can provide *crucial guidance* for decision making in a variety of ways. They can provide an early warning, sounding the alarm in time to prevent economic, social and environmental damage. A good indicator *alerts you to a problem before it gets* to back and helps you recognize what needs to be done fix the problem. They allow you to see where the problem areas are and help show the way to fix those problems.

An indicator is something that points to an issue or condition. Its purpose is to *show you how well a system is working*. If there is a problem, an indicator can help you determine what direction to take to address the issue or solve problems, hopefully before they become too severe.

Indicators can be useful as proxies or substitutes for *measuring conditions that are so complex* that there no direct measurement. For instance, it is hard to measure the 'quality of life in a town' because there are may different things that make up quality of life and people may have different opinions on which conditions count most. A very simple substitute indicator is 'Number of people moving into the town compared to the number moving out'.

The indicators should enable or promote information exchange regarding the issue they address. Environmental indicators provide *information about phenomena that* are regarded typical for an / or critical to environmental quality
In addition environmental indicators may be used as a powerful *tool to raise public awareness* on environmental issues

5. Usefulness of environmental indicators at policymaking level

To supply information on environmental problems, in order to enable policy makers to value their seriousness
　　To support policy development and priority setting by identifying key factors that cause pressure the environment
　　To monitor the effects of public policy
　　To measure the environmental performance
　　Integration of environmental concerns in sectoral policies
　　Integration of environmental and economic decision making through environmental accounting
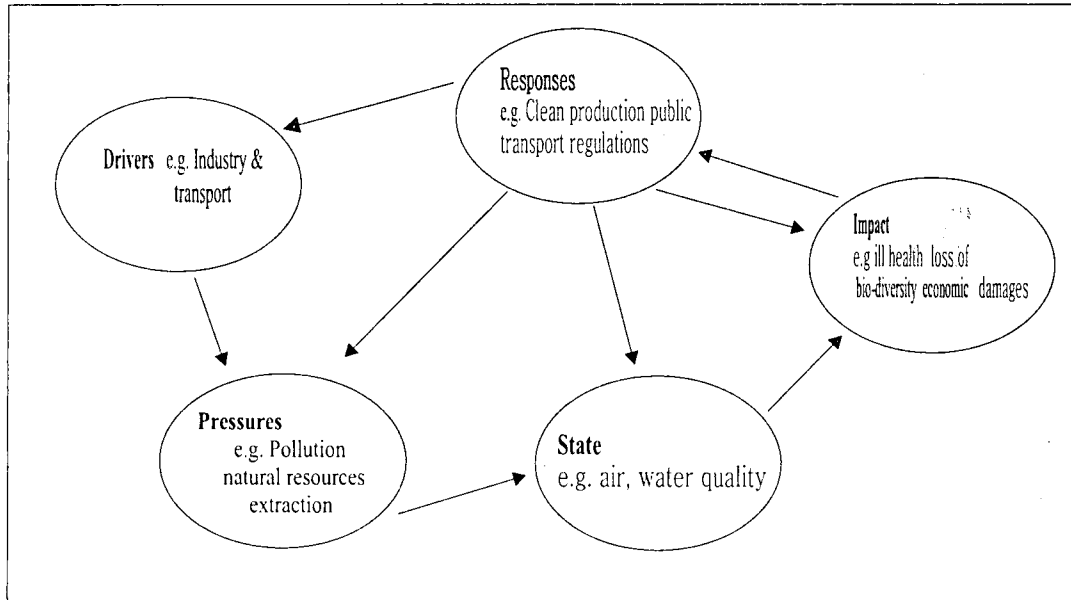　　Reporting on the state of the environment

6. Development of Indicators

Those trying to develop indicators often end up with long lists of indicators selected on the basis of a subjective perception of their importance. Such indicator lists tend to treat some topics in depth while ignoring others. Having too many indicators can also result in confused priorities and overwhelming details for both developers and users. Many of these

problems can be avoided by using the DPSIR framework, which combined with a number of selection criteria. This is a framework developed by the Organization of Economic Co-operation and Development (OECD) for national, regional and international level analyses.

The DPSIR indicator's framework

According to this analysis , social and economic developments exert **Pressure**, on the environment and as a consequence, the **State** of the environment changes, such as the provision of adequate conditions for health, ecosystems and materials that may elicit a social **Response** that feeds back on the **Driving Forces,** or on the state or **Impacts** directly, through adaptation or curative action. Based on the DPSIR various types of indicators can be developed with specific focus.

Development of Indicators

7.   Type of Indicators

(i)   Pressure Indicators

Pressure indicators are measures of pressure on the environment caused by human activities. An example is the amount of a particular stratospheric ozone-damaging pollutant emitted into the air by an industry, and is measured at the location where the pollutant is released into the environment.

(ii) State Indicators

State indicators are measures of the quality of the environment and the quantity of natural resources, and include the health effects caused by the deterioration of the environment on human populations and ecosystems. An example is the concentration of a particular ozone-damaging pollutant in the air. It is to be noted that pressure indicator measures the amount of a pollutant emitted at the locations where it is released into the environment, and the state indicator captures the concentration of a pollutant in the air, perhaps discharged by several industries and influenced by atmospheric and other factors.

(iii) Response Indicators

Response indicators are measures of the efforts undertaken by society to respond to environmental changes and issues. An example is the amount of alternative substances substituted for ozone-damaging substances in a particular production process.

(iv) Impact indicators

Impact indicators are measures of the impact which is caused to the human population and ecosystem due to the changes of state of environment

8. Challenges/constraints in developing environmental indicators

One of the major problems in developing indicators is non-availability of primary data in the sector. Without good primary data it is impossible to produce good information. Therefore, most indicator efforts need to focus on generating good primary data and indicators to develop good indices. In order to overcome this it is important to identify the existing data sources to avoid the duplication of efforts. Organizing the collected data is a necessary step toward producing the information needed for decision making. In selecting applicable indicators it is important to look at the regional, national and local level indicators which is one of the easiest way to identify the environmental issues at each level. Therefore working at different levels in order to simplify the complex process will be an advanced methodology in terms of communication as well as the decision making

Poorly established communication among the line agencies is another major constrains in terms of collecting information. Communication is the main function of indicators. They should enable or promote information exchange regarding the issue they address. At the same time the communication demands the simplification.

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