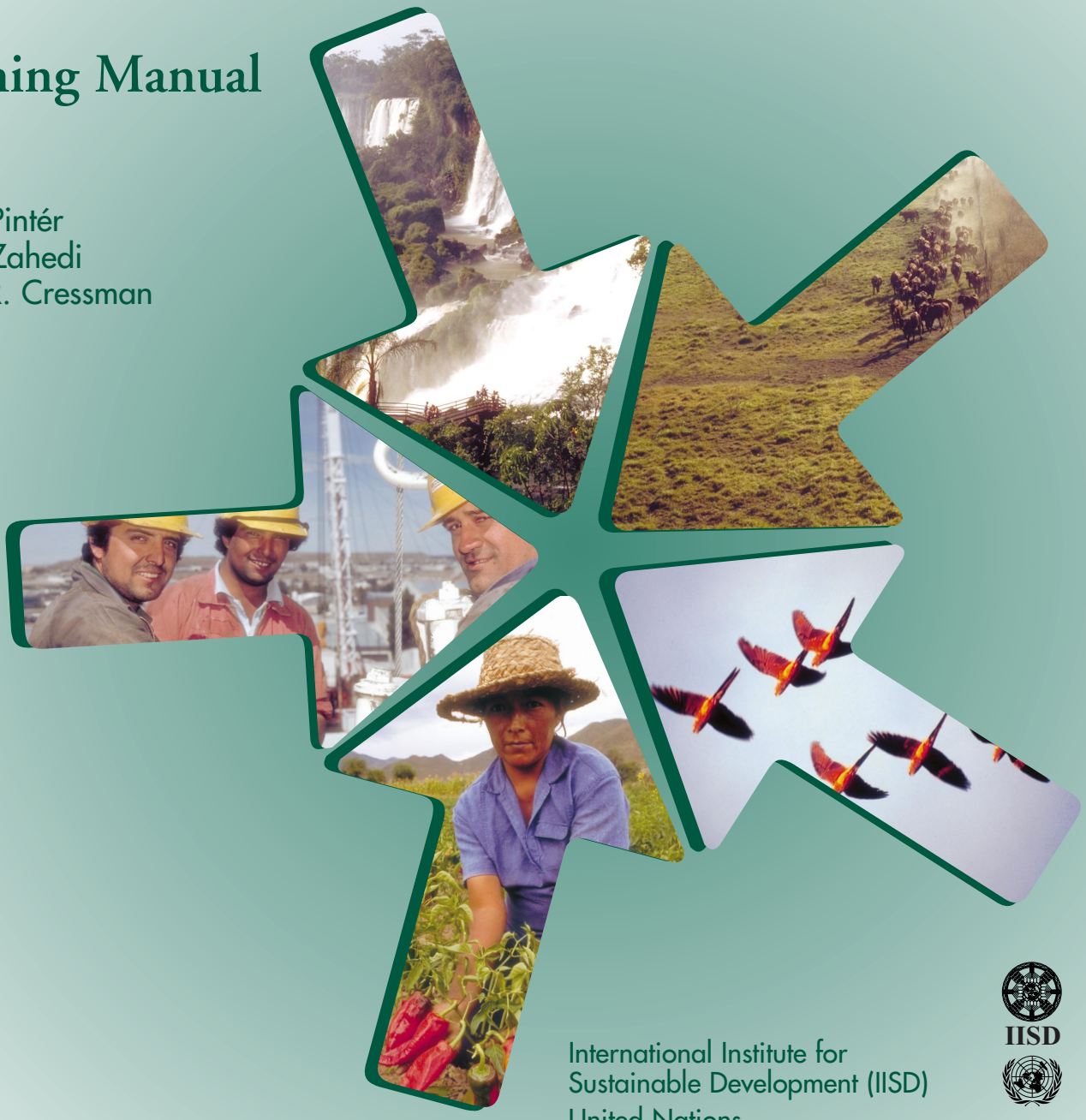
Capacity Building for Integrated Environmental Assessment and Reporting

Training Manual

László Pintér
Kaveh Zahedi
David R. Cressman



International Institute for Sustainable Development (IISD)
United Nations Environment Programme (UNEP)
Ecologistics International, Ltd.

IISD
UNEP

Second Edition

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About the participating agencies

IISD

The International Institute for Sustainable Development (IISD) is an independent, not-for-profit corporation headquartered in Winnipeg, Canada, established and supported by the governments of Canada and Manitoba. IISD's mission is to champion innovation, enabling societies to live sustainably.

UNEP

The United Nations Environment Programme (UNEP), established in 1972, is the principal United Nations body in the environmental field. UNEP's mission is to provide leadership and encourage partnership in caring for the environment by inspiring, informing, and enabling nations and peoples to improve their quality of life without compromising that of future generations. UNEP's headquarters is in Nairobi, Kenya.

Ecologistics International Ltd.

Ecologistics International Limited is a private company, headquartered in Waterloo, Ontario, Canada that offers consulting services in environmental planning, impact assessment and resource management. Its mission is to help organizations and communities achieve development objectives in ways that are sustainable from environmental, economic and social perspectives.

Preface

Providing accurate assessments of both the state of the environment and the consequences of policies on the environment is critical for effective sustainable development decision-making. In response to this need UNEP initiated the Global Environment Outlook (GEO) report series in 1995. The aim of the GEO series is to produce regular environmental reports that reach beyond traditional state of the environment reporting and incorporate assessments of policies and emerging issues as an integral part of the sustainable development decision-making cycle.

This training manual and the accompanying training program have been prepared to meet the needs of partners for improved guidance and training during the production of GEO and other associated integrated assessment reports. Although the skills and methods outlined here closely reflect those developed for GEO, they were designed to be applicable to all integrated environmental assessment reports at the national and regional levels, as well as in other contexts. As such, the manual reflects the experience gained by UNEP, IISD and other partners while producing integrated assessments over the past decade.

The aim of integrated environmental assessments, such as GEO, is to meet the need for better and more relevant information for policy-makers. This is a dynamic process requiring flexibility and an inter-disciplinary approach. Through each workshop and with every report completed using the method contained in this manual, we hope to learn more about the integrated assessment process and improve the method for carrying out integrated environmental assessment, allowing us to produce better tools for sound decision-making.

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The views, insights and critical comments of participants at the first four regional training sessions (Bahrain, December 1998; Ghana, June 1999; Trinidad and Tobago, October 1999; and Gabon, February 2000) were invaluable and were to the best of our ability taken into consideration in this final version of the manual.

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This project has been made possible by financial contributions from the governments of the Netherlands, (Ministry of Foreign Affairs) and Canada, and from UNEP. IISD has provided additional in-kind contribution.

Manual content and design

This training program and manual prepare you to undertake integrated environmental assessment and reporting nationally or subnationally. *Integrated environmental assessment is a process of producing and communicating policy-relevant information on key interactions between the natural environment and human society*. The manual is designed for an intensive, four-day program, facilitated by qualified instructors. It includes all the information you will need to participate successfully, and can be used as a reference volume in your future work.

We assume that most readers and course participants are high-level technical experts in national or state/provincial government agencies who are usually responsible for coordinating the environment or development reporting process, or both. They are also the ones who directly communicate with top policy-makers. Participants usually have an academic degree in either the natural or social sciences, and may already have experience in state of the environment (SOE) reporting and environmental assessment (EA).

Course structure and conduct

During this training program we will prepare you and your organization to answer the following questions about your country, province or local community:

1. What is happening to our environment and why?
2. What are we currently doing about it?
3. What can we do about it in the future?

You may realize that answering these questions requires a step-by-step approach, in both the structure of the reports and the organization of the reporting process. The training program will follow this modular pattern.

Session 1 will introduce the overall framework and logic behind integrated environmental reporting. Session 2 will deal with the method of preparing the SOE section (to answer the first question). Session 3 will provide guidance in carrying out policy assessment related to the state of the environment (to answer the second question), and session 4 will help in assessing future directions, using scenarios and other tools (to answer the third question).

The process we prepare you for is like conducting an inquiry: you can plan its specific approach in specific steps, review experience from similar cases, but you will know few of the answers beforehand. In fact, you might find that different people have different answers to the same question. To integrate different, but equally important perspectives into reporting, the stakeholders must participate in the process. Starting and managing a participatory integrated environmental reporting process is a complex task that requires familiarity with a range of theoretical issues, practical experience, practice and the ability to learn. To prepare you for its challenges, the course will include a variety of the following learning and training methods:

- Brief introductory lectures;
- Participatory exercises;
- Case studies;
- Individual study;
- Demonstration of technical tools; and
- Open roundtable sessions.

We believe in learning by doing. These activities, therefore, are scheduled in a way to keep the program interesting and to help reinforce the points in the lecture through case studies and participatory exercises. The blank forms in the manual are for your use. They will help to document your ideas, opinions and development during the course. We hope that they will make the workbook even more useful for you after the course is completed.

In session 2 we will introduce you to Myland, an imaginary country that has initiated an integrated environmental assessment and reporting process. We will return to Myland later in the program to help construct strategies, design processes, understand stakeholder perspectives and so on. In a sense, Myland will be what we—instructors and participants—collectively make of it. The Myland example may be replaced by examples of real countries from your region, if preferred by instructors and a majority of participants.

The manual has been prepared for a global audience and it is used in many different regions of the world. Therefore, it does not automatically come with information custom-designed for any one region. Instructors will make an effort, however, to customize exercises and quote relevant case studies from your region throughout the program.

Your active participation in the learning and training process is essential. You will learn not only from the trainers, but also from other participants. In fact, you will probably find that most of your learning occurs by interacting with other trainees.

The instructors will work to enrich this experience, but you will also need to help. You are invited to draw upon your experience when relevant, express your doubts, offer insights, speculate on alternative opinion, and even be funny (within the constraints of staying constructive). In doing so please respect others and follow the guidance of the instructors.

The times allowed for individual sections are approximate. Capacities, needs and experience related to integrated environmental reporting are different for each region. Your instructors will exercise their best judgment to make small adjustments in the program as appropriate.

Layout of sections

This workbook is the only tool you will need to participate in the training session. The following icons, printed on the sidebar, will help you navigate through the various sections:

Lecture: brief lecture to introduce key issues and concepts.

Essay: background documents or excerpts from the professional literature; you will be advised if reading them beforehand is required.

Small group exercise: there will be small group activities each day; their purpose and mechanics will be explained by the instructor, but they are also described in the workbook.

Individual work: the section where you are required to work—usually write—individually. Please use the blank forms in the manual.

Study questions: questions to help you focus on the key lessons in a session.

Case study: case studies both from an imaginary country—Myland—and from real life.

Evaluation: the forms for session or course evaluation.

Overheads: used by the instructor to illustrate and sum up key points of discussion; all information shown on overheads is covered in more detail in this training manual.

Course evaluation

At the end of each session and at the end of the entire program you will be required to fill out and hand in the evaluation forms in the workbook, but you will not have to give your name. The evaluations will help to further improve the training program. As well as filling out these forms, you are encouraged to share your opinions with the instructors and to send additional written evaluations after the training session has ended.

Session 1: Background

Session 1 at a glance

1 hr	Opening ceremony
1 hr	Introduction and session objectives (1.1)
1 hr 30 min	What is integrated environmental assessment and reporting? (1.2)
1 hr 30 min	LUNCH
1 hr	The assessment and reporting process (1.3)
30 min	Communications strategies for assessment and reporting (1.4)
1 hr	Planning the assessment and reporting process (1.5)
15 min	Roundtable discussion and wrap-up (1.6)
	Bibliography (1.7)
15 min	Session 1 evaluation (1.8)

1:1

1.1 Introduction and session objectives (1 hr)

In this course you will:

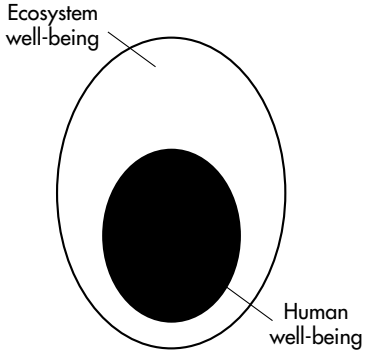
- Learn what is meant by integrated environmental assessment and reporting and why they are useful;
- Become familiar with their components and structure in theory and practice;
- Learn about the challenges of running the process while involving the public;
- Encounter and practice the organization and management of an assessment and reporting process;
- Be introduced to useful tools to carry out this task; and
- Exchange your views with colleagues through exercises and informal discussion.

The world at the start of the third millennium is fundamentally different from anything humanity has ever experienced. Environmental change has intensified, international security is ever more complex, globalization is occurring at an ever quicker pace, and the gap between rich and poor continues to widen, just to mention a few of the current trends.

Institutions have been under pressure both in developing and developed countries and in what are called 'transition economies' to respond to changes and environmental pressures. However, in an ever-more interconnected world the traditional pattern of decision-making—narrowly focused responses to what are perceived as isolated problems—has itself become part of the problem.

Responding to interconnected, high-risk issues requires realistic assessment and reporting practices that try to communicate problems and solutions to decision-makers and the public. For the environment this started by requiring government agencies to prepare state of the environment (SOE) reports. Sustainable development, however, increased the need for broader-based assessment and reporting that take into account the dynamic links among ecological, socio-economic and policy issues more systematically. Integrated SOE reporting can help policy-makers make better informed decisions that maximize social and economic gains while minimizing environmental impacts. This brings a number of benefits. History tells us that environmentally wasteful decisions are usually economically wasteful. They often also result in ongoing social conflict and bring large clean-up costs.

Sustainable development evolved as a broad policy priority over the last few decades (IISD, 1998). According to its classical definition, sustainable development is development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs (WCED, 1987). The concept is based on the recognition that the well-being of human society is closely related to the well-being of natural ecosystems (Chimbuya et al., 1997). The condition for overall sustainability is the well-being of both human and natural systems, as shown conceptually in Figure 1, the egg of sustainability.



Ecosystem well-being	Human well-being	Outcome
▼	▼	Unsustainable
▼	▲	Unsustainable
▲	▼	Unsustainable
▲	▲	Sustainable

▲ – increase ▼ – decrease

(Source: Chimbuya et al., 1997)

Figure 1: The egg of sustainability.

Sustainable development brought new requirements for assessment and reporting, including:

- Recognizing the links between environmental conditions and human activities;
- Highlighting the need for long-term perspectives;
- Explicitly recognizing uncertainties and emphasizing adaptive management;
- Considering equity both within and between generations; and
- Engaging the participation of all sectors of society in the decision-making process.

1:4

Sustainable development also increased the emphasis on accountability, reporting and performance measurement beyond mere economic performance. The theory and practice of assessment and reporting are far from perfect in meeting these objectives. But the direction of needed change is at least known and there have been many pioneering initiatives over the last years in many countries and at many scales.

?

Study/discussion questions

Q: Why is there a need for more integrated decision-making that takes into account the environment, economy and human society and the links among them?

A: _____

_____

_____

_____

Q: What are some good examples of the interconnectedness of ecosystem and human well-being?

A: _____

_____

_____

_____

Q: What is the role of assessment and reporting in sustainable development?

A: _____

_____

_____

_____

1.2 What is integrated environmental assessment and reporting?

(1 hr 30 min)

Traditional SOE reports have been useful to point out environmental trends and conditions. SOE analysis, however, needs to be integrated with the assessment of key driving forces and policies that cause or influence the environmental trends that have been identified. *Thus, although SOE analysis substantiates claims about environmental conditions, policy assessment points out the key leverage points to decision-makers.*

A key message is that integrated environmental reporting needs to incorporate policy assessment for the whole system. The reason for this is that the intentional or unintentional consequences of policies are often dispersed over space, sectors of the economy or environmental media. They are also often delayed in time. While the consequences of policies can be incremental and cumulative, they may also represent root causes of environmental problems.

Integrated environmental reporting answers four consecutive questions as shown in Figure 2.

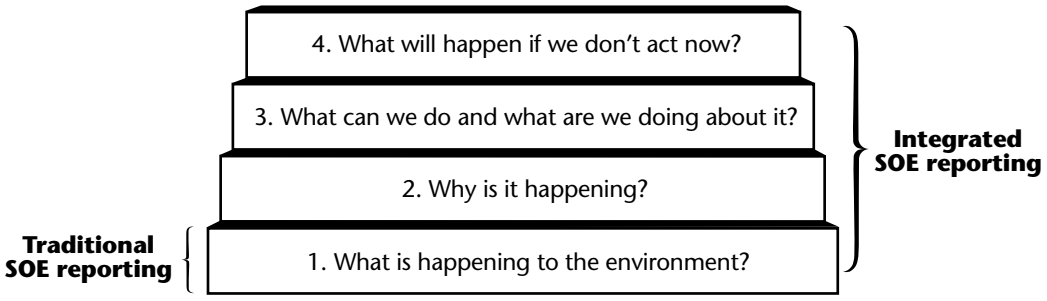


Figure 2: Steps in the integrated environmental reporting process.

We defined integrated environmental assessment as a process of producing and communicating policy-relevant information on key interactions between the natural environment and society. Having a clear idea of who the target audience is and having a well-planned and executed communications plan are key to the success of the SOE effort.

The interactions between society and the environment can be categorized as pressures people put on the environment; the resulting state or condition of the environment; and the response of society to environmental conditions.

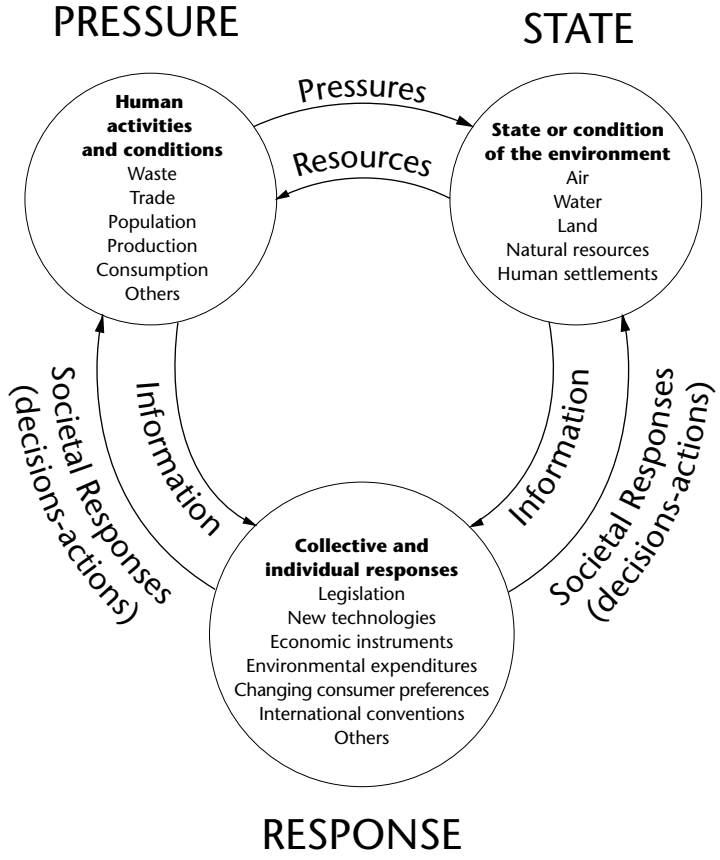
These three categories are the basic components of the pressure-state-response (PSR) framework underlying integrated environmental assessment. One possible diagram for the PSR framework is shown in Figure 3. Based on the logic of the PSR framework some more detailed alternatives have been developed, such as the pressure-state-impact-response (PSIR) framework.

Some terms can be put in more than one of these categories, depending on the relationship analyzed. The framework, therefore, should be used for analysis, rather than for rigid categorization.

- ***Pressures*** are often classified into underlying forces such as population growth, consumption or poverty. The pressures on the environment are often considered from a policy perspective as the starting point for tackling environmental issues. Information on pressures tends to be the most readily available since they are derived from socio-economic databases.

1:5

- ***The state*** refers to the condition of the environment resulting from the pressures outlined above; for example, the level of air pollution, land degradation or deforestation. The state of the environment will, in turn, affect human health and well-being as well as the socio-economic fabric of society. For example, increased land degradation will lead to one or a combination of the following: decreased food production, increased food imports, increased fertilizer use and malnutrition. Knowing both the state of the environment and its indirect effects is critical for decision-makers and the public.
- ***The response*** component of the pressure-state-response model corresponds to societal action taken collectively or individually to ease or prevent negative environmental impacts, correct environmental damage, or conserve natural resources. Responses may include regulatory action, environmental or research expenditures, public opinion and consumer preferences, changes in management strategies, and providing environmental information. Satisfactory indicators or measurements of societal response tend to be the most difficult to develop and interpret.

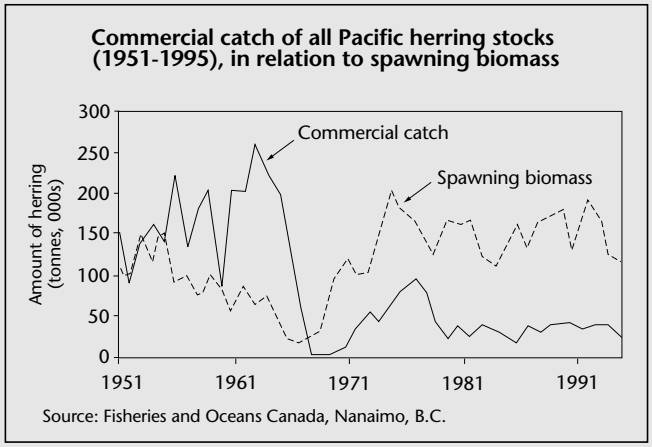


(Modified from Australia Department of the Environment, Sport and Territories, 1994 reported in Rump, 1996)

Figure 3: One example of a pressure-state-response framework.

The following example further illustrates pressure-state-response links.

Many major fisheries around the world have experienced crashes over the last decades, with devastating consequences not only on ecosystems but also on entire regional economies and the livelihoods of many people. One such collapse is the Pacific herring fishery off the west coast of North America.



(Source: Auditor General of Canada, 1997)

Figure 4: What is happening to the environment?

Turning around the collapse of a fish population requires more than replenishing fish stocks. Long-term, sustainable solutions need to address the root causes of the decline. Some causes can be environmental, but often they are social or economic.

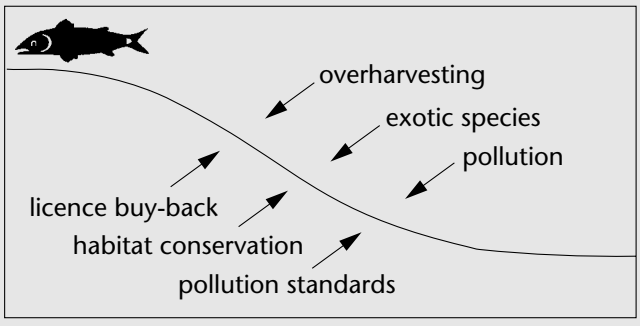


Figure 5: Why are fish stocks collapsing and what are we doing about it?

Integrated environmental reporting requires not only a framework, but also a method to help keep the analytic process together. The method most appropriate for this purpose is integrated assessment (IA).

IA is an interdisciplinary and participatory process that combines, interprets and communicates knowledge from different scientific disciplines to allow a better understanding of complex phenomena (Rotmans, van Asselt and de Vries, 1997).

In more detail, the steps of an IA are as follows:

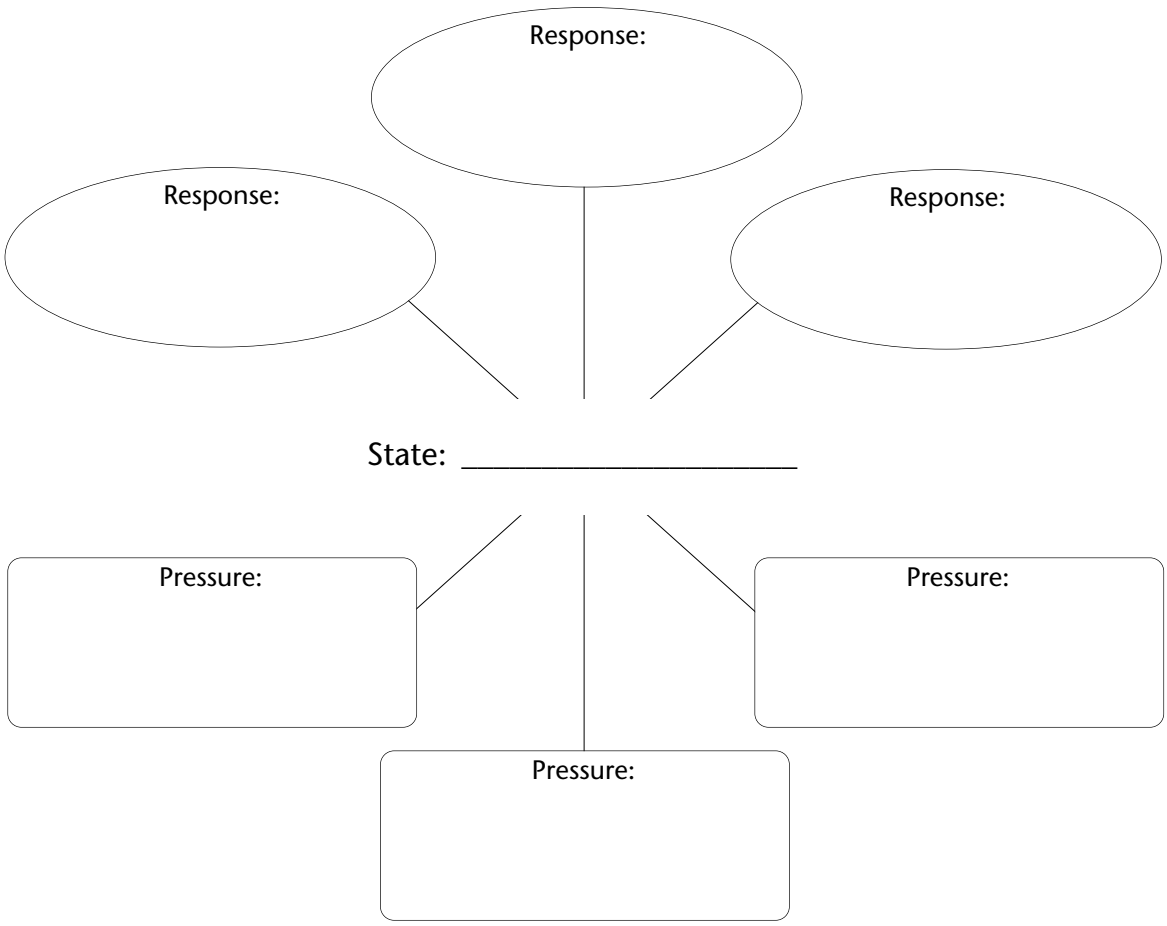
- ***Combining and linking*** pieces of knowledge from a variety of disciplines, such as ecology, economics, geography, sociology, and so on.
- ***Interpreting*** viewpoints of various stakeholders, possibly including governments, non-governmental organizations, corporations and universities.
- ***Communicating*** knowledge to a broad audience.

1:9

Exercise

Please form a group with your neighbours and provide examples for pressures and responses for an environmental state or condition of relevance in your region.

1:10



Study/discussion questions

?

Q: The results of groundwater pollution are often irreversible. How can the PSR framework help identify possibilities or the need for preventive action?

A: _____

_____

_____

_____

Q: Can you think of other examples for a PSR chain in your country?

A: _____

_____

_____

_____

Q: The causes and impacts of environmental problems often reach beyond international borders. What are the practical implications of this for the integrated assessment method presented?

A: _____

_____

_____

_____

LUNCH (1 hr 30 min)

1.3 The assessment and reporting process (1 hr)

In this section we focus on assessment and reporting as a process and the organizational issues necessary to provide leadership; specifically,

- Why is the process important?
- Who will manage the process?
- Who will take part?
- In what institutional setting?
- With what legislative mandate?

Why is the process important?

Even if an organization participated in environmental reporting in the past, it is clear that the objectives of *integrated* environmental reporting as defined here are broader and more ambitious. Integrated environmental reporting therefore requires learning, both for individuals and organizations. The key opportunities for learning emerge in the process of producing new information by interacting with others. Interaction is also critical since individuals representing different disciplines, organizations, or, more broadly, different social interests may also have different though equally legitimate views on the environment and economy.

- ***Answering key questions in sequence***

  The four questions associated with the key steps in reporting (recall Figure 2) should be answered in sequence. We need to first know what is happening to the environment to answer why it is happening. And we need to have a clear idea about the driving forces and root causes to talk about what we can do better or the potential consequences of inaction.

- ***Dealing with knowledge fragmentation by facilitating cooperation***

  Integrated environmental assessment requires bringing together information and insight that usually lay scattered across a variety of disciplines and organizations. Thus it also requires bringing together organizations and people that may not have a history of collaboration. The potential for tension along professional, bureaucratic, religious or political lines is considerable. Trust, confidence and cooperation both between organizations and key individuals are key for success, but they can only occur over time and need facilitating.

- ***Ensuring buy-in***

  The purpose of integrated environmental reporting is to improve the understanding of societal and environmental interactions and to help catalyze change. The best way to ensure that the insights and recommendations arising from the reporting are seriously considered in decision-making is to involve those who need to make those decisions and are affected by their outcomes.

- ***Making uncertainties and assumptions clearly known***

  Participation and cooperation of diverse interest groups throughout the reporting process are essential. Nevertheless, this also comes with significant challenges.

Who will manage the process? Who will take part?

These are critical questions that need to be answered early in the initiative. The organizational structure to be set up will work throughout the entire project, not only in the first step that deals with environmental conditions. It is important that all involved understand the need for long-term commitment.

Integrated assessment and reporting is a tool to aid communication between science and policy. This role is particularly important because institutionalized assessment and reporting can provide a forum for continuing dialogue between these two fields and stakeholders, as well as society in general. To bring science and policy together, a participatory process is necessary. Participation needs to be representative, but the number of participants in assessment and reporting needs to be limited to keep the process manageable.

The figure below shows an example of organizational structure for a real-life assessment and reporting initiative in the province of Manitoba, Canada (Manitoba Environment, 1997). There are no set rules, so many variations are possible.

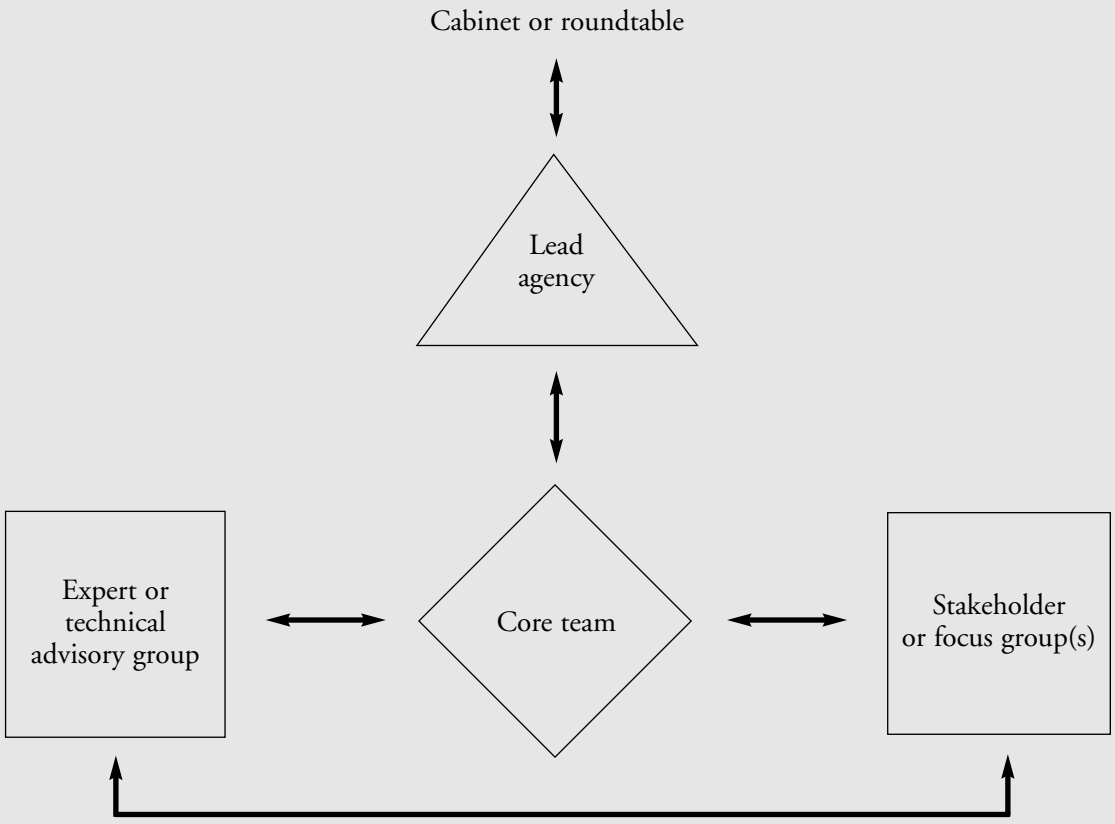


Figure 6: General organizational chart to manage the reporting process.

The make up and responsibilities of these groups may be described as follows:

Core team: five to six members from key departments and non-governmental, academic institutions or business associations.

Cabinet or roundtable: high-level government body to which the core team reports; in some countries they can be interdepartmental or multistakeholder roundtables.

Lead agency: usually environmental or planning departments.

Expert or technical advisory group: participants from various government departments and other organizations who have specialized knowledge and direct access to primary data.

Stakeholder or focus group: representatives of a variety of social organizations (see below). Focus groups have been used for qualitative participatory research, but only recently have they been introduced as a tool in integrated assessment. Their purpose is to inform decision-makers about social preferences, opinion and concerns and to provide decision support for complex policy issues (Dürrenberger et al., 1997).

Exercise

The range of potential stakeholders to be involved can include:

- Governments
- Businesses
- NGOs
- Media
- Religious organizations
- Universities
- Trade unions
- Youth groups
- Indigenous peoples' groups
- Political party representatives
- Unaffiliated citizens
- The poor or disenfranchised

As a group, discuss the relevance of involving these and other stakeholders in your country.

Institutional setting

Reporting and assessment are not the exclusive domain of national governments. Over the last few years many municipalities, grassroots or non-governmental organizations and corporations have been publishing integrated environmental assessments (IISD, 1999). *Although we are dealing primarily with government reporting here, these efforts should not be thought of as competing but rather as synergistic, bringing different, often equally relevant perspectives to the public's attention*.

It is important that the institutional arrangements for reporting are consistent with the broader institutional setting of the country or region. Some countries have a tradition of scientific investigation, systematic data gathering and planning. Here, environmental information may be adequately developed and organized. In other countries, responsibility for environmental information may be scattered and reporting is uncoordinated.

Countries have successfully tried various institutional models to deliver reporting programs.

Basically, national governments can:

- Use an existing government department; or
- Establish an independent agency to the government responsible for reporting and environmental information (see Table 1).

Table 1: Common institutional models for state of the environment reporting.
(Adapted from Environment Canada, 1992)

Type of Agency	Possible Advantages	Possible Disadvantages
Existing government department	• Limits proliferation of special agencies • Existing regional networks • Greater collaboration within government • Access to data and information	• Not recognized as independent • Limited public and other stakeholder involvement • Tends to protect the *status quo*
Independent or semi-independent agency	• Autonomous • High profile and visibility • Potential for innovation and greater efficiencies • Links to non-governmental stakeholders and scientists	• Requires formal powers of access to data • Lack of regional networks • Potentially insecure funding • No authority associated with reporting

Legal mandate

Assessment and reporting are complex tasks, and they will not produce the expected results unless the capacity to perform them adequately is permanently maintained. This requires that the mandates and capacities to carry out this task are considered as part of the core infrastructure of social organizations, a responsibility often of government. Usually, this requires that the mandate is clearly expressed by laws and regulations.

Legislation could also cover the extent of collaboration between government agencies that can contribute to the reporting initiative. Sometimes, it may be fitting for the legislation to establish a special partnership among the national statistical authority, national environmental monitoring programs, and the reporting agency. Similarly, it would be appropriate for the legislation to discuss environmental reporting among various levels of government. A national reporting agency, for example, could play a catalytic and supporting role in developing reporting at subnational and local levels. In addition, the legislation could be used to encourage data sharing and harmonization of reporting initiatives. Finally, the legislation can set the stage for external consultation and participation, including the use of advisory bodies.

The balance between national and regional reporting must be decided by national governments, but there are many precedents where environmental reporting is completed at both national and regional levels. The first option provides the opportunity for national governments to contribute to reporting on environmental issues in a broad regional or continental context. This is particularly appropriate for shared issues or common ecosystems.

Study/discussion questions

Q: What is or should be the institutional setting for environmental reporting in your country?

A: _____

_____

_____

_____

Q: Is the existing setting appropriate and effective?

A: _____

_____

_____

_____

Q: Is environmental reporting required by legislation in your country?

A: _____

_____

_____

_____

Q: If it isn't, how could the process for legislation be initiated?

A: _____

_____

_____

_____

1.4 Communications strategies for assessment and reporting (30 min)

Why should the scientist or administrator worry about communications? Without adequate communications your work has little or no impact, and it may become yet another important report that gets filed for future reading.

Big SOE reports loaded with technical jargon can be intimidating to the non-scientist. Major messages about critical trends and policy options are often scattered through the text.

Such reports need communications strategies and plans that make the highlights readily available and understandable to key audiences, a diverse group with different needs and levels of understanding of environmental issues. The people who create environment reports do not have to be communications experts, but they should be able to make strategic communications decisions and guide the communications experts who prepare and deliver messages.

Successful communications is not an add-on. It must be built into the way an organization plans and conducts its work. Communications must be a part of strategic planning if an organization is to successfully articulate its vision and communicate its messages.

Communications is a process with its own rules and procedures. Don't blame the audience if your message is not understood. To be effective you must set goals, know your audiences, prepare your material, and spend the time needed to deliver effectively.

Constructing a flexible communications strategy involves a series of tasks. Note the differences between the traditional and flexible model (Table 2). For our purposes, the flexible model is probably more useful.

Table 2: Communications planning in a traditional and flexible model

Traditional Model	Creating A Flexible Strategy
• Management and experts decide there is an issue. • Determine position and performance. • Select the audiences. • Decide what people should know. • Select key concepts, messages and decide on form and content. • Prepare the messages. • Produce materials that reflect their opinion. • Publish, disseminate, train and lobby. • Determine success without formal evaluation.	• Management and experts decide there is an issue. • Build a communications plan. • Create an advisory group: multistakeholder, collaborative, solution seeking. • Set long-term goals. Refine goals. • Identify stakeholders and audiences. • Determine their knowledge, beliefs, opinions, where they get information and who they trust. • Research what communications is being done by various parties now. • Develop first message, based on research. Build on existing credible messages. • Pre-test message. Does it make sense? Train communicators in workshops. • Deliver messages. Help others to deliver compatible messages. • Consult, survey and determine effectiveness of messages. (This testing process establishes a feedback loop.) • Refine message, based on feedback. Modify messages. Develop other messages as necessary. Retrain communicators as necessary. • Advise others on their messages. • Continue to deliver and modify messages over time.

Make your messages understandable to your audiences

First, understand your audiences. These can range from fellow experts to policy-makers, political and business leaders, teachers, journalists and the average citizen. Aside from environmental specialists, most people are unfamiliar with scientific terms.

Limit the use of jargon. If you think people might not understand a technical term, define it in a few words. Choose the appropriate language and method of delivery for each audience.

Make information relevant to your audiences

Communications is a two-way street. It is vital to listen to your audiences, and understand what is interesting and relevant to them, before you tell them what you think they should know. First, find out what they understand, misunderstand or do not know about. Use this information to shape your communications messages.

People's major concerns include health, income and quality of life.

- How do environmental issues and trends affect these key issues?
- Talk about risks to health and economic well-being.
- Talk about benefits of conserving resources, and using them within natural rates of regeneration.

Shape the delivery system for the audience

Choose a delivery system suited for each audience. Don't give long, technical reports to people who cannot understand them. Avoid boring people with overly long messages. Keep initial messages short. Offer more detailed information to those who want it. Cabinet ministers like a one-page synopsis. The media like a one-page press release with a few pages of details, including illustrations. TV needs moving images. Only specialized audiences have the time and interest to read the full report.

- Develop your own delivery system, using proven communications tools.
- Build a collegial working relationship with other message carriers, including other governments, business, non-governmental organizations and educators.
- Make use of news media to help distribute your message.

Consider a full range of communications options

A wide range of techniques gets your message to a wide audience.

Classic methods, largely oriented to print

- State of the environment reports
- Synopsis report with highlights
- Periodic reports on critical issues
- Bulletins on new developments
- Articles, written by in-house experts or by professional writers
- Newsletters

Radio and television

- Pre-recorded messages
- Interviews

Internet-based reporting

- Print reports put on-line in various formats
- Interactive reports designed for the Web, with extensive internal and external links
- Passive reporting systems available on demand
- Active systems based on electronic bulletins by e-mail

These can draw from print report information, or can be created independently. UNEP-GRID's *Cookbook for State of the Environment Reporting on the Internet* provides help and suggestions for creating and maintaining SOE Web sites (UNEP/GRID, 1998).

Alternative communications tools

- Posters
- Picture books
- Songs
- Dialogues
- Street theatre

1.5 Planning the assessment and reporting process (1 hr)

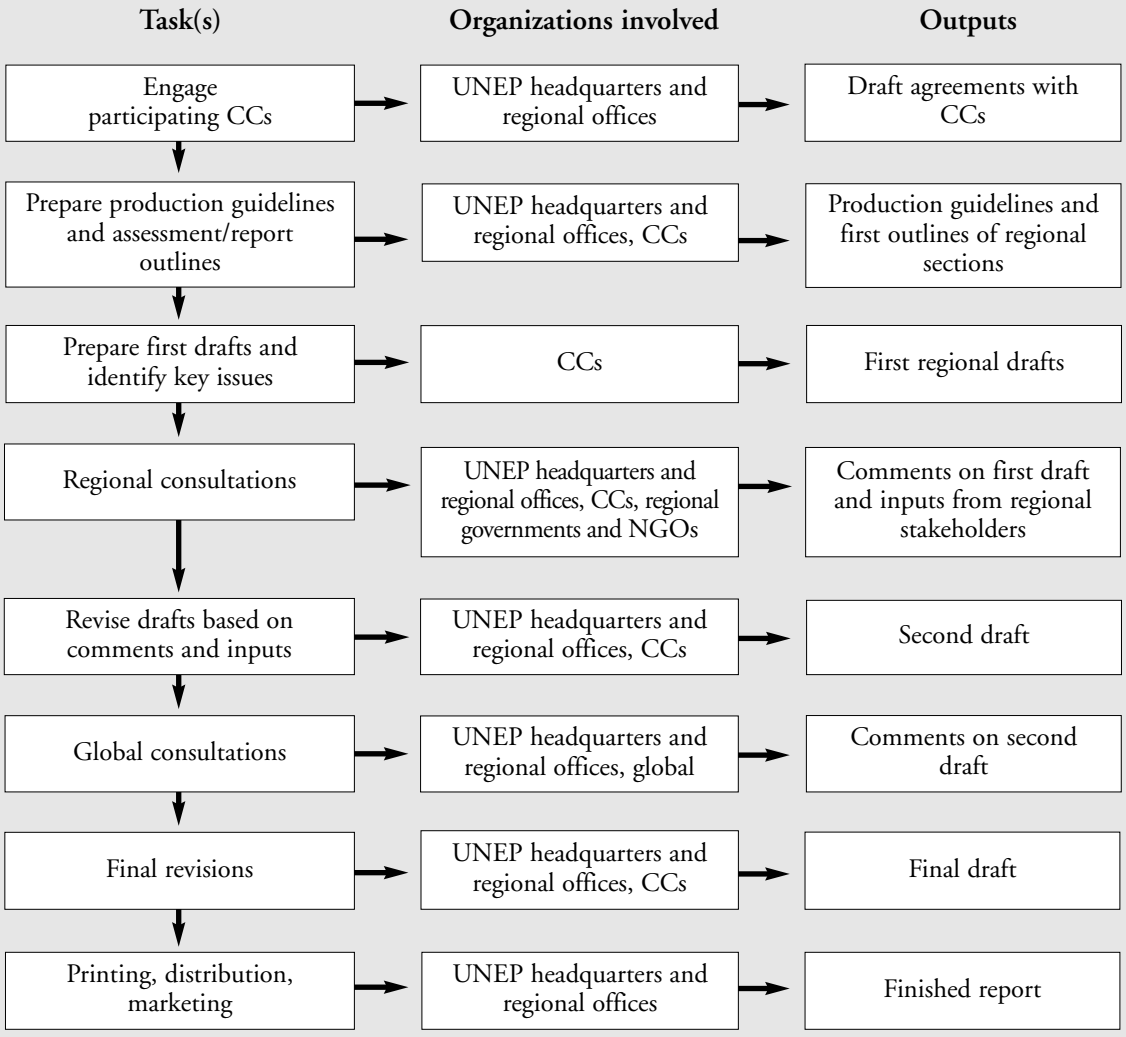
In this section the purpose is to learn about designing the assessment and reporting process, giving consideration to the following previously discussed procedural and institutional issues:

1:19

- Learn about the process used in GEO and South Africa as real-life examples;
- Analyze the process currently used in individual countries; and
- Develop a general process template.

Reporting process in GEO: A real-life example

To understand the reasons for the structure of the GEO process one needs to recall that a key purpose of integrated assessment and reporting is to influence decision-making. For an integrated assessment, environmental issues are analyzed in a broad context, widening the range of stakeholders that are potentially affected. Their participation in the assessment process results not only in increased awareness, but also ensures the perspectives provided in the GEO report are balanced.



1:20

Figure 7: Steps, responsibilities and results in the regional components of the GEO process.

The GEO process aims to become an umbrella for global and regional environmental assessments, providing a framework and a mechanism for wide participation and cooperation that will also help build the capacity in developing countries for conducting integrated, policy-relevant assessments. As such, it should become a way to combine and link sectoral and regional assessments, as well as a mechanism for aggregating and disseminating their results.

The message in any analysis is only as useful as the number of people who listen to it, understand its meaning and are empowered to act upon its findings. The message of GEO is communicated, in fact formulated, throughout the report preparation process through UNEP and the collaborating centres. Once the report is completed, both paper and electronic copies are made available to the public.

The audience of GEO is global and the report is written to be understandable to readers without a technical background. Since a picture is worth a thousand words, diagrams, carefully designed charts and illustrations complement the text.

SOE reporting in South Africa: How was the report developed?

The first attempt to produce a national SOE report for South Africa was in 1992, when a report was submitted to the United Nations Environment Programme at UNCED in Rio de Janeiro, describing the South African environment and resource base. (Although South Africa could not participate fully in UNCED, it had observer status.) A prototype electronic NSOE report was then compiled by the Department of Environmental Affairs & Tourism (DEA&T) in 1995, but was not published. This report is the first national SOE report on the Internet for South Africa. The Internet was chosen as the preferred medium (although an overview is also available in printed format), since it is widely and freely accessible to a broad spectrum of users, it can be easily updated, modified, and added to, and it gives greater flexibility in accessing the information. In this way, the report is useful to decision-makers, environmental managers, and interest groups from different backgrounds, and for different purposes. To make this report useful to as wide an audience as possible, it is also available in Afrikaans, iXhosa, isiZulu, and Tswana.

State of the environment reports for cities are being developed in parallel with the national report for the Cape Metropolitan area, Durban, Johannesburg Metropolitan area and Pretoria Metropolitan area. These will provide information on local environmental issues specific to each city, and outline what can be done to enhance sustainable development and use of natural resources at a local level. As part of the State of Environment Reporting Programme initiated by DEA&T, four provinces, namely North West, Gauteng, Mpumalanga, and KwaZulu-Natal, have recently completed preliminary SOE reports. These may also be available on the Internet in the near future.

This report has been produced by DEA&T in close collaboration with GRID-Arendal—the Global Resource Information Database in Arendal, Norway, and over 20 research institutions and specialist consultants in southern Africa. The project was funded by the Norwegian Research and Development Agency, NORAD and by DEA&T. Internet software and training were provided by GRID-Arendal and Ugland Publikit. The project was managed by the CSIR Division of Water, Environment & Forestry Technology.

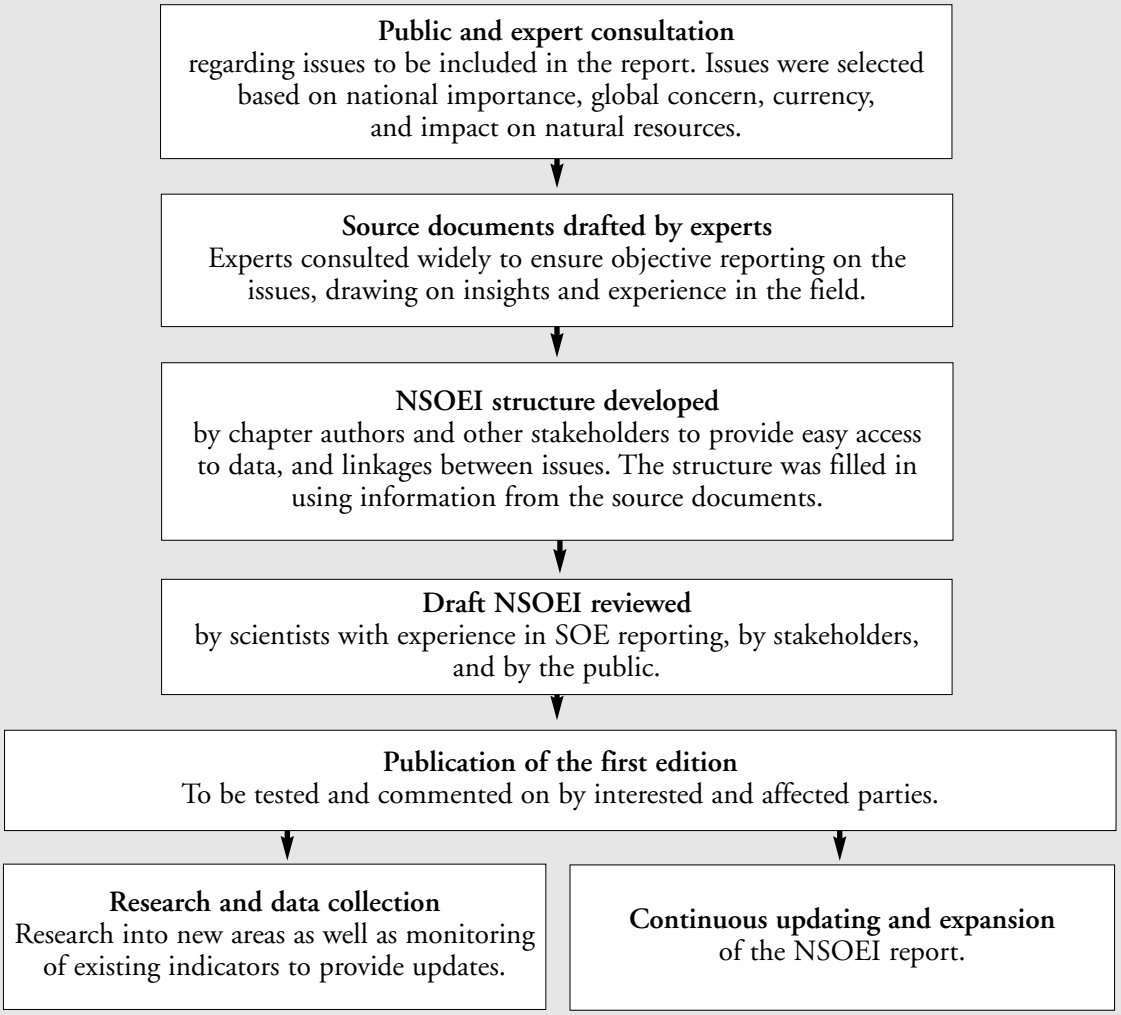
The report is the result of an extensive consultation process, with inputs invited from more than 200 stakeholders, and comments invited from the public. The issues were agreed upon as being the most important current environmental issues in South Africa at present, by a wide range of stakeholders and specialists in the natural, social, economic and political environments. Information on each of these issues was gathered and interpreted by specialists in the relevant fields. This information forms the seven sections on which this report is built. Summary information from these chapters has been organized into a framework designed to provide easy access to the issue and related

information. The seven sections remain as source documents providing more detailed descriptions of the issues. This framework was developed through a series of expert workshops and general review. Earlier drafts of the report were reviewed by a panel of stakeholders, and comments were invited from the public through the Internet.

Acknowledgements

This document is the first draft of the national SOE report on the Internet (NSOEI) for South Africa, and will be updated regularly to include new data, updates on trends in environmental quality, and new environmental management indicators and recommendations.

The following flow diagram shows the stages in the ongoing development of the national SOE report.



(Source: South African Department of Environmental Affairs and Tourism, 1999.)

Figure 8: The process of preparing South Africa's national SOE report.

1:21

Exercise

During the discussions in this session you have probably started to form an opinion about how far your own country has progressed in its national environmental reporting capacity and process.

Working in groups, discuss the institutional structure and process of current SOE reporting in a country of your choice in your region. What would an ideal institutional structure and process look like? Prepare a diagram of both in the space below and on an overhead transparency. Be prepared to share it with all participants.

Also be prepared to talk very briefly about the following issues in an ideal case:

- Legislative mandate;
- Human resources available for reporting initiative;
- Funding; and
- Scope of consultations with stakeholders.

Participating institutions and their relationships, similar to example in Figure 6:

Process diagram, similar to examples in Figures 8 and 9:

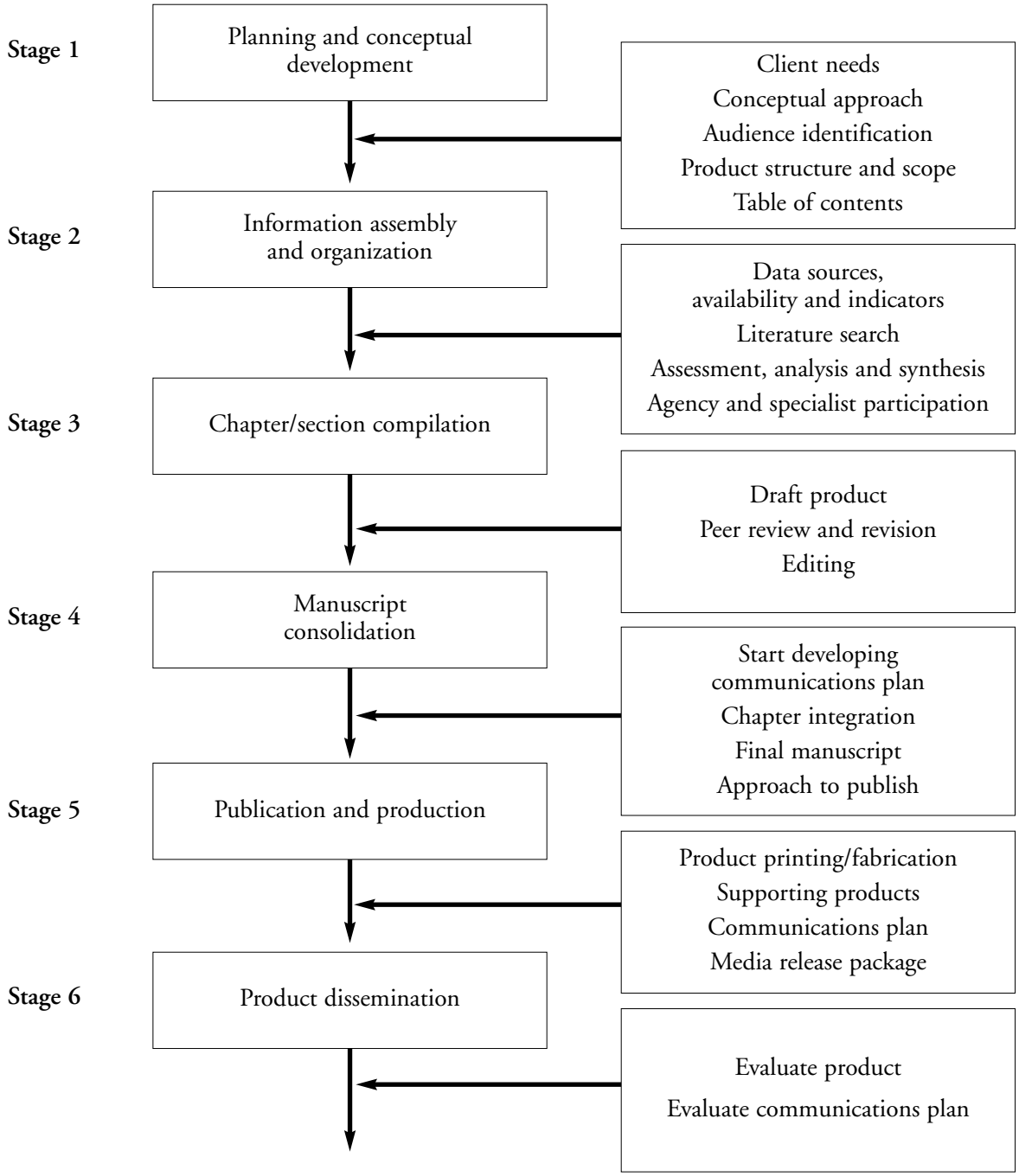


Figure 9: One possible flowchart of an ideal process (modified after Rump, 1996).

1:22

Study/discussion questions

Q: How realistic is the implementation of the ideal process created in our group session or the one on Figure 9 in your country?

A: _____

_____

_____

_____

Q: Why?

A: _____

_____

_____

_____

Q: What is the most important thing you can do to help establish a process similar to the one in the template you created for your home country?

A: _____

_____

_____

_____

1.6 Roundtable discussion and wrap-up (15 min)

The instructor will summarize this day's program and identify the topic for session 2, followed, if time permits, by a brief roundtable discussion.

1.7 Bibliography

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1.8 Session 1 evaluation (15 min)

You may provide comments either in English or in your mother tongue. Please make your comments as specific as possible.

What would you like the trainers to stop doing? _____

What would you like the trainers to start doing? _____

What would you like the trainers to continue doing? _____

Other comments: _____

Please detach and hand in the page after finishing. Thank you.

Session 2: Assessing the state of the environment

Session 2 at a glance

10 min	Introduction to the session and logistics (2.1)
1 hr	Regional experience in environmental reporting (2.2)
50 min	The Global Environment Outlook (GEO) (2.3)
20 min	BREAK
40 min	Strategies for SOE reporting (2.4)
1 hr 15 min	Preparing for data collection and indicator development (2.5)
1 hr 15 min	LUNCH
15 min	Welcome to Myland (2.6)
1 hr 15 min	Preparing for Myland's assessment and reporting process (Part I) (2.7)
1 hr	Preparing for Myland's assessment and reporting process (Part II)
15 min	Roundtable discussion and wrap-up (2.8)
	Bibliography (2.9)
15 min	Session 2 evaluation (2.10)

2.1 Introduction to the session and logistics (10 min)

Session objectives

At the end of session 2 you will:

- Understand the reasoning for reporting on environmental trends and conditions;
- Have learned the place of an SOE analysis in the integrated assessment and reporting framework;
- Have learned about some essential tools to perform an SOE analysis; and
- Have created a strategy to manage an SOE reporting process in Myland, an imaginary country.

Reporting on the state of the environment is the first part of the integrated assessment and reporting process. It is also the component that has been around the longest. Since the first SOE report was issued in the early 1970s the number of countries regularly publishing SOE reports has continued to grow (UNEP-GRID, 1999).

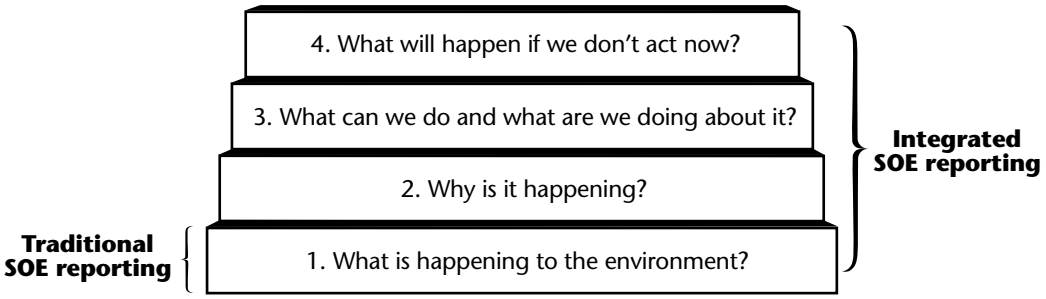

Figure 10: The place of SOE analysis in the integrated environmental reporting framework.

2.2 Regional experience in environmental reporting (1 hr)

The purpose of this session is to help assess how countries are currently carrying out SOE (state of the environment) reporting, to review which institutions are involved, and to compare current national SOE reporting with the integrated assessment reporting used in the Global Environment Outlook.

Before this session began, some or all of the participants were invited to review and fill out an SOE reporting questionnaire (included in the appendix of this manual). This exercise required thinking about the method and mechanics involved in SOE reporting. It also required considering the institutional structure of the organizations conducting the SOE report.

We will now listen to an overview of national SOE reporting experience presented by some of your fellow participants. The purpose of these brief presentations will be to help focus on the SOE reporting issues that are unique and critical in your region. They will provide information on the following aspects of real-life reporting:

- Report structure;
- Information sources and tools;
- Key environmental issues, policies and indicators;
- Process and participants of assessment and report preparation; and
- Assessment and report use and audience.

A question-and-answer period will follow. You will be invited to ask questions and compare the SOE summaries heard with your national experience.

2.3 The Global Environment Outlook (GEO) (50 min)

What is GEO?

In response to the need for comprehensive, integrated, policy-relevant assessments of the global environment, UNEP launched the Global Environment Outlook (GEO) project in 1995.

The GEO project has two main components:

- A global environmental assessment process, the GEO process, that is cross-sectoral and participatory. It incorporates regional views and perceptions, and builds consensus on priority issues and actions through dialogue between policy-makers and scientists at regional and global levels.
- GEO outputs, in printed and electronic formats, including the GEO report series. This series makes periodic reviews of the state of the world's environment, identifying major environmental concerns, trends and emerging issues together with their causes, and their social and economic impacts. It also provides guidance for decision-making processes such as the formulation of environmental policies, action planning and resource allocation. Other outputs include technical reports, a Web site and a publication for young people.

  The first issue of the GEO report series, *GEO-1*, was published in 1997. The second issue was published in 1999 as *GEO-2000*.

Although GEO does provide a template for integrated environmental reporting, the purpose here is to use it as an illustration. GEO is a learning process for all involved, and many of its methods need to be adapted to be used in national- or subnational-scale reporting. With these statements in mind, GEO can provide useful lessons for assessment and reporting on a smaller scale in the following areas:

- Assessment and reporting concepts and strategies;
- Stakeholders' involvement in assessment and reporting;
- Report structure;
- Organization of reporting process; and
- Communication of results.

Assessment and reporting concepts and strategies

GEO builds on the concept that assessment and reporting are not goals in themselves but a means to an end. The long-term goal of environmental assessment is globally concerted and effective action to achieve sustainable development. This goal requires a globally distributed and continuous assessment process to support informed decision-making and global agenda setting. To achieve this, integrated assessment and forecasting capabilities are required worldwide so that all regions of the world can contribute as equal partners in environmental negotiation and agenda-setting processes. One of the major goals of the GEO project is to build up and put into operation this globally distributed assessment process.

GEO is produced using a regional and participatory process. This participatory process ensures that the assessment involves stakeholders and experts from all over the world and from every discipline that relates to environment and development issues. GEO aims to incorporate regional views and perspectives and to build consensus on priority issues and actions through dialogue among policy-makers and scientists at the regional and global levels. The main components of the GEO process are:

- GEO collaborating centres;
- GEO associated centres;
- Regional policy consultations;
- International working groups; and
- UN participation and partnership through UN System-wide Earthwatch.

GEO collaborating centres or CCs are multidisciplinary centres of excellence from all the regions that form a coordinated network for making policy-relevant assessments. The GEO-2000 network consisted of some 26 such collaborating centres (Figure 11). GEO associated centres are institutions with global or thematic expertise relevant to integrated environmental assessment.

Policy consultations are held in each region to ensure the participation of all stakeholders, especially policy-makers, regional organizations and NGOs. The regional consultations not only represent a forum for governments to include their view in the GEO process, but also stimulate dialogue between scientists and policy-makers—a crucial step in ensuring that assessments are geared toward policy formulation and action planning.

International working groups are organized on models, scenarios, data and policies to provide technical support to the GEO process by developing and recommending methods for harmonized and integrated assessment.

The UN system-wide Earthwatch ensures that UN agencies participate in the GEO process.

Environmental issues in GEO are analyzed using a systems approach and the pressure-state-response (PSR) framework, described earlier. Based on the systems approach, environmental issues are analyzed, taking their geographic and ecosystem aspects, changes over time and links with socio-economic matters fully into account. Following the logic of this framework, the emphasis is on identifying priority environmental issues and their links to policies and human decision-making. GEO draws on the best available information on all aspects of sustainable development.

GEO is an integrated report not only in the sense that it looks at the links between socio-economic, environmental and policy issues. The report also tries to envision future policy options and priorities, based on current and past experience. Rather than trying to forecast the future, GEO uses a scenario approach by examining a range of potential outcomes in light of possible policy decisions we can take today. It also identifies possible emerging issues. These activities and their methods are reviewed in detail in session 4.

2:6

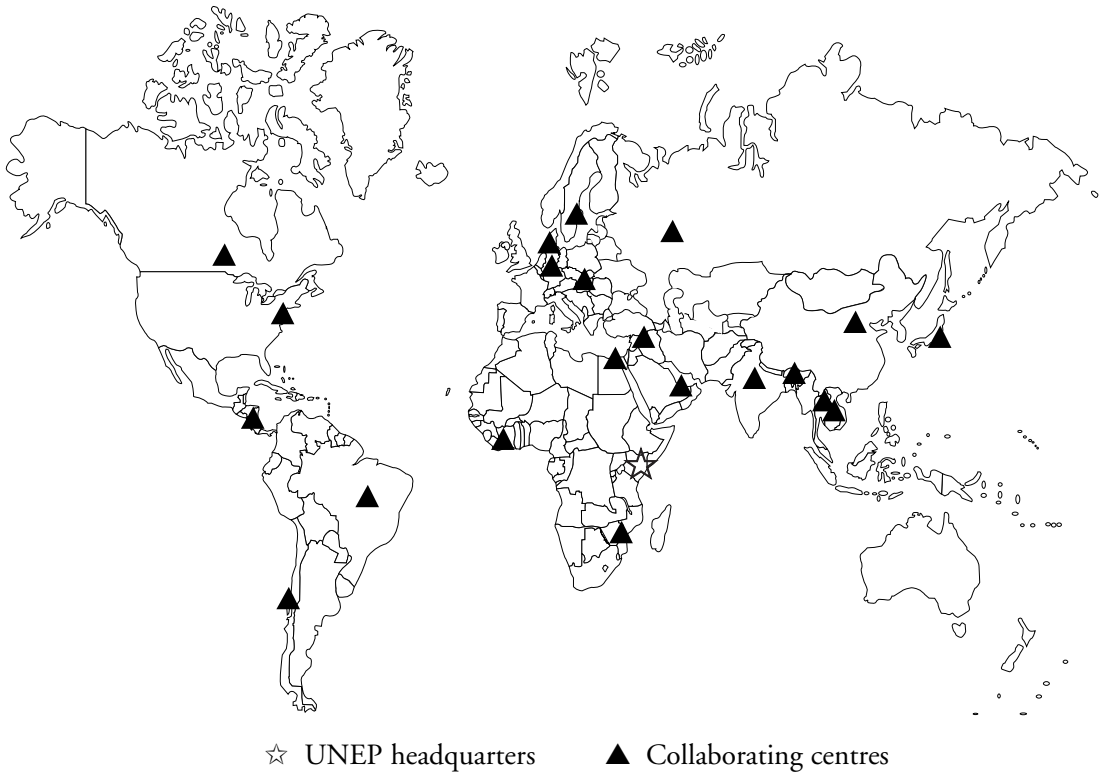

Figure 11: The collaborating centre network for GEO-2000.

2:7

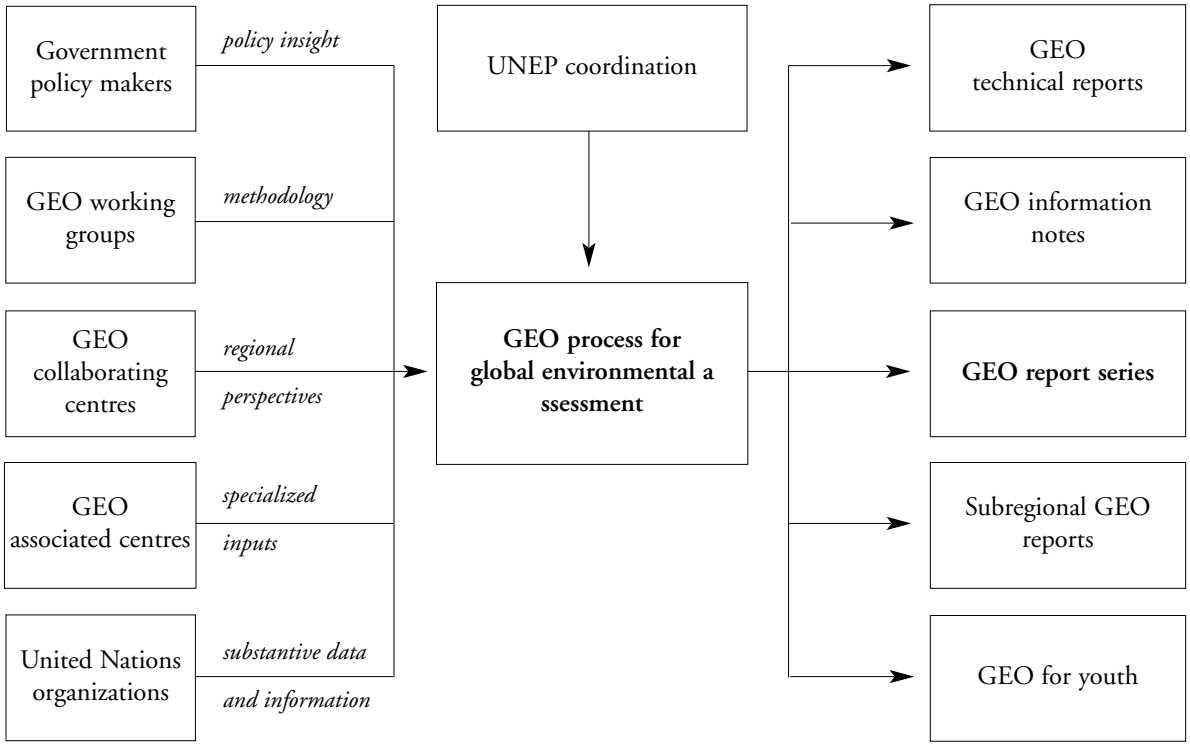

Figure 12: GEO project organization and outputs (UNEP, 1999)

Stakeholder involvement

The partnerships in GEO accomplish the following:

- Ensure regional priorities and perceptions are reflected;
- Provide a mechanism to aggregate information across scale to the global level;
- Facilitate access to data and information;
- Increase policy relevance of the analysis;
- Help raise the profile of critical issues and put emerging issues on the agenda;
- Contribute to improved policy coordination; and
- Provide a quality-control mechanism.

2:8

The structure of GEO reports

The core of GEO reports is the following:

- The state of the environment;
- Policy responses; and
- Future perspectives.

2:9

The SOE section aims to provide a comprehensive overview of the state of the environment at global and regional levels. The socio-economic driving forces leading to the observed environmental conditions are briefly described and the projection of trends into the near future depicted. The section follows the PSR method.

The section on policy responses provides a systematic description of environmental policies both in the regions and globally. It provides information on current policy initiatives, identifies major gaps and weaknesses of these policies as well as the barriers to their successful implementation. This chapter includes the analysis of multilateral environmental agreements (MEAs) as well as analysis of national legislation, economic instruments, and the like. Priorities for regional policy action are also covered.

The last section aims to identify the environmental and sustainable development issues of the future and to provide some broad categories of emerging environmental problems—including those that do not currently receive much policy attention. The section also identifies and analyzes alternative policies to assist sustainable development in the regions.

Regional GEO experience

Optional overview of regional GEO experience by the regional collaborating centre.

BREAK (20 min)

2.4 Strategies for SOE reporting (40 min)

Reporting on baseline environmental conditions and their main driving forces provides the foundation for integrated assessment and reporting. Key objectives of this stage are the following.

Establish context for assessment and report

Determine the area and jurisdiction for which the report is to be prepared, keeping in mind that many ecosystems and issue linkages extend beyond political borders. Agree upon core values and a framework that the assessment and report are to be based on.

The area for which you prepare a report may be an ecosystem or a jurisdictional boundary, but only rarely do the two regions coincide as they do, for example, in small island states.

Using either approach has advantages and disadvantages.

Table 3: Comparing SOE reporting in regions with ecosystem or political boundaries.

Ecosystem boundary Example: Aral Sea watershed in Central Asia	Advantages: • more meaningful ecosystem averages • understanding of ecosystems as functional units • direct connection to ecosystem-scale policies
Jurisdictional (political) boundary Example: most national SOE reports	Advantages: • more uniform regulatory environment • simpler data collection • direct connection to jurisdiction-wide policies

2:10

Document the most important environmental trends and conditions

2:11

The number of issues and trends on which to report is potentially unlimited, so the strategy needs to focus on a small number of important issues. Given that priorities vary from one stakeholder to the next, the strategy needs to include a method that lets participants rank the issues.

Identify and document key driving forces of environmental change

The report needs to clearly identify driving forces of environmental change such as production, consumption and demographics. Given that the number of issues is high, systematic ranking is needed. Many of the driving forces, such as trade and investment rules, technology and so on, are often not recognized as directly affecting the environment. But it is often these that serve as root causes of pressures and should not be ignored.

What conceptual framework should be used to categorize issues?

Integrated assessment should encompass the whole system. In moving from these general statements toward more detailed ones, you will find that a framework is needed to set up the main categories within which key values, issues and later indicators and performance criteria can be identified. The more commonly found frameworks are listed in Table 3. Some of these, like the pressure-state-(impact)-response framework, have been developed and tested in national reporting. Others, like the orientor framework, are more recent but hold promise because they are based on a systems view of ecosystems and economies (Bossel, 1999).

Table 4: Common indicator frameworks.

Type	Components
PSR or PSIR	Pressure-State-(Impact)-Response
Capital based	• Natural capital • Human-made capital • Social capital • Human capital
Orientors	• Existence • Effectiveness • Freedom of action • Security • Adaptability • Coexistence • Psychological needs
Sectoral	Land, forest, biodiversity, fresh water, marine and coastal areas, atmosphere, built-up areas
Issue based	Climate change, water pollution, urbanization, environmental education

These frameworks are not necessarily mutually exclusive. There may be components of other frameworks nested within the overall one selected. For example, even if the PSR framework is the overriding one, issues such as climate change and sectors such as transportation still need to be addressed.

An obvious choice is using the pressure and state components of the PSR framework, which was discussed in session 1. However, there are further questions about the details of pressures and states or, as they are sometimes called, conditions.

Many initiatives that follow the logic of sustainable development divide issues into three or four categories: economic, environmental, social and institutional—all with many variations. One example is shown in Figure 13 from the 1997 SOE report of the Province of Manitoba, Canada.

The framework to use becomes particularly important in analysis when the relationships between environmental and socio-economic issues are considered. The framework below expresses a hierarchy, with the socio-economic system inside the larger context of ecosystems or natural resources.

Figure 13: Example of a framework for issues in the context of sustainable development.
(Manitoba Environment, 1997).

In preparing to focus on key issues it is useful to reflect on the place of this task in the assessment hierarchy. The experience coming from actual reporting is that the selection of issues is a useful intermediate step between framework development and indicator identification.

Exercise

Please fill out the worksheet below for your own country. One or two participants will be asked by the trainer to present his or her summary to the whole group. Think about how integrated environmental reporting can bring attention to these issues.

What is the environmental problem? (national and/or regional scale)	**How serious are the main consequences?**			**Which areas are affected?**			**What priority should be given to the problem?**		
	Low	Med	High	Human Health	Ecology	Economy	Low	Med	High
	☐	☐	☐	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐	☐	☐	☐
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	☐	☐	☐	☐	☐	☐	☐	☐	☐
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2:14

Environmental conditions and driving forces are dynamic; that is, they change over time. When they are described, therefore, it's extremely important to consider changes over time. This is particularly true for data that are variable or error-ridden, where trends may show up only over a long time.

Study/discussion questions

Q: How can you ensure that SOE analysis covers all of the critical issues of environmental conditions?

A: _____

_____

_____

_____

Q: Who will you work with when analyzing the identified SOE issues?

A: _____

_____

_____

_____

2.5 Preparing for data collection and indicator development (1 hr 15 min)

Why measure?

Measurement progress in general and environmental performance in particular are important for a number of reasons:

- To provide feedback on system behaviour and policy performance;
- To improve chances of successful adaptation;
- To ensure movement toward common goals;
- To improve implementation; and
- To increase accountability.

2:15

What gets measured stands a better chance of getting done. Although the purpose of an SOE report is to provide an assessment, it needs to be supported by reliable data and relevant indicators. Data are the basic units of information, for example the concentration of a pollutant in water, collected through monitoring programs. Data usually require processing to create a suitable indicator, for example the overall suitability of water for human consumption, to make them more understandable or relevant for decision-making, evaluation and communication. Indicators help support SOE assessment, but they are equally essential in policy evaluation. Indicators, therefore, have a role in all phases and components of integrated environmental reporting.

To develop indicators you must use a process where you progress from the general framework and underlying basic values, to priority issues, to issue-specific indicators and, finally, to concrete performance criteria and analysis. Given that governments, businesses, civil-society organizations and other stakeholders all have different perspectives, this process must fit into the participatory process of assessment and reporting (Figure 14).

2:16

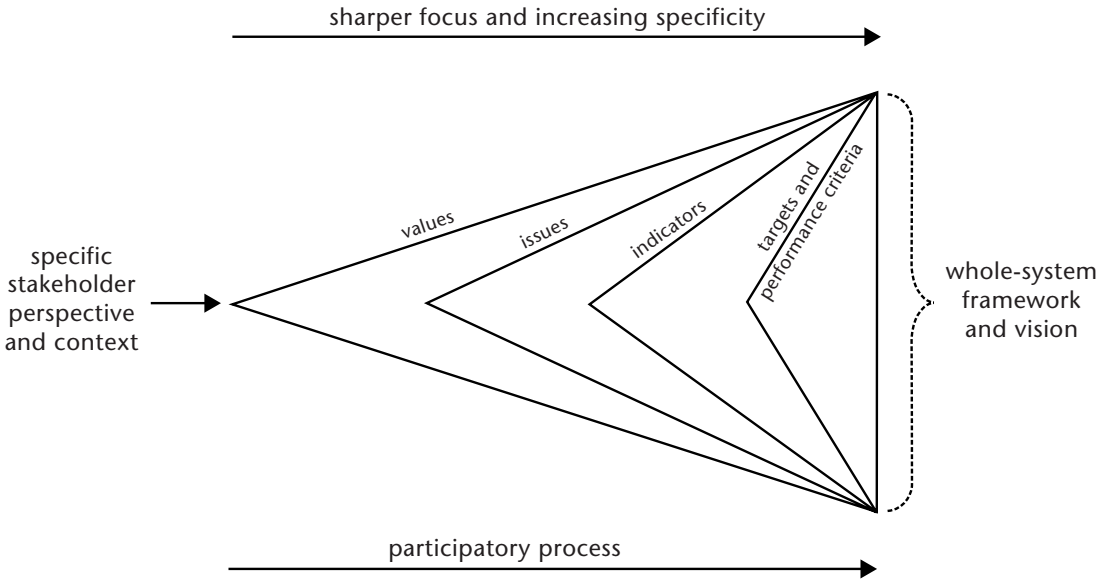


Figure 14: Linking values, issues, indicators and performance criteria in a participatory process.

Key questions

- Relationship of data, indicators and indices
- Data collection
- Data quality
- Indicator development
- Performance criteria and targets
- How to use indicators
- Presenting indicators

Relationship of data, indicators and indices

Decision-makers and analysts working at different scales require information on different levels of grouping. *Aggregate* or *composite indices,* as they are sometimes called, are those at the highest level of grouping. They are few and incorporate many, often very different, sub-variables. The Human Development Index or HDI (UNDP, 1998), the Genuine Progress Index or GPI (Cobb et al., 1995) and the Gross National Product or GNP are some examples of aggregate indices.

Many jurisdictions use aggregate indices for water or air quality (for example, Manitoba Environment, 1997). These sub-indices are clusters of indicators nested within narrow socio-economic or environmental categories.

Although highly aggregated indices are attractive because of their relative simplicity, they also carry risks. Most of all, aggregates tend to mask real-life complexity and detail so relevant for policy-making. Highly aggregate indices are important in making macropolicy and giving a view of overall progress, but they serve their purpose only if their calculation and the underlying assumptions are apparent. The index should be readily disaggregated to its components that may help find the specific reasons for the index going up or down and also answer questions of interest to decision-makers working on lower scales.

Indicators are found further down the hierarchy. They can be defined generally as system variables that express and communicate important information to an audience. Indicators vary depending on the audience, and the geographic, political or social context. Selecting indicators that are appropriate for a given context is important: One cannot simply adopt indicator sets developed elsewhere.

Indicators require numerical *data*, preferably time series, to express trends. Data are the primary, raw output of monitoring systems, surveys and so on, and normally require analysis to be meaningful to the audience. All assessment processes ultimately depend on data, but very few projects have the resources and capacity to collect primary data. Therefore, data collection usually requires getting data from other sources, usually many different ones.

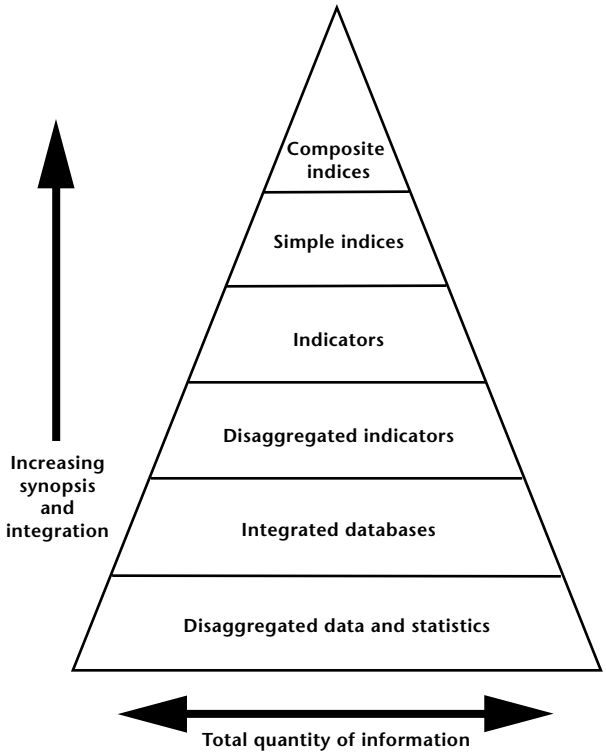


Figure 15: Relationship between data, indicators and indices.
(Australia Department of the Environment, Sport and Territories, 1994)

2:18

Exercise

Working together as a group please provide other examples of data, indicators, indices and the underlying monitoring system from your profession.

Monitoring system	Index	Indicator	Data
water quality sampling sites, personnel and equipment	water quality index	rate of compliance with nitrate standards for drinking water	nitrate levels in water
conservation database	habitat conservation index	portion of ecosystems under protection	size of protected area
air quality measurement stations, database and personnel	air quality index	days SO_X standards for air quality not met	SO_X emissions

2:19

Data collection

The content of SOE analyses should be determined by national policy priorities, but the availability and quality of data are also important. The relationship between data and SOE reporting goes both ways: Data are needed to support analysis, but the SOE process can be used to make and strengthen the case to monitor and collect data where needed (UNEP/GRID-Arendal, 1998).

Because of the wide range of issues that are likely to emerge in integrated environmental reporting, data needed for the analysis will be stored across the various archives of governmental and non-governmental organizations. Unfortunately, many of these organizations have never done SOE reporting and maintain weak links to environment agencies.

Data management is undertaken in tandem with report development throughout the entire process, producing data of increasing specificity and clarity as dictated by the needs of assessment (Figure 16).

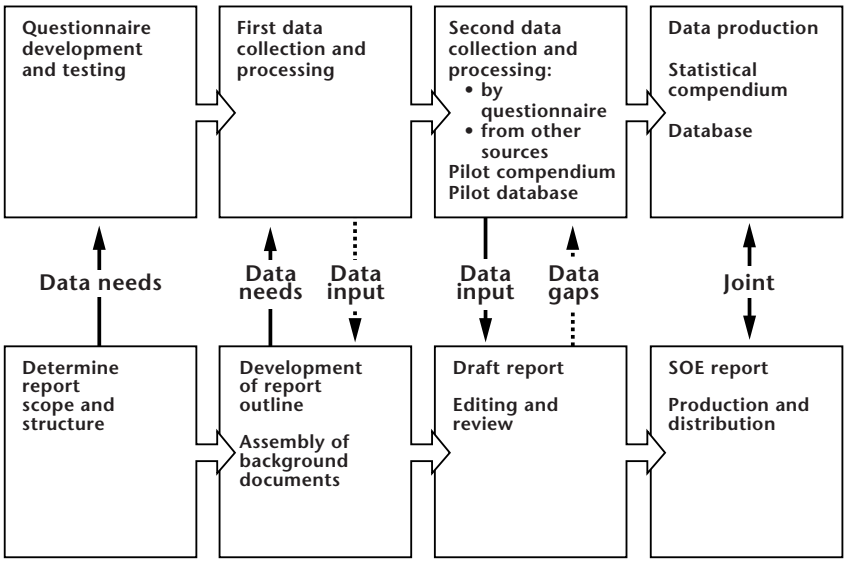


Figure 16: Links between database and report development in OECD countries (as quoted in Rump, 1996).

Gathering map-based and GIS data presents unique challenges. Most environmental issues have a spatial dimension, and understanding the links requires analysis that takes the spatial aspect into account. Spatial analysis can help recognize the following:

- Transboundary issues;
- The importance of spatial scale;
- Functional links between pressures, states or responses;
- Cumulative effects; and
- 'Hot-spots'—areas where high sensitivity and high pressure increase risk of damage.

2:20
2:21

Exercise

In many parts of the world lack of reliable data, or data in general, is a reality. Although lack of data makes SOE reporting more difficult, it does not make it impossible. *Some* data are always available if one looks through a variety of sources, ranging from national, regional or local government departments, to universities, non-governmental sources and international organizations. If no data directly related to an important issue are available, a number of techniques may help to fill the gap. Discuss these techniques with all participants and try to find specific examples where they would be useful. Discuss strengths and weaknesses of the techniques mentioned.

Technique	Example
Proxy data: using data indirectly related to the issue in question	
Survey of limited number of key experts	
Statistical gap-filling	
Other methods:	

Data quality

The *GEO-2000* report identified *both* data availability and data quality as issues that limit environmental reporting worldwide. Not having any relevant data is obviously a problem, but having poor quality data may sometimes cause more problems than having none at all. Quality control, therefore, should be an essential part of the data collection strategy.

A good method to generate reliable and valid data is to build quality assurance into the management process. One example is the general data quality objectives process developed by the Environmental Protection Agency of the United States. The process starts with the statement of the environmental problem or issue and the decision, for instance, related to a project or policy.

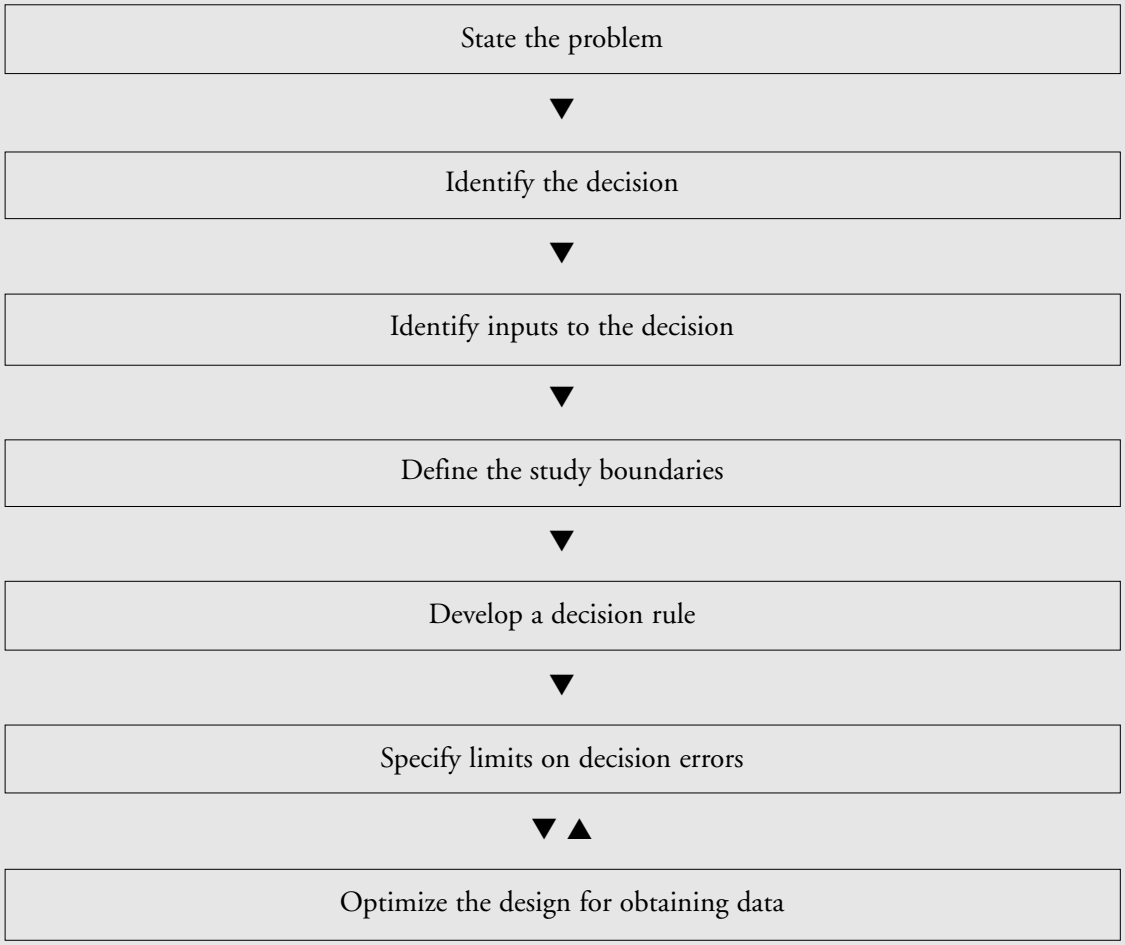


Figure 17: The data quality objectives process. (Source: US EPA, 1994).

Indicator development

Indicators are developed based on available data, the information needs of decision-makers and key policy priorities. In other words, indicators express information in ways that are directly relevant to the decision-making process.

Indicators help assessment and evaluation, but perhaps most important, they help improve accountability. Just as economic indicators, profits or losses can help improve economic accountability, environmental indicators can strengthen environmental accountability. They are powerful tools for creating change because they go to the heart of decision-making.

Indicator selection itself is a critical process, one with significant consequences on the meaningfulness and effect of assessment. In the context of integrated environmental reporting indicator selection should build on the participatory process by involving members of society and policy-makers, not just because they are the expected users of the information but perhaps even more importantly because they are experts with specific knowledge of environmental and sustainable development.

Clearly, some indicators are better than others. To avoid selecting indicators haphazardly usually criteria are used to test whether any given indicator should be kept or discarded. An example set of criteria is shown below.

Indicators should…

- Be developed within an accepted conceptual framework;
- Be clearly defined and easy to understand;
- Be subject to aggregation (from household to community, from community to nation);
- Be objective (be independent of the data collector);
- Have reasonable data requirements (either data that are available or data that can be collected at low cost and within the ability of the country's statistical agencies);
- Be relevant to users;
- Be limited in number; and
- Reflect causes, process or results (or, as used in the environment literature, reflect pressure, state and response) (World Bank, 1997).

2:24

Criteria like these are useful, but they are not a guarantee that the indicators selected will be the most meaningful to any given audience. Quality control needs to be built into the discussions with stakeholders not only for individual indicators but also for the entire set, to make sure that the indicators are useful in the subsequent analysis and help substantiate connections between pressures, states and responses.

The table below contains a sample indicator set from a UNEP document (after Rump, 1996).

Table 5: Examples of frequently suggested environmental indicators.

Issue	Indicators		
	Pressure	**State/Condition**	**Response**
Climate change	• Fossil fuel consumption • Greenhouse gas emissions	• Mean global temperature • Ambient levels of CO_2 or other greenhouse gases	• Change in energy use
Water quality/ eutrophication	• Nitrogen and phosphorus emissions • Wastewater discharges • Livestock density	• Biological oxygen demand; dissolved oxygen; nitrogen and phosphorus levels in water	• Population served by treated water supply • User charges for wastewater treatment
Urban environmental quality	• Air pollutant emissions • Traffic density • Rural-urban migration	• Urban air quality • Ground-level ozone concentrations	• Pollution abatement expenditures

2:25

How to use indicators

Choosing the right indicators is an important step, but they need to be used appropriately in assessment. Misusing available information and indicators in decision-making can be just as damaging as not having the required information at all. Indicators can be powerful tools to help identify and support PSR relationships for both the SOE report and subsequent policy analysis, as illustrated conceptually in Figure 18.

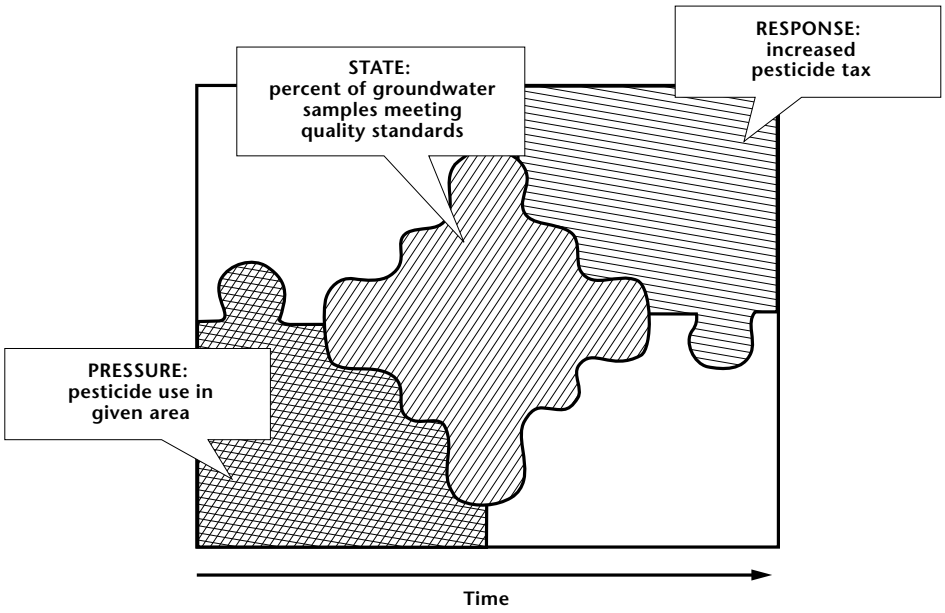


Figure 18: An example for linking pressure-state-response indicators.
(Hardi and Pinter, 1995)

Indicators can also help with overall analysis in the following areas:

- Performance evaluation: indicators help evaluate performance if a basis for comparison is clearly identified; for example, a target specified in policy process or a benchmark;
- Thresholds: thresholds are unique and perhaps the most important bases for assessment; in general, crossing a clearly identified sustainability threshold should send an obvious message to policy-makers and society;
- Causal loops: indicators are important to support claims for causality, such as the links between pressures and environmental conditions; and
- Model construction and scenario analysis: indicators provide real data and support field-testing of models and future scenarios.

Presenting indicators

Indicators should be presented with information that helps interpretation. An example indicator presentation template is shown in Figure 19. You'll find a direct link to a collection of actual indicator pages from around the world on the Compendium of Sustainable Development Indicators Web site at <http://iisd.ca/measure/displayintro.asp>. The examples in this collection have been selected based on solid content *as well as* attractive design and good communication.

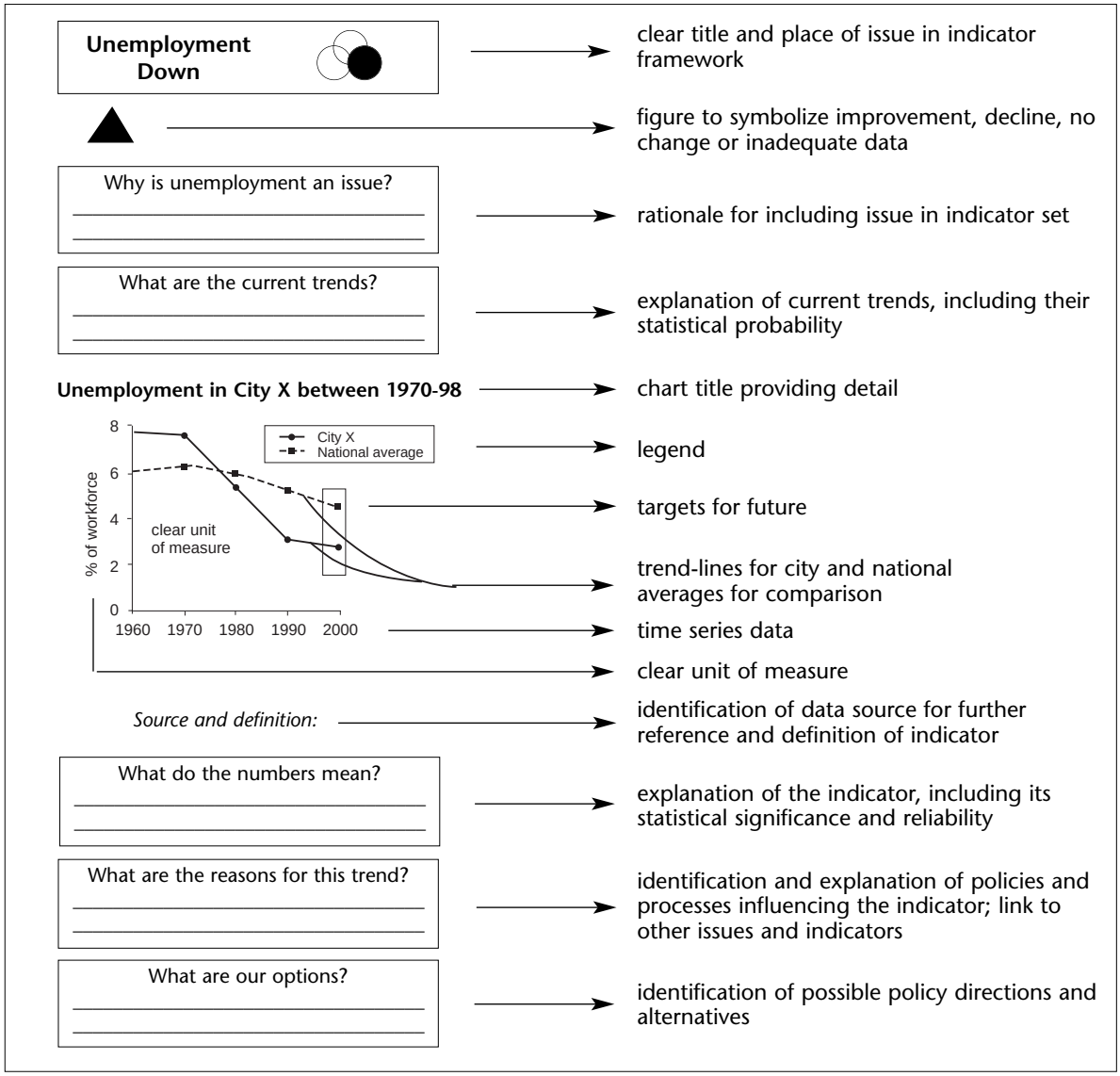


Figure 19: General template for presenting indicators (modified from IISD, 1998).

To conclude the section on indicators, discuss the following key points together as a group:

- Without good data based on monitoring, it is not possible to develop indicators.
- Indicators *arise* from values. They also *create* values.
- Performance measurement implies real targets and benchmarks (something to which actual performance can be compared).
- Different people living in different places have different values. Indicators, therefore, must be unique to people, places, cultures and institutions.
- Indicator sets evolve over time.
- No indicator set is complete.
- Measurement tends to reduce uncertainty but never eliminates it.
- Indicators play a central role in how a system works. Changing indicators will likely change the system.
- The same indicator can be excellent or poor, depending on how it is used.

(Source: Meadows, 1998)

Key resources on indicators

The following organizations offer key resources and data on indicators:

- UN Commission for Sustainable Development (http://www.un.org/esa/sustdev/isd.htm)
- World Bank (http://www-esd.worldbank.org/eei/)
- International Institute for Sustainable Development (IISD) (http://iisd.ca/measure/compindex.asp)
- Food and Agriculture Organization of the UN (http://apps.fao.org)
- World Resources Institute (http://www.wri.org/data/)
- United Nations System-wide Earthwatch (http://www.unep.ch/earthw.html)
- Center for International Earth Science Information Network (CIESIN) – World Data Centre (http://www.gateway.ciesin.org/wdc)

LUNCH (1 hr 15 min)

2.6 Welcome to Myland (15 min)

As an option to using Myland, your group may decide to do the remaining exercises in session 2 around a real country from the region.

Overview

This is the general outline of a situation in Myland, an imaginary country. We will regularly refer to the Myland example during the rest of the training program in exercises and to complement real-life case studies. Among other examples, the Myland case will be used to help identify and rank environmental issues and develop future-oriented scenarios. We will ask you to speculate on the practical challenges of assessing and reporting in Myland and to come up with institutional strategies to deal with them.

In working with Myland we will rely on your ability to use your imagination and professional judgement as well as your creativity to mix the facts with knowledge that you have gained throughout the training.

Country profile

Myland is a moderately developed country, encompassing 25 million ha. Some of the basic national statistics are shown below. These measures are similar to those used in World Resources Reports (The World Resources Institute et al., 1998). As typical of many developing countries, some of the data are based on estimates or are not available at all.

Table 6: Basic statistics for Myland.

Parameter	1950-1955 average	1990-1995 average	Projection for 2020-2025
Population	5 million (estimate)	12 million	17 million
Percent living in cities with population over 500,000	14	29	45
Per capita GNP (constant 1999 US$)	700	2,400	N/A
Percentage of total income held by richest 10 percent of population	N/A	41	45
Index of food production, per capita (1999 = 100)	90 (estimate)	100	97
Extent of forest cover (percent of total area)	57 (estimate)	42	N/A
Annual internal renewable water resources, per capita (m^3)	N/A	4,500	3,200
Average annual fisheries catch (thousands of metric tonnes)	220	512	300
Total commercial energy production (petajoules)	200	800	1,200

N/A – data not available

Physical description

Myland is divided by landscape into four main regions: the highlands, the rainforest, the lowlands and the coast. The western side (the highlands) has low mountains and hills. The run-off from precipitation collects in many creeks and small rivers that converge to form a large river (the Blue River) that flows east to the coast. This river system constitutes a large watershed shared with the neighbouring country to the north. The foothills and middle region of the country are covered with rainforest because of high precipitation and run-off from the mountains. The lowlands and coast are somewhat drier and the soils in these regions are generally poor. The Blue River is the heart of the country, one of the main resources for rural peoples and now the main transportation route to move goods to the coast and global markets.

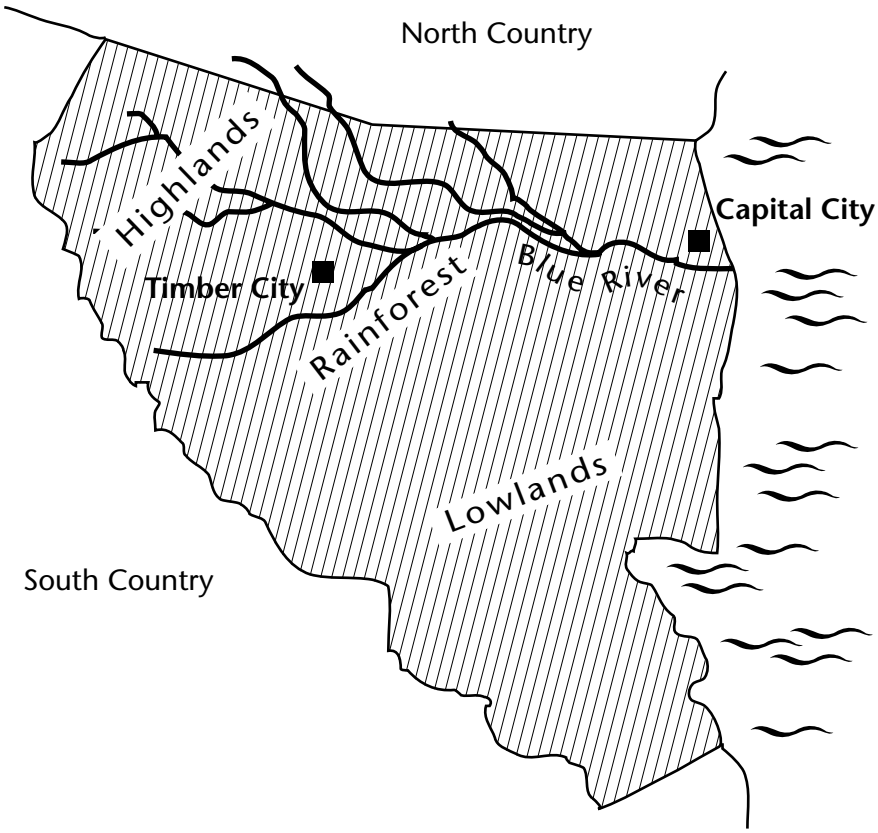


Figure 20: Map of Myland.

Myland has two major city centres. Timber City is located at the confluence of the river delta, carved out of the rainforest. It emerged to service the logging industry of the surrounding delta and foothills. The largest urban centre is Capital City, the seat of government. It is located at the mouth of the Blue River, a busy port and the gateway to the rest of the world and export markets. Smaller towns and villages are distributed throughout the country. The majority of the indigenous population once lived in the resource-rich rainforest delta area. In recent years, however, these people have moved away because of encroachment from logging, ranching and plantations into their homeland. They go to the highlands where they try to farm on steep slopes or to the cities in search of jobs. Capital City is developing quickly and now boasts technological and manufacturing capabilities that attract foreign investment.

Environmental institutions and management in Myland

Myland is a fledgling democracy with sporadic social tensions based on social status, political affiliation and ethnicity. Nevertheless, with some effort, the people of Myland do get along.

The country has a federal system of governance, with national, state and municipal agencies. Federal and state environmental agencies are about 10 years old, and are generally understaffed and underfunded. A National Environmental Action Plan (NEAP) has been prepared, with the assistance of international organizations, but it has been largely ignored or inadequately carried out. Municipal governments are carrying most of the burden of environmental management, although they have the least resources, staff and skills to do the job. One SOE report has been prepared by an international NGO, but without the legislative requirements and institutional capacity to do so, another hasn't been prepared since.

2:31

International commitments by Myland

- Reduce greenhouse gas emissions;
- Protect species and ecosystem diversity;
- Conduct free trade with surrounding countries; trade agreement with certain countries for raw resource export (in return for technology import);
- Support human rights and alleviate poverty; and
- Increase world literacy.

2:32

Trends

The following are some of the documented environmental trends in Myland. Some of these are from the previous SOE report; other information is from international sources, based largely on expert estimates.

2:33

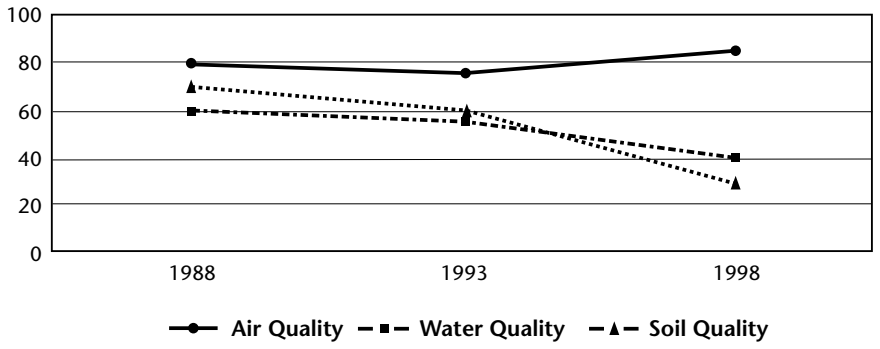


Figure 21: Air, water and soil quality indices for Myland.

Figure 22: Distribution of productive land in Myland.

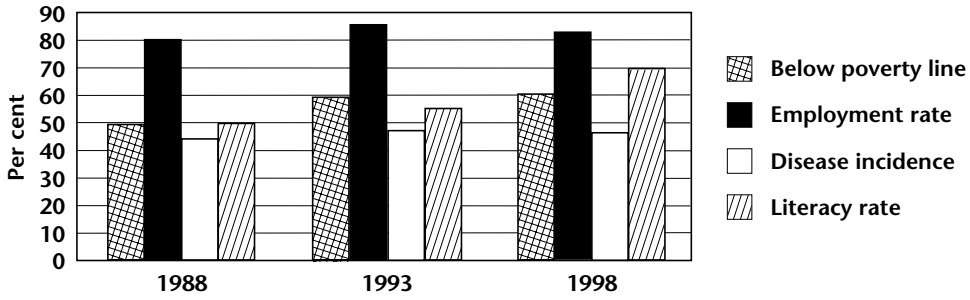


Figure 23: Social indicators in Myland.

Figure 24: Distribution of jobs by sector in Myland.

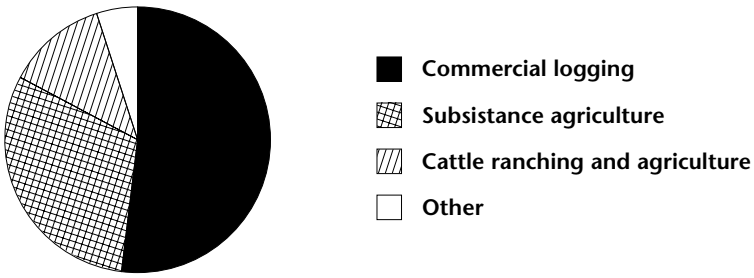
The forestry sector

Forestry is an extremely important industry in Myland, both for export revenue and internal employment. But the focus on employment and prosperity today conflicts with a sustainable use of forest resources.

Driving forces of deforestation

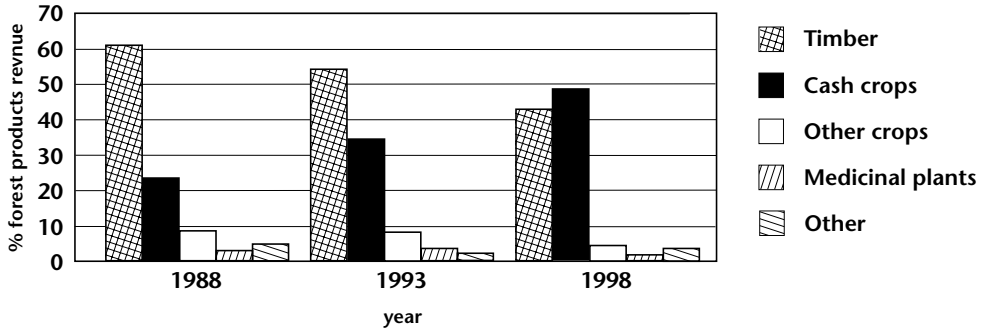
- Commercial logging: economic incentive to cut down mature trees for the export market; demand for pulp and paper products.
- Subsistence agriculture: displaced farmers slash and burn large areas of forest for agriculture; they must move and clear new areas every few years as the soil degrades.
- Cattle ranching and agriculture for export: forests are cleared for ranching to produce beef for fast-food chains abroad; cattle can graze on the land for only 6 to 10 years before it becomes scrubland; at this point the area is often converted to plantations to grow cash crops, again for sale on foreign markets.

2:37



2:38

Figure 25: Causes of deforestation in Myland.



2:39

Figure 26: Revenues from forest products in Myland.

These driving forces set a feedback cycle into motion. As Myland's forests disappear, pressure mounts to issue more licences to timber companies so that the licensing fees can help the country import products now that are unavailable because of the loss of renewable forest resources. The result: Posterity is sacrificed for the here and now.

Policy responses to this situation must break this cycle and stimulate the use and demand for renewable forest products (for example, nuts and medicines) and sustainable yields.

2.7 Preparing for Myland's assessment and reporting process

Case study exercise, part I (1 hr 15 min)

In the context of sustainable development, SOE reporting requires information not only on environmental factors, but also on socio-economic ones. This will help us understand the current state of the environment under the existing social and economic conditions. The regional "snapshot" produced serves as a baseline that can later help test the impact of alternative policy measures.

The purpose of the exercise is to help you understand the practical details and challenges when creating a state of the environment baseline. We will focus on understanding the importance of consensus building and participation. Our focus is to deliver results.

Exercise

It is the year 2005 and the Government of Myland has just passed a law mandating the federal Ministry of the Environment and Natural Resources (MENR) to issue a national report on the environment and sustainable development every four years.

The law provides only vague guidelines about what is required, so it is up to ministerial staff to devise the best strategy. As always, funds are scarce, staff are stretched to their limits, data are hard to come by, and key stakeholders have barely started talking to each other.

MENR needs to start with only the following specific guidelines:

- Development must meet the needs of the present generation without compromising the ability of future generations to meet their own needs;
- The report should cover environmental, social and economic trends and their interactions;
- All affected sectors of society should be involved;
- The report should use quantitative sustainability indicators as appropriate;
- The report should deal only with the highest priority issues;
- The description of current trends should be presented along with possible future development paths;
- The final report should be ready within a year;
- The total budget cannot exceed 500,000 Mylandian dollars (a modest sum).

Congratulations, you have been just appointed to the steering committee responsible for coordinating this project. Four types of organizations are involved: government departments, industry associations, NGOs and universities. You need to make a decision on the best strategy to carry out this exercise within the specified time frame and budget, and satisfy the government and public. At the same time you must ensure that the interests and perspective of your own stakeholder group are forcefully represented.

- Form subgroups of four.
- Designate a chairperson and rapporteur, a person who prepares an account of the proceedings.
- Determine roles: have one person each represent the government, industry, NGOs and universities.

Task 1

This is your first meeting and you need to establish a workplan for the project. After a few minutes of individual thinking every member of the subgroup will make an opening statement about the issues below. Please represent the point of view of your stakeholder group *in the first person*, as though it were your opinion. Record the essence of your statement and that of the others in the table below.

Issue	Government	Industry	NGOs	Academia
Scope and emphasis of report				
Distribution of responsibilities				
Requirement for funding				
Human resources required				

2:41

Task 2

Now that you are familiar with the positions of the other stakeholders in your group, find representatives belonging to your own stakeholder group (for example, if you are a government representative, find others who also represent government in other subgroups). Once you have gathered all participants that represent your stakeholder group, everyone in that group should give an account of the key point of discussion in the previous subgroup (with the other stakeholders).

Once everyone has had his or her turn, try to formulate a common position and negotiating strategy for yourself with respect to the other three stakeholder groups. Make notes in the table below.

I represent: _____

Negotiating strategy – positions I should advocate and/or support
Negotiating strategy – positions I should oppose

2:42

Task 3

Reconvene with members of your first subgroup (you are again in a group representing government, industry, NGOs and universities). Keeping in mind the guidelines for the initiative and the position of your own stakeholder group you agreed to, draft a workplan using the following table.

How do we ensure that:

	Joint strategy
1. The report covers environmental, social and economic trends and their interactions	
2. All stakeholders are involved in the reporting process	
3. The report uses quantitative sustainability indicators as appropriate	
4. The report deals only with high-priority issues	
5. The assessment and report are forward looking	

2:43

Case study exercise, part II (1 hr)

In the previous section we defined the general character of the integrated environmental report for Myland, formulated and negotiated strategies for a given stakeholder group, and thought about specific roles.

Let's begin to plan the process that will result in creating the environmental and socio-economic baseline.

2:44

Task 1

Working in your subgroups of four different stakeholders, prepare a flowchart and timeline to create the SOE assessment and report.

Task flowchart	Time required

2:45

Task 2

Using the environmental awareness sheet from this morning's session, please fill out the matrix below for Myland based on the information provided. If you chose to do the entire exercise on your country, and not Myland, you may be able to use the results straight from the table on page 37.

What is the environmental problem? (national and/or regional scale)	**How serious are the main consequences?**			**Which areas are affected?**			**What priority should be given to the problem?**		
	Low	Med	High	Human Health	Ecology	Economy	Low	Med	High
	☐	☐	☐	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐	☐	☐	☐

2:46

Task 3

Based on the information you have on Myland, create a table of contents for the environmental and socio-economic baseline. Identify what you consider critical issues within specific chapters and point out one or two possible indicators (without knowing of course what data are available).

To help your work, a sample table of contents is provided from each of several other jurisdictions or countries. Please use these only as a guide since all jurisdictions and countries have different requirements.

Uganda

- Environment and development
  - Sustainable development and environmental management
  - State of the economy
  - Trade
  - Human resource development
- Natural resources management
  - Land use and soils
  - Minerals
  - Energy resources
  - Agriculture
  - Rangelands and livestock
  - Forest resources
  - Wildlife resources and tourism
  - Water resources
  - Fisheries resources
  - Water hyacinth
  - Wetlands resources
  - Biodiversity
  - Climate change as a result of global warming
- The human environment
  - Demography
  - Social development
  - Legal, policy, institutional framework and environmental information

(Source: National Environment Management Agency, 1998.)

GEO-2000

- Global perspectives
- The state of the environment
  - Global and regional synthesis
  - Africa
  - Asia and the Pacific
  - Europe and Central Asia
  - Latin America and the Caribbean
  - North America
  - West Asia
  - The Polar regions
- Policy responses
  - Global and regional synthesis
  - Africa
  - Asia and the Pacific
  - Europe and Central Asia
  - Latin America and the Caribbean
  - North America
  - West Asia
  - The Polar regions
- Future perspectives
- Outlook and recommendations

(Source: United Nations Environment Programme, 1999.)

Hungary

- Environmental resources
  - Air
  - Water
  - Land
  - Nature
  - Landscape
- Human settlements
- Human health
- Waste
- Noise

(Source: Ministry for Environment, 1999.)

China

- About SOE China '97 (Introduction)
- Driving forces
- Urban environment
- Water environment
- Biodiversity
- Acid rain
- Ozone layer depletion
- Land resources
- Forest resources
- Environmental management

(Source: State Environment Protection Administration, 1999.)

Scotland

- Introduction
  - Foreword by Scottish Environment Protection Agency's chief executive
  - The natural environment (geology, climate)
  - Human influence on the environment (population)
- State of the environment
  - Air (emissions, acid precipitation, overview of emission trends)
  - Land (soils, contaminated land, waste management, litter, radioactivity)
  - Water (groundwater, lochs, rivers, sewage pollution, urban drainage, industrial discharges, mining and abandoned mines, intensive agriculture and forestry, river habitat quality, coastal and estuarine waters, marine fish farming and aquaculture)
- The issues
  - Sustainable development
  - Global issues (climate change and protection of the ozone layer)
  - Emissions to atmosphere
  - Power generation and acid precipitation
  - Issues relating to land
  - Waste management
  - Radioactivity
  - Water
  - Complex interactions and exotic chemicals
  - Environmental monitoring
  - Environmental performance indicators

(Source: Scottish Environment Protection Agency, 1999.)

Topic/chapter title	Key issues in Myland	Possible indicators

Your rapporteur should make a photocopy of the completed table and present it to all participants for discussion.

Study/discussion questions

Q: Consider the range of stakeholders that were involved in the SOE process through the role-playing experience. Is this a valuable addition or does it only make work more complicated?

A: _____

_____

_____

_____

Q: How can you include socio-economic information in the SOE section of an integrated environmental report?

A: _____

_____

_____

_____

Q: If you did, would this still be only a state of the environment report?

A: _____

_____

_____

_____

2.8 Roundtable discussion and wrap-up (15 min)

The instructor will summarize this day's program and identify the topic for session 3, followed, if time permits, by a brief roundtable discussion.

2.9 Bibliography

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2.10 Session 2 evaluation (15 min)

You may provide comments either in English or in your mother tongue. Please make your comments as specific as possible.

What would you like the trainers to stop doing? _____

What would you like the trainers to start doing? _____

What would you like the trainers to continue doing?_____

Other comments: _____

Please detach and hand in the page after finishing. Thank you.

Session 3: Assessing environmental policy

Session 3 at a glance

10 min	Introduction to the session and logistics (3.1)
50 min	What is policy? (3.2)
1 hr	Links between policy and the environment (3.3)
20 min	BREAK
1 hr 40 min	Steps in policy analysis (3.4)
1 hr 30 min	LUNCH
1 hr 30 min	Current policy analysis for Myland: Part I (3.5)
1 hr	Current policy analysis for Myland: Part II
15 min	Roundtable discussion and wrap-up (3.6)
	Bibliography (3.7)
15 min	Session evaluation (3.8)

3:1

3.1 Introduction to the session and logistics (10 min)

At the end of session 3, you will:

- Be familiar with the broad range of policy types and instruments;
- Have explored the links between a broad range of policies and the environment;
- Have learned about approaches to current policy analysis;
- Have practised current policy analysis; and
- Have understood issues associated with reporting policy assessment results.

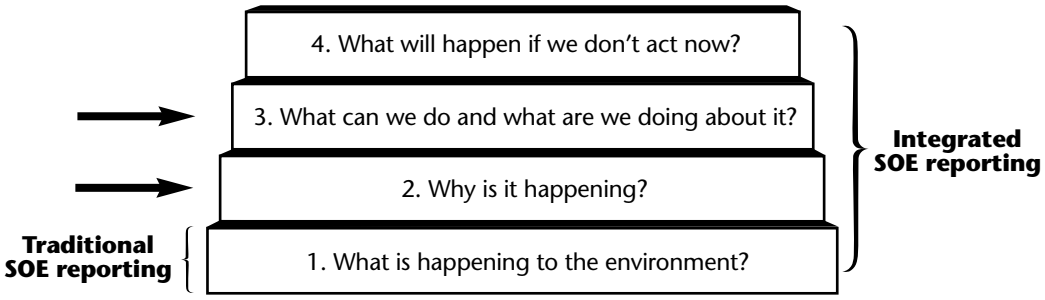


Figure 27: Place of current policy analysis in the integrated environmental reporting framework.

Assessing environmental policy helps to answer two questions when conducting integrated environmental reporting:

- **Why is it happening**; that is, how are policies affecting the state of the environment?

  Policies can be the driving forces behind either desirable or undesirable environmental outcomes.

- **What are we doing about it**; that is, what policies are in place that are intended to deal with the current environmental issues?

  Some policies may have already been formed to influence current environmental conditions, although there may be a lag time before effects are visible.

Policy assessment has been beyond the scope of many traditional SOE initiatives. A conscious and explicit link to policies and policy performance can add much weight and relevance to the assessment.

3.2 What is policy? (50 min)

What is policy? Although scholars have proposed many definitions, policy remains a vague concept.

The following definition of policy confirms the broad meaning used in this manual:

> *A set of interrelated decisions taken by a political actor or group of actors concerning the selection of goals and the means of achieving them within a specified situation where these decisions should, in principle, be within the power of these actors to achieve.*
>
> – Jenkins, 1978

The policy context

Policies are formulated in many ways, complicating the job of policy analysis. Below are examples of three ways in which policies can be developed (Figure 28).

- ***Urgent, reactive policies:*** The government's highest priorities often require policies outside the normal policy-making process. For example, policies on environmental emergencies formulated quickly in response to sudden threats can have significant consequences on a wide range of established policies.
- ***Routine decisions:*** Most policies are developed through routine decisions that are made according to well-understood and predetermined fiscal frameworks and broad policy objectives.
- ***The grey zone:*** Grey-zone policies are the ones in the middle, between exceptional and routine policies. These policies are few, have a high political profile and do not always follow the conventional policy-making process.

Government processes that integrate environmental factors into policy-making can accommodate routine decisions more easily than exceptional ones. This is not to say that exceptional policies should be exempt from environmental analysis, but that different approaches are needed for the various types of policies and policy-formulation processes. It also demonstrates the requirement for a tiered approach in which environmental implications are considered at program and project-planning levels as well as at the policy level.

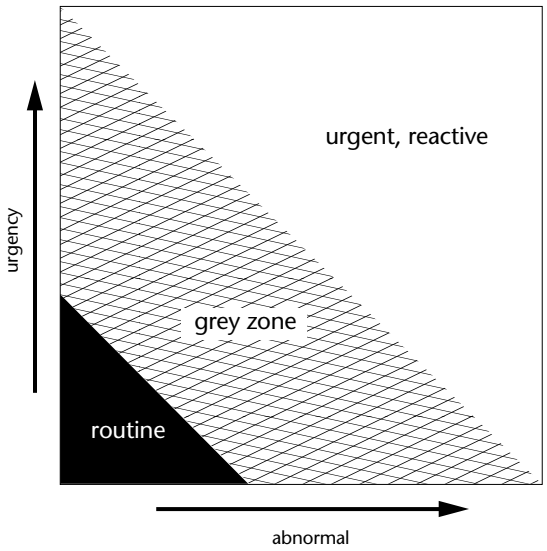


Figure 28: Policy formulation context.

Attributes of policies

- General or specific
- Explicit or implicit
- Reactive or proactive
- Evolutionary or revolutionary
- Independent or integrated with other policies (nested)

Of course, policies can be anywhere between these extremes.

Explicit policies are clearly articulated and announced.

For example
- Green papers
- Ministerial speeches
- Legislative statements
- Regulations
- White papers
- Press releases
- Laws

In contrast, **implicit policies** are not as clearly stated or explained, but can be equally powerful as explicit policies.

For example, in some countries the law requires that decisions about forestry are made by consulting with local communities made up of representatives from the village. In reality decisions are often reached by the forest officer and—at best—rubber-stamped by the village committee without any real consultation. This implicit policy is not written down (in fact, it would be against the official and stated policy), but it is the one that tends to be in force.

Often policies result simply from the **incremental accumulation of decisions** made over time. Although each of these individual decisions may be of little environmental consequence, together they can produce far-reaching effects.

Beware of cumulative effects!

Any given fossil fuel power plant may have negligible effects on the environment. But combined, these plants can contribute significantly to acid precipitation, causing forest decline, lake acidification and soil degradation. On a global scale fossil fuel consumption leads to climate change. Such cumulative effects have sometimes been described as destruction by insignificant increments.

Policies can exist in hierarchies, where narrowly focused policies are nested within and linked to a series of progressively broader policies. This nested arrangement can exist across many levels of government, both within a country and internationally (Figure 29).

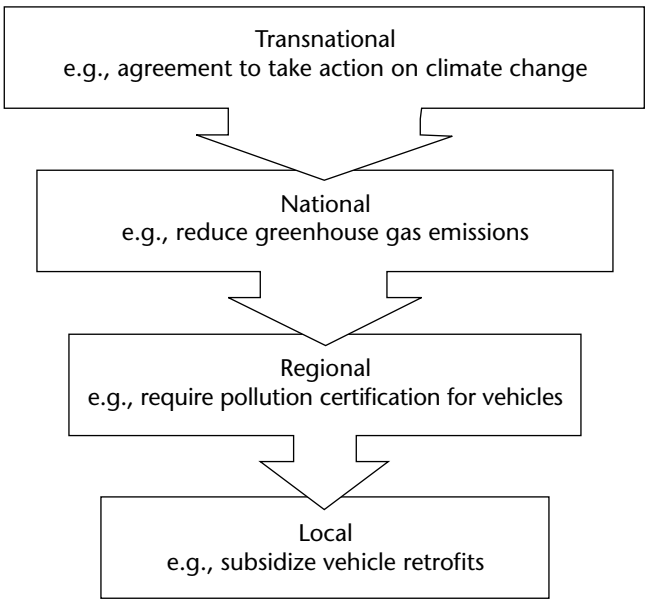


Figure 29: An example of nested arrangement of policies.

It is clear from the pressure-state-response model discussed in session 1 that **no policy exists in isolation**. It is important to consider the many other unintended links that exist, both among various environmental policies and between environmental and other types of policies. For example, analysis of the environmental implications of policies on pesticide use must include the consequence of policy changes in other policy areas. Figure 30 shows four policy areas that could be affected by policies on pesticide use.

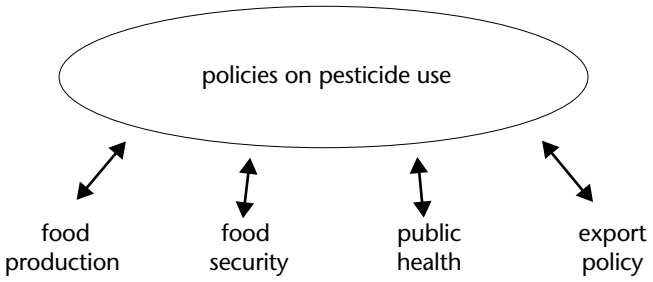
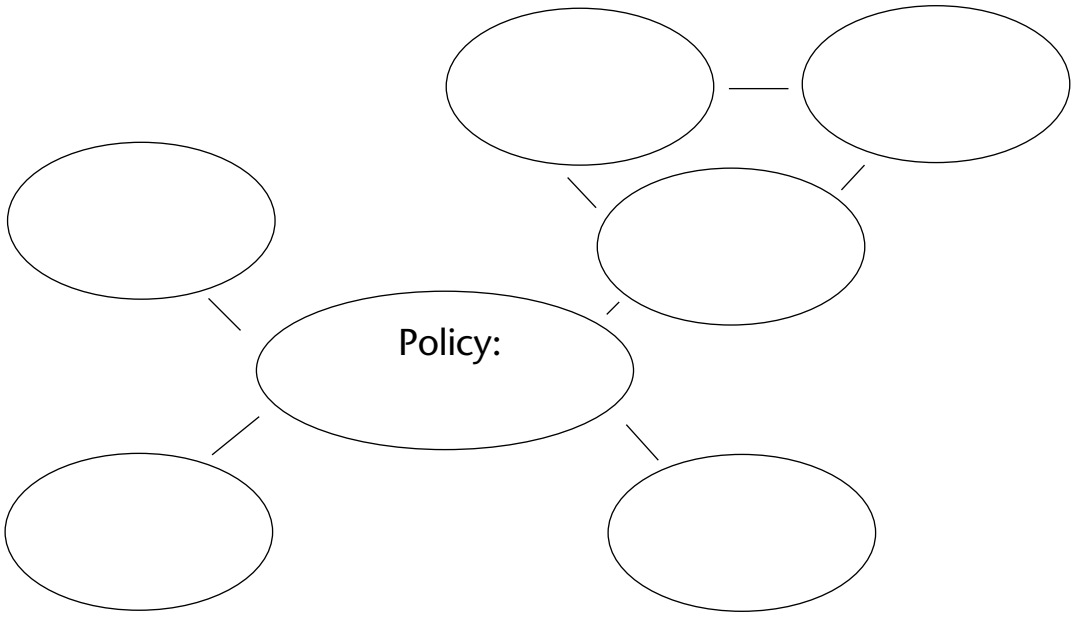


Figure 30: Policy areas that could be affected by policies on pesticide use.

3:10

Exercise

Working together as a group, choose a policy (real or fictional) and place it in the centre circle below. In the surrounding circles, list other policies that could affect the outcome of the policy you put in the circle. Also list policies that could be affected by the policy in the centre circle. Add circles and connectors as needed to demonstrate the web of influence.



3:11

3.3 Links between policy and the environment (1 hr)

Policies do not exist in isolation. As illustrated in Figure 31, the rules of human behaviour, of which policies are a part, interact with both values and beliefs and the underlying physical context.

The reality of the physical and living environment—including structures created by society—are a key determinant of the policy context. Myland has some forest cover, so it needs policies to govern forest use. It also has farmland and human settlements, so it also needs regulations related to those.

Human values, beliefs and ideas are other determinants of policies that govern human behaviour. The competing visions of the forest by Myland's indigenous people (forest as a sacred site), international forest corporations (forest as an economic resource) and ecologists (forest as a life-support system) are examples of competing values that may have a combined effect on policies.

3:12

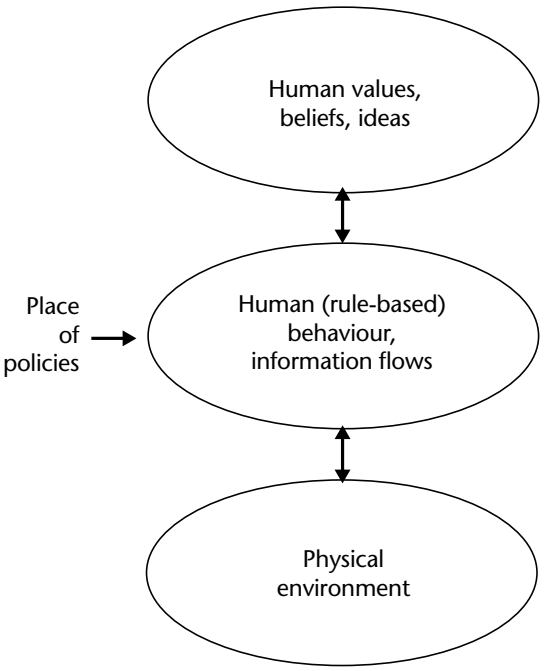


Figure 31: Three interacting levels of reality (modified from Rotmans et al., 1997).

The effectiveness of policy is another aspect to consider. Policy is meant to guide or influence human activities to achieve particular desired outcomes. But what actually occurs in the environment does not necessarily follow the policy intent. The reasons for this phenomenon are many and varied. Figure 32 illustrates some of the links and confounding factors in this process.

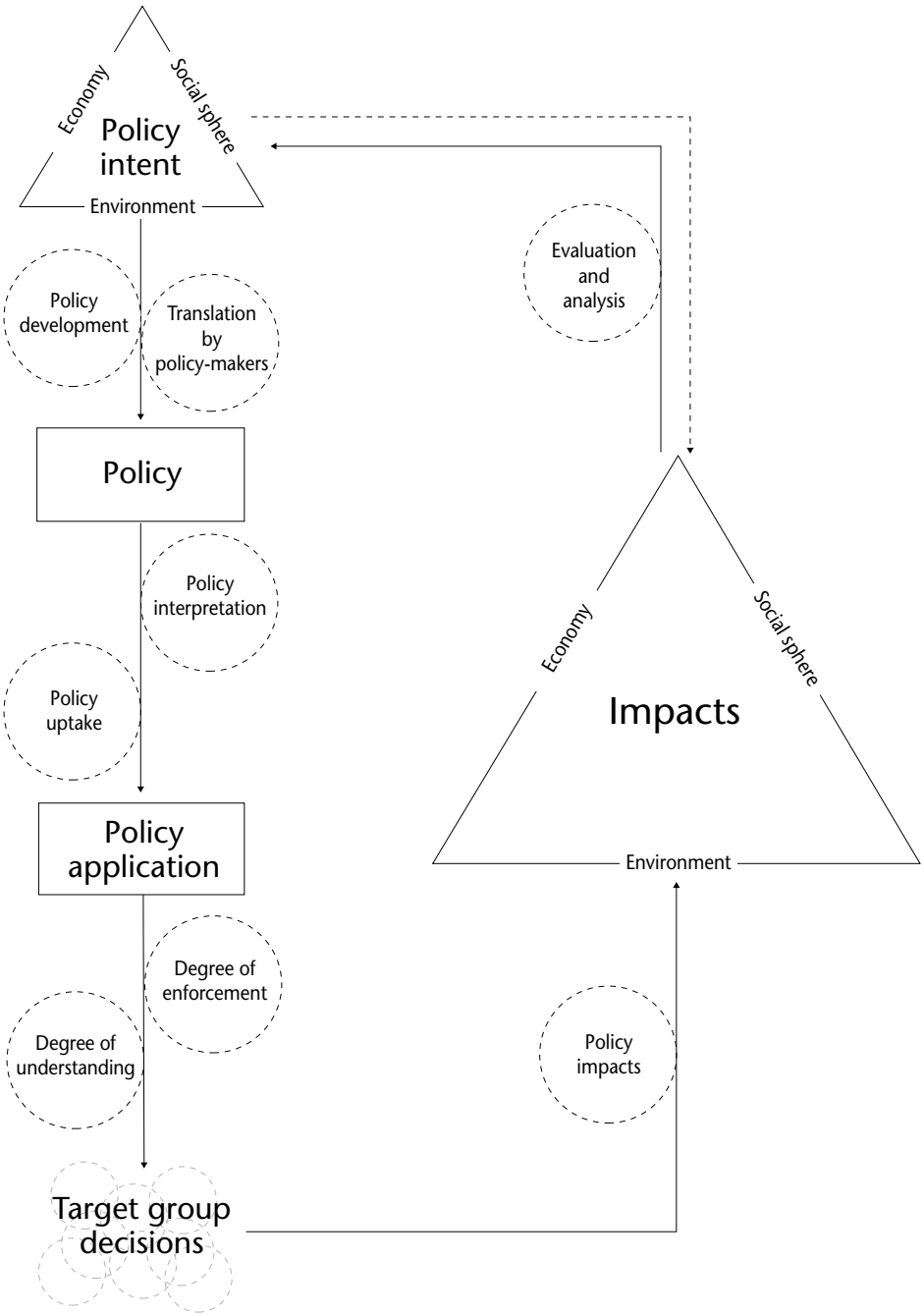


Figure 32: An example of the policy cycle for environmental reporting. Modified from Boyle, Kay and Pond (1996).

Exercise

1. Divide into groups.
2. Within each group pick a real issue and a major policy designed to affect it.
3. In the space below draw a diagram similar to the one in Figure 32 for the chosen policy issue. Consider aspects of implementation that both encourage and discourage the policy intent. What informal mechanisms are involved that encourage or discourage? How could the process be changed to better achieve the policy intent?
4. Redraw the final version of the diagram onto an overhead to share with other participants.

When finished, all participants should reconvene as a group. A representative from each group will present and explain the links between the group's chosen policy issue and the actual state of the environment.

BREAK (20 min)

3.4 Steps in policy analysis (1 hr 40 min)

Policy-making should be a continuous, iterative process

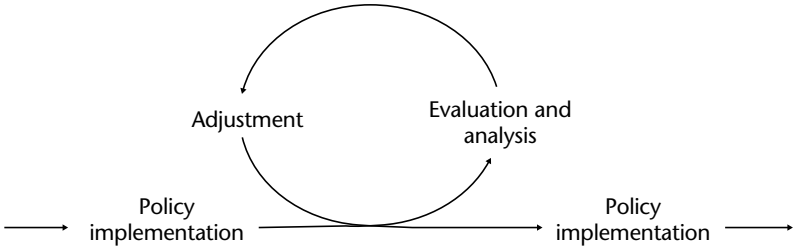


Figure 33: Policy-making is a cyclical process.

As environmental conditions and socio-economic priorities evolve, policies need to be continuously evaluated and adjusted (Figure 33). The term that perhaps best describes this process is *adaptive learning*. When performing the evaluation and analysis it is important to be consistent and structured. One method is presented below.

Performing a current policy analysis involves three main steps:

Step 1: Identify and list current policies and legislation with a significant effect on the environment.

Step 2: Identify performance criteria for the selected policies.

Step 3: Evaluate selected policies.

Step 1: Identify and list current environmental policies and legislation.

- What types of policies are there to choose from?
- Which policies should be included in the analysis?

The SOE baseline, the first module of the integrated assessment framework, provides a basis to evaluate current policies. The SOE section already highlighted the most critical environmental issues and documented trends with data and indicators. The purpose here is to find and evaluate their main policy drivers, whether environmental, economic or social.

Many seemingly unrelated policies have, in fact, significant potential to adversely affect the environment. Others can have unintended, yet beneficial effects on the environment. (The diagram and exercises earlier today outlined some of these factors.) Thus, it is critical to be aware of and to understand the implications of such policies. These links are at the heart of the holistic systems view of the environment and human society, and are a core idea in sustainable development.

Both the causes and solutions to environmental problems can lie outside the domain of the environment and environmental policies, just as environmental policies can have effects outside the environmental domain into those of the economy and society. For instance, in the past governments may have created tax policies with the belief that they were creating simply that—tax policies. But it is now clear that many fiscal macro-policies have environmental side-effects that cannot be ignored. The devaluation and collapse of national currencies in Southeast Asia during the late 1990s pushed many people into poverty. Poverty combined with misguided governments spending to mitigate the crisis may have serious long-term consequences, for example, on forests and marginal land.

3:14

3:15

In the previous discussion on what is a policy, we spoke generally of policy types and their attributes (see section 3.2). But when conducting current policy analysis, we must select a relatively small number of the most relevant policies to be practical.

The range of policies with environmental implications is broad. Consider each of these categories:

- International mechanisms
- National sustainable development policies
- National financial and fiscal policies
- Legal instruments
- Economic instruments
- Awareness raising and educational policies
- Voluntary standards and instruments
- Social policies

3:16

Not all of these policy categories will be relevant in any given country. Several of these can be used to achieve the same aim, and specific policy responses are never used in isolation. It is up to governments and society to choose which responses or combination of responses will best achieve policy goals.

Policy behaviour is strongly influenced by the context of the country and region. Cultural issues, the actual policy mix, historical precedents and the like may all have an effect on how well policy works. Policy analysis must account for these contextual issues. Nevertheless, the following checklist can be useful to identify and select current policy initiatives for analysis.

Exercise

As you read the list of policies, check those that are used in your region or country and write specific examples of each in the space provided.

Share an environmental policy example with the other participants that you think is particularly successful. Are there any policies that do not fall directly into at least one of these categories?

International mechanisms

	Examples
☐ Bilateral and multilateral agreements (for example, conventions)	
☐ Regional environmental and sustainable development bodies and organizations	
☐ Transboundary environmental laws	
☐ Trade agreements	

National sustainable development policies

	Examples
☐ Government decision to require departments to report on their sustainable development strategies and performance	
☐ Establishing and supporting national advisory groups (for example, roundtables) focused on implementing sustainable development; Institutionalizing sustainable development assessment, considering both environmental and socio-economic issues	
☐ Support for the national set of sustainable development indicators with sustainability thresholds, goals or targets	
☐ Support for national environmental or sustainable development action plans	

National financial and fiscal policies

	Examples
☐ Allocation of government budget and other resources	
☐ Green taxes	

Legal instruments

	Examples
☐ Environmental legislation	
☐ Mandatory environmental impact assessment	
☐ Mandatory disclosure of emissions	
☐ Standards, bans, limits, permits (for example, "command and control" or "end of pipe" measures)	

Economic instruments

	Examples
☐ Taxes	
☐ Subsidies	
☐ Tradeable permits	
☐ Charge systems (for example, user fees) and fines	
☐ Liability systems	
☐ Financial instruments (for example, loans for environmental funds)	
☐ Bond-deposit and refund systems	
☐ Pricing structure	
☐ Eco-labelling	

Awareness raising and education policies

	Examples
☐ Consultation with the public	
☐ Measures directed at disadvantaged groups (for example, women, youth, indigenous peoples)	
☐ Demonstration projects	
☐ Environmental journalism	
☐ Conferences and seminars	
☐ Environmental curricula	
☐ Information networking and databases (national and regional)	

Voluntary standards and instruments

	Examples
☐ Local Agenda 21	
☐ ISO 14000	
☐ Responsible care	
☐ Best management practices	

Social policies

	Examples
☐ Employment laws	
☐ Workplace safety and health regulations	
☐ Support for public participation	
☐ Gender equity related rules and regulations	

The matrix shown on the next page is a useful way to summarize the existing environmental policies for a given region or country. It also links policies with specific issues of concern.

The complete list is likely to be too long for a full analysis, but it can be reduced to a manageable length by applying selection criteria to help choose the most important policies for the evaluation. The criteria employed should be agreed based on the particular requirements and purposes of each assessment. One possible list is proposed below.

Criteria for selecting policies to include in a current environmental policy analysis (not in order of importance):

- Relevance for the public and decision-makers
- Link with key environmental priorities identified in the SOE section
- Affecting the health, income and well-being of a large number of people
- Importance of policy response to an environmental situation that is:
  - physically severe
  - changing rapidly
  - irreversible
- Related to the country's international obligations
- Potential for policy to cause disruption or conflict
- Potential for easy and feasible solutions
- Uniqueness of current policy initiative for region

Exercise

Working together as a group fill out one selected column and one selected row from the matrix with policy examples from your country or region.

3:18

Policy review matrix

Policies / Sectors	International mechanisms	National sustainable development policies	Financial and fiscal policies	Legal instruments	Economic instruments	Awareness raising and education policies	Voluntary standards and instruments	Social policies	Others?
Land									
Forest									
Water									
Atmosphere									
Biodiversity									
Marine and coastal environment									
Urban and industrial environment									

Step 2: Identify performance criteria for the selected policies.

Once a manageable number of high-priority policies have been identified, the next step is to determine criteria that help evaluate their performance from an environmental and sustainable development perspective.

In an ideal case, performance criteria and the requirement for evaluation are built into policies, and the criteria are easily associated with routinely monitored indicators. If this is the case, evaluation is relatively straightforward, assuming that both the indicators and criteria appropriately represent the effects of the particular policy.

3:19

Usually, however, policies are designed either without clearly defined and specific performance criteria or criteria that are not necessarily related to *environmental* performance. This is often so for economic policies related to taxation, trade or investment. Although these may have very significant links to environmental issues—in fact they may be the key drivers of environmental change—their built-in evaluation criteria are usually limited to economic performance. This makes their evaluation particularly challenging from an environmental and sustainable development perspective.

Performance criteria can range from general and descriptive (for example, whether a policy is in compliance with broadly defined principles), to specific and quantitative (for example, a target value associated with a specific indicator on a specific time scale). In essence, they provide a basis for comparison between planned or desirable performance and actual performance. Table 7 provides examples for some main types of performance criteria.

3:20

Table 7: Main types of criteria.

Type of criteria	Example
Benchmark	Comparison with a documented best-case performance related to the same variable within another entity or jurisdiction. The policy is evaluated based on its impact in a given jurisdiction compared with conditions in the benchmark or reference jurisdiction. *Example: highest percentage of households connected to sewage system in a comparable entity in the same jurisdiction.*
Thresholds	The value of a key variable that will elicit a fundamental and irreversible change in the behaviour of a system. The policy is evaluated based on its role in making the system move toward or away from the threshold in any given period. *Example: maximum sustainable yield of a fishery.*
Principle	A broadly defined and often formally accepted rule. If the definition of the principle does not include a relevant performance measure, the evaluator should seek a mandate to identify one as part of the evaluation. *Example: the policy should contribute to the increase of environmental literacy.*
Standards	Nationally and/or internationally accepted properties for procedures or environmental qualities. The policy is successful if it helps keep performance within specified limits. *Example: water quality standards for a variety of uses.*
Policy-specific targets, including those specified in legal agreements	Determined in a political and/or technical process taking past performance and desirable outcomes into account. *Example: official development assistance shall be 0.4 per cent of national GNP.*

3:21

Step 3: Evaluate selected policies.

The ultimate purpose of policy evaluation is to influence decision-making and initiate policy change when and where required. It is quite clear that a recommendation for a policy shift is more likely to be adopted if those who are to make the move are involved in the analysis from the point where critical environmental issues are identified, indicators and criteria selected and the link to specific policies is confirmed. Therefore, approaching this third phase of policy assessment in the spirit of collaboration among stakeholders is important.

Since each evaluation is unique, specific circumstances will cause a different process to unfold each time it is carried out. However, as pointed out before, the process also has some common elements. Building on our earlier diagram of the policy cycle, Figure 34 highlights the importance of expected versus actual performance. Specific policy expectations, or *criteria* as they are sometimes called, should be identified early in the policy planning process, although in reality they often have to be created retroactively once the need for them in policy evaluation becomes obvious. Note that indicators and associated targets play a critical role in determining both policy expectations and actual impacts.

Policy evaluation focuses on comparing the *actual* and expected performance of a given policy based on relevant performance criteria. As neither environmental issues nor policies can exist in isolation, any given environmental trend will be a combined result of interacting policies and natural factors some of which are outside the control of human decision-making. For instance, water quality change can be a result of not only agricultural policies affecting land-use and runoff as well as policies affecting wastewater discharge, but also of seasonal weather patterns. Also, any given policy will have an impact on a range of environmental factors. For example, energy subsidies and increased energy consumption may have implications for air quality, overall material use and waste production, but also global climate change. It may well be that a given policy does well with one particular type of environmental impact and criteria but fares poorly with another.

Although policy evaluation may be focused on analyzing a single policy, it in fact requires that the links and interactions of policies are realized, as in the previously practised web of policy influences.

3:22

To further understand policy analysis and some of the issues that arise during the process, you will work through a policy analysis exercise for Myland in the next section. There are many tools that help simplify the policy-analysis process. The action-impact matrix (AIM) shown in Table 8 is an example of a useful tool to organize policies and consequences in a way that shows the possibilities for combined effects.

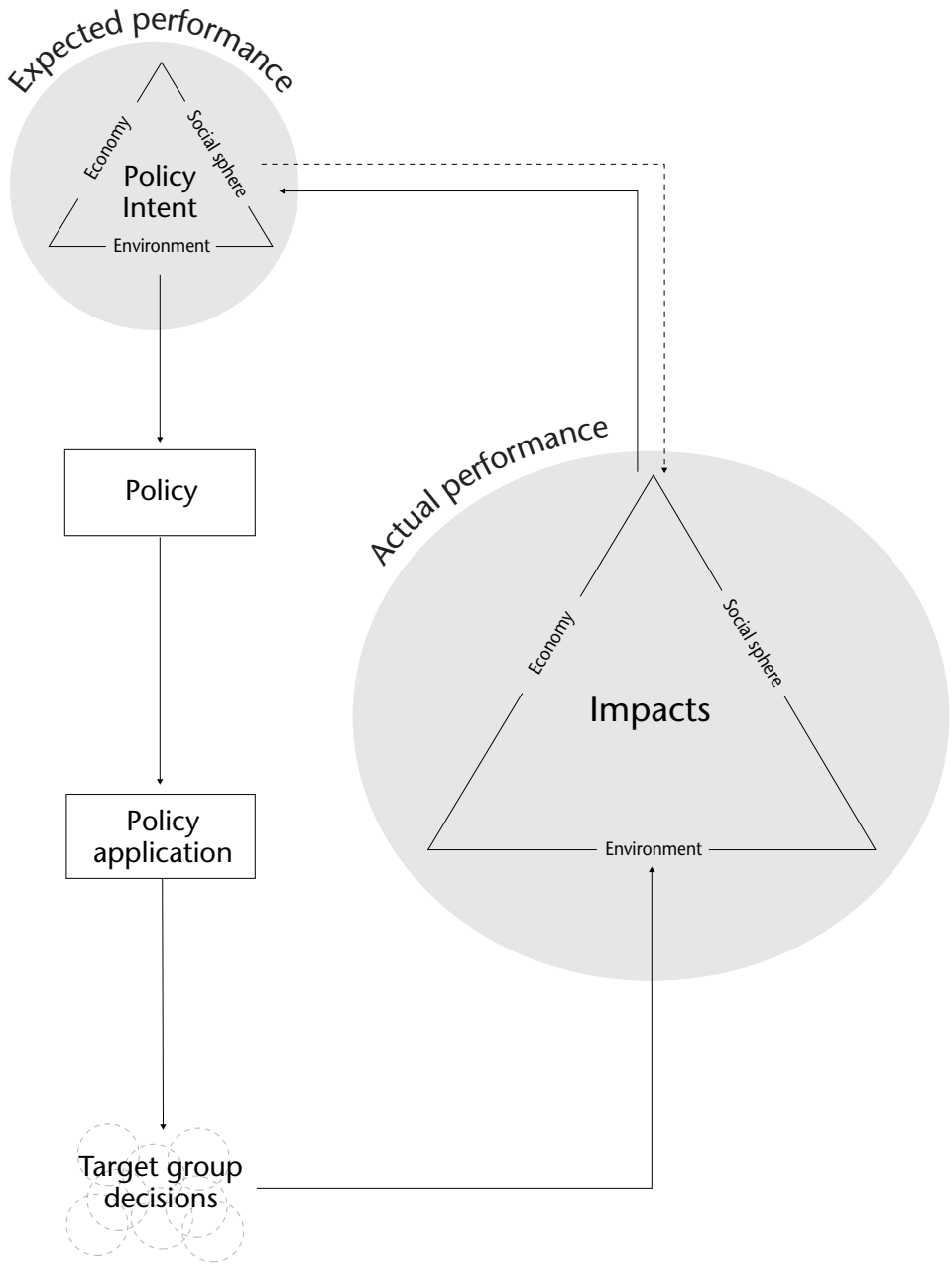


Figure 34: Linking expected and actual policy performance.

Table 8: Simplified example of an action impact matrix (AIM)[1]

Action/Policy	Main objective	Effects on key sustainable development issues			
		Land degradation	**Air pollution**	**Resettlement**	**Others**
Macroeconomic and sectoral policies	Macroeconomic and sectoral improvements	Positive effects because of removing distortions; negative effects mainly because of remaining constraints			
• Exchange rate	• Improve trade balance and economic growth	(-H) (deforest open-access areas)			
• Energy pricing	• Improve economic and energy use efficiency		(+M) (energy efficiency)		
• Others					
Investment projects	Improve efficiency of investments	Investment decisions made more consistent with broader policy and institutional framework			
• Project 1 (Hydro dam)	• Use of project evaluation (cost-benefit analysis, environmental assessment, multi-criteria analysis, etc.)	(-H) (inundate forests)	(+M) (displace fossil fuel use)	(-M) (displace people)	
• Project 2 (Re-afforest and relocate		(+H) (replant forests)		(+M) (relocate people)	
• Project N					

1 A few examples of typical policies and projects as well as key environmental and social issues are shown. Some illustrative but qualitative impact assessments are also indicated; thus + and - signify, respectively, beneficial and harmful impacts, and H and M indicate, respectively, high and moderate intensity. The AIM process helps to focus on the highest priority environmental issues and related social concerns. (Source: Munasinghe, 1993 as quoted in Atkinson et al., 1997.)

LUNCH (1 hr 30 min)

3.5 Current policy analysis for Myland

To do this exercise you will have to draw upon all that you have learned about the integrated environmental reporting process. You may want to refer to the pressure-state-response model and other information in section 1.2.

Case study exercise, part I (1 hr 30 min)

Divide into groups representing four different stakeholders as in yesterday's exercise. Each group will represent a task force that meets to analyze current environmental policy. The ultimate goal is to analyze policy for its implications on sustainable development issues in Myland. Alternatively, if you have sufficient information available, you may decide to do the exercise with a real policy issue in a country of your region. If you choose to do this, the references to Myland in this section should read as references to your selected country.

- Choose one of the environmental conditions that has been identified as an issue for Myland (in the previous exercises). Write it in the space above the action impact matrix on the next page.
- List three pressures that contribute to this environmental issue.
- Determine three policies that could have given rise to this issue and determine the original intent of these policies—probably quite different from their actual impact on the environmental issue you chose!
- In the fourth column write down the effects each policy has on the issue you selected.
- Consider the effects of each policy on two other key environmental issues of your choice.

Present your results to all participants and discuss.

3:26

Action impact matrix (AIM) for Myland policy analysis.

Environmental issue/condition: ________________________

Pressures contributing to the selected environmental issue	Action/Policy	Effects on key environmental conditions			
		Original policy intent	Environmental issue selected: ______	Second environmental issue: ______	Third environmental issue: ______
Pressure 1	Policy 1				
Pressure 2	Policy 2				
Pressure 3	Policy 3				

Case study exercise, part II (1 hr)

Within your groups, address the following questions:

- Draw conclusions about the success or failure of the policies you selected for analysis regarding the broad goal of sustainable development in Myland. What should be done differently in the future? Use the table on the next page to help organize your evaluation.

  (Note: A full assessment might include sustainable development criteria and performance indicators. We are only looking for general impressions in this exercise.)

- When you have completed the table, discuss the social issues and values implicit in the policies that are revealed in this discussion.

Policy evaluation regarding sustainable development goals for Myland.

	Overall performance (goal = sustainable development)	**Major successes or failures regarding the goal**	**Priority actions for the future**
Policy 1			
Policy 2			
Policy 3			
Policies as a group			

3:27

Study/discussion questions

Q: What is the role of criteria in policy assessment and evaluation?

A: _____

_____

_____

_____

Q: How can you decide what policies to assess and evaluate?

A: _____

_____

_____

_____

Q: What is the role of indicators in policy assessment and evaluation?

A: _____

_____

_____

_____

3.6 Roundtable discussion and wrap-up (15 min)

The instructor will summarize this day's program and identify the topic for session 4, followed, if time permits, by a brief roundtable discussion.

3.7 Bibliography

Atkinson, G., R. Dubourg, K. Hamilton, M. Munasinghe, D. Pearce and C. Young. *Measuring sustainable development: Macroeconomics and the environment*. Cheltenham: Edward Elgar Publishing, Inc., 1997.

Boyle, M.S., J.J. Kay and B.A. Pond. *State of the landscape reporting: The development of indicators for the provincial policy statement under the Land Use Planning and Protection Act*. Ontario Ministry of Natural Resources, 1996.

Jenkins, W.I. *Policy analysis: A political and organizational perspective*. London: Martin Robertson, 1978.

Munasinghe, M. "The economist's approach to sustainable development." *Finance and Development*, 30: 16-19, 1993.

Rotmans, J., B.J.M. de Vries and M.B.A. van Asselt. "Concepts" in *Perspectives on global change: The TARGETS approach*, edited by J. Rotmans and B. de Vries. Cambridge: Cambridge University Press, 1997.

3.8 Session 3 evaluation (15 min)

You may provide comments either in English or in your mother tongue. Please make your comments as specific as possible.

What would you like the trainers to stop doing? _____

What would you like the trainers to start doing? _____

What would you like the trainers to continue doing?_____

Other comments:_____

Please detach and hand in the page after finishing. Thank you.

Session 4: Assessing the future

Session 4 at a glance

10 min	Introduction to the session and logistics (4.1)
50 min	Emerging environmental issues (4.2)
50 min	Reasons to conduct forward-looking policy studies (4.3)
20 min	BREAK
1 hr	Analytic framework for assessing policy options and scenarios (4.4)
50 min	Modelling tools for scenario analysis (4.5)
1 hr 30 min	LUNCH
45 min	Practising scenario analysis: Part I (4.6)
1 hr 15 min	Practising scenario analysis: Part II
30 min	Workshop summary and wrap-up (4.7)
	Bibliography (4.8)
30 min	Final training program evaluation (4.9)

4.1 Introduction to the session and logistics (10 min)

Session objectives

At the end of session 4 you will:

- Understand the relevance and process of identifying emerging environmental issues;
- Recognize how policy studies fit into the overall process of integrated environmental reporting;
- Understand the reasons for conducting forward-looking policy studies;
- Have learned about scenario analysis and tools and techniques to employ in alternative policy analysis; and
- Have worked through a scenario analysis.

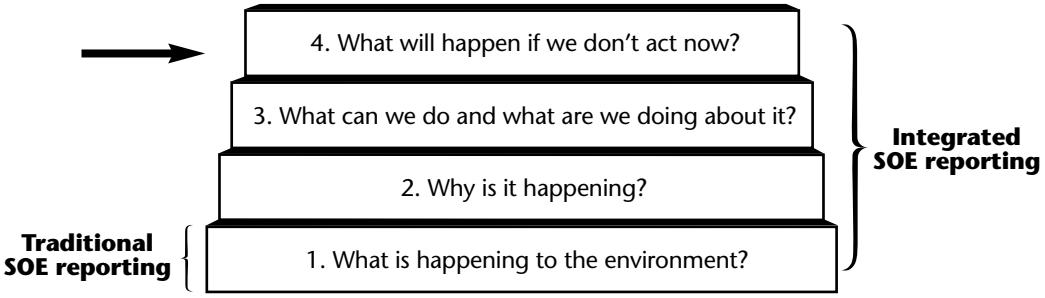


Figure 35: The place of forward-looking assessment in the integrated environmental reporting framework.

Session 4 deals with the last question: Where are our policies taking us? Is this where we want to go? What other policies could be more useful?

What can we do about it, that is, what consequences might various policy alternatives have on the state of the environment?

Forward-looking policy studies—and scenario analysis in particular—can help us consider where different policy options could lead. Such discussions expose values and preferences for different possible futures and inform the decision-making process.

4.2 Emerging environmental issues (50 min)

4:4

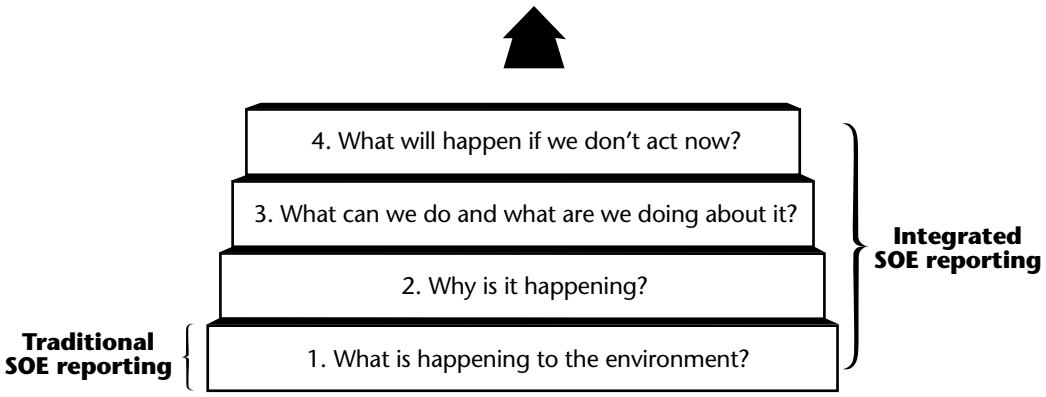


Figure 36: Place of emerging environmental issues in the integrated environmental assessment framework.

Identifying emerging environmental issues is the final component of the integrated environmental reporting framework.

It attempts to address the following questions:

4:5

- What is happening now that might affect the environment in the long term?
- What are we doing to monitor the status and urgency of this issue?
- What are we neglecting that could turn this issue into a crisis?

As changes unfold in the ways humans interact with the Earth, so, in turn, do global resources and processes change. As this context changes, new environmental issues continually emerge. This section deals with the task of detecting these issues early on so that actions may be taken before they become crises. The task is challenging for the following reasons:

- We tend to think of the state of the environment as a static entity at a moment in time. It is more realistic, however, to think of the environment and global systems as a series of dynamic and interconnected processes changing and interacting over time. This is hard to imagine since time scales are often so large that change within an individual's lifetime is imperceptible.
- Environmental issues have been recognized for only a relatively short period, mostly within the last 50 years. We have had little practice and few opportunities to learn from our theories and mistakes.
- This is the realm of uncertainty. We are not working with hard facts, but often with controversial or insufficient evidence and testimony.
- For all our attempts at forecasting, there will always be surprises.

Nonetheless, there have been encouraging results so far. Recent scientific work has helped to illuminate some very significant changes in global ecosystems, while international events such as Agenda 21 have focused public attention on them. Even since the Rio agreement, one can point to a broad range of emerging issues in the global environment. Some are already being addressed—adequately or not—in new international conventions like the Kyoto Protocol for reducing greenhouse gas emissions.

What are emerging environmental issues?

We use the term *emerging* to refer to a certain class of environmental issues.

An emerging environmental issue can be defined as an issue (positive or negative) that is not yet generally recognized but which may have significant impact on human and ecosystem health in the 21st century and beyond.

Some of the driving forces or causes that lead to new environmental trends and issues are natural (for example, fluctuations in solar activity), while others are caused by human society. Changes in the nature and scale of human activities may give rise to emerging environmental issues.

Consider, for example:

- New technologies in crop production
- Emergence of new economies
- Changing attitudes of the business community
- Increase in global tourism

The extent of influence that these issues will have can only be speculated.

Environmental issues that may become priorities in the 21st century can be clustered in three groups: unforeseen events and scientific discoveries; sudden, unexpected transformations of old issues; and well-known issues for which the present response is inadequate—although their long-term consequences are well known.

In hindsight we can identify examples from the past that had few, if any, foreseen consequences, such as the following:

- Effects of pesticides on birds (1950s)
- Long-range transport of atmospheric pollutants (1960s)
- Death of the Aral Sea through uncontrolled water extraction (1970s)
- Elimination of the guinea worm through water management (1980s)
- Collapse of North Atlantic fish stocks (1990s)

4:6

For each of the above issues there was a period, sometimes a decade or longer, when only a few researchers and others knew of the potential significance of the issue for the environment, but most others, including key decision-makers, did not.

Why consider emerging environmental issues?

Identifying and reporting on emerging environmental issues is, without a doubt, a difficult and resource-intensive process. From the previous discussion you may be able to understand the importance of making this investment at regional, national and international levels despite the many obstacles. Here are some specific reasons:

- Raise awareness of the issues;
- Start timely policy and management action before the issue becomes a crisis;
- Guide environmental research and data and information collection;
- Increase understanding of ecosystem dynamics and the effects of human activities; and
- Promote learning and proactive management in human societies.

4:7

Identifying emerging environmental issues can go a long way toward anticipating problems before they become crises, or recognizing opportunities before they are lost. (But we must also remember that mistakes and surprises will occur; therefore, we need adaptive policies to complement anticipatory efforts.)

A process for identifying emerging environmental issues can take many forms. GEO provides one method that has already been put into practice.

Let's look at one example in more detail and map the development of the issue.

Table 9: The emergence of an environmental issue and crisis.

Collapse of the North Atlantic fishery	
Developments in human and natural systems (with potential for significant environmental consequences)	• technological efficiency in fishing techniques • high market demand • growing investment and dependence on fishery for livelihoods (individuals, communities and regions) • cycles and limits of fisheries resource not well understood
New evidence and theories suggest potentially large environmental consequences	• rapid collapse of fish catches • some scientists stating that sustainable fish yields were being exceeded • studies of complex systems suggesting thresholds and complete collapse, not a slow linear decline in fish stocks • anecdotal evidence from long-time fishermen warning of over-fishing
Lack of adequate policy, action or leadership	• large-scale regional economic dependence on resource • government believed that costs to compensate or retrain people in fishing communities too high • no protection of resource from foreign fishermen and large commercial vessels • competition forced all parties to "take what they could get" (sustainable management theories and policies not upheld)
Result: The threshold for maintaining fish stocks was not met and, within a year, the North Atlantic fishery collapsed. This catastrophe left entire coastal areas with a legacy of severe economic depression and threatened the way of life for whole communities in Atlantic Canada. Prices for fish, especially cod, skyrocketed on the world markets. It is believed that it will take years, probably decades, for a viable fishery to develop again in the North Atlantic region.	

We are learning to recognize early warnings of emerging issues through new scientific techniques and processes such as integrated environmental reporting. In the last decade or so, a number of early warning signs have been identified, and, armed with this information, we can act now to reduce damage or encourage remedial action.

Recently identified emerging environmental issues:

- Global trade and its effects on the environment
- Antibiotic resistance
- Hormone disrupters
- Climate change
- Damage to the ozone layer
- Regional-scale forest fires
- Loss of biodiversity
- Unintended genetic transfers
- Coral reef bleaching
- Weapons as waste
- Decommissioning of military installations

Exercise

Work together as a group to brainstorm some possible emerging environmental issues from your region.

Examples of emerging environmental issues from the region	**What, if anything, is being done to address this issue?**

4.3 Reasons to conduct forward-looking policy studies (50 min)

The future is inherently uncertain and unpredictable: no one can predict it with absolute certainty, but it is very important that society consider the range of policy choices available and the range of possible outcomes associated with alternative policy paths. This is particularly important for countries whose environments are rapidly changing. At one time this would have applied to only a handful of countries, but today this includes all nations (Ringland, 1998).

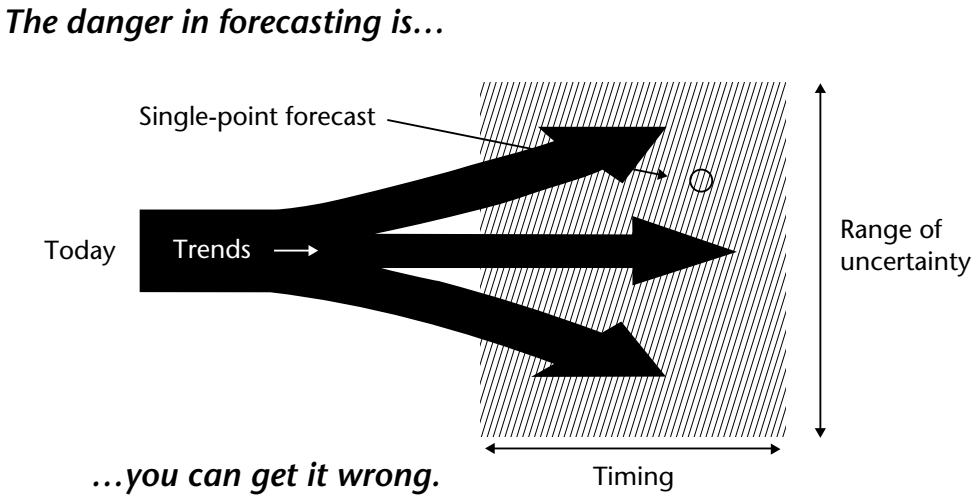


Figure 37: The danger in forecasting.
(Source: ICL as quoted in Ringland, 1998.)

Given the uncertainty of outcomes and the consequences of policy choices, thinking about and reporting on the future is like insurance. It may reduce the risk of unpleasant surprises and broaden the perception of the public and policy-makers in at least the four following ways:

- ***Consequence assessment:*** assessing the implications of present actions, decisions, policies and so on;
- ***Early warning and guidance:*** detecting and avoiding problems before they occur;
- ***Proactive strategy formulation:*** considering the present implications of possible future events; and
- ***Normative scenarios:*** envisioning aspects of possible or desired futures.

(R. Slaughter, as quoted in Ringland, 1998)

Achieving all four aspects of forecasting is difficult. The political setting is often complex and involves many institutions. Nevertheless, the ability to think ahead—to anticipate outcomes and uncertainties—is an essential capacity for sustainable development. Assessing alternative development outcomes or scenarios is about destinies and choices. It is partially about destinies, because the range of possible futures is limited, given the current state and nature of development. But it is even more about choices because the differences between potential futures can be vast even though all start from the same point: the conditions that prevail today.

Exercise

Can you think of an environmental policy or decision that was prepared based on certain forecasted trends or developments, but got it wrong? Briefly present your example to all participants. You may want to record examples mentioned by others.

Table 10: Examples of problems that could have been avoided if we had used scenarios for the future.

Country	What was the policy or decision?	What went wrong?
Example: Canada	In the Great Lakes region, government tried to reduce lake pollution by lowering phosphorus concentrations in effluent water from municipal sewage treatment systems.	Water quality improved not to the extent expected because phosphorus runoff from agricultural land was not understood and was thus overlooked.

Discuss with all participants how these problems could be avoided by thinking about policy options. What would that have meant for the planning process?

Forward-looking policy studies aim to provide responses to the following questions:

- Where are we headed, given current environmental conditions, trends and policies?
- What are the policy options and the range of possible outcomes?
- What will be the consequences of policy options on the overall environment?
- What are the implied social and ecological values when discussing preferred outcomes?

Whatever the answers, they need to build on and be consistent with the process and results of the previous phases of the integrated environmental assessment process. Consistency needs to occur in the following areas:

- To a large extent future policies are understood through retrospective analysis; the past provides some of the best clues to understanding future societal and environmental interactions.
- Forward-looking policy analysis must be based on facts through previously identified trends and indicators.

Assessing policy options needs to be based on a *systems approach*, similar to that used in previous sections of the integrated assessment process. Although this is unavoidably more complex, it is also more realis-

tic. A holistic perspective may help identify policy options and consequences for decision-makers that could not otherwise be identified when analyzed in isolation.

Examining alternative policy paths holistically is not only more complex, it can also highlight *uncertainties* and inconsistencies with socially desirable outcomes. *Learning* from this process is a key purpose of policy options studies, and it results in a better understanding of the range of potential policy paths and associated outcomes for a given time horizon. A country or government that considers possible but unlikely development paths will have a much better chance of successful *adaptation* if, for whatever reason, events lead to a less likely path.

Alternative paths that arise from sequences of policy decisions and events and are looked at in a whole-system setting are called *scenarios*. The broadening range of possible outcomes is called a scenario funnel, as shown in Figure 38.

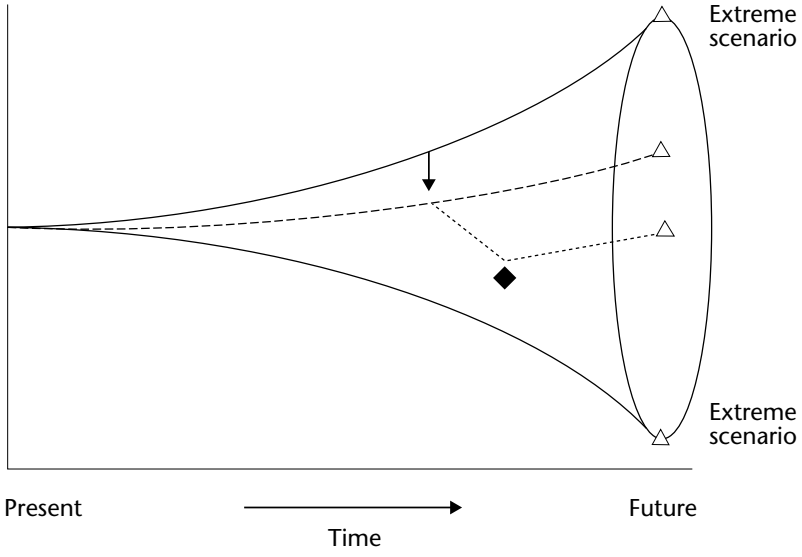


Figure 38: Conceptual diagram showing the effect of a disruptive event on the range of possible scenarios.
(Source: Reibnitz, 1988.)

BREAK (20 min)

4.4 Analytic framework for assessing policy options and scenarios (1 hr)

Policy options and futures can be assessed in many ways but some elements are common to all forward-looking studies. These elements are:

Task 1: Define the major environmental issue and policy question.

Task 2: Define the current situation (data conditions, trends and existing policies).

Task 3: Estimate the consequences of the current situation on the environmental issue.

Task 4: Define policy options.

Task 5: Estimate the changes in impact (for each option).

Task 6: Draw conclusions about the range of possible outcomes.

4:15

Note that this framework does not necessarily imply a sequential step-by-step process. It depends partly on the information available. As well tasks may need to be reiterated as understanding of the policies and of their consequences improves.

For example, the policy question may already be clear or it may need to be formulated. Perhaps a comprehensive state of the environment reporting process and current policy analysis (that is, task 2) must be done first to identify priority issues. Or an issue may become a priority because of public lobbying or the ratification of an international agreement. Here, the policy question is defined but the current situation and the issue itself must be explored before policy options can be identified.

Let's look at a specific example from *GEO-2000* to clarify the framework that deals with water availability in West Asia (UNEP, 1999). We will work step-by-step as a group through the case study.

Task 1 – Define the major environmental issue and policy question.

Three scenarios have been considered to study the water balance that is required to ensure sustainable development in West Asia for the period 1995-2015. For this study the policy question has been phrased as follows:

"Is there an urgent need to address water issues from all perspectives or will isolated measures be sufficient to deal with the water shortage crisis expected for the near future?"

4:16

Task 2 – Define the current situation (data conditions, trends and existing policies).

The West Asia region, occupying 4 million km^2, includes the Mashriq countries and territories: Lebanon, Syria, Jordan, Iraq, the West Bank and Gaza, and the Arabian Peninsula countries: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, UAE and Yemen. Most of this region has an annual rainfall of less than 100 mm, so some 80 percent of the region is classified as semi-desert or desert land. Only 11 percent is suitable for agriculture, with 2.5 percent under irrigation and 8.6 percent under rainfed cultivation.

Desalination technology was introduced in the mid-1950s and has developed quickly to counteract the shortage in conventional water sources. The 45 desalination plants in the region in 1992 had a total designed capacity equal to 41 percent of global capacity. The cost of desalination ranges from \$1 to \$1.5 per m^3 of water. All desalination plants have some detrimental effects on the environment since they pollute the air and contaminate the soil with brine.

Wastewater treatment in the Arabian Peninsula is an increasing source of water, driven by escalating water use in urban areas. Current plants, which process primary wastewater and treat sewage water, could handle about 43 percent of all domestic wastewater. This reused treated water, however, is

used mainly to irrigate fodder crops, gardens, highway landscapes and parks. The remainder is dumped at disposal areas to infiltrate the shallow aquifers.

Except in large cities in Mashriq, wastewater is discharged into watercourses and only part is used for irrigation. Recycled irrigation water is rarely used in the Arabian Peninsula since excess irrigation water infiltrates and reaches the water table. In the Mashriq subregion, only Syria exploits this water. This source has, however, future potential if proper irrigation practices are applied. Other forms of nonconventional water sources, such as rainwater harvesting, weather modification, and so on, are still in the research stage.

Population growth in West Asia affects all sustainable socio-economic development. The population in 1995 was an estimated 85.6 million with an average growth rate of 3.73 percent for the Arabian Peninsula and 3.0 percent for Mashriq. The high growth rate in the region exceeds the rate of developing water resources; consequently, the annual per capita share of water resources is decreasing—and at an increasing rate.

Five countries of West Asia have per capita water use of less than 500 m^3 a year, half the benchmark figure of 1,000 m^3 a year, which identifies chronic water scarcity. Only two countries, Iraq and Syria, have actually exceeded the 1,000 m^3 a year benchmark, while Saudi Arabia and the UAE have done so only by mining their groundwater reserves.

In descending order of importance, the national economy of most countries of West Asia depends on oil and oil-related industries, commerce, light industries and agriculture. Because of the increase in population and urbanization, domestic water and industry needs are escalating at rates faster than the available water resources. Furthermore, the policy of food self-sufficiency imposes continuous constraints on allocating water resources, which would otherwise reduce the share for agriculture in favour of increased domestic and industrial demand. Currently, the agricultural sector takes 85 percent of available water resources in the Arabian Peninsula and 95 percent in the Mashriq, with domestic water use at 14 percent and 4 percent respectively. Industrial use for both subregions accounts for less than 2 percent.

Task 3 – Estimate the consequences of the current situation on the environmental issue (the 'business as usual' or baseline scenario).

The following points are the working assumptions:

- Population growth based on 1997 UN projections;
- No further development of water resources;
- Total water demand estimated on established criteria;
- Secure domestic and industrial water use as first priority; and
- Improving agricultural productivity per unit of water to achieve a 17 percent savings in agricultural water demand by 2015.

Future water demand in the business-as-usual scenario

The Arabian Peninsula already has a water resource deficit. The 1995 total annual water demand of 29,565 million m^3 is estimated to increase to 47,320 million m^3 by 2015, whereas the total available water is unlikely to exceed 15,400 million m^3. Under these circumstances it will be difficult to maintain emphasis on regional food production, so widespread import of foodstuffs will become necessary.

The water deficit is partially compensated by over exploiting shallow and deep fossil aquifers and by extensive installation of costly desalination plants, with the detrimental effects of quickly depleting aquifer reserves, possible conflicts arising from differential use of aquifers shared between states,

and deteriorating water quality and salinization of agricultural lands. Current wastewater treatment facilities can deal with only 35 percent of the urbanized and industrial waste disposal. Pollution from inappropriate disposal of untreated wastewater will create health hazards through contaminating shallow groundwater aquifers.

These issues are all aggravated by general weakness among the institutions dealing with water affairs, because of inadequate technical capabilities and unsatisfactory coordination with other concerned water authorities.

The Mashriq subregion, with nearly 10 times the renewable water resources of the Arabian Peninsula, is in a more favourable position, and available resources can theoretically sustain the projected use of 95,875 million m^3 in 2015. Strict control measures will be needed to curb over exploitation, inefficient reuse of wastewater, untreated industrial waste and pollution of shallow aquifers. Institutional capacity building and enforcing legislation also require attention, as well as the continuing problem of potential conflicts between neighbouring states over equitably distributing shared water resources.

Scenario 1 appears pessimistic or even unrealistic, but considering this path is often justified for the following reasons:

- West Asia is an arid region, with 80 percent of its land classified as desert or semi-desert.
- Most of the easy and promising water sources have been developed; remaining locations require heavy investments, laborious investigations and intensive research programs.
- The potential conflicts over shared water resources—a sizeable portion of total resources—requires lengthy and difficult negotiations before equitable reconciliation is possible. This has postponed many water development schemes.
- The political conflicts, regional wars and disputes that have occurred in the last three decades, along with the lack of permanent settlement, have drastically affected the economy of the region and upset the socio-economic development plans of all member countries.

The expected achievements in this scenario would focus on reducing the agricultural water demand by 17 percent by 2015. This saving will result from agricultural research on maximizing agricultural productivity per unit of water and applying appropriate technologies, including biotechnology.

Task 4 – Define policy options.

Scenario 2 – Increasing supplies

- Increase surface and groundwater resources for both the Arabian Peninsula and the Mashriq subregion by 100 million m^3 a year, to give a total increase of 2,000 million m^3 a year in 2015 for each subregion.
- Increase desalination capacity to 3,000 million m^3 a year in the Arabian Peninsula.
- Increase recycled wastewater to 3,000 million m^3 a year in the Arabian Peninsula and to 2,000 million m^3 a year in the Mashriq.
- All other assumptions for population, water consumption rates, domestic and industrial water use, and policies of food self-sufficiency are the same as those in scenario l.

Scenario 3 – Increasing supplies and rationalizing consumption

- Further gradual, rational decrease of the consumption patterns outlined in scenario 1 and 2 is achieved by increasing the efficiency of irrigation, reviewing the price of water, and improving wastewater management, resulting in a decrease in total water demand of the Mashriq and Arabian Peninsula of 6,000 and 5,600 million m^3 a year respectively by 2015.
- Other assumptions of scenario 1 and 2 as given.

Task 5 – Estimate the changes in impact (for each option).

The intensive research foreseen in various fields for both conventional and non-conventional water sources in scenario 2 yields an additional 4,000 million m^3 a year by 2015.

Scenario 3 will require extensive research and programs to develop the additional water resources foreseen in scenario 2, and, in addition, bring about optimum water use and minimal water losses to gain about 11,600 million m^3 a year by 2015. This might be achieved by resolving the major problems that hinder efficient use of available water resources.

Task 6 – Draw conclusions about the range of possible outcomes.

Finding sustainable solutions for water resources in the West Asia region requires both technical development and policy intervention. The current water use practices clearly will be unsustainable in the near future, and even intensified research and technological development to increase the supply may leave a gap of 14.1 percent between water demand and supply by 2015 for the whole of West Asia. The region will have to rely on both technological options to boost supply and policy remedies considered in scenario 3 to produce the most acceptable outcome, even though the regional water deficit will still reach 6.6 percent by 2015. This scenario will require determination and systematic effort, but failure to do so would result in deteriorating quantity and quality of water supplies, widening food deficits, social unrest and, possibly, regional conflicts. None of these scenarios reverses the trend of decreasing water availability, but the strict and combined implementation of technological and policy measures would best reduce the rate of decline and help buy the time needed to develop better alternatives.

Exercise

The table on the next page lists examples of policy measures that have been identified in scenario 3 of the West Asian study in *GEO-2000*. The planning, institutional and other implications of two types of policy measures for priority setting and groundwater protection are provided. Review the strategies for these measures then work together as a group to provide examples for the two additional policy measures—water pollution control and increasing water use efficiency—identified in the table. Once you are done try to identify two other clusters of policy measures and give examples of their implications. Discuss results with all participants.

Policy	Planning and analysis	Legal and institutional	Regional economic	Projects and programs
Priority setting of water supply for domestic, industrial and agricultural uses	• Water resources assessment and development • Population growth projections • Water demand projections • Water quality monitoring	• Protection zones for surface water, well fields, springs, and catchment area • New competent authorities • Control illicit connections • Training of staff	• Increasing water tariffs for high segments of water demand • Provision of funds for new water facilities • Strict regulation and penalties • Wide application of metering system • Water viewed as economic commodity • Full participation of users	• Continuous maintenance of water facilities and networks • Construction of water purification plants and desalination plants for future needs • Information, education and campaign to change consumer behaviour • Improve sanitation condition
Groundwater protection	• Comprehensive groundwater quality monitoring • Simultaneous use of surface and groundwater	• Controlling rate of pumping to prevent mining the reserve • Application of metering system • Adoption of detailed well-drilling licensing • Strict penalties for groundwater depletion and contamination	• Change irrigation charge systems to be based on the volume of water used • Cancel subsidy for well drilling • Appropriate incentives for application of water irrigation technology • Review water tariff for domestic and industrial use	• Application of water-saving technologies • Update studies on groundwater availability for sustainable water management • Artificial recharge • Public awareness campaign and educational programs
Water pollution control				
Increasing water use efficiency				
Others:				

The material below on scenarios is for further reading on your own time. Please review this text during the lunch break before this afternoon's exercise.

Further reading

Scenarios of the future

Scenario analysis offers structured accounts of possible long-range futures. The value of scenarios lies not in their capacity to predict the future, but in their ability to provide insight into the present. Scenarios bring the future to bear in today's decisions by helping to identify drivers of change, the implications of current trajectories and options for action. This is a critical contribution since the world is dominated by fragmented rationality—for example, firms concerned with only profit, decision-makers with short-term agendas, scientists conversant in only their subspecialties, and households with ever increasing material accumulation. The danger is that such local rationality taken together leads to global irrationality, to a worldwide pattern that no one would have chosen.

Scenarios enlarge the canvas to include a holistic perspective over space, issues and time. They illuminate the contradiction between the geometric growth of population, resource use and economic activity and the limits of a finite planet. In conventional development paradigms, long-range global affluence and environmental preservation are assured, it is hoped, through market adaptations, perhaps with the help of well-designed policies. But there are other ways to reconcile the tension between economic growth and environmental limits. Some visions are bleak, and include the possibility of catastrophic environmental and social collapse—or, perhaps to prevent such breakdown, the emergence of authoritarianism. Others are idealistic, picturing a root and branch transition where post-consumerist values and lifestyles form the basis for a more just, humane and ecological stage of civilization.

These three scenarios of the future—*Conventional Worlds, Barbarization*, and *Great Transitions*—are described by Gallopin et al., 1997. The *Conventional Worlds* scenarios assume that current trends play out without major discontinuity and surprise in the evolution of institutions, environmental systems and human values. In *Barbarization* scenarios, fundamental social change occurs, bringing great human misery and collapse of civilization. The *Great Transitions* scenarios also represent fundamental social transformation but to a new and arguably higher stage of human civilization.

These wide and contrasting future possibilities, all consistent with current conditions and trends, are necessary because long-range future is not predictable. The global socio-ecological system is far too complex for that, and scientific understanding of current conditions, forces of change, and systems dynamics are limited. But even with accurate knowledge, uncertainty and surprise are still inherent in complex systems.

Moreover, the future is subject to human choices that have not yet been made and actions that have not yet occurred. Indeed, the entire discussion of a transition to sustainable development is based on the idea that humankind can, to a degree, influence its destiny. In this sense, scenarios can serve as self-fulfilling *attractors*, desirable visions of the future that help stimulate the actions so they are realized. The future beckons to the present through our capacity to envision goals and our ability to act to achieve them.

(Adapted from Raskin et al., 1998)

4.5 Modelling tools for scenario analysis (50 min)

As you learned earlier today, scenarios are alternative, but internally coherent and credible 'histories' or visions of the future, linked to a sequence of policy choices and decisions. *Alternative* future histories are needed because the future is uncertain: the longer the time horizon, the broader the range of possible outcomes. Understanding the possible range of outcomes allows organizations—on any scale—to better prepare for them by building flexibility and resilience into policies and programs.

Scenarios combine numerical and qualitative information. Some trends can be projected with greater certainty, and expressing these numerically can be useful. But many trends and especially their interactions over time have great uncertainties, and they are better described qualitatively as a narrative. Scenarios, therefore, are expressed with both quantitative information with indicators, trends and potentially targets, and descriptive text that serves to build, enrich and communicate a story line. This is a continuum, with fully numeric models at one end and completely descriptive stories at the other.

Balancing the simplicity of scenarios with credible scenario paths is a critical but not particularly easy task. Simplicity matters for many reasons, but mostly to be able to communicate with nontechnical participants and audiences during and after the initiative. But making scenarios credible is at least as important, as seen, for example, in global climate scenarios.

An increasing number of software tools is available to help manage the complex process of scenario construction and analysis. The purpose of this section is to give a taste of some of the best-known applications, without going into great detail. The list is not exhaustive, but further information is made available in the last section.

Risks and opportunities of using modelling tools to strengthen scenario analysis

- Risks
  - can be too technical;
  - increases chance of taking scenarios for prediction (and getting it wrong);
  - may lead to accumulation of errors that distort output; and
  - depends highly on accurate data and information: GIGO (garbage-in, garbage-out).
- Opportunities
  - potentially attractive interface;
  - allows for an analytic framework but can be customized;
  - forces analytic rigour;
  - contains built-in examples or ones available from the literature; and
  - can have technical support.

Participation in constructing scenarios

Individual preferences about the future can vary widely based on worldview. The interest in capturing these preferences in scenario construction and analysis has been increasing and lead to developing participatory methods (for example, Dürrenberger et al., 1997).

Communication is particularly important between technical experts that construct the quantitative structure of the scenario and policy-makers, the eventual audience of the results. The role of the core team of the integrated reporting process may be critical: they can serve as a mediator between the two, ensuring that on the one hand scenarios remain policy relevant, and on the other that policy-makers understand the weight of assumptions and uncertainties (van Asselt, n.d.). In essence, this 'triangular approach' can build on participatory methods used in the earlier stages of issue and indicator selection.

Tools for scenario analysis

There are many potential software tools to assist scenario analysis. In this section the following will be demonstrated:

- STELLA
- PoleStar

STELLA demonstration

STELLA was developed by High Performance Systems, Inc. in the United States. STELLA is object-oriented simulation software that increases understanding of dynamic interrelationships within and among biological, social and physical systems. STELLA starts with the description of system boundaries, such as a watershed, a province or a country, followed by the description of its components, and the identification of key relationships among these components.

4:18

STELLA offers a customizable interface to communicate model results, a modelling layer to see systemic relationships and set key variables, and a layer to view and review relationships in mathematical form. Model construction is based on associating four general classes of system components, including stocks, flows, converters and connectors, and does not require mathematical programming, since the mathematical layer is created by the system based on the graphical associations and defined numeric variables.

Examples of the first two layers are shown below for waste management. While the example presented is extremely simple, it can already help formalize some key relationships. STELLA can be and is being used to create far more complex models. But because of the inverse relationships between model complexity and communicability, the trade-off between the two should be carefully considered.

4:19

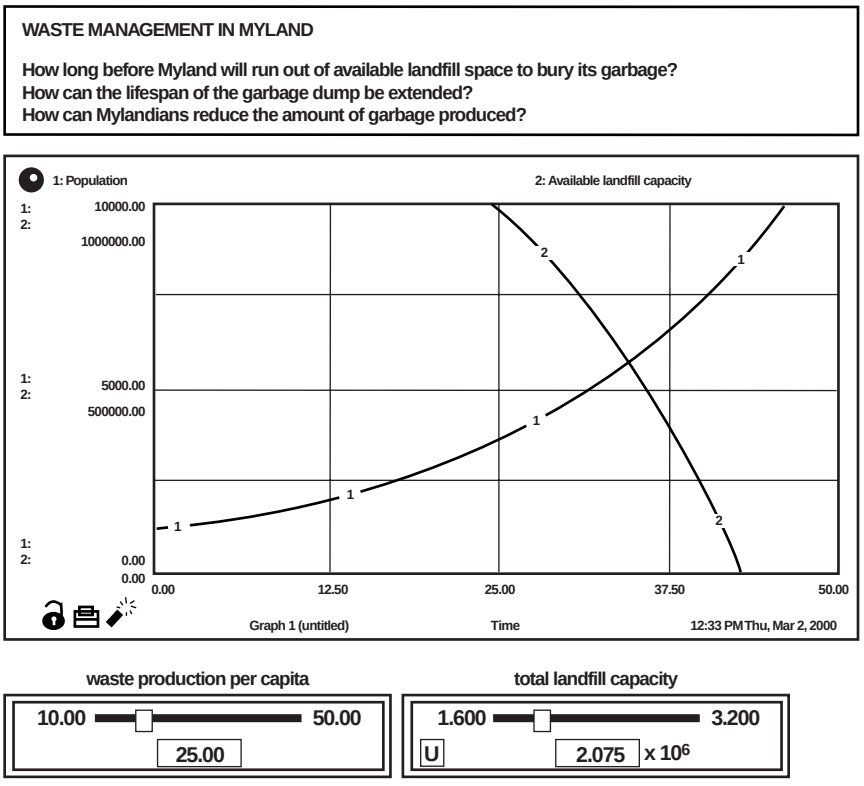


Figure 39: Communication of a waste management issue with STELLA.

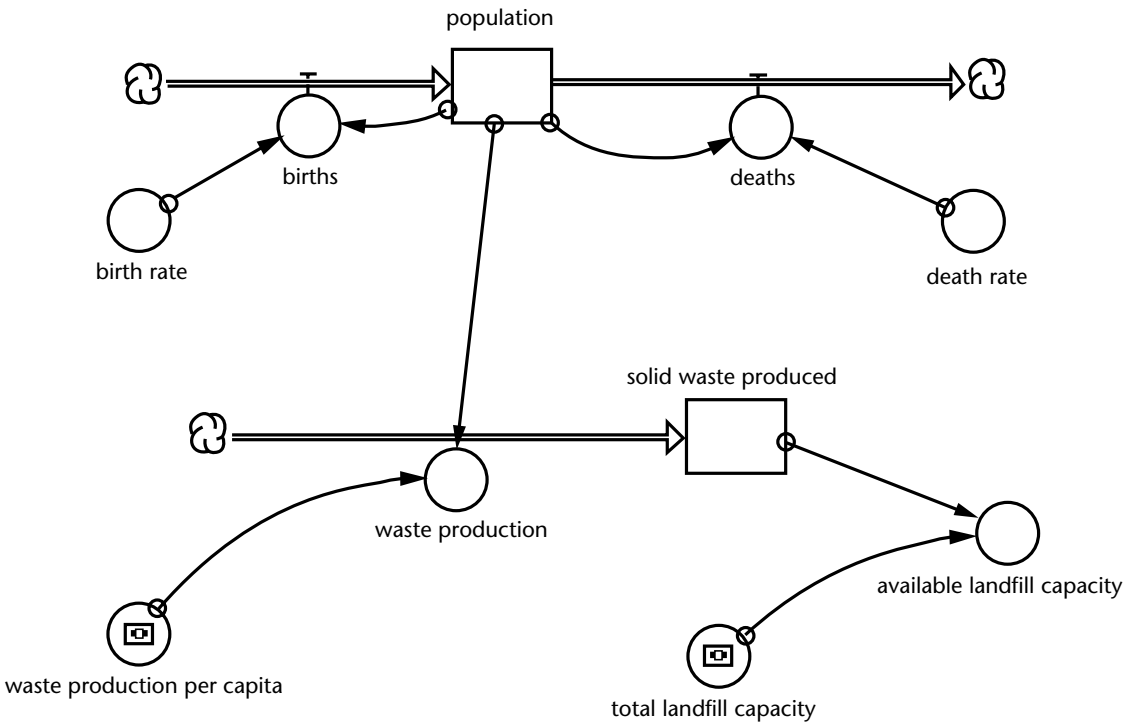


Figure 40: Structure of a very simple waste management model.

The following are some of STELLA's highlights:

- Microsoft Windows-based application;
- Object-oriented modelling environment;
- User-defined, expandable structure;
- Customizable, user-friendly model interface;
- Automatic mathematical description of relationships.

For further information on STELLA, please visit <http://www.hps-inc.com/products/STELLA/STELLA.html>.

PoleStar

The Stockholm Environment Institute's (SEI) PoleStar software system is a comprehensive, flexible and easy-to-use tool for building and evaluating development scenarios. Designed initially to support SEI's own research efforts, it is now available to other organizations. The software is both a scenario-building tool and, through its included global scenarios dataset, a comprehensive database of current global indicators that covers social, economic and environmental issues.

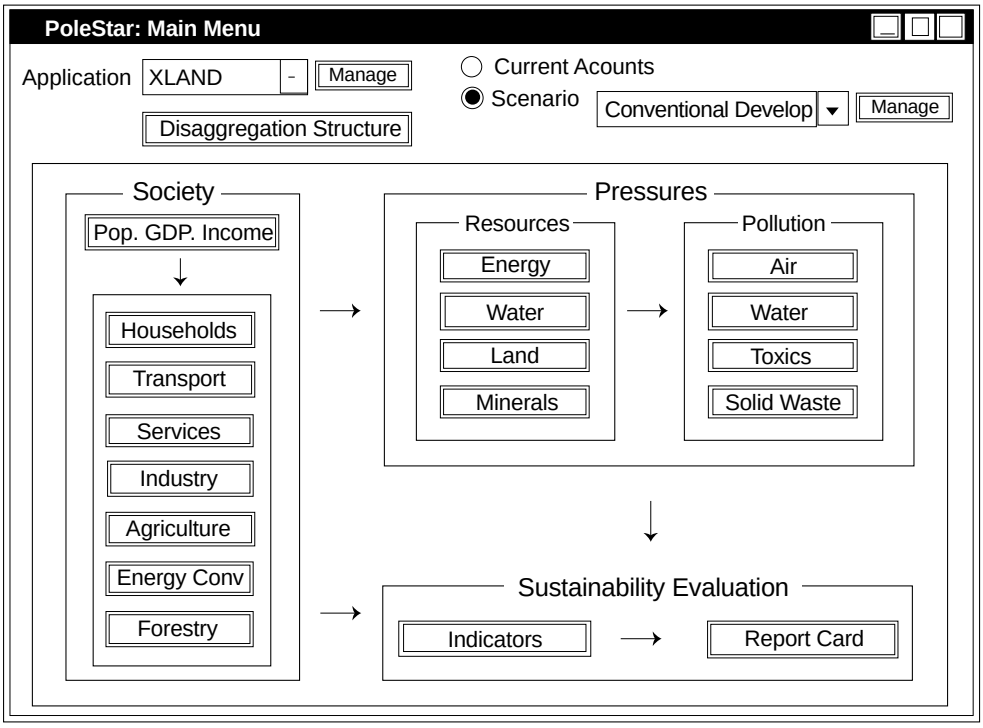


Figure 41: The main menu of PoleStar (SEI-B, 1999).

PoleStar is an adaptable accounting system for mounting economic, resource and environmental information, and for examining alternative development scenarios, not a rigid model reflecting a particular approach to environmental and developmental interactions.

The PoleStar system applies to national, regional and global scales. The user customizes data structures, time horizons, and spatial boundaries—all of which can be expanded or changed easily in the course of an analysis. The system accepts information generated from formal models, existing studies, or any other source the user wishes to draw upon.

An application generally begins with the current accounts, a snapshot of the current state of affairs. Then, scenarios are developed to explore alternative futures. A scenario is a set of future economic, resource and environmental accounts, based on assumptions developed by the user. Finally, environmental and resource pressures are computed and compared with user-defined sustainability criteria.

Current accounts and scenarios are developed through a series of linked modules. In the modules on population, GDP and income, demographic and economic data and assumptions are entered. The module can also be used to examine income distribution and poverty issues. These macroeconomic variables set the scale of activity within the sectoral analysis. The various sectors include households, industry and minerals, transport, agriculture and land, services, energy production and resources, water, and solid

waste. Sectors are divided by subsector (for example, household type, industrial category, transportation mode, crop) and further by process (for example, household end-use devices, manufacturing process, vehicle type, farming practice). The user sets the number and types of subsectors and processes to best match the aims of the analysis and data availability.

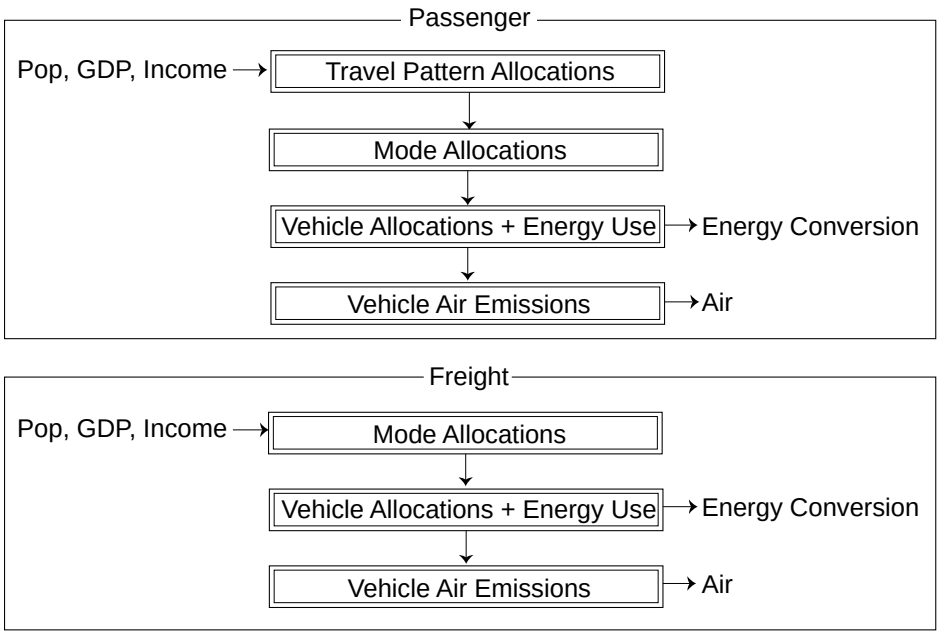


Figure 42: PoleStar transport module map.

Modules are laid out on screen as *module maps* that give the user an easy-to-understand overview of the main relationships and data requirements for each step in the analysis. Figure 42 illustrates the module map for the transport module. Notice how the overall analysis is broken down into separate components for freight and passenger transport, which can then (optionally) be further broken down by travel pattern type (passenger only), mode and vehicle type. Notice also how the overall scale of activities in the module is driven by the calculations of the population, GDP and income module.

Activities are computed down each chain as the product of the macroeconomic variables driving the sector. Allocation factors are then computed down to subsectors and, within each subsector, to final processes. The activities multiply coefficients of intensity that specify resources required, pollution emitted, or waste generated per unit of activity. For example, in the transport sector, population, travel distances for different groups, modes of travel and vehicle shares determine the activity level for automobiles. Vehicle fuel and emission coefficients of intensity are applied to compute gasoline consumption and air emissions from each vehicle class. Scenarios explore the effects of alternative assumptions on population, travel patterns, modes and vehicle characteristics.

The modules are linked as appropriate. For example, energy and water demands from the household, service and industry modules drive the energy production and water system modules. Biomass requirements from the energy production module are passed to the agriculture and land use module to track competing land uses. Similarly, population growth drives land requirements for the built environment. Irrigation requirements from the agriculture module are linked to the water system module.

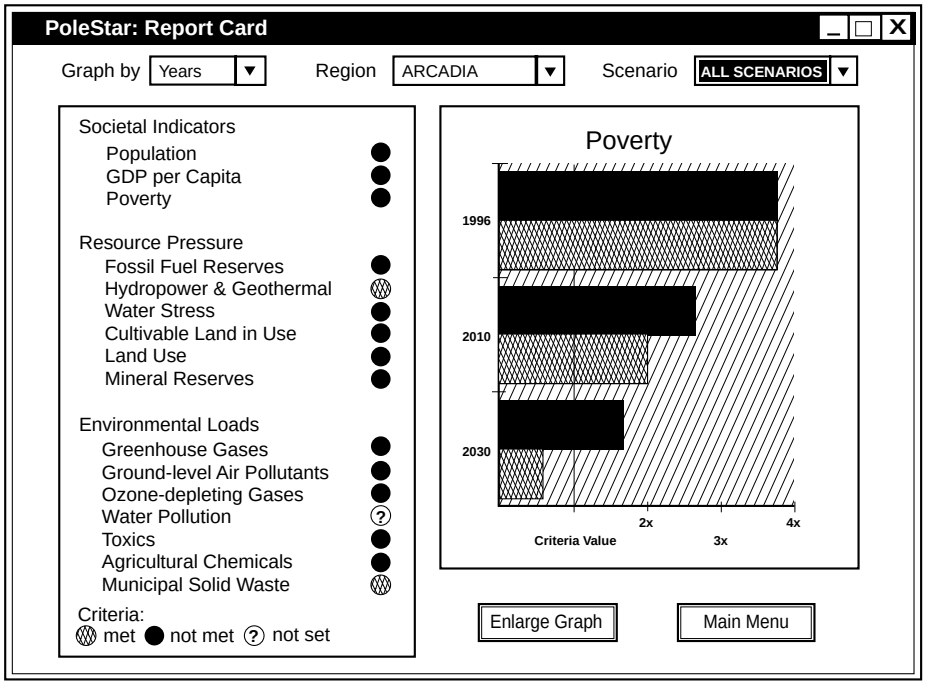


Figure 43: An example of a PoleStar report card.

Report Card: In the report card module, scenario results are evaluated with reference to development and sustainability criteria, which the user may set to define socio-economic, resource and environmental goals. For example, sustainability targets may be set for nutrition, greenhouse gas emissions, ground-level pollutants, forest and wetland preservation, non-renewable resource depletion rates, water stress, nutrition levels, chemical hazard loads, and so on. Comparing scenario results with such measures provides an overview of areas of stress between a scenario and sustainability targets, and provides insight into the requirements for building alternative scenarios for achieving a sustainable future.

Major Indicators: The major indicators module can be used to create more detailed reports and graphs of multiple major indicators calculated in the various modules of the PoleStar system.

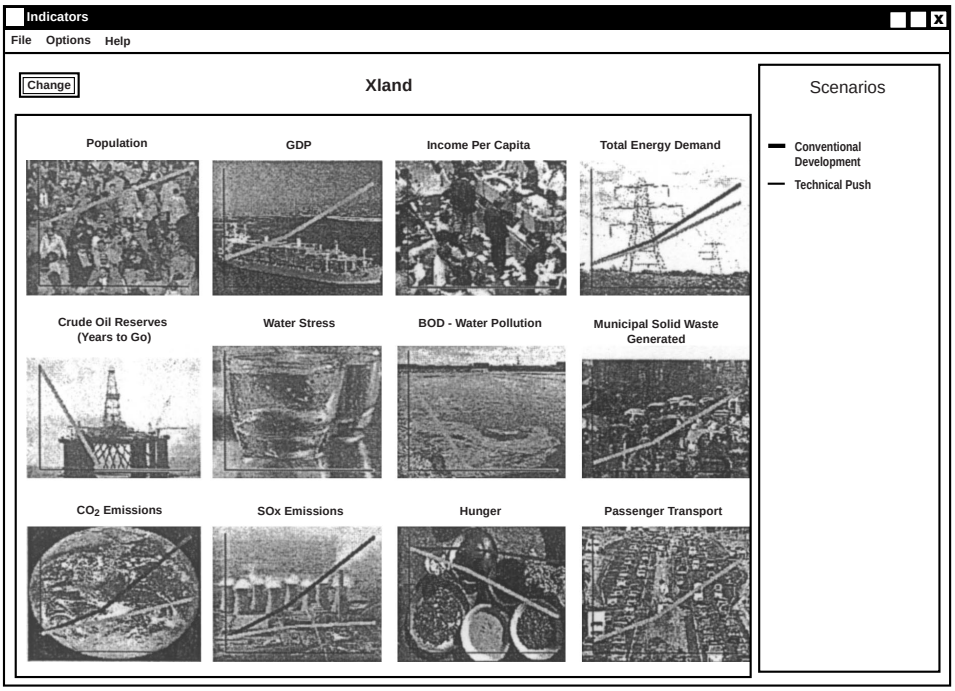


Figure 44: Examples of major indicators as displayed in PoleStar.

The following are some of PoleStar's highlights:

- Microsoft Windows-based software tool for sustainability studies
- Integrated long-range scenarios
- Flexible and expandable data structures
- Comprehensive coverage of issues (macroeconomic variables, energy, water resources, raw materials, agriculture, land use, solid-waste management, environmental loadings, income distribution, poverty, and so on)
- Easy-to-use graphical interface
- Powerful reporting system with graphs
- Links to spreadsheets and word processors
- Detailed system manual available

(Source: Stockholm Environment Institute – Boston, 1999.)

Additional resources on modelling and scenarios

The scenario analysis and modelling tools reviewed in this section are only examples, and there are many more models and programs that may be equally or even more useful, depending on the nature of your work and requirements. Below is a longer though still not comprehensive list of references to scenario applications and modelling tools that you may find relevant for your work. Note that some of the software is free or is available as a demo version that can be downloaded from the Internet free of charge.

IMAGE 2.0 integrated society-biosphere-climate model and scenarios of RIVM
http://www.ciesin.org/datasets/rivm/image2.0-home.html

Climate change integrated assessment modeling: The model visualization and analysis service of CIESIN's Socioeconomic Data and Applications Center
http://sedac.ciesin.org/mva/

Threshold 21 world model of the Millennium Institute
http://www.igc.apc.org/millennium/t21/index.html

MATTER energy and materials system model of the Netherlands Energy Research Foundation for Western Europe
http://www.ecn.nl/unit_bs/etsap/markal/matter/

Vandaclim training model on climate change vulnerability and adaptation assessment for an imaginary small island state
http://www.geic.or.jp/cctrain/vanda/vandaclim.html

OilFund energy sector simulator of PowerSim
http://www.powersim.com/demo/websims/oilfund/index.htm

QUEST software of Envision Sustainability Tools and the Sustainable Development Research Institute
http://www.sdri.ubc.ca/research/quest.html

Global Scenario Group
http://www.gsg.org/

Smart Growth Index, GIS-based development scenario planning tool of Criterion, Inc.
http://www.crit.com/smartgrowth.htm

Study/discussion questions

Q: Do you see a realistic role for modelling tools in integrated environmental reporting in your country?

A: _____

_____

_____

_____

Q: In your own work?

A: _____

_____

_____

_____

Q: Are there precedents?

A: _____

_____

_____

_____

Q: What are some other software tools that are or should be used in reporting and assessment in your organization?

A: _____

_____

_____

_____

LUNCH (1 hr 30 min)

4.6 Practising scenario analysis

Case study exercise, part I (45 min)

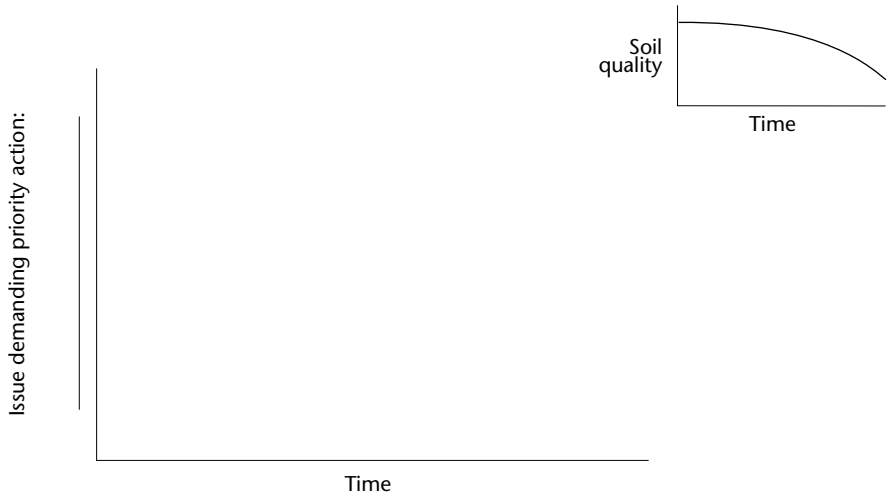
Return to the current policy analysis exercise using the same groups as you used for yesterday's task force exercise.

In this exercise you will summarize and assemble all that you have learned about Myland so far. If instead of Myland your group chose to work on a real country and issue, continue to build on that example. The results of this exercise will be the basis for an exercise in scenario and policy outcome analysis this afternoon.

Choose one of the priority actions for the future from the action impact matrix in exercise 3.5. Rewrite it below.
Formulate a relevant policy question to explore.
What is a key environmental issue of concern associated with this policy?

Draw and label a simple graph to represent the current trend in environmental conditions that is of concern.

Example: An increasing rate in soil salinity levels may be shown on a soil quality graph as follows:



4:25

Now explore in a little more detail the driving forces and potential outcomes associated with the environmental issue you selected. Please note that in the first column you may also identify issues that are closely related to the one priority issue you chose to focus on. For instance, if your focal issue is land degradation you may also identify, for example, water availability as a related issue. You may find it useful to refer to the tables you completed in exercise 3.5 for ideas and information.

Environmental issue of concern	**Driving forces**	**Expected outcome ("business as usual")**

How does the expected outcome compare with the general intent of the priority action for the future that you identified at the beginning of this exercise?

The next step is to develop scenarios surrounding specific policy options and their outcomes.

Case study exercise, part II (1 hr 15 min)

Exercise

Return to the task force groups and designate a rapporteur.

Start with the results from the previous exercise. Imagine three policy options that are possible given the current situation. Use the previous analysis of environmental conditions and driving forces to list outcomes these options could have on the environmental issue.

In addition to the "business as usual" policy that is currently in place and thus at least partly responsible for environmental problems, envision and describe two policy options. The policy options may lead to a modification of the policy currently in effect or the introduction of new policies. Describe the possible effect of these policy options on the key environmental issues.

Policy package	Possible effect on the environment and economy
Business as usual:	
Policy options:	

Discuss these scenarios within your group.

Describe a decision-making process to choose among policy options for implementation. Who would be included in this process? How would the group decide among the value choices and trade-offs between different social groups?

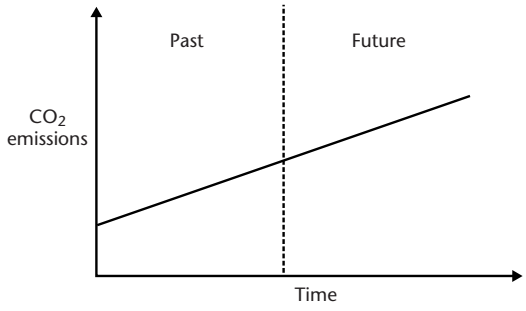
Exercise

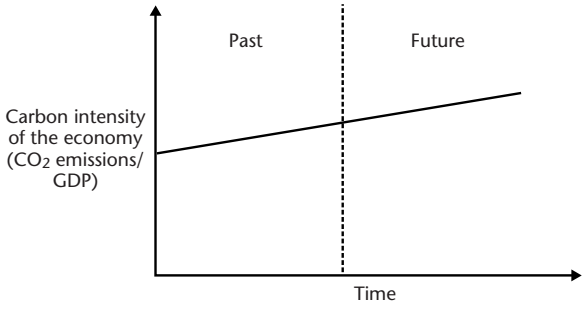
Identify some possible indicators that can describe the effect of these policies and that can also be used to compare their effectiveness. Draw approximate trendlines for these indicators on the next page, starting with the "business as usual" scenario, then the two options, using the same indicators. Make sure the trendlines start in the past so that the impact of a policy change on the trend can be illustrated as shown in the examples below.

Environmental issue: climate change

A. "Business as usual" policies: fuel subsidies

Indicators:



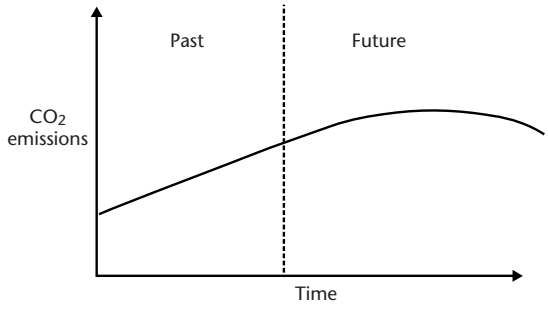


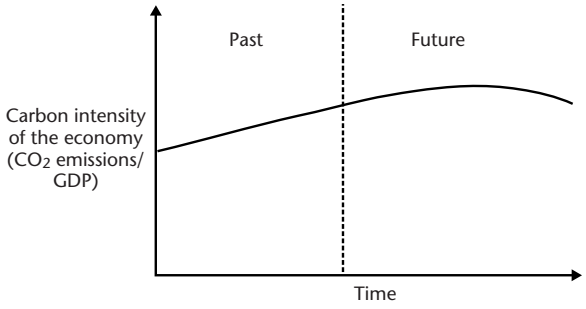
4:28

B. Policy options:

- Significant decrease of fuel subsidies
- Technology measures
- Investment in public transit

Indicators:





4:29

Environmental issue:

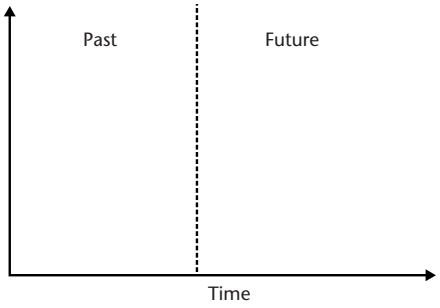
"Business as usual" policies:

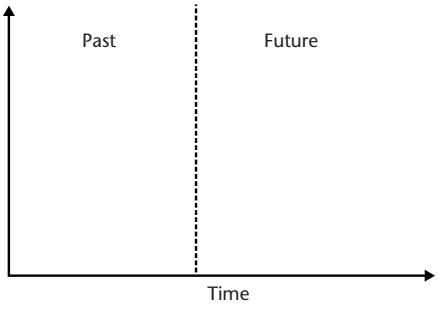
_____

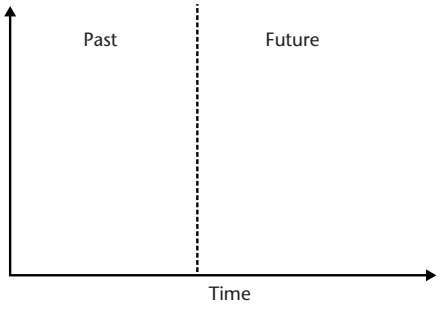
_____

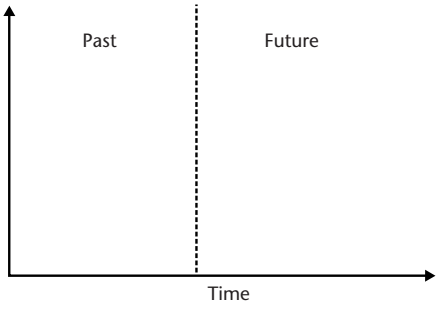
_____

Indicators and trends:









4:30

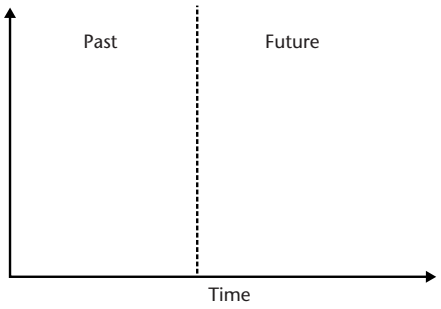
Policy option(s):

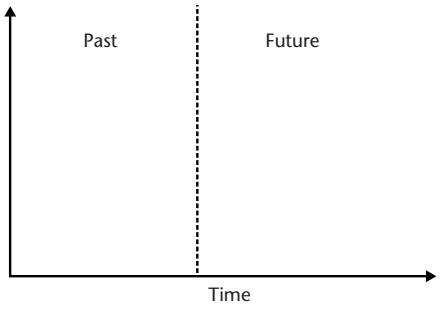
_____

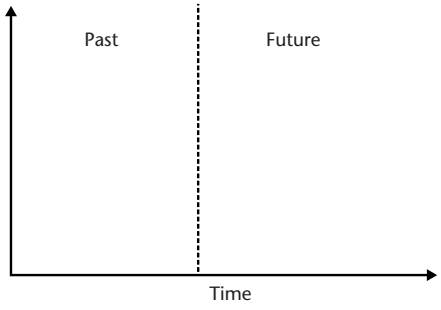
_____

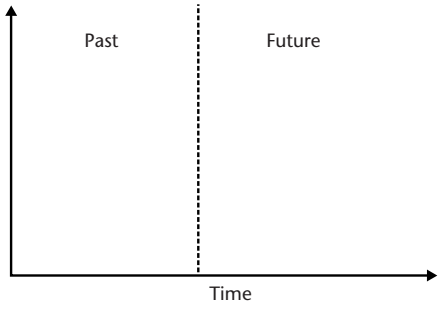
_____

Indicators and trends:









Conclusions:

_____

_____

_____

_____

4.7 Workshop summary and wrap-up (45 min)

We will spend half an hour to ask each of you to summarize your experience with the training program, followed by a final evaluation and wrap-up by the instructor(s).

Exercise

In this final and *individual* exercise, please think about the specific actions you can start in your country, based on what you learned during the workshop. Fill out and hand in your *individual* action planning form.

Integrated environmental assessment workshop:

My individual pledge for action

Name _____

Organization _____

Please write down your specific goals for *integrated environmental assessment and reporting* as a result of participating in this course. These activities should be specific and attainable.

Actions to be taken to complete integrated environmental assessments	When will this happen?	Indication of my undertaking and attaining of this action	Resources required	Potential obstacles (and how these can be overcome)

4.8 Bibliography

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Gallopin, G., A. Hammond, P. Raskin and R. Swart. *Global scenarios and human choice*. Stockholm, Sweden: Stockholm Environment Institute, 1997. PoleStar Series Report no. 7. A PDF file of this publication is available at <http://www.gsg.org/branchpt.pdf>.

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UNEP. *GEO-2000*. London: Earthscan Publications Ltd., 1999.

van Asselt, M. *Global integrated assessment models as policy support tools: A triangular approach*. Enschede, The Netherlands: University of Twente, no date.

4.9 Final training program evaluation (30 min)

Please complete and hand in the final program evaluation form.

Please indicate your opinion about each section of the training workshop by circling the appropriate number.

1 = not at all 2 = a little 3 = somewhat 4 = mostly 5 = completely

Overall objectives and content

4.1	Were the objectives clear and precise?	1	2	3	4	5
4.2	Were the objectives attained?	1	2	3	4	5
4.3	Was the content linked to the objectives?	1	2	3	4	5
4.4	Was the content well structured?	1	2	3	4	5
4.5	Was the content presented clearly?	1	2	3	4	5

Comments on the overall objectives and content of the training workshop:

_____

_____

_____

_____

_____

_____

To what extend did these sections of the training workshop meet your expectations?

4.6	Introduction to the workshop and its goals	1	2	3	4	5
4.7	Overview of the GEO initiative	1	2	3	4	5
4.8	Carrying out SOE reporting	1	2	3	4	5
4.9	Review of national SOE experiences (by participants)	1	2	3	4	5
4.10	Carrying out environmental policy assessment	1	2	3	4	5
4.11	Preparing for forward-looking policy studies	1	2	3	4	5

What part of the training program did you find least valuable? Why?

_____

_____

_____

_____

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_____

What part of the training program did you find most valuable? Why?

_____

_____

_____

_____

_____

_____

Methodology

4.12 Was the methodology used appropriate for the training program and you as a professional?	1	2	3	4	5
4.13 Did the methodology help you to share your own knowledge and experience?	1	2	3	4	5

How useful did you find the following elements of the training program?

4.14 Case studies	1	2	3	4	5
4.15 Presentations	1	2	3	4	5
4.16 Group exercises	1	2	3	4	5
4.17 Group sessions	1	2	3	4	5
4.18 Demonstrations of tools (for example, models)	1	2	3	4	5
4.19 Networking	1	2	3	4	5

For you, what were the strong points of the methodology? What could be improved?

_____

_____

_____

_____

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_____

Training materials

Were visual aids (for example, overhead transparencies) clear and easy to follow? Yes ___ No ___

How much did you use the manual during the training? Never ___ Occasionally ___ Daily ___

Was the training manual easy to use? Yes ___ No ___

How could the manual be improved?

Logistics

4.20 Was the meeting venue adequate?	1	2	3	4	5
4.21 Was the timing of the agenda comfortable?	1	2	3	4	5
4.22 Was the length of the sessions appropriate?	1	2	3	4	5

Other comments on logistics:

How will this program help you in your job? Please be specific.

Did the instructors teach the course effectively? Please be specific.

_____

_____

_____

_____

_____

_____

How would you improve the training or make it more interesting?

_____

_____

_____

_____

_____

_____

4.23 Overall, how would you rate the training? Please circle one.

Excellent Good Average Unsatisfactory Poor

General remarks

_____

_____

_____

_____

_____

_____

Appendix: Background documents

Questionnaire on national state of the environment reporting experience

The purpose of the state of the environment (SOE) reporting questionnaire is to help both the participants and instructors prepare for the integrated environmental assessment and reporting workshop. It will help instructors assess how countries are currently carrying out SOE reporting, which institutions are involved, what are some of the core issues covered and in what framework. The completion of the SOE reporting template will also enable the participants to think about the methodology and mechanics involved in their SOE reporting, thereby helping them prepare for the training workshop.

For this summary, SOE reporting is defined broadly to also capture national initiatives that may not be organized under the umbrella of an SOE reporting project or a single institution. It may be, for example, that national reports deal with environmental issues on a sectoral basis, such as water, air or land resources, without compiling these into a single national SOE report. These reports or reporting series may provide a basis for developing integrated environmental reports in the future. The template has been designed to allow including information about them if appropriate.

Ideally, the questionnaire should be filled out and mailed back to organizers well before the training session so they can compile responses and make the whole set available to participants at the training session. This helps instructors recognize and address region-specific issues in the program, and provides participants with an up-to-date summary of SOE activities in other countries of their region.

The SOE reporting questionnaire consists of six main sections:

Section I: Contact information

Section II: SOE report structure

Section III: Information sources and reporting tools

Section IV: Key environmental issues and indicators

Section V: Process and participants of assessment and SOE report preparation

Section VI: SOE report use and audience

A question-and-answer period will follow a brief introduction to all participants. You will be invited to ask questions to clarify ideas but we encourage you to make comments and compare the SOE summary with your national experience.

Section I: Contact information

1. **Country:**	
2. **Organization:**	
3. **Primary contact person:**	Mr/Ms/Dr
4. **Full address:**	
5. **Telephone:**	
6. **Fax:**	
7. **E-mail:**	
8. **Address on WWW:**	http://

Section II: SOE report structure

9. Title of initiative:		
10. Year of first SOE report:		
11. Frequency of reporting:		
12. Geographic coverage:[1]		
13. Frameworks used in report (Please check all that apply):	Resource-sector based	
	Environmental-media based	
	Pressure-state-response	
	Geographic-subregion based	
	Others (please specify[2])	

[1] Please attach map if available.

[2] Please attach diagram of framework if available.

14. Main sections and subsections in report.

Main sections	Subsections

Section III: Information sources and tools

15. Main sources of environmental information for the SOE/sectoral report(s).	National census Census frequency: every _____ years	
	Reports from governmental departments	
	Municipal/local governments	
	International organizations	
	Non-governmental organizations	
	Schools and universities	
	Private sector	
	Special surveys	
16. Presentation tools used in the report:	Case studies or box stories to illustrate general points	
	Graphs with time-series data	
	Diagrams to illustrate links among environmental issues	
	Symbols to communicate success or failure in meeting targets	
	Photographs	
	Others (please specify)	

Section IV: Key environmental issues, policies and indicators

17. **List of key environmental issues identified in the SOE report. List all issues that are related to a specific sector and specific policy, and if indicators were used in reporting on their performance.**

Section in report	Issue	Sector	Policy	Indicator
	1			
	2			
	3			
	4			
	5			
	1			
	2			
	3			
	4			
	5			
	1			
	2			
	3			
	4			
	5			
	1			
	2			
	3			
	4			
	5			

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Section V: Process and participants of assessment and SOE report preparation

18. Main steps in developing the SOE/sectoral report(s).

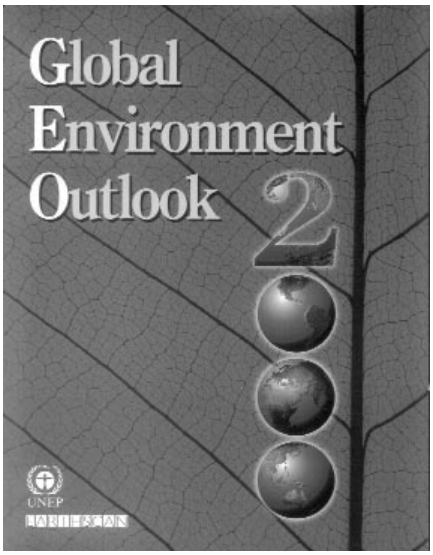
19. Please identify other participants in the SOE reporting process and specify their role, if applicable, by putting a check mark in the appropriate boxes:

Role	Other government departments	Academic institutions	NGOs	Industry and private sector	International agencies	General public	Other (please specify)
a. Share project-management responsibilities							
b. Invited to participate in specific tasks for the SOE report							
c. Help identify key environmental issues for the report							
d. Help develop indicators							
e. Help with data collection							
f. Help with data analysis							
g. Help with policy analysis							
h. Provide comments on drafts							
i. Participate in writing specific sections of the SOE report							
j. Provide additional funding for the project							
k. Provide other, non-monetary support (please specify)							
l. Participate in distributing and marketing the SOE report							

Section VI: Assessment and SOE report use and audience

20. **Number of copies printed (latest edition):** _____
21. **Number of copies distributed:** _____
22. **Cost for local residents to get report:** _____
23. **Target audiences:** _____

Other government departments	
Schools and academic institutions	
NGOs	
Industry and private sector	
International agencies	
General public	
Others (please specify)	



The training manual on *Capacity building for integrated environmental assessment and reporting* is a product from the Global Environment Outlook (GEO) programme of UNEP. The global publication of this programme, the *Global Environment Outlook 2000 (GEO-2000)* (ISBN: 1 85383 588 9), can be ordered from Earthscan Publications Ltd., 120 Pentonville Road, London N1 9JN, UK.

Tel: +44 (0)171 278 0433
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WWW: http://www.earthscan.co.uk

GEO-2000 is a comprehensive and authoritative review and analysis of environmental conditions around the world. It is the flagship publication of the world's leading environmental organization, the United Nations Environment Programme (UNEP), and is based on information provided by more than 30 regional and international collaborating centres.

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http://www.grid.unep.ch/geo2000/
http://grid2.cr.usgs.gov/geo2000/

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