TRAINING MANUAL ON INTEGRATED ENVIRONMENTAL ASSESSMENT AND REPORTING IN AFRICA

Coordinating Lead Authors: **Musisi Nkambwe and Munyaradzi Chenje**

Lead authors: **Christopher Ambala and Washington Ocholla**

NOT FOR QUOTING – December 2006

TABLE OF CONTENTS

List of Figures

List of Tables

List of Boxes

Acknowledgements

The preparation of the Training Manual on Integrated Environmental Assessment and Reporting in Africa has been a partnership of many individuals and institutions involved in capacity-building in environmental assessment and reporting at different scales. It should be seen in the context of implementing the Bali Strategic Plan on Technology Support and Capacity Building, one of the key decisions adopted by the United Nations Environment Programme (UNEP) Governing Council/Global Ministerial Environment Forum (GC/GMEF) in February 2005.

The UNEP Division of Early Warning and Assessment (UNEP-DEWA) would like to thank the University of Botswana for leading the process and hosting a number of workshops and meetings which facilitated collaboration and partnerships among universities and UNEP collaborating centres (CCs) in Africa. The UNEP-DEWA CCs involved in both the Global Environment Outlook (GEO) and Africa Environment Outlook (AEO) processes as well as the Africa Environment Information Network (AEIN) have been instrumental in testing and applying the various modules of this manual over the years. UNEP-DEWA thanks them all for applying the theory and strengthening capacity-building in the region.

The CC partners and individuals to whom we are grateful:

- Ahmed Abdelrehim, Centre for Environment and Development in the Arab Region and Europe (CEDARE)
- Clever Mafuta and Stanley Mubako, Southern African Research and Documentation Centre (SARDC), Zimbabwe
- Raj Mohabeer and John L. Roberts, Indian Ocean Commission (IOC), Mauritius
- Telly Eugene Muramira, National Environment Management Authority (NEMA), Uganda
- Elizabeth Gowa, formerly of NEMA, Uganda
- Charles Doumambila and Crepin Momo Kama, Agence Internationale pour le Développement de l'Information Environnementale (ADIE), Gabon
- Fatou Ndoye and Bora Masumbuko, Network for Environment and Sustainable Development in Africa (NESDA), Cote d'Ivoire

Regarding the University partners, we specifically thank the following:

- Musisi Nkambwe and Opha Pauline Dube, University of Botswana, Botswana
- Fanuel Tagwira, Africa University, Zimbabwe
- Aloane Kane Universite' Chuck Anita Dio, Senegal
- Aboua Aboua Gustav, Abobo Ajame Universite', Cote D'voire
- Connie Musvoto, University of Zimbabwe, Zimbabwe
- Evans Mwangi and Eucharia Kenya, Kenyatta University, Kenya
- Riziki Shemdoe, University College of Lands and Architectural Studies (UCLAS), Tanzania
- Samuel N. Ayonghe, University of Buea, Cameroon
- Hassan Awad , University of Alexandria, Egypt

The Training Manual on Integrated Environmental Assessment and Reporting in Africa is based on the 1999 training manual developed as part of the GEO process by UNEP and its partners – the International Institute for Sustainable Development (IISD) and Ecologistics International Ltd. The authors are grateful to these institutions and specifically the authors of the original training manual for their inspiration in the preparation of the Africa training manual.

At UNEP, we are grateful to Sekou Toure, the Director of the Regional Office for Africa, Alex Alusa, the Deputy Director, Peter Acquah of the AMCEN Secretariat, Angele Luh of UNEP Regional Office for Africa (ROA), Frank Turyatunga of UNEP Division for Environmental Policy and Implementation (DEPI) for their support and input during the preparation of the manual and other materials of the AEO and AEIN processes.

Some of the ideas, illustrations, and exercises in the manual come from discussions and workshops conducted in preparation for writing this manual. We extend our gratitude to Velma Kiome for her outstanding contribution in terms of the graphics, the DEWA Africa team of Munyaradzi Chenje, Charles Sebukeera, Christopher Ambala, Janet Waiyaki, Sylvia Adams and other colleagues in DEWA for supporting this initiative in many different ways.

We would also like to thank Jacob Gyamfi-Aidoo, Joseph Opio-Odongo of the UNDP-Drylands Development Centre, Franck A. Attere, Randa Omar Kazem Baligh, Elton Laisi, Amadou Moctar Dieye, and many other colleagues for their continued support and input in capacity-building in integrated environmental assessment (IEA) and reporting.

Finally, we would like to thank all participants – past and future – in various training sessions on IEA and reporting.

BACKGROUND

The Training Manual on Integrated Environmental Assessment and Reporting in Africa is the first in a series of training materials and guidelines whose main objective is to build capacity in the region in environmental assessment and reporting at different levels. The other materials include:

- Africa Environment Information Network (AEIN) implementation guidelines
- Africa Environment Outlook (AEO) Data and Indicators tool
- Guidelines for National Integrated Environmental Reporting in Africa (NIER)
- Methodology for the Preparation of AEO Cities Reports
- Presentations which highlight the environment outlook reporting process

These and other related materials have been prepared by the United Nations Environment Programme (UNEP) in collaboration with many stakeholders, including government agencies, universities and non-governmental organizations (NGOs). The UNEP Division of Early Warning and Assessment (DEWA) has, through its Africa Programme, coordinated this initiative. The implementation of this initiative is within the context of UNEP Governing Council/Global Ministerial Environment Forum (GC/GMEF) decisions and those of the African Ministerial Conference on the Environment. The decisions relate to the implementation of the Global Environment Outlook (GEO) process as well as the AEO and AEIN processes. Both the AEO and AEIN were mandated by the African Ministerial Conference on the Environment (AMCEN).

At the global level, the GEO process, which incorporates different activities including capacity-building and production of a report series and other materials, aims to:

- Track yearly environmental issues and developments, highlighting them as well as emerging issues and technological developments for policymakers and other stakeholders in the GEO Year Book report series, .
- Undertake, once every five years, a comprehensive and policy-relevant assessment of the state of the global environment, analysing environmental trends, their driving forces, current policies and emerging issues. The GEO reports also assess the impacts of the changing environment on people and ecosystems.

The AEO process is an AMCEN initiative which started in 2000 and whose objective is to monitor sustainable environmental management in Africa and provide a framework for national and sub-regional environmental reporting. It provides a more comprehensive assessment of the regional environment compared to the GEO report series, which is more aggregated to provide a global picture of environmental issues

and trends. It is also designed to support the policy initiatives of the New Partnership for Africa's Development (NEPAD), particularly the implementation of the Environment Action Plan.

The GEO process also facilitates capacity-building at a global level, enhancing North-South and South-South cooperation and interaction in environmental assessment and reporting. This takes the form of hands-on training, professional exchanges, and production of training manuals and guidelines. The preparation and publishing of the materials highlighted above is in the context of the overall GEO process, and they form a body of knowledge aimed at enhancing the skills and expertise in environmental assessment and reporting in Africa.

For Africa, this level of the effort is also in support of regional initiatives "to provide reliable assessments of, and information on, environmental conditions to guide policy formulation and decision making, and to create an informed citizenry who feel empowered to act intelligently at their own levels in managing environmental resources for the benefit of themselves and society as a whole" (UNEP 2003).

The training to be supported by this manual and the other materials builds on previous efforts exerted in Africa. Several initiatives in environmental assessment have been attempted in the region since the early 1970s to build skills to make environmental information available for decision making and policy formulation. However, most of these initiatives were pilot activities whose information was used mostly in narrowly defined project-level decision making or in building databases for specific objectives.

Capacity-building in the management of environmental information was likewise directed at the project level. One of the more successful broad-based programs in capacity-building launched in the early 1990s, was the World Bank's Programme on Environmental Information Systems in Sub-Saharan Africa (EIS-SSA). The main objective of the programme was to assist sub-Saharan countries to build sufficient capacity for assessing their needs in environmental management and sustainable development.

National Conservation Strategies (NCS) and National Environmental Action Plans (NEAPs), which were adopted by governments in the region, provided a basis for further capacity-building and other programmes at the national level. Of particular importance in this regard, were the:

- UNEP Environment and Natural Resources Information Network (ENRIN);
- Sahara and Sahel Observatory (OSS); and
- Environmental Information Systems on the Internet (SISEI).

At the sub-regional level, significant capacity-building efforts were implemented under the:

- Regional Environment Information Management Programme (REIMP) in Central Africa;

- Southern African Development Community (SADC) Environmental Training and Education Sub-programme (SETES); and

- Southern African Network for Training and Research on the Environment (SANTREN) in Southern Africa.

The list of initiatives highlighted above is not comprehensive but is a good indicator of the multiplicity of efforts that tried to create skills in the management of environmental information and the awareness of their relevance to sustainable development. While technical and technological issues were appropriately addressed, organizational issues were not. There are two challenges that relate to organizational issues:

- The multiplicity of sources of information that require standardizing to facilitate cooperation among the people involved in the disparate projects in this field. Adjustments were required in the data collected and used by individual groups, to obtain overall assessments of the state of the environment. This challenge has received a lot of attention at regional, sub-regional and national levels, for example, through the AEIN and the UN Economic Commission for Africa's (UNECA) Commission on Development Information (CODI). This links into a global concern for standardized data that can be used for multiple purposes.

- The ability to integrate this information with the broader issues relevant to decision making and sustainable development. Environmental assessment for sustainable development has to be integrated with social and economic issues. There must be "an understanding of the development aspirations of society; the characteristics of the *environment* within which "development" will take place, the conflicts that could arise, and the means of resolving them as well as acceptable trade-offs" (UNEP 2003). A good sense must also be developed of the alternatives in terms of development paths and their potential future impacts. This manual facilitates capacity-building to overcome this challenge.

Building capacity in integrated environmental assessment (IEA) and reporting encourages broad-based participation of civil society in environmental policy formulation. In a region where the majority of people are often not involved in formulating environmental policy, the AEO capacity-building initiative is an opportunity to develop the skills of governmental agencies in the preparation of IEA reports, and to enhance the skills of civil society organizations (CSOs) in environmental policy formulation.

Manual content and design

The main objective of the manual is to enhance understanding the role of environmental assessment and reporting to policy processes and sustainable development. Ultimately, a good environmental assessment report can only be effective if it conveys scientific developments and trends for the policymaker to respond with appropriate decisions and policies to address a particular problem of challenge.

The manual is designed in modular format and may be used either in its entirety or in modules, depending on the duration of the training period. The content is broad enough to be applicable at different spatial levels – from the city level to national, sub-regional, regional, and ultimately, the global level. The manual can be used by both trainers – individuals involved in IEA and reporting or lecturers; and trainees – individuals who are keen to build upon their expertise or who are completely new to the area of environmental assessment and reporting. There are many case studies to illustrate the theoretical aspects of the manual. The expected length of the training period is five days of intensive discussion, but the manual is designed in such a way that trainers may add or leave out sections for a specific training session to shorten or lengthen the suggested period. The training is expected to take place in a workshop setting, but, once again, trainers may modify the format to suit their preference.

Structure and conduct

The manual recognizes the importance of building the skills to conduct IEA and reporting. However, the process of learning used in the AEO/GEO process and followed in this manual, tries to make trainees realize that there is as much value in facilitating the participation of a wide range of stakeholders for whom the assessment reports are prepared as in making the information accessible. It is very important that trainees bring to the training workshop data from their own daily work. A questionnaire is attached at the end of the manual for trainees to complete, and preferably send to the training centre ahead of the actual training session. This helps the trainer(s) to tailor the whole course to address the needs of all the trainees. As an alternative and back up, the trainers are encouraged to build up data, probably from local sources, to use for the training workshop in case the data sent in by trainees is insufficient.

The manual follows a sequence of questions answered with the participation of the trainees:

1. What is happening to the environment and why (state and pressure)?

2. What is the consequence for the environment and humanity (impact)?

3. What is being done about it and how effective is it (response)?

4. What could be alternative futures of environmentally sustainable (or unsustainable) development (scenarios)?

5. What alternative action could be taken (options for action)?

There are eleven modules which trainees cover to answer these questions and to realize their value in IEA and reporting . Each of the modules has a brief introductory lecture, participatory exercises, case studies, and discussions. In addition, some of the modules have demonstrations and/or individual study sections.

Module 1 gives the background to IEA and its relevance to recent efforts to develop policies for sustainable development in Africa. Module 2 discusses the meaning of IEA and reporting while Module 3 looks at two approaches that have been used in the preparation of the AEO-1 and AEO-2 reports. Module 4 discusses the management of

the IEA and reporting process. Modules 5 introduces the concept of peer review and its benefits and possible contributions. Module 6 focuses on the preparation for the assessment process and how to communicate the message of the activity itself, while Module 7 goes through the steps of assessing the state of the environment. Module 8 is a role playing exercises for trainees to conduct a mock IEA. Modules 9 illustrates the link between environmental assessment and policy formulation and Module 10 highlights one possible theme to the assessment, which is Human Vulnerability to Environmental Change. The last module, Module 11, discusses the development of scenarios and the alternative paths that may be taken in different situations, and how to assess their potential impact.

Course evaluation

At the end of the training course, an evaluation is requested from each individual trainee. The evaluation allows trainees to highlight points that will assist trainers to improve their delivery of the course. The trainers are requested to forward these comments to the DEWA Africa Regional Coordinator to facilitate the review and revision of the manual over time.

Figure 0.1: Countries and sub-regions of Africa

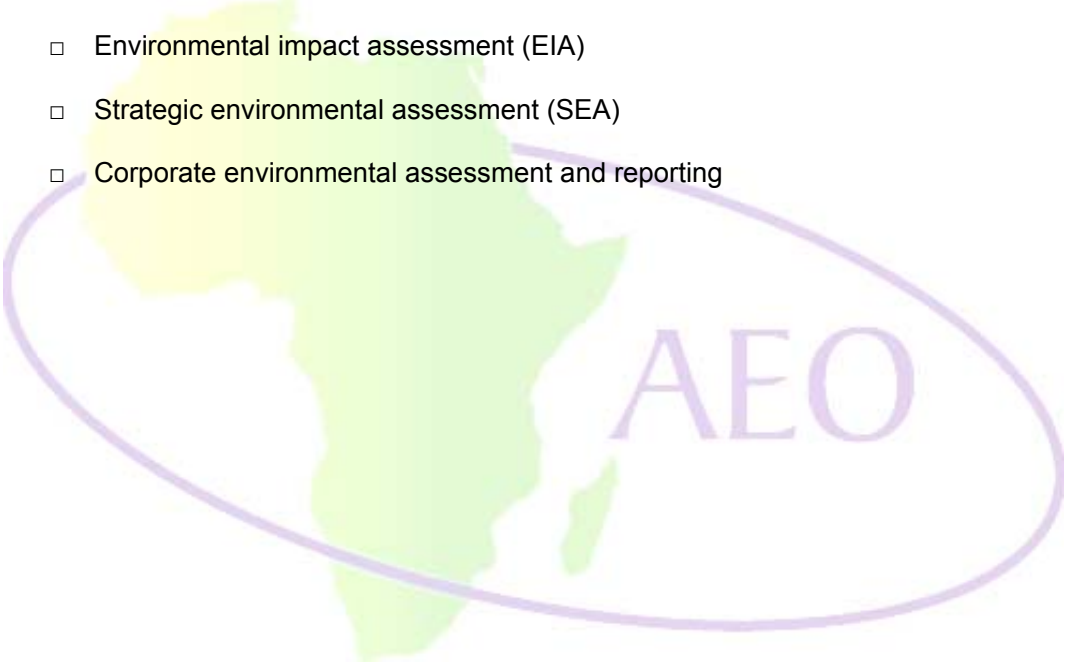
Reference

UNEP (2003). *Africa Environment Information Network (AEIN): Framework for Capacity Building in Integrated Environmental Assessments and Reporting in Africa*. United Nations Environment Programme, Nairobi. http://www.unep.org/dewa/africa/docs/en/AEIN_framework_Document.pdf

Module 1 – Introduction to Environmental Assessment

Overview
This module highlights different types of environmental assessment, and the context within which Integrated Environmental Assessment and reporting (IEA) has evolved. By the end of the module, you will have learned about:

- The different types of environmental assessment
- State of the environment (SOE)
- Integrated Environmental Assessment and reporting (IEA)
- Environmental impact assessment (EIA)
- Strategic environmental assessment (SEA)
- Corporate environmental assessment and reporting



1.1 Introduction

Environmental assessment has come into its own since the 1970s as a key tool in environmental management. While such assessment had been practised in one form or another long before the 1970s, it is perhaps after the United Nations Conference on the Human Environment, Stockholm, 1972, that environmental assessment became part of the common lexicon among environmental stakeholders as well as the private sector. Environmental assessments are conducted by various stakeholders and to meet disparate objectives as numerous as the stakeholders themselves.

The different types of environmental assessment include, but are not limited, to:

- State of the environment (SOE)
- Integrated Environmental Assessment and reporting (IEA)
- Environmental impact assessment (EIA)
- Strategic environmental assessment (SEA)
- Corporate environmental assessment and reporting

Common to these and other environmental assessment processes is the need for policy responses for effective environmental management and/or sustainable utilization of the environment.

1.2 State of the environment

State of the environment (SOE) reporting has been largely the preserve of government, through a department or ministry mandated to undertake such an assessment and to report to parliament or government or for public information. Traditional SOE reporting has the objective of providing information on the environment and the trends in its key variables. It is mainly concerned about the biophysical environment and less about the human dimension except in the context of the pressures humanity exerts on the environment. It gives information on what is happening to the environment. This information is very useful and may be used to analyse trends in key variables of the environment.

1.3 Integrated environmental assessment and reporting

State of the environment (SOE) reporting has evolved over the past three decades into Integrated Environmental Assessment and reporting (IEA). With the emergence of the concept of sustainable development – whose three main pillars are social, economic and environment – practitioners responded with the introduction of IEA, which integrates social, economic and environmental issues in the analyses. Integrated environmental assessment and reporting tries to show the cause-effect linkages of human and natural action on the environment, and in turn, the resultant environmental change in the state of the environment and human well-being. The end result of environmental assessment should be more than just knowing the state of the environment. It should give policymakers and other stakeholders some guidance on how to better manage the environment. In order to achieve this, information obtained

from such reports should be integrated with other social and economic data and information to assist in policy formulation for the environment. The growing interest in linking environmental, social and economic data and information within the context of sustainable development facilitates integrated analysis of the complex interactions between people and their environment. It is also essential to consider leverages required on policies to promote sustainable development. This is the concept of IEA and it introduces new challenges to the process of environmental assessment:

- It implies an acknowledgement of the environment and human interactions and the impacts they have on each other over time.

- It incorporates environmental assessment into the whole process of environmental policy planning, pulling together the impact of policies from different sectors over time and the existing opportunities to promote sustainable livelihoods and options.

- It gives us an inventory of available resources which can be used as a starting opportunity for working towards sustainable development.

- It requires the development of appropriate measures to assess existing and changing pressures and opportunities in the environment, and achievements in reducing or containing these pressures and increasing available opportunities in a progressive movement towards sustainable development.

Integrated Environmental Assessment and reporting (IEA) encourages all stakeholders to constantly ask whether enough is being done in: looking out for and utilizing opportunities currently available in environmental resources, achieving sustainable development, reducing poverty, conserving and improving the state of the environment, and utilizing scenarios in constructing an outlook.

1.4 Environmental impact assessment

Of the various environmental assessment processes, EIA is arguably one of the most famous or notorious, depending on the protagonists. Often in the past, investors/developers have viewed EIA with suspicion as a tool used by environmentalists to undermine development. However, EIA is a tool used to determine the social, economic and environmental impacts of major developments in order to determine the necessary mitigatory measures. In the context of IEA, EIA is considered a policy response, along with other policies such as multilateral environmental agreements (MEAs) and natural resource management laws and institutions. The Southern African Institute for Environmental Assessment (SAIEA) describes environmental assessment as: a process to identify, evaluate and assess the potential effects on the environment of a proposed development before a major decision or commitment is made (SAIEA 2005). The main aims of the assessment are to:

- Understand the consequences or impacts of the proposed development on the environment.

- Identify ways in which the development can be improved. These could include ways to minimize negative impacts and ways to enhance its benefits.

- Provide this information to decision-makers.

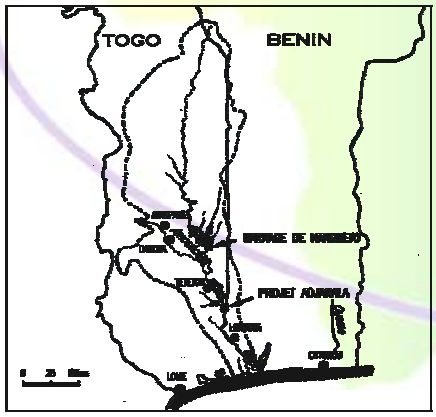
Ultimately, the aim of an environmental assessment is to ensure that developments are sustainable and do not detrimentally affect people's lives or the natural environment (SAIEA 2005).

Box 1.1: EIA of the Adjarala hydroelectric project (Togo-Benin): the aquatic environment component

1. Introduction

The electrical consumption of Togo and Benin has been increasing at the rate of 5 per cent per year. To satisfy the increasing demand the Nangbeto dam was constructed in 1987. A new dam, the Adjarala dam, was constructed on the Mono River to supplement the Nangbeto dam in supplying electric power to both Togo and Benin. The sponsors of the Nangbeto dam required a comprehensive EIA. This box only summarises the aquatic component of the EIA and is based on the situation as analyzed in 1997-98.

The optimal location of the Nangbeto dam was the Adejalara site halfway between Nangbeto to the north and the coast, at a point where the river forms part of the border between Togo and Benin. It is designed to cover 9 500 ha, have a maximum depth of 50 m, and an average turbinated flow of 40-50 m^3.



The Mono River watershed is 20 600 km^2 and has a complex system of wetlands, mainly made up of brackish coastal lagoons and flood plains for which it is the main freshwater inflow. The observed impacts of the Nangbeto dam and its effect in modifying the river-lagoon hydrosystem provided a good starting point and the reference state to project the environmental impacts of the Adjarala project. It was possible to predict the potential impacts of the Adjarala project in light of the observed impacts of the Nangbeto dam. Specifically, modifications of the fluvial system by the Nangbeto dam reduced fluctuations in the peaks of water flow; reduced suspended matter but increased ammonia concentrations downstream from the dam; and increased pollution from irrigation and fertilizer use for cotton cultivation in the Adjarala watershed, discharges from the TOGOTEX textile factory, and increased urban effluents from Atkapame (population 42 000). Aquatic fauna and flora were also affected. Some areas of the estuary were colonized by the water lettuce *Pistia stratiotes* and the Nangbeto impoundment supported an informal traditional fishing industry.

2. Potential impacts of the Adjarala dam project on the aquatic environment as identified by the IEA

In carrying out the EIA for the aquatic environment for the Adjarala dam project, two key groups of impacts were identified related respectively to the filling of the reservoir,

and the hydrosystem downstream from the Adjarala dam.

a. Impacts related to the filling of the reservoir: **"**The creation of the Adjarala reservoir will be accompanied in typical fashion by a modification of the fish population, the lentic and pelagic species (*Cichlidae*, *Cyprinidae*, *Characidae*) becoming predominant over the lotic and benthic or benthophagic (siluriform) species." The potential fisheries production is estimated in the range of 800 to 1 300 t per year. Given the current level of nutrient inputs and the rapid turnover time of the water in the reservoir (2.5 months), there is no reason to fear eutrophication of the future impoundment. The inputs of nitrogen, phosphorus and organic matter of anthropic origin should instead have a beneficial effect on the productivity of the impoundment.

b. Impact on downstream aquatic environments: the development of the Nangbeto dam has already resulted in very significant modifications to the river's low-water regime. The commissioning of the Adjarala dam will not modify the current situation and will therefore not have a significant impact on the river's regime, nor on the hydrodynamic and ecological functioning of the lagoons and wetlands of the lower Mono. The river's capacity to transport solids will not be modified by development of the Adjarala dam. However, the supply of sediments by the watershed, already reduced by the Nangbeto dam, will be reduced further downstream of Adjarala, which will trap the inflows from the Amou, the last important tributary.

3. Environmental action plan, "aquatic environments" component

The EIA recommended a list of environmental action plan activities to both reduce the negative impacts of the Adjarala project to an acceptable level and mitigate certain persistent impacts of the Nangbeto dam. The following were the key actions:

a. Partial tree cutting around the impoundment to improve the aesthetics of the impoundment and the circulation of fishing boats

b. Reduction of discharges from the TOGOTEX factory

c. Control of the proliferation of floating macrophytes to prevent the proliferation of water hyacinths (*Eichhornia crassipes*) and water lettuce (*Pistia stratiotes*) in the hydrosystem.

4. Monitoring the impacts afterwards and the effectiveness of the plan suggested by the EIA

An environmental monitoring plan was recommended by the EIA to make it possible to verify the effectiveness of the action plan, and eventually to adapt its methods.

5. Conclusion

In the area that will be submerged by the reservoir, the Adjarala dam will have the usual impacts on the aquatic environment, similar to those observed following construction of the Nangbeto dam in 1987.

Source: Trebaol and Chabal 2003

1.5 Strategic environmental assessment

According to Opio-Odongo and Woodsworth (2006) SEA contributes to decisions related to both environmental protection and sustainable development by:

- Providing broader environmental vision.
- Considering the effects of proposed strategic actions (policy, programme and plan).
- Identifying the best practicable environmental option.
- Providing early warning of cumulative effects and large-scale changes
- Contributing to integrated policy-making and planning.

Strategic Environmental Assessment (SEA) has six distinct features:

- Helping to incorporate sustainability principles in the policy making process.
- Helping to influence and improve decision making in ways that ensures integration and sustainability of the environment.
- Enabling the tiering of environmental sustainability and ensuring an integrated approach to policy, planning and programming.
- Providing better context for assessment of cumulative effects.
- Providing the context for screening for lower level environmental assessment through the EIA.
- Enabling the anticipation of impacts that can occur at project level, helping to strengthen the attendant EIA.[1]

Box 1.2: Strategic environmental assessment of the Durban South Basin Area

Background

The South Industrial Basin is the economic heartland of the Durban Metropolitan Area. It contributes over 40 per cent of Durban's gross geographic product and occupies over 50 per cent of the industrial land in the city. It is also environmentally degraded, experiencing air pollution and waste disposal problems, and the loss of important natural resources.

[1] For more information, refer to Guidelines on Policy Analysis for Integrated Environmental Assessment and Reporting, developed by Joseph Opio-Odongo and Gregory Woodsworth as part of the AEO-2 process. The guidelines are part of a wide range of capacity building materials coordinated by UNEP-DEWA as part of its work in integrated environmental assessment in Africa.

This situation has undermined the quality of life of residential communities in the area. It has also negatively impacted on the competitiveness of the business environment. The close interface between residential and industrial activities in the area has also created tensions between residential communities, local government and industry regarding future development in the area.

Strategic Environmental Assessment
In order to start a process of addressing these problems, an SEA was commissioned for the Durban South Basin area in1997. The aim of the SEA was, firstly, to assess the problems and opportunities in the area. Secondly, the SEA would propose sustainable development guidelines and management programmes to address current environmental problems and to guide future development.

Summary of methodology used in the SEA:

- Produce a baseline assessment of the Durban South Basin identifying opportunities and constraints for future development
- Identify key strategic development criteria
- Evaluate the impacts of different types of potential development (petrochemical, port, mixed use, light industry)
- Develop a policy planning framework for sustainable development

The study has addressed both short-term and long-term development scenarios for the area. Each scenario was assessed as to its impact on living environments, air quality, waste generation and disposal, and institutional and infrastructural needs.

Public participation

As with all of the projects undertaken within the context of the Local Agenda 21 programme, a process of constructive engagement has been pursued with all stakeholders during the course of the SEA. This has included among others:

- A school education programme aimed at familiarising young people in the area with the project.
- A field worker development programme for a limited number of individuals from residential sectors within the study area. This increased the understanding of environmental issues by local communities. It also facilitated their informed participation in the SEA.

Disaster management
One of the key recommendations to emerge from the SEA to date has been the need for improved disaster management in the Durban South Basin. To this end, the UNEP Awareness and Preparedness for Emergencies and the Local Level (APELL), will be launched in Durban in October 1999 as a Phase 3 Local Agenda 21 programme.

Source: Metropolitan Durban 1999

1.6 Corporate environmental assessment and reporting

The private sector has become a major player in producing annual environmental reports, which assess their environmental performance in production. About 25 per

cent of all Global Fortune 500 companies now produce some type of report that charts their environmental, social or sustainability efforts (Oracle 2005). The increased presence of corporate responsibility in daily business operations is driven by factors such as the erosion of trust in large corporations, the globalization of business, the corporate governance movement, the rise in importance of socially-responsible funds and sheer competitive pressures.

The Global Reporting Initiative (GRI) has developed globally applicable *Sustainability Reporting Guidelines* to facilitate the private sector's public account of its economic, environmental, and social performance in relation to its operations, products, and services. The GRI, which is a UNEP collaborating centre (CC), "seeks to elevate sustainability reporting to the same level of rigor, comparability, credibility, and verifiability expected of financial reporting, while serving the information needs of a broad array of stakeholders from civil society, government, labour, and the private business community itself" (GRI 2002). According to GRI, by 2002, organizations worldwide had produced about 3 000 sustainability, environmental, social and citizenship reports (GRI 2002). The GRI guidelines include economic, environmental and social indicators.

Box 1.3: Extracts from Eskom (South Africa)'s corporate environmental report

Eskom (South Africa)'s mission statement on the environment

In its environmental policy, Eskom will:

- Promote open communication on environmental issues
- Establish an environmental management system (EMS) with a view to ensuring continual improvement
- Contribute towards sustainable development
- Educate, train and motivate its employees about the environment

Management Board Environmental Steering Committee statement

Eskom is committed to providing for the energy needs of South Africa and the southern African region and continues to maintain its environmental stewardship and socially responsible investment. The Corporate Environmental Affairs Manager is tasked with ensuring the overall setting of policies and directives, giving strategic direction and providing input to the determinations and processes of the Environmental Steering Committee, comprising Management Board members. A representative from each group, who has been nominated by the relevant executive director, serves on the Eskom Liaison Committee and liaises with the Corporate Environmental Affairs Manager on strategic and policy issues.

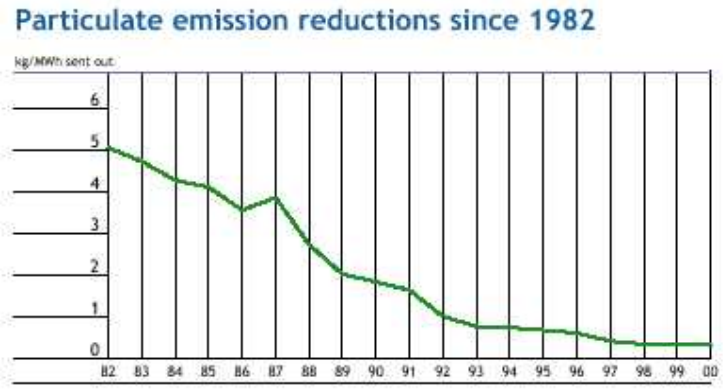
This 2000 Environmental Report demonstrates Eskom 's commitment to the principles of transparency and of continual improvement, through reporting on our performance, our environmental management system, our impact management and future planning.

Eskom 's strategic ambient air quality monitoring network plays an important role for Eskom and national and local authorities. The network assesses compliance with ambient air quality guidelines and provides strategic information on long-term trends in air quality from various sources on national and regional scales.

Sustainability index (SI)

Eskom 's impact on the environment is monitored by many indices including the following:

- Relative particulate emissions: amount of ash emitted per unit of generated power sent out by Eskom, measured in kilograms per megawatt-hour sent out (kg/MWh sent out). Relative emissions for 2000 were 0.35 kg/MWh sent out, 0.02 kg/MWh sent out less than 1999 and 0.1 kg/MWh sent out less than 1998 (See graph of Particulate emission reductions since 1982 below).



- Specific water consumption: volume of water consumed per unit of power sent out by all generating stations in Eskom, measured in litres of water per kilowatt-hour sent out (l/kWh sent out). Water consumption decreased to 1.21 l/kWh sent out, the best performance since 1997, as the result of improved water management practices (see graph of Specific water consumption over the last ten years).

- Sustainability index

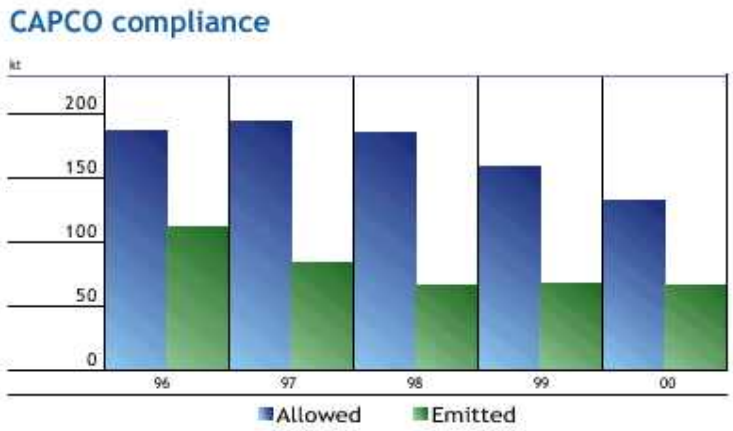
List of SI indicators and targets: 2000 sustainability index: Environmental component

Key Performance Indicator (KPI)	**Unit of Measure**	**2000**	**1999**	**1998**	**1997**	**1996**	**1995**	**2000 Target**
Legal compliance [1]	Number of contraventions to environmental legislation	3	9	9	15	11	16	0
PreCare /MaxiCare (customer satisfaction) [2]	PreCare/ MaxiCare environmental index	8.82	8.78	8.90	9.10	8.72	8.38	>8.0
Relative particulate emissions	Relative performance (kg/MWh ash particulate	0.35	0.37	0.36	0.44	0.60	0.67	0.36

	emissions) sent out							
Specific water consumption	l/kWh sent out by all stations (before 1997:coal-fired sent out stations only	1.21	1.25	1.23	1.20	1.32	1.38	1.41

- Legal compliance

Particulate emissions: the emission of particulates (ash) is regulated by the Chief Air Pollution Control Officer (CAPCO) of the Department of Environmental Affairs and Tourism. Registration certificates for individual power stations are issued by CAPCO. These certificates state the actual quantity of particulate emissions that may be emitted from the power station stacks during a 31-day period. For 2000, the overall particulate emissions performance of 66.08 kt is well within the permitted allowance by CAPCO of 131.76 kt.



[1] Measurement of this KPI was amended to introduce certainty on what comprises a legal incident in relation to business risk. This change was introduced to encourage reporting on environmental contraventions. Of the twenty-one legal contraventions reported, three were registered against the sustainability index, in accordance with the amended definition. Areas of non-conformance to legislation included waste management, a sewage spillage and the removal of protected vegetation without a permit. Reported incidents have been investigated and appropriate preventative actions to lessen the potential for recurrence have been implemented.

[2] The PreCare/MaxiCare survey has a specific question on how Eskom is perceived with respect to its environmental performance. Respondents are required to rate Eskom on a scale of 1 to 10. Performance in terms of the PreCare/MaxiCare indicator improved from 8.78 to 8.82.

Source: Eskom 2000

Box 1.4: Global Reporting Initiative performance indicators

Performance indicators, both qualitative and quantitative, are the core of a sustainability report. The performance indicators are grouped under three sections covering the economic, environmental, and social dimensions of sustainability.

Economic indicators concern an organization's impacts, both direct and indirect, on the economic resources of its stakeholders and on economic systems at the local, national, and global levels. Included within economic indicators are the reporting organization's wages, pensions and other benefits paid to employees; monies received from customers and paid to suppliers; and taxes paid and subsidies received.

Environmental indicators concern an organization's impacts on living and non-living natural systems, including ecosystems, land, air and water. Included within environmental indicators are the environmental impacts of products and services; energy, material and water use; greenhouse gas and other emissions; effluents and waste generation; impacts on biodiversity; use of hazardous materials; recycling, pollution, waste reduction and other environmental programmes; environmental expenditures; and fines and penalties for non-compliance.

Social indicators concern an organization's impacts on the social systems within which it operates. GRI social indicators are grouped into three clusters: labour practices (e.g. diversity, employee health and safety), human rights (e.g. child labour, compliance issues), and broader social issues affecting consumers, communities, and other stakeholders (e.g. bribery and corruption, community relations).

Source: GRI 2002

1.7 Questions for discussion

Q: What are the different types of environmental assessment and reporting processes which have been covered in this module?

A:

_____

_____

_____

Q: What are the similarities and differences among these environmental assessment and reporting processes? Can you explain?

A:

_____

_____

_____

Q: Identify the main target audience of each assessment process and describe the similarities and differences of the needs of these target audiences.

A: _____

_____

_____

_____

Q: Can you explore opportunities for synergy among these different environmental processes?

A: _____

_____

1.8 References

Eskom (2000). *Environmental Report 2000: Towards Sustainability*. Eskom, Johannesburg. http://www.eskom.co.za/enviroreport01/PDF/report.pdf

GRI (2002). *Sustainability Reporting Guidelines 2002*. Global Reporting Initiative, Boston. http://www.globalreporting.org/NR/rdonlyres/529105CC-89D8-405F-87CF-12A601AB3831/0/2002_Guidelines_ENG.pdf

Metropolitan Durban (1999). Durban South Basin Strategic Environmental Assessment. http://www.ceroi.net/reports/durban/response/envman/sdbnsea.htm

Opio-Odongo, J. and Woodsworth, G. (2006). *Guidelines on Policy Analysis for Integrated Environmental Assessment and Reporting*. United Nations Development Programme / United Nations Environment Programme, Nairobi. http://www.unep.org/dewa/africa/docs/en/AEO_Policy_analysis_guidelines_IEA_Oct06.pdf

Oracle (2005). Oracle and Economist Intelligence Unit announce results from corporate responsibility survey: 85 per cent of executives and investors surveyed rank corporate responsibility a central consideration in investment decisions. Press Release, February 10, 2005. Oracle Corp., Redwood Shores. http://www.oracle.com/corporate/press/2005_feb/orcl_eiu_final.html

Trebaol, L. and Chabal, J-P. (2003). EIA of the Adjarala hydroelectric project (Togo-Benin): the aquatic environment component. *AJEAM-RAGEE* 5(1), 55-65

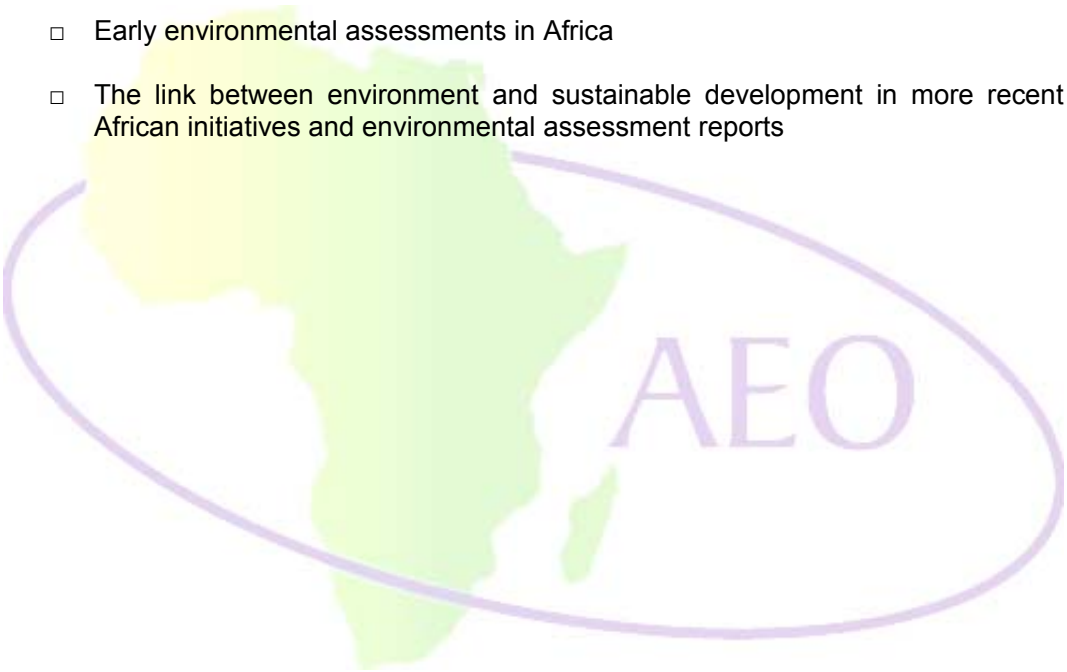
SAIEA (2005). CALABASH – *A One Stop Participation Guide: A Handbook for Public Participation in Environmental Assessment In Southern Africa*. Southern African Institute for Environmental Assessment, Rivonia. http://www.saiea.com/calabash/handbook/handbook.pdf

Module 2 – Introduction and Background to Integrated Environmental Assessment in Africa

Overview

This module introduces the background against which IEA and reporting has been developed in Africa. By the end of the module, you will have learned about:

- The key points in the development of environmental assessment and reporting in Africa
- The AEO process
- Early environmental assessments in Africa
- The link between environment and sustainable development in more recent African initiatives and environmental assessment reports



2.1 Introduction

Integrated environmental assessment (IEA) and reporting has been used to link human development, economic activity, and environmental management in the context of sustainable development. The realization of the importance of these links has been evolving since the late 1960s in the United States of America and early 1970s at the international level when in Stockholm, in 1972, the United Nations Conference on Human Environment adopted a declaration which, among other decisions, provided for environmental assessment and reporting (UNEP 1981) (see Section 2.3 below). More than a decade later in 1983, the United Nations established the World Commission on Environment and Development (WCED), which went on to define the relationship between environment and development in its 1987 report, *Our Common Future*. The report also advanced the concept of sustainable development, which defines environmental policy responses today. The WCED declared in the report that the then existing institutions and decision making process, both at national and international levels, could not cope with the demands of sustainable development (WCED 1987).

For Africa, one of the most important policy initiatives in terms of environment and development issues, was the 1980 Lagos Plan of Action, and the formation of AMCEN in Cairo, Egypt, in 1985. The objective of AMCEN was to strengthen cooperation between African governments in economic, technical, and scientific activities, to halt and reverse "the degradation of the African environment in order to satisfy the food and energy needs of the peoples of the continent" (AMCEN 1985). It has become the guiding forum for Africa leading up to the United Nations Conference on Environment and Development (UNCED) held in Rio in 1992. The 40 chapters of the UNCED *Agenda 21* laid a solid foundation for the promotion of sustainable development in terms of social, economic, and environmental progress (UN 1992). Although other important conferences have occurred since then, Agenda 21 remains a major blueprint for environmental management across the world.

The latest in this series of conferences was the 2002 World Summit on Sustainable Development (WSSD) held in Johannesburg which reviewed the progress made on the declarations at Rio in 1992. It reaffirmed the World's commitment to sustainable development and adopted the Johannesburg Plan of Implementation, stressing that the resources to overcome poverty and achieve sustainable development were available. Chapter VIII of the Plan of Implementation specifically addresses sustainable development in Africa. The Chapter also highlights the international community's recognition of the NEPAD Action Plan of the Environment Initiative (UN 2002).

2.2. Early environmental assessment activities in Africa

Environmental assessment for decision making in many African countries was mainstreamed in the 1980s as national environmental profiles, and during the implementation of NCS and NEAPs. Before then, assessments were in the context of national reporting on flora and fauna under MEAs such as the 1973 Convention on International Trade in Endangered Species (CITES), particularly in terms of listing of species on the different appendices of the convention.

In 1985, UNEP published a booklet - *Report of the Executive Director of the United Nations Environment Programme*, which highlighted the then African environmental

situation and some of the major policy initiatives. A major policy response measure proposed by Africa is the 1982 *World Charter for Nature*, which was initiated by the president of the Democratic Republic of Congo (DRC) (then Zaire), and adopted by both the Organization of African Unity (OAU) and the UN General Assembly (UNGA).

In the lead up to the UNCED, virtually all countries in Africa prepared UNCED national reports highlighting environment and development issues. The AMCEN process was key to leading this process.

Early SOE reports gave good descriptions of the state of the environment as observed at the time the reports were written. A review of the history, progress and lessons learned from the writing of SOE reports was discussed at a workshop in Harare in August/September 1997. It showed that over time, there had been a lot of change in national and sub-national environmental reports (including SOE Reports), in three main characteristics: ownership, participation, and links to policy. Early reports were not a result of user demand but were produced in response to external demand (IUCN/ROSA 1997). Table 2 below gives some examples characteristic of early African reports to illustrate lack of ownership by African countries (e.g. Angola, Lesotho, Mauritius etc); little commitment and poor networking in their production (e.g. Malawi, Mozambique); and little or no link to policy (e.g. Tanzania, Zambia).

Regarding actual state of the environment reports, the 1994 *State of the Environment in Southern Africa* perhaps provides the first comprehensive assessment of the environment at sub-regional level. Similar reports have been produced since then.

The AEO-1 report launched at the 9th AMCEN session in Uganda in July 2002, was the first comprehensive IEA report at the regional level. Through its sub-regionally distributed network of CCs and other stakeholders, the AEO process has spawned several initiatives of which capacity-building is an integral part.

Table 2.1: Some early reports on the environment from African countries

COUNTRY	NATIONAL & SUB-NATIONAL REPORTS AND RESPONSIBILITIES	CONSTRAINTS AND SUCCESSES
Angola	Prepared in 1992 for UNCED.	Outdated environmental legislation and policies. Lack of coordination between ministries.
Lesotho	State of Environment Report for UNCED 1992. SOE prepared through National Environmental Secretariat within the President's Office headed by General Secretary every three years or as rate of change demands. Uses local consultants, with peer reviewers to cross-reference validity of information. Used as a tool for decision making and for academic institutions.	
Malawi	Report for UNCED 1992; NEAP 1994 and related Environmental Support Programme; Environmental Management Reports for catchments; Environmental Management Project report; National Inventory of Natural Resources Management; NATURE; Rio+5; National Environmental Information Systems Report State of Environment.	Time, lack of data and information, and lack of commitment are constraints to the production of SOE
Mauritius	Ministry of Environment prepared an SOE for UNCED in 1992 with the assistance of a foreign consultant but the document was mainly descriptive. Instead, the NEAP, the National Environmental Policy and white papers were used for decision making.	Lack of baseline data.
Mozambique	National Environment Management Programme 1994, National Environment Policy 1995, Environment Framework Act 1997, 1st SOE 1990. Institutional leader Environmental Division 1990, Environmental National Commission 1992, Ministry for Coordination of Environmental Affairs 1994.	Lack of networking; human and financial resources and current data. Also SOE not prioritised by some sectors.
Namibia	National: Environmental Profile of Namibia, Namibia's Green Plan, Sector Environment reports such as desertification etc. under responsibility of Ministry of Environment and Tourism. Sub-national: Environmental profile and atlas, Namibia's least known wilderness, Biodiversity.	No previous culture of sharing or reporting information on the environment; budget limitations; technical inexperience.

COUNTRY	NATIONAL & SUB-NATIONAL REPORTS AND RESPONSIBILITIES	CONSTRAINTS AND SUCCESSES
South Africa	Department of Environmental Affairs and Tourism responsible for legislation, but Interdepartmental Committee for Environmental Co-ordination lead agency for co-ordination from different sectors. Little produced because of country's isolation and exclusion. Report for UNCED 1992; various Environmental Management Plans.	Plenty of information available but no culture of sharing. Gaps at regional level which need to be filled.
Swaziland	Secretariat established under Ministry of Tourism and Department of Environment 1992 in preparation for SOE. Produced report for UNCED 1992, EIA legislation, Environmental issues paper in preparation for National Development Strategy, Swaziland Environmental Action Plan 1997, Biodiversity Plan.	Challenge to develop and implement EIAs across institutions.
Tanzania	Conservation Strategy, National Action Plan, Forestry Action Plan, National Action Programme to combat desertification, UNCED 1992, EIA Guidelines, Marine Contingency Plans produced through Environmental Management Council and NGOs, establishment of Environmental Information Centre and Tanzania Natural Resources Information Centre at Dar es Salaam. Sub-national: Regional Environmental Profiles since 1991, Environmental Pollution Status reports through five district consultative committees and strategies.	Inadequate resources; unreliable and unavailable data; weak networks; bureaucratic procedures; political clout is limited because politicians do not understand the issues.
Zambia	NEAP 1994 produced by Ministry of Environment and Natural Resources; SOE 1994 coordinated by Environmental Council of Zambia. Sub-national: Environmental Profile of Lusaka produced by Lusaka City Council; Lusaka Action Plan; Provincial Environmental Action Plans. Annual reports on pollution.	Lack of awareness; no trained personnel in environmental reporting; difficult to access information on environmental issues.
Zimbabwe	First SOE 1992 compiled from provincial reports with Ministry of Environment funding only. EIA Policy 1992. Ministry of Environment Committee responsible for development of indicators available for chapter coordinators of SOE.	

Source: SADC/IUCN/SARDC 1997 (unpublished)

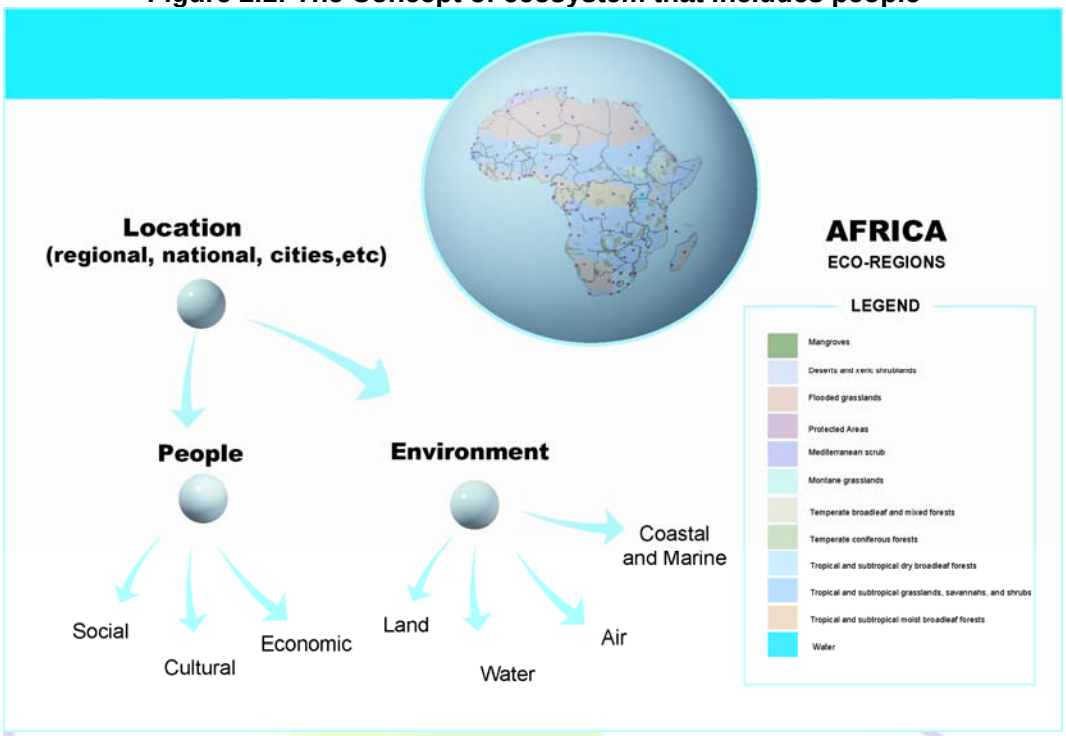
The various reports highlighted, and many others published over the years, provide a rich source of environmental data and information as well as trends, particularly since the 1980s. Taken together with socioeconomic reports produced by other agencies, for example, the United Nations Development Programme (UNDP), the United Nations Educational, Scientific and Cultural Organization (UNESCO), the United Nations Children's Fund (UNICEF), the Food and Agriculture Organization of the United Nations (FAO), the World Food Programme (WFP), the United Nations High Commissioner for Refugees (UNHCR), the World Bank, and others, these reports have become critical to IEA and reporting. The old reports also provide important information on the evolution of assessment – from SOE to IEA and reporting. The evolution has also seen a transition of the various frameworks and methodologies from resource and sector-focus to more complex methodologies which take into account social, economic and environmental interactions.

The different frameworks which were common in the past include:

- Issues framework - land degradation and soil erosion, water and air pollution and waste management
- Environmental resource framework - agriculture, forestry, tourism, energy
- Environmental media framework - land, air, water and biota
- Environmental process framework - pressure, state, response.

The environmental process framework has since evolved to include all of the above within the driving forces-pressures-state-impacts-responses (DPSIR) framework, which was used in the AEO-1 report. Other methodologies include vulnerability and resilience assessment, ecosystem assessment as employed by the Millennium Ecosystem Assessment (MA), and human-ecosystem assessment.

Figure 2.1: The Concept of ecosystem that includes people



The DPSIR framework has been adapted to the Opportunities Framework, which was used to prepare the AEO-2 report. The main difference between the DPSIR and Opportunities Frameworks is that the latter highlights the state of the current environmental assets and the opportunities they provide for sustainable development in Africa. The emphasis is on opportunities rather than losses – the environmental losses are analysed in the context of foreclosure of opportunities.

Integrated environmental assessment (IEA) and reporting has become commonplace across Africa with many countries now using it to assess and report on the national environment. However, it is common for national level reporting for countries to start using traditional SOE reporting. Box 2.1 gives a summary of Libya's First National Report on the State of the Environment, 2002. Although the IEA and reporting skills had been well developed at the time this report was made, the Environment General Authority of Libya strategically decided to produce its first report using the traditional SOE reporting process with a possibility of using the IEA and reporting process in subsequent reports.

Box 2.1: Libya's First National Report on the State of the Environment, 2002

Libya is about 1 775 000 km^2. 94.73 per cent of the country is desert, only 3.94 and 0.29 per cent are covered by agriculture and forests respectively. The population of the Jamahiriya was 3.23 million in 1984, growing to 4.4 million in 1995. Estimates for the 2005 population are 5.87 million. The majority of the population live along the northern coast in the country's major cities. The percentage of the population living in cities has increased dramatically since the 1970's; in 1973 it was 57.5 per cent, but by 1995 it

had reached 85.39 per cent. The districts that contain the four major cities of Tripoli, Benghazi, Misurata, Azzawiya and Derna have a population density of 45 persons per km^2, a hundred times the density of the districts to the interior of the country (0.45 persons per km^2). The country greatly depends on oil and other oil-related products and has not been able to diversify the sources of its income over the almost 40-year period during which it has pumped oil for export. Oil, however, is a non-renewable resource and continued dependence on it without diversification is not acceptable under Libya's efforts to achieve sustainable development.

Libya's *The First National Report on the State of the Environment* (2002) states that "the main objective of development is to fulfil the needs of man *[sic]* such as food, clothing, shelter, job opportunity and his aspiration for a better life". The main factors that constrain the achievement of this objective sustainably in Libya relate to limited water supply. Up to 95 per cent of the total water supply is ground water but is supplemented at an increasing rate by valley water (2.7 per cent); desalinated water (1.4 per cent) and reusable treated water (0.7 per cent). The most important use of water is agriculture (85 per cent) which is continuously increasing with greater demands for food for a rapidly growing population. Urban and industrial purposes take 11.5 per cent and 3.5 per cent respectively. Safe water drawing limits have been calculated especially for underground aquifers, but they are not followed because of excessive demand. In the Gefara Plain, for example, safe drawing limits are exceeded by 5.61 per cent leading to fast depletions in the quantity and degradations of quality of water supplies. Infiltration of sea water to compensate for drawn water especially in the coastal strip has led to serious degradation of water quality rendering some of the water drawn unsuitable for most uses. Encroachment of salt water into underground aquifers has also been experienced further south for similar reasons. Serious health, environmental and socioeconomic effects, together with socioeconomic losses may be expected from these occurrences. In addition, land is becoming dry, salty, and less able to support increasing populations and/or provide jobs. This may not be a reversible state of the environment.

Legislation on water management and use has been passed under a general umbrella of laws that address environmental protection in general with specific laws, administrative and technical decrees, and regulations on water management and use. The legislation is promulgated with due consideration to relevant international rules and standards. An example of water legislation includes Law No.3 of 1982 in regard to the regulation of water sources utilization. The law has 14 Articles including those that emphasize that every person shall undertake to preserve water (Article 1); and that people are the owners of water sources (Article 2). The law sets priorities for the provision of licenses for water drilling in the order of human usage, agriculture, and mining and industrial purposes (Article 8).

Source: Government of Libya 2002

2.3 UNEP environmental assessment mandate

The United Nations Environment Programme (UNEP) derives its mandate from UNGA 2997 of 1972, which also facilitated the establishment of UNEP as discussed above. The resolution states in part that UNEP should keep the global environment under review (UN 1972). The UN Conference on the Human Environment whose

recommendations led to Resolution 2997 was also emphatic in highlighting the importance of environmental assessment and report (see Box 2.2 below).

Box 2.2: Decision on environmental assessment at the UN Conference on Human Environment, 1972

One of the early decisions of the international community on environmental assessment and reporting highlighted the following:

- To facilitate the development of social and cultural indicators for the environment, in order to establish a common methodology for assessing environmental developments and preparing reports on the subjects.

- To prepare, on the basis of (the) national reports on the state of, and outlook for, the environment, periodic reports on regional or sub-regional situations and on the international situation in this matter.

Source: UNEP 1981

The Division of Early Warning and Environmental Assessment (DEWA) is one of eight UNEP sub-programmes (divisions) responsible for implementing UNGA Resolution 2997. The DEWA mission is to:

> Provide the world community with improved access to meaningful environmental data and information, and to help increase the capacity of governments to use environmental information for decision making and action planning for sustainable human development (UNEP 2006).

2.4 The Global Environment Outlook process

Up to the mid-1990s, an integrated, global environmental assessment report was lacking. In response to the need for comprehensive, integrated, policy-relevant assessments of the global environment, UNEP launched the GEO process in 1995. The GEO assessment aims to ensure that environmental problems and emerging issues of wide international significance receive appropriate, adequate and timely consideration by governments and other stakeholders. The overarching objectives are to:

a. Provide *access* to the best scientific knowledge for *international environmental governance* and the *mainstreaming* of environmental concerns in social and economic sectors, and in support of internationally agreed environmental goals.

b. *Facilitate interaction* between science and policy through multi-scaled and multi-dimensional integrated assessment process and *products of high legitimacy, credibility and utility*

c. Build *geographic and gender-balanced partnerships and capacity* for environmental assessments (UNEP undated).

A worldwide network of CCs forms a strong assessment partnership at the core of the process and a focus for building capacity at various levels. Comprehensive peer review and consultative mechanisms with governments, NGOs, and scientific

institutions are other integral elements. Advisory groups provide guidance on conceptual approaches and methodology development and capacity-building. This process is underpinned by a dedicated, interactive online data system called the GEO Data Portal (http://geodata.grid.unep.ch/). This participatory and consultative process gives GEO assessments scientific credibility, accuracy and authority targeting a wide audience by providing information to support environmental management and policy development. Annex 1 highlights the major stakeholders in the GEO assessment. In addition to these stakeholders being players, they are also a major target audience and potential GEO spokespeople. Through their own organizations and networks at global and regional levels, these GEO stakeholders can also help "spread the word" on GEO. The first GEO assessment report was initiated by the UNEP Governing Council in its decision 18/27 (1995) where the Executive Director was requested to prepare a new comprehensive report on the present and future state of the world environment, including possible response measures to address the situation (UNEP 1995). Following the establishment of the GEO process and production of the first GEO report, the Governing Council renewed the mandate for GEO in 1997, 1999 and 2003 and 2005 (GC19/3, GC20/1, GC22/1/IB, GC23/6). The GC/GMEF decisions in 2003 and 2005 facilitate the preparation of GEO-4.

GEO assessment has evolved since its launch through the publishing of:

- *GEO-1: For life on Earth* in 1997,
- *GEO-2000: UNEP's Millennium Report on the Environment* in 1999, and
- *GEO-3: Past, present and future perspectives* in 2002.

2.5 GEO-4 assessment objectives

The drafting of the GEO-4 report is advanced. Its launch in 2007 will be two decades after the release of the Brundtland Commission's seminal report - *Our Common Future*. The Brundtland report provides the baseline upon which the 20-year GEO-4 retrospective is founded.

The overall theme of the GEO-4 report is "Environment for Development." It will include the valuation of environmental/ecosystems goods-and-services, and the role of such services in enhancing human wellbeing, minimizing human vulnerability to environmental change, and supporting development. Both the issues of environmental valuation and enhanced human wellbeing were strongly endorsed by the first GEO-4 Production and Authors' Meeting held in Nairobi in June 2005. The baseline for the report is the 1987 Brundtland Commission seminal report published as *Our Common Future.*

The GEO-4 report objectives include the following:

- Show how the environment is key to sustainable development, human well-being, conflict prevention, prosperity and poverty alleviation.

- Identify the direct and indirect drivers of environmental change and their impacts on the environment, and human well-being.

- Show the impacts of policy responses since the Brundtland Commission report in 1987 in terms of addressing the environmental challenges of today.

- Identify some emerging issues at global and regional levels that may have significant impact on human well-being

- Use global and regional scenarios to show impact of different policy interventions to highlight to policymakers some options worth considering to better manage the environment and derive sustainable benefits for current and future generations.

- Highlight the need for immediate action at different levels to mitigate and adapt to negative environmental change from human actions and enhance well-being.

The GEO approach to IEA and reporting has continued to evolve with the preparation of each GEO report, strengthening areas considered weak. For example, state-and-trends issues were analysed separately from policy responses in GEO-1 but strengthened in subsequent reports in the series. Such developments have enriched IEA processes at different sub-global levels – from regional and sub-regional to national to local levels. At the global level, UNEP has established a network of CCs across the globe, which assist in the assessment at different levels. At national levels, ministries and/or departments of environment are responsible, responding to statutory requirements to report on the state of the environment.

The most fundamental developments in the GEO IEA process (), include the following:

- Introduction and strengthening of capacity-building activities across different spatial levels. While capacity-building was not central to the GEO-1 process, it has since become key during the preparation of subsequent reports.

- Refinement of the DPSIR analytical framework, which underpinned GEO-2000 and GEO-3 as a key component of the UNEP IEA and reporting process. The analytical framework has since been further refined, adapting the framework used in the Millennium Ecosystems Assessment.

- Strengthening of consultations with policymakers, the scientific community and other stakeholders. Upfront consultations to determine the needs of both policymakers and the scientific community have redefined the GEO assessment, particularly the GEO-4 process. With the chapter content increased from five to 10, the GEO IEA has introduced chapter working groups comprised of 15-20 experts for each of the 10 chapters. The result has been a more decentralized process with strong involvement of both government and other stakeholders, wider buy-in and ownership of the assessment; and enhanced profile of the GEO assessment.

The strength of the GEO IEA process is also its adaptability for use at different spatial levels. It is now being used at global, regional, sub-regional, national, city and ecosystems levels. Despite some variations in terms of emphasis in its application, the GEO IEA has two common elements of analysis:

- Integration of state-and-trends issues with policy responses as well as that of environmental issues with socioeconomic developments. Such integration provides

for a better understanding of the complexity of human-environment interactions, and the influences each has on the other.

- Use of scenarios to try to determine the likely impacts of certain policy decisions to address the environmental challenges facing society today. Scenarios and modelling underpin the future perspectives of the outlook chapter.

The GEO IEAhas strengthened the accessibility of reliable environmental data and information for improved policy-making at different levels. Today, there is greater investment by the international community and governments in environmental assessments, both in terms of human and funding resources. Despite the availability of such a wealth of information state-and-trends of the global environment, policymakers still face many environmental challenges. Many of these are complex, requiring enhanced understanding of analyses for effective response measures.

Box 2.3: Websites to be accessed as resources for more information

- NEPAD: http://www.nepad.org
- MDGs: http://www.developmentgoals.org
- AMCEN decisions: http://www.unep.org/ROA/AMCEN/decisions.asp
- AEIN: http://www.unep/dewa/Africa/aeoprocess/aein.asp
- Frameworks of Environmental Statistics and Indicators: http://www.unescap.org/stat/envstat/stwes-015.pdf

2.6 Africa Environment Outlook

Regional SOE reports have developed from the GEO process. These reports focus on strategies that are more relevant to their regional environments. Africa, as a region, contributes to the GEO process through the AEO process. The origin of the AEO reporting process is AMCEN whose UNEP-based Secretariat has worked to strengthen the process of producing the AEO Report. The process involves wide consultation and participation with stakeholders throughout Africa and reflects sub-regional and multi-stakeholder perspectives and priorities. It identifies and stresses the importance of emerging issues and gives early warning on impending environmental threats. In relating human activity, environment, policy formulation and sustainable development, the AEO reporting process uses IEA and reporting as an effective tool for communication between science and policy.

As a regional report, the AEO emphasizes those issues that are most relevant to the African continent. Most importantly, it is integrated with initiatives that link environment assessment to sustainable development. These include:

- NEPAD Environmental Initiative Action Plan
- Environmental targets set under the Millennium Development Goals (MDGs)
- Environmental recommendations adopted by AMCEN
- Recommendations of the African Ministerial Council on Water (AMCOW)

- Africa Environment Information Network (AEIN)

2.7 Sustainable development as the basis of more recent environmental assessment reports in Africa

The main emphasis of the African initiatives on which the AEO is based is sustainable development. Chapter VIII of the WSSD Plan of Implementation (UN 2002) as well as the NEPAD Environment Action Plan (NEPAD 2003) have articulated Africa's sustainable development issues.

On a global scale, the concept of sustainable development first gained international attention in the late 1980s based on a realization that the continuous well-being of humankind depends on the well-being of the environment. In 1987, the WCED also known as the Brundtland Commission defined in *Our Common Future* sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs", a generation's long outlook into the future. There was emphasis in the report that equity, growth and environmental protection can be simultaneously maintained. These views have been subsequently endorsed by governments. In September 2000, commitment was given to sustainable development and poverty alleviation at the Millennium Summit in the form of the MDGs in-which governments re-affirmed their commitment to sustainable development and poverty alleviation (UN 2000). Commitment to the same principles has been given especially by the Rio Declaration on Environment and Development and Agenda 21 (UN 1992), and by the WSSD Plan of Implementation (UN 2002).

For the African continent, further endorsement has come from the NEPAD *Action Plan for the Environment Initiative*. NEPAD particularly emphasizes poverty reduction as the keystone of sustainable development. The overall effect of the various endorsements has been to develop a new conceptual framework for development bringing the environment to the centre. They have also increased the need for broader based IEA and reporting that takes into account the dynamic links among ecological, socioeconomic and policy issues more systematically (NEPAD 2003).

The traditional pattern of decision making on the environment that isolated problems according to sectors that characterized the early SOE reports as already highlighted earlier:

- was less effective in developing appropriate policies linking human activity, environment and sustainable development;

- was not sufficiently focused on adaptive management for long term perspectives; and

- did not have an in-built framework that required the participation of different sectors of society in decision making processes.

Integrated Environmental Assessment (EIA) and reporting so far offers a more comprehensive and effective alternative because it involves many different stakeholders, expertise and is consultative and participatory.

2.8 Questions for discussion

Q: What is your understanding of a more traditional SOE reporting, and why is it considered traditional?

A: _____
_____
_____
_____

Q: Why might a strategy taken by Libya (of using the traditional SOE approach) be advantageous in the early stages of building integrated environmental assessment?

A: _____
_____
_____
_____

Q: What the similarities and differences among different assessment and reporting frameworks highlighted earlier in this module i.e. issues, environmental sector, resource and environmental process frameworks? Do you think these frameworks are still relevant today, and why?

A: _____
_____
_____
_____

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

A: _____
_____
_____
_____

Q: Give two characteristics that strike you from the early reports on the environment from African countries given in Table 1.

A: _____
_____

2.9 References

AMCEN (1985). Annex I: Resolution adopted by the conference at its first session. African Ministerial Conference on the Environment. UNEP/AEC 1/2: Proceedings of the First Session of the African Ministerial Conference on the Environment, Cairo, Egypt, 16-18 December. http://www.unep.org/roa/Amcen/docs/AMCEN_Decisions/WORD/Amcen%201%20decision.doc

Dürrenberger, G., Behringer, J., Dahinden, U., Gerger, Å., Kasemir, B., Querol, C., Schüle, R., Tobara, D., Tóth, F., van Asselt, M., Vassilarou, D., Willi, N. and Jaeger, C.C. (1997). *Focus Groups in Integrated Assessment: A Manual for a Participatory Too*l. Darmstadt. Ulysses Working Paper 97-2. ZIT - Centre for Interdisciplinary Studies in Technology, Darmstadt. http://www.jvds.nl/ulysses/eWP97-2.pdf

Government of Libya (2002). *The First National Report on the State of the Environment*. Government of Libya, Tripoli

Haas, P.M., Levy, M.A. and Parson, E.A. (1992). Appraising the Earth Summit: How should we judge UNCED's Success?, *Environment,* 34 (8) 6-11, 26-33

IUCN/ROSA (1997). Proceedings of a Workshop on Environmental Reporting: Experiences, Lessons and Next Steps, Harare, Zimbabwe, 31 August - 3 September 1997. IUCN - World Conservation Union / Regional Office for Southern Africa, Harare

NEPAD (2003). *Action Plan for the Environment Initiative*. New Partnership for Africa's Development, Midrand. http://nepad.org/2005/files/reports/action_plan/action_plan_english2.pdf

Rump, P.C. (1996). *State of the Environment Reporting: Sourcebook of Methods and Approache*s. United Nations Environment Programme, Nairobi

SADC/IUCN/SARDC (1997). [Some early reports on the environment from African countries]. Southern African Development Community / IUCN – The World Conservation Union / Southern African Research and Documentation Centre. Unpublished data.

UN (2002). World Summit on Sustainable Development Plan of Implementation. Proceedings of the World Summit on Sustainable Development. Johannesburg, South Africa. 26 August – 4 September. United Nations. http://www.un.org/esa/sustdev/documents/WSSD_POI_PD/English/WSSD_PlanImpl.pdf

UN (2000). United Nations Millennium Declaration. A/RES/55/2. United Nations, New York. http://www.un.org/millennium/declaration/ares552e.pdf

UN (1992). Agenda 21. Proceedings of the United Nations Conference on Environment and Development. Rio de Janeiro, Brazil, 3-14 June 1992. United Nations. http://www.un.org/esa/sustdev/documents/agenda21/english/Agenda21.pdf

UN (1972). Resolution 2997 (XXVII) of the General Assembly, 15 December 1972: Institutional and Financial Arrangements for International Environmental Cooperation. A/RES/27/2997. United Nations, New York. http://daccessdds.un.org/doc/RESOLUTION/GEN/NR0/270/27/IMG/NR027027.pdf

UNEP (2006). DEWA Home Page. United Nations Environment Programme. http://www.unep.org/dewa/

UNEP (2003). *Global Environment Outlook 3.* United Nations Environment Programme, Nairobi

UNEP (2002). *Africa Environment Outlook: Past, Present and Future Perspectives.* United Nations Environment Programme, Nairobi

UNEP (1995). Report of the Governing Council on the work of its eighteenth session. Proceedingds of the Eighteenth Session of the Governing Council of the United Nations Environment Programme. Nairobi, Kenya, 15-26 May 1995. http://www.unep.org/gc/gc18-report.doc

UNEP (1981). *In Defence of the Earth: The Basic Texts on Environment: Founex, Stockholm, Cocoyoc*. United Nations Environment Programme, Nairobi

UNEP (undated). GEO Assessment. United Nations Environment Programme. http://www.unep.org/GEO/About/Background/

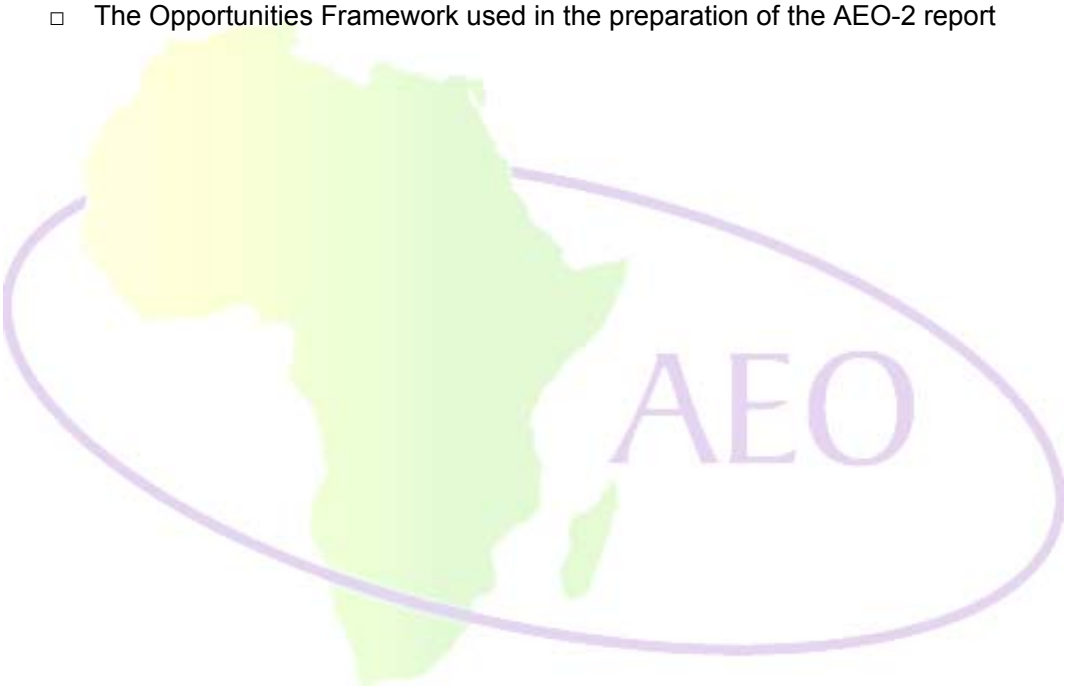
WCED (1987). *Our Common Future*. World Commission on Environment and Development. Oxford University Press, Oxford

Module 3 – Frameworks for Environmental Assessment and Reporting

Overview

In this module, you will be introduced to various analytical approaches that have been used for IEA and reporting especially in Africa. By the end of the module, you will know:

- The DPSIR (environmental process) framework currently widely used in many IEA processes in Africa
- The Opportunities Framework used in the preparation of the AEO-2 report



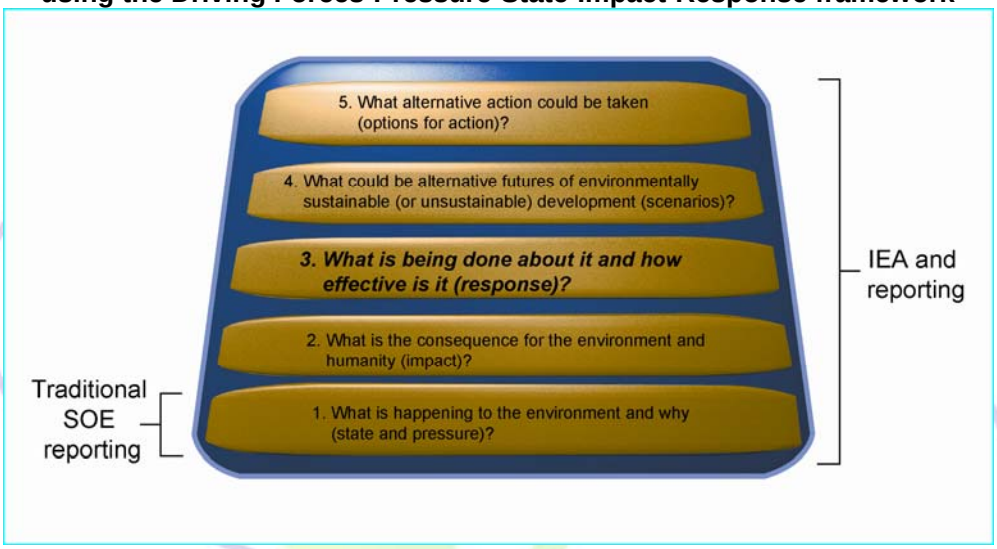
3.1 Introduction

The AEO process used two approaches in IEA and reporting, the DPSIR and Opportunities frameworks. The first AEO report used the DPSIR framework while the Opportunities Framework was adopted for the AEO-2 report.

3.2 Driving Forces-Pressure-State-Impact-Response Framework

The DPSIR framework focuses on what has gone wrong with the environment and how to fix it. The DPSIR framework is an extension of the Pressure-State-Response (PSR) model, developed by Anthony Friend in the 1970s, and subsequently adopted by the Organization for Economic Cooperation and Development's (OECD) State of the Environment group. It answers five questions in sequence as shown in Figure 3.1.

Figure 3.1: Steps in the integrated environmental reporting process using the Driving Forces-Pressure-State-Impact-Response framework



Source: Pinter and others 1999

Throughout the analysis, the questions in Figure 3.1 follow a process of producing and communicating policy-relevant information on key interactions between the natural environment and society. The interactions may be categorized into the pressure human activity put on the environment; the state which the environment takes on as a result of these pressures; the impacts of the changed state on the environment itself and humanity; and the response of society as a result of changing states of the environment. The four categories of interaction are the basic components of the DPSIR framework used in IEA.

Many African countries have changed their SOE reports from traditional reporting to use the DPSIR framework. We can illustrate this change with reference to an extract from Uganda's (2001) State of Environment Report in Box 3.1.

Box 3.1: An Extract from Uganda's SOE Report, 2000/2001

The SOE 2000 differs from the previous three [SOE Reports] both in format and content. While the report is entirely home-grown, the new format has benefited from

the process, findings, and outputs of UNEP's GEO project. The main reason for change in format and content is the fact that the previous three reports [were] presented along sectoral lines. Also, after the production of the third issue [of the State of environment Report], it became clear that the reports were beginning to become repetitive. Feedback from users of the last three issues indicated that the content was not comprehensive and integrated enough. The content also lacked policy-relevant assessment and a look into the future. Finally, it was felt that rather than trying to cover a wide range of issues some of which were of peripheral importance, it would be better to focus on key issues in each thematic area. Consequently, the reader should bear this important departure in mind when reading the SOE 2000. For each issue identifies, reporting follows the pressure-state-response framework judiciously mixed to allow for ease of reading. As a result, in addressing shortcomings of the last three issues and incorporating additional features, the new format consists of …five sections…

Section 1 looks at environment and development, in particular how the poor impact on each and are, in turn, impacted upon by the environment.

Section 2 resembles the traditional SOE reports. Even then, only important themes in which there are key issues, qualify for inclusion… .

Section 3 looks at policy responses. The section describes the different types of policy response that are being used to address environmental issues; and also tries, where possible, to assess their success or failure. The quantitative assessment of success or failure of policy initiatives and development is not easy. Furthermore, for Uganda, most of the policies are relatively new, making it extremely difficult to assess or even attribute impacts. Nonetheless, the section is treated under the following clusters: laws and institutions; economic instruments; decentralized environmental management; financing of environmental action; public participation; environmental information and education; and social policies.

Section 4 attempts a look into the future, principally for two reasons. First, present day actions have consequences that reach far into the future. Second, there is a need to look at the environmental issues that are likely to require priority attention in future. There are many scenarios to choose from for future direction. The…scenarios…were identified through a participatory process where Ugandans reached a consensus on the landscape of the future possible unfolding of events. The likely environmental consequences of following each of the paths are identified and presented in this section.

Section 5 concerns outlook and recommendations. It addresses Uganda's population growth that threatens to outstrip the country's environmental absorptive and natural resource base. It offers observations on emerging problems, documents significant achievements realized so far, and offers recommendations for action.

Source: NEMA 2000

As we can see:

- Sections 1 and 2 together answer Questions 1 and 2 in Figure 3.1. Section 1 specifically identifies the driving forces that have created pressures (and how the pressures have impacted on the environment). Pressures in the DPSIR framework may be divided into two categories: underlying pressures (e.g. population, poverty) which may be the root cause of actual pressures (e.g. overgrazing, unsustainable fishing, using the land beyond its capacity, deforestation, etc.). In policy-relevant environmental assessment, identifying pressures would be the natural starting point. Formulating policies that reduce pressures is likely to make a significant contribution to sustainable development. As might be expected, the NEPAD Action Plan for the Environment Initiative emphasizes two key underlying pressures on the African environment, population growth and poverty, which require immediate attention if Africa aims at harnessing its resources for sustainable development.

- In Box 3.1, Section 2 is referred to as resembling the previous SOE reports, narrating the state of the environment. The “State” is a description of the condition the environment at the time of description. The “state” will include the “impact” (result) of the pressures described above, but may also have elements contributed by a change in the natural environment (e.g. droughts, floods, hurricanes).

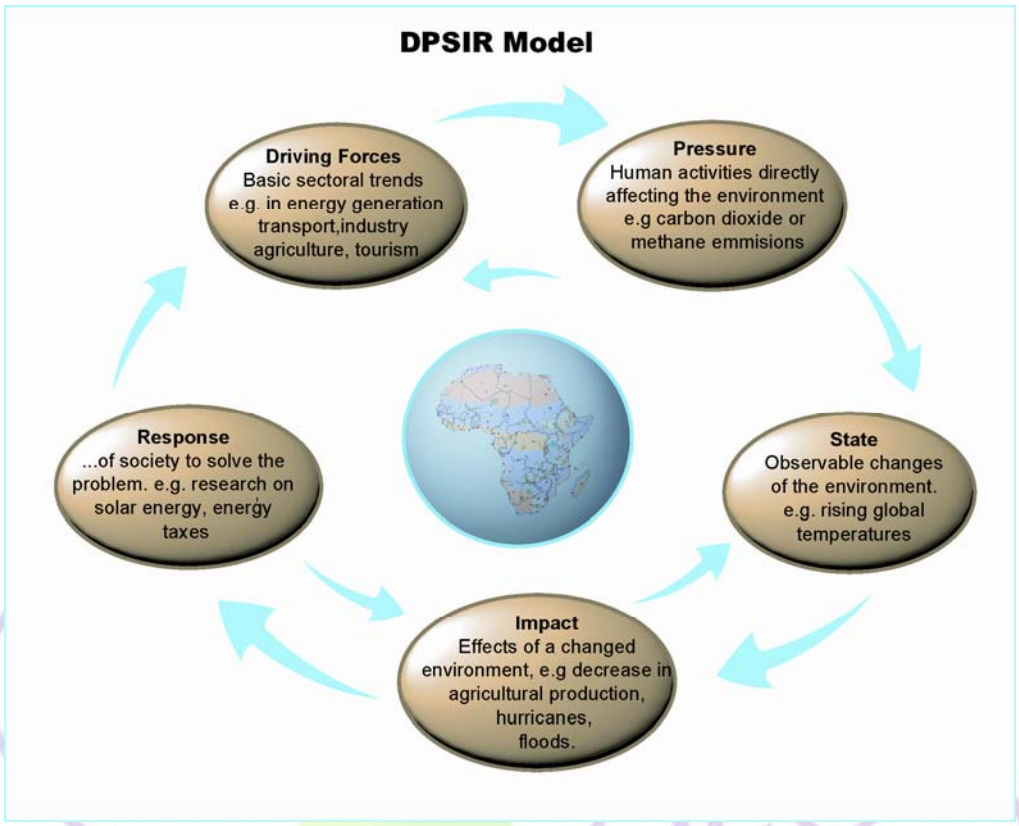
- Section 3 is the “what is being done about it” (response) to the changing environment. It also gives information on the effectiveness of what is being done. The "response", in general, refers to individual or societal action to reduce or prevent negative environmental impacts, conserve resources or correct environmental damage. Responses may be expressed in many ways, including laws, incentives to promote good practices and/or disincentives to discourage bad practices, or means of educating the public about preferred environmental behaviour. In the case of Uganda, Box 3.1 shows that a wide range of responses were attempted. Note the problem with assigning impacts of new responses. It is often difficult to develop the right responses for pressures which have been identified within short periods of planning responses. It is even more difficult to evaluate the effectiveness of recent responses and plan for subsequent ones.

- Section 4 provides information on what would happen if Ugandan society does not act now (Question 4 in Figure 3.1). It also provides different scenarios of what may happen in the future if different policy paths are taken.

- Section 5 answers Question 5 in Figure 3.1, providing recommendations for improving the environment (alternative options for action). In Uganda’s case, the authors of the report considered that one specific “pressure” (population growth) required special attention. Section 5 takes this “pressure” and makes a more detailed discussion of its potential devastating impact on sustainable development in Uganda in the future, if it does not receive specific attention.

One possible illustration for a general DPSIR framework is shown in Figure 3.2.

Figure 3.2: One example of a Driving Forces-Pressure-State-Impact-Response framework



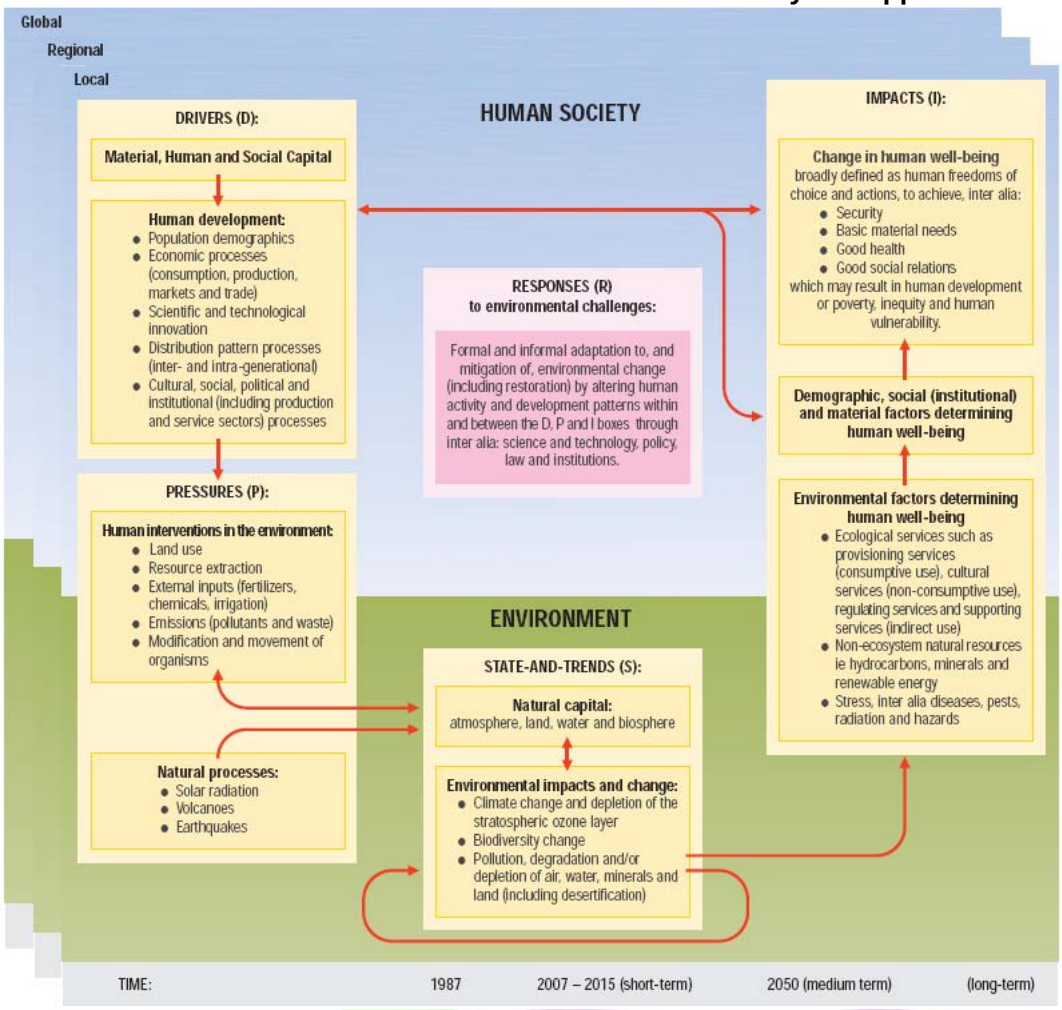
Source: Adapted from Shah 2000

The DPSIR framework may be defined to address particular concerns that may be of special interest in a region or country. In the case of Africa, poverty alleviation and sustainable livelihoods have been identified as the most important. Poverty is the basis of many pressures on the environment creating an un-sustainable state of the environment. Responses to this state have been the formulation of policies that attempt to overcome poverty. However, recent arguments have been advanced that DPSIR stresses the negative in IEA and reporting, accounting for what has been lost as the basis of influencing policies to promote sustainable development. An alternative framework is discussed below in Section 3.4 below.

3.3 GEO-4 analytical framework

It will be useful to link the GEO-4 underlying theme to the descriptions of the DPSIR framework made above. The underlying theme of the GEO-4 assessment is human well-being and the contribution of environmental/ecosystems goods-and-services to such well-being (see Figure 3.3).

Figure 3.3: The Driving Forces-Pressure-State-Impact-Response Framework based on UNEP's Human-Environment interaction analytical approach



Source: UNEP 2006

The UNEP Human-Environment Interaction analytical approach is built on the DPSIR framework, the MA Conceptual Framework, and vulnerability considerations (the driving forces are referred to as "drivers" in the GEO-4 framework). It is multi-scalable and indicates generic cause-and-effect relations within and among:

- DRIVERS: They are sometimes referred to as indirect or underlying drivers or driving forces and refer to fundamental processes in society, which drive activities having a direct impact on the environment.

- PRESSURES: They are sometimes referred to as direct drivers as in the MA framework. They include, in this case, the social and economic sectors of society (also sometimes considered as Drivers). Human interventions may be directed towards causing a desired environmental change and may be subject to feedbacks

in terms of environmental change, or could be an intentional or unintentional by-product of other human activities (i.e. pollution).

- STATE: Also include trends, often referred to as environmental change, which could be both natural and human-induced. One form of change, such as climate change, (referred to as a direct driver in the MA framework) may lead to other forms of change such as biodiversity loss (a secondary effect of climate gas emissions). Multiple pressures could leave the environment more vulnerable, leading to cumulative change and, in some cases, sudden and disruptive change.

- IMPACTS: Environmental change may positively or negatively influence human well-being (as reflected in international goals and targets) through changes in ecological services and environmental stress. Impacts may be environmental, social and economic, contributing to the vulnerability of people. Vulnerability to change varies between groups of people depending on their geographic, economic and social location, exposure to change and capacity to mitigate or adapt to change human well-being, vulnerability and coping capacity are dependent on access to social and economic goods-and-services and exposure to social and economic stresses.

- RESPONSES: They (interventions in the MA Framework) consist of elements among the drivers, pressures and impacts which may be used for managing society in order to alter the human-environment interactions. Drivers, pressures and impacts that can be altered by a decision-maker at a given scale are referred to as endogenous factors, while those that can't, are referred to as exogenous factors. Responses can occur at different levels: for example, environmental laws and institutions at the national level, and MEAs and institutions at the regional and international levels. Responses address issues of vulnerability of both people and the environment, and provide opportunities for enhancing human well-being.

Central to the framework in Figure 3.3 are:

- The economic sectors and the role they play in a particular country, sub-region or region as well as at the global level. Economic activity is a key factor in terms of human well-being just as much as it is in terms of its impacts on environmental change, and ultimately the goods-and-services available to society to adapt and/or mitigate such change. Rich and poor regions and societies have economic sectors which depend on their resource base, such as land, water, forests and biodiversity.

- Available resources and the extent to which these resources are utilized and managed may be a major factor in terms of environmental change as well as human well-being. Consumption derived from such resources may also influence policies across regions and societies, often extending the footprint of some consumers well beyond their own resource base. A good example is the exploitation of tropical forests to produce timber and other products for consumers in temperate regions.

- Interlinkages among environmental goods-and-services and aspects of human well-being as well as some of the stresses that influence the environment, human

well-being and the relationship between them. These interlinkages are central to the value placed on environmental services, whether such value is direct (consumptive or non-consumptive), indirect, option, bequest, or existence/intrinsic. The interconnectedness of the environment, society, and economy make the need for mainstreaming environmental issues a prerequisite. The environment should not be a concern for environmental ministries and departments but other parts of government as well. It should be a concern for private sector and other stakeholders.

- The state of the environment is another important factor in terms of human well-being, particularly where the majority of the people depend directly on environmental goods-and-services for their basic needs. Human well-being and ecosystems goods-and-services are interconnected and inseparable. All people – rich and poor alike and in all regions – depend directly on their environment, for example, in terms of livelihoods or goods-and-services such as safe water and air. In the developing regions, the majority of the people depend directly on the environment for livelihoods and development. In developed regions – in which commerce, industry, and services dominate and direct dependence on the environment is less apparent – ecosystem goods-and-services are still a major factor, particularly in supplying the raw materials for industry and manufacturing, and food (even though these services might have been externalized) as well as in providing a sink for waste, emissions and effluent.

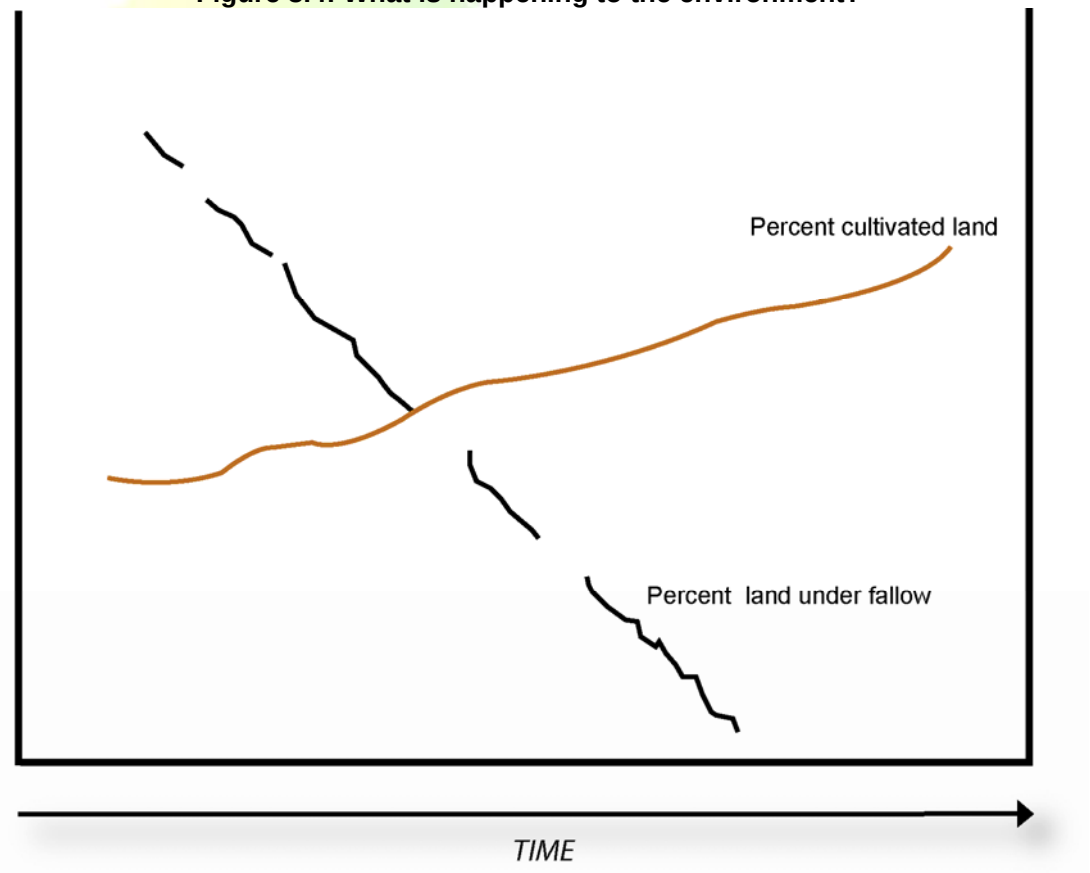
The critical role of the environment in terms of human well-being and economic activity cannot be overlooked. The environment-social-economic interactions are relevant to any society, rich or poor. For developing regions, where the majority of the people depend directly on the environment, there is a direct link between the **environmental capital** and **human well-being** boxes (see Figure 3.3). The figure also highlights the crosscutting nature of human rights and fundamental freedoms in terms of human well-being. The policies, mitigation and adaptation box straddles both the environment and human society sections because of the relevance of these issues to both spheres.

3.4 The Driving Forces-Pressure-State-Impact-Response framework at the local level

The DPSIR framework can be used at any spatial level to address the need for reliable environmental data and information for effecting policy responses for better environmental management. Driving forces are the social, demographic and economic developments in a city, for example. They also include livelihood options, changes in lifestyles, poverty levels and consumption as well as production patterns. These driving forces exert pressure on the environment; for example, the excessive use of natural resources such as forests for firewood or land for urban agriculture. Over-utilization of forests for firewood may lead to deforestation and land degradation, and urban agriculture may contribute to soil erosion and siltation of rivers, depending on how the land is managed. These pressures change the state of the environment and such changes may have environmental, social and economic impacts. These may eventually be factors on human health and the economic and social welfare of a society. Society is then forced to intervene to limit the damage or restore degraded areas. This may be in the form of bylaws, in the case of cities, as well as budget allocations for monitoring and enforcement.

The following examples further illustrate DPSIR links at a local level. Population increases have been identified as being among the most important pressures on the environment. The worst are in peri-urban areas where, in Africa, people may still be practicing traditional lifestyles, with semi-subsistence agriculture, while at the same time suffering from the cost of urban living. In Botswana's peri-urban zones, this is specifically the case where peri-urban villages, even around the capital, Gaborone, still have rural subsistence lifestyles but cannot escape the costs of urban living. Land is a critical factor of production, but the technology used requires a fallow period of at least three years. If this were to be strictly followed, at least two-thirds of the land should be under fallow. However, due to high demand for arable land [DRIVERS] in the city, a decreasing percentage of land is under fallow [PRESSURE] with the result that land quality is deteriorating [STATE]. Consequently, yields on arable land have decreased tremendously [IMPACT] (see Figure 3.3) but action [RESPONSE] by city authorities has been limited (Nkambwe 2003).

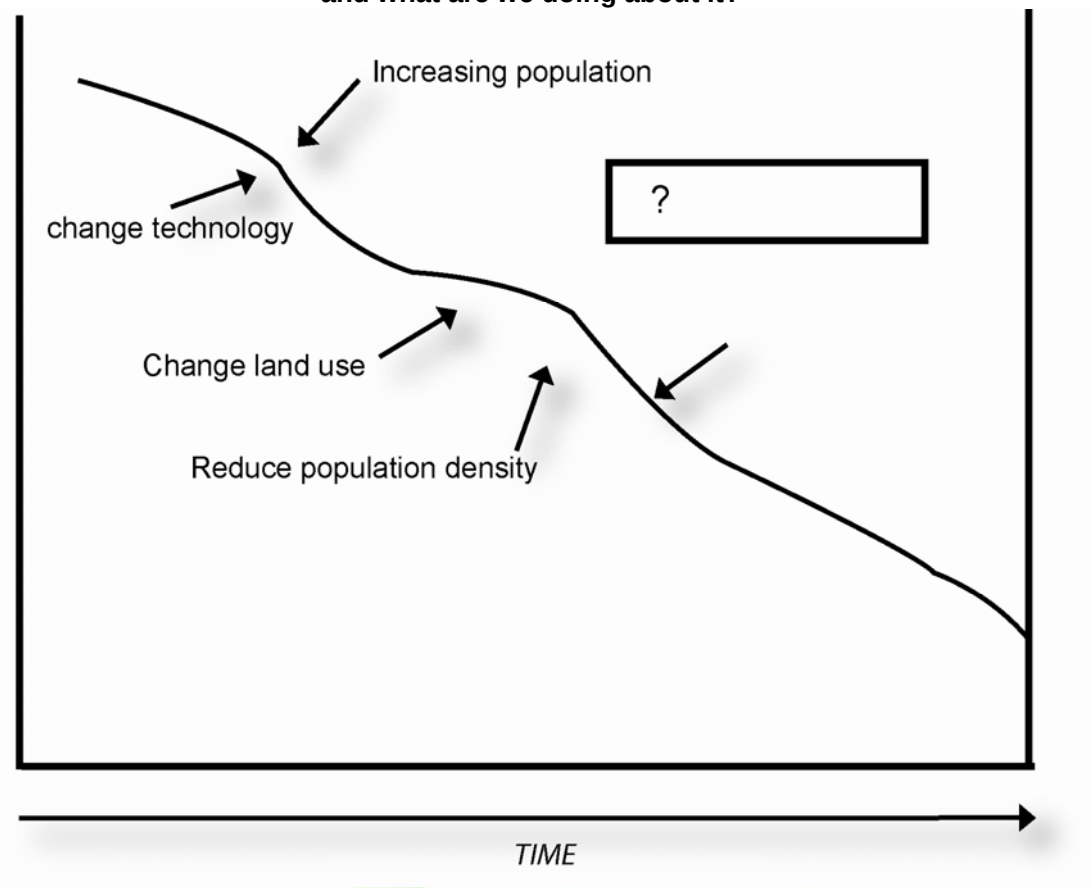
Figure 3.4: What is happening to the environment?



Improving lifestyles under such circumstances is difficult because it requires a comprehensive analysis of the impact of the increasing population and the potential alternatives available. Figure 3.4 below shows some of the possible responses. Long-term sustainable solutions need to recognize that supporting current population

densities in Botswana's peri-urban areas is incompatible with the technology being used for agriculture and that alternative livelihoods are needed for the growing population. Otherwise, there will be decreasing yields on the land and increased poverty (Nkambwe 2003).

Figure 3.5: Why are yields on the land decreasing and what are we doing about it?



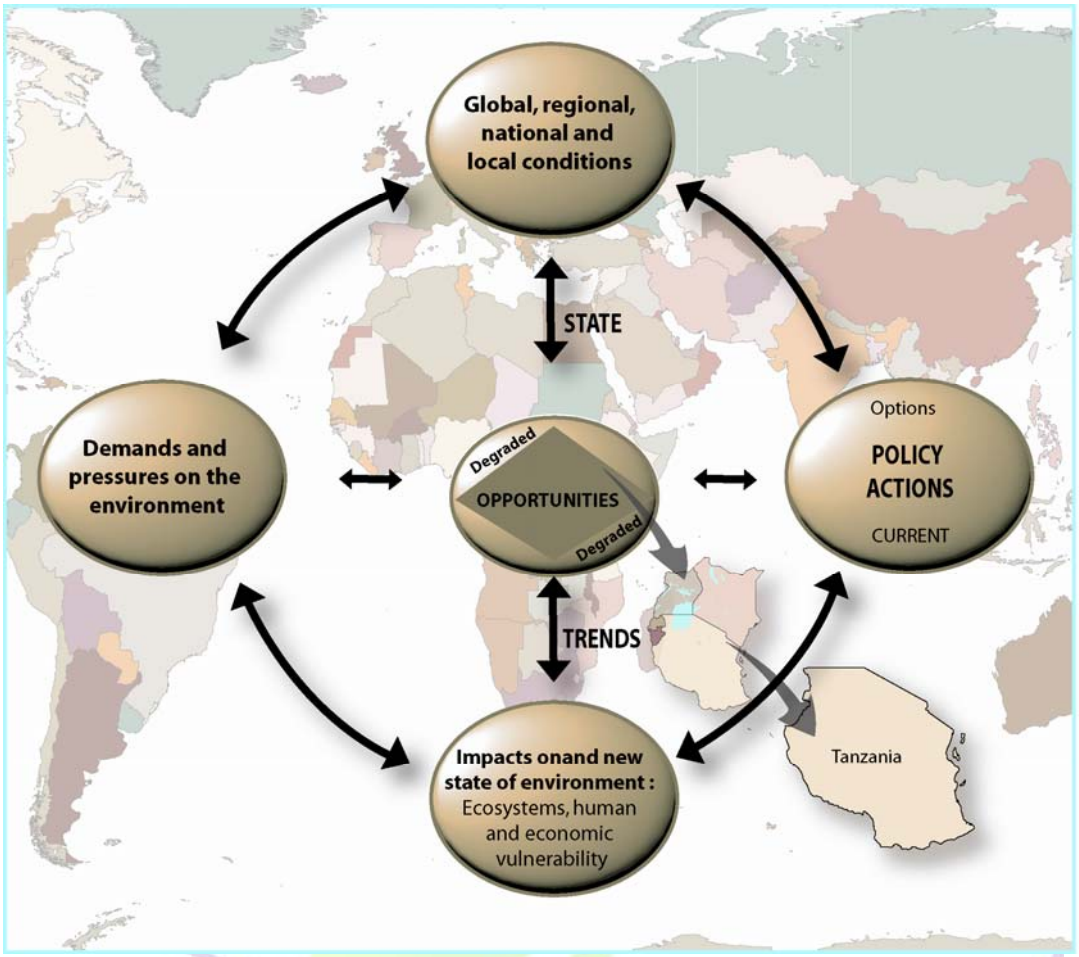
3.5 The Opportunities Framework

This approach, as used in AEO-2, is particularly focused on looking at potential opportunities for reducing poverty and promoting sustainable livelihoods. It starts by taking an inventory of existing resources and looking at trends in the recent past at the scale of interest (local, national, sub-regional or regional) and explaining why the observed trends have occurred. While the DPSIR approach is environment-pressures-centred, (i.e. we must reduce the pressures on the environment through decreased socioeconomic activity, changes in consumption patterns, improvement in technology, etc.), the Opportunities Framework focuses on the available assets and how they can be sustainably used for human and economic development. Opportunities could also be in the form of reforesting a degraded forest, for example. The existing resource base in the environment provides an asset that can be improved with targets to provide sustainable livelihoods. The framework answers the following questions:

- What resources are available (**resource inventory, state-and-trends**)?
- What opportunities exist for using the resources to promote poverty reduction and sustainable development (**value/opportunities and potential**)?
- What are the main challenges to capitalizing on the opportunities to utilize resources (**demands/pressures**)?
- What policy and institutional actions should be taken in order to capitalize on opportunities? What is the impact (including potential) of each policy on the assets and the environment (**policy actions**)?
- What would be the consequences of success/failure in seizing the opportunities (**outlook**)?
- How might the various forms of vulnerability be exacerbated by the successes/failure to capitalize on opportunities and effectively avert the environmental costs so far incurred?

Figure 3.6 illustrates the main elements of the Opportunities Framework.

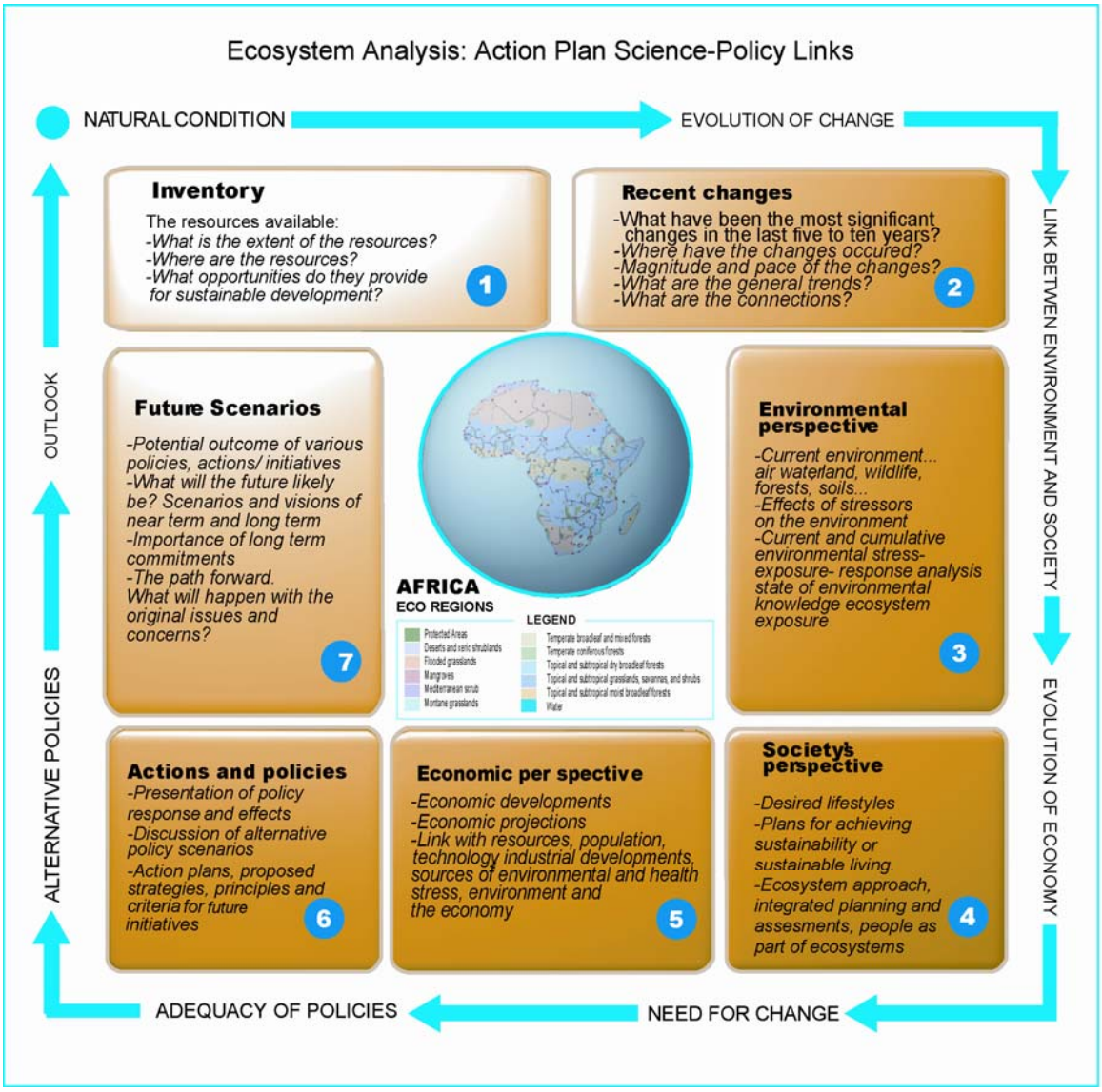
Figure 3.6: The Opportunities Framework



Source: M. Chenje.

The Opportunities Framework is applicable at different spatial levels – from sub-national and national to sub-regional and regional as well as global – and can be applied to different resources. For example, biodiversity provides various opportunities for humanity – it is the biological basis for world food security and support for human livelihoods. In South Africa, it is estimated that about 27 million consumers depend on indigenous medicine, and households spend 4-8 per cent of their annual income on traditional medicine services (Lötter and Krynauw 2002).

Figure 3.7: The link between action plan science and policy



Source: Adapted from Wiken 1997

3.6 Questions for discussion

Form groups of three or four to discuss the following problems/questions. Each group will select a person to present their discussions to the rest of the training group.

Q: Taking the main elements of the DPSIR and Opportunities Frameworks, list five advantages and five disadvantages of each in providing critical environmental information for policy-making and implementation.

A: _____
_____
_____

Q: What is the major constraint of the Opportunities Framework and how can it be resolved?

A: _____
_____
_____

Q: The area around Freetown (Sierra Leone) is threatened with seawater intrusion to contaminate existing groundwater supplies. Discuss how the DPSIR framework may be used to help in identifying the links in this problem and seek for potential solutions

A: _____
_____
_____

Q: Outline a problem you are aware of in your country where the Opportunities Framework can identify opportunities for sustainable development.

A: _____
_____
_____

Q: The Lake Malawi Basin covers many countries which contribute to problems associated with lake siltation and flooding problems downstream in Mozambique. What are the practical implications of this for the DPSIR framework presented?

A: _____
_____
_____

3.8 Exercise 3.1: Using the Opportunities Framework

Groups formed earlier should be used for this exercise. Each member of the group should present a case from his/her own experience that illustrates how the Opportunities Framework may be used for a specific situation. The group will select one of these that they want to discuss in detail and will prepare it for presentation to the rest of the participants.

3.9 References

Hamwey, R. M. (2005). Environmental Goods: Where Do the Dynamic Trade Opportunities for Developing Countries Lie? A Cen2eco Working Paper. Centre for Economic and Ecological Studies, Geneva. http://www.cen2eco.org/C2E-Documents/Cen2eco-EG-DynGains-W.pdf

Lötter, M.C. and Krynauw, S. (2002). Economically Important Medicinal Plants. In *Determining the conservation value of land in Mpumalanga* (eds. Emery A.J., Lötter M., and Williamson, S.D.), pp. 75-83. Department of Water Affairs and Forestry / Department for International Development, Pretoria. http://www.dwaf.gov.za/sfra/SEA/usutu-mhlathuze%20wma/Biophysical%20Component/Mpumalanga%20Biobase.pdf

NEMA (2000). *State of Environment Report for Uganda 2000/2001.* National Environmental Management Authority, Kampala

Nkambwe, M. (2003). Contrasting land tenures: subsistence agriculture versus urban expansion on the rural-urban fringe of Gaborone, Botswana. *IDPR,* 25 (4), 391-406

Pinter, L., Cressman, D.R. and Zahedi, K. (1999). *Capacity Building for Integrated Environmental Assessment and Reporting – Training Manual*. International Institute for Sustainable Development and United Nations Environment Programme, Winnipeg. http://www.iisd.org/pdf/geomanual.pdf

Shah, R. (2000). International Frameworks of Environmental Statistics and Indicators. Proceedings of the Inception Workshop on the Institutional Strengthening and Collection of Environment Statistics, Samarkand, Uzbekistan, 25-28 April 2000. United Nations Economic and Social Commission for Asia and the Pacific. http://www.unescap.org/stat/envstat/stwes-015.pdf

UNCTAD Secretariat (1995). Environmental Preferable Products (EPPs) as a trade opportunity for developing countries, UNCTAD/COM/70. United Nations Conference on Trade and Development, Geneva. http://www.unctad.org/trade_env/test1/publications/unctadcom70.pdf

UNEP (2006). *Africa Environment Outlook - 2: Our Environment, Our Wealth*. United Nations Environment Programme, Nairobi

UNEP (2002). *Africa Environment Outlook: Past, Present and Future Perspectives.* United Nations Environment Programme, Nairobi

WCED (1987). *Our Common Future*. World Commission on Environment and Development. Oxford University Press, Oxford

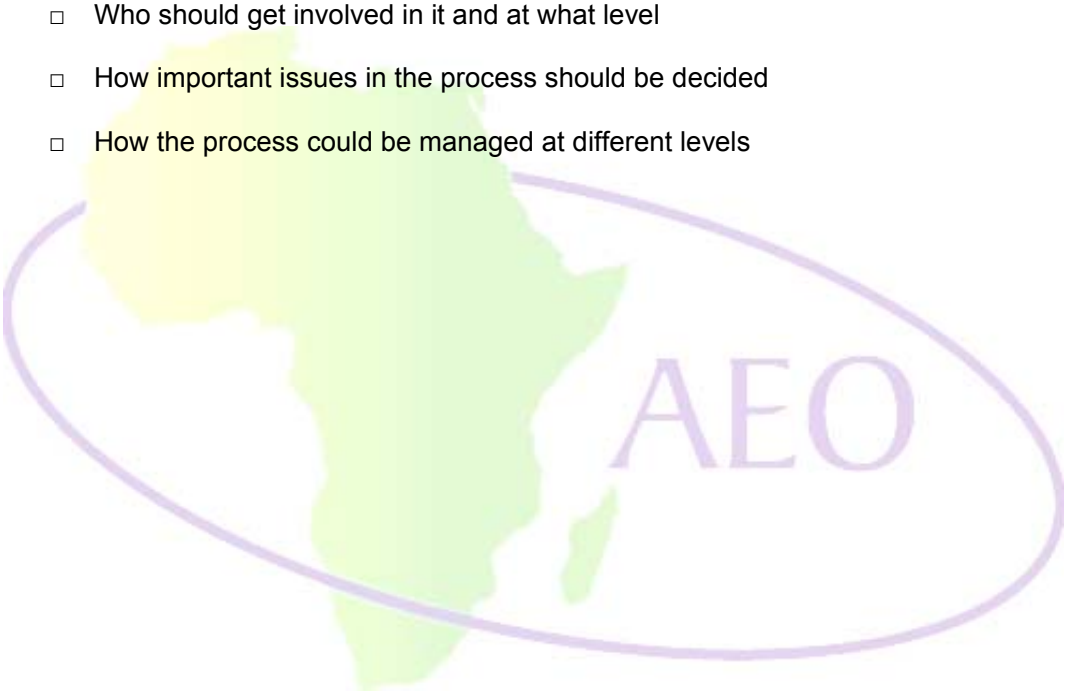
Wiken, E.B. (1997). State of the Environment Reporting in Canada and North America: An Overview of the Concepts and Applications. In *Proceedings of the First National Workshop on the State of the Environment Reporting*. SOER Occasional Paper No. 1, pp. C13-C18. Ministry of Environment and Tourism. Harare

Module 4 – Managing the Assessment and Reporting Process

Overview
This module discusses the involvement of various groups of people, including the public, in the integrated assessment and reporting process. It also outlines some of the arrangements for its management.

In this module you will learn:

- Why the IEA and reporting process is important
- Who should get involved in it and at what level
- How important issues in the process should be decided
- How the process could be managed at different levels



4.1 Introduction

Environmental assessment and reporting should be looked at as a continuous process. Its organization and management must be carefully planned to allow scientists in various fields of environmental pursuits to choose the important issues for analysis in collaboration with a broad but manageable range of civil society members. Also the institutional setting that is entrusted with the leadership should have a legal mandate to conduct or provide leadership in all aspects of environmental assessment and reporting, and to expect the participation of other institutions as an obligation.

4.2 Importance of the process

The IEA and reporting process is important first and foremost because it is in itself a learning process. With a wide range of stakeholders involved from different sectors of society to influence decision making, it becomes a capacity-building process encouraging stakeholders, both individuals and institutions, to learn about the process of sustainable development and environmental protection. Through interaction to develop and produce an assessment report, more and more people learn about how they can work together for the greater good. This is important in all situations but is particularly important where expertise and financial resources are limited. The interest in sustainable development spreads from individual sectors or ministries, to a set of stakeholders in all sectors providing a much broader base for:

- Supporting sustainable development by identifying economic, social and environmental linkages and the synergies among them. By answering the questions in Figure 3.1 in sequence, IEA and reporting provides a step-by-step linkage between human activity and environment. “What is happening to the environment?” and “Why is it happening?” directly link the pressures humankind is putting on the environment. This information is essential before we can decide to link the state of the current environment to policy formulation. In asking “What is being done about it and how effective is it?”, we can evaluate the effectiveness of existing policies in mitigating the problems of the environment. Lastly, by asking "What will happen if we do not act now?", we present a new basis for influencing decision making. Since these questions are asked all the time, we offer a continuous basis for influencing policy formulation for sustainable development with subsequent IEA reports. Some linkages will obviously be more beneficial and provide greater synergies than others. Skills should be developed to identify the most beneficial linkages.

- Exploring linkages between a particular policy, the economy, society and the environment. If the part of the IEA and reporting process stated above is carried out successfully and continuously with appropriate participation/consultation of a wide range of stakeholders, it will encourage decision-makers to develop sustainable development strategies and policies. Through a learning process, assumptions and expectations are clearly identified through the participation of a large number of stakeholders, and decision-makers will learn how to build support for their goals.

- Developing appropriate policy packages. Often, a country or a region may have a specific theme as the focus of its sustainable development effort and may need a

set of related policies to achieve this theme. The policy package developed for sustainable development may differ and IEA and reporting may be used to develop the appropriate package for a region or country. Poverty alleviation, for example, has been the main focus of NEPAD in the African region in line with the MDGs. It is a major challenge in practice to put together a package of policies that will promote equity (i.e. greatest benefits to the poorest people) with policies for sustainable development. Integrated Environmental Assessment (IEA) and reporting provides a good basis for meeting this challenge.

- Encouraging good governance and ownership of the report. The report produced using IEA and reporting is very important as a final document. However, the process of its production is just as important particularly in making those who produce it feel a sense of ownership of the report. The involvement of a wide range of government departments on one hand, and the private sector, industry, academia, local communities and other domestic interest groups helps to ensure that a wide range of views are considered. It also increases transparency and accountability in decision making, and helps to build consensus and to strengthen national capacities through doing. Widespread participation in the process and good governance increase the chances that the report will be taken seriously by both the public and the decision-makers.

- Bringing together fragmented knowledge and streamlining issues for policy formulation. The range of knowledge required in IEA and reporting is to be found in many government departments and in institutions and organizations outside government. Table 4.1 gives the main topics on which knowledge was required in writing the Uganda State of Environment Report in 2001 (national level) and the West African State of the Environment (sub-regional level) respectively, implying that the sources of information needed were many and varied. Investigation of each of these themes required cooperation from a range of Departments at the national level for Uganda, and the regional level (for West Africa) normally used to fighting for their turf. 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

Table 4.1: Major topics for which data was acquired for Uganda's 2000/2001 SOE Report

Theme	Issue for policy formulation
Land	degradation, tenure
Forests and woodlands	deforestation
Wetlands	Degradation
Freshwater	access and quality
Biodiversity	loss of biodiversity and introduction of alien species
Urban areas	unplanned settlements, sanitation, waste management

Theme	Issue for policy formulation
Atmosphere	climate change, variability, and air pollution
Human health and environment	disease prevalence, HIV/AIDS
Environmental disasters	wars and conflicts, droughts, floods

Source: NEMA 2000

- Facilitating cooperation between policymakers across government and beyond. Bringing together the fragmented knowledge stated above for IEA and reporting requires the cooperation of policymakers and scientists, some of whom may have had little cooperation with each other before. The process is a learning experience in cooperation across sectors, disciplines, and ideological lines whose value goes beyond the report produced.

4.3 Involvement in the integrated environmental assessment and reporting process

African communities have extreme contrasts in social class, levels of awareness of the development processes, levels of education, etc. Poverty is widespread and new ideas which cannot be easily linked to poverty reduction are very difficult to communicate. You may therefore need extra effort to link civil society and decision-makers. It is advisable that you do not take the involvement (particularly of the poorer communities) of civil society in the environmental assessment process for granted. The management of IEA and reporting encourages the participation of all sections of society in areas of the report where their contribution is important. The rural communities would particularly contribute indigenous knowledge on environmental issues, some of which may not be readily available to urban-based decision-makers. This attitude to involvement in environmental assessment should be extended to all sections of civil society.

There are three major levels of involvement in the IEA and reporting process:

- Information dissemination: this is a fairly low level of involvement. Here, civil society is informed of policies either about to be made or already made on the environment. They may comment and their comments may be listened to but may not influence the final outcome of environmental policy that is eventually practiced.

- Consultation: this is a higher level of involvement under which, at some point before environmental policy is put into practice, opinions of stakeholders are solicited. That point may be before or after the policy is drawn up for discussion. Those drafting the policy are expected to take into consideration the comments and advice that they get from the stakeholders that they consult.

- Participation: this is a three-way and continuous communication process between stakeholders, those who draft environmental policy, and decision-makers. Policy is the result of the complete and direct involvement of all the three groups, and when

it is necessary to change various components of existing policy, the same level of involvement is expected.

While it is desirable that civil society should participate widely in environmental policy formulation under IEA and reporting, it is not practical that all sectors of society will participate to the same degree. For practical reasons, you should identify those stakeholders who are most involved in a specified part of environmental policy to directly participate in its formulation. Those who are indirectly affected may be consulted, while those whose interest is tangential to the policy may be informed. Realize that no group of people may be suitable for designing, drafting and formulating all environmental policy under IEA and reporting. Table 4.2 gives some possible illustrations where different levels of involvement may be expected. Information must be available at an early stage to enable different groups of civil society to get involved in the environmental assessment and reporting process.

The AEO process uses all three levels of involvement.

- Specialised working groups of experts, (e.g. on policy, capacity-building, data, etc.), CCs and other special interest institutions, participate in identifying key issues of concern in the various areas of their interest, in line with the various environmental initiatives in Africa.

- Thematic groups (e.g. on the marine environment) and youth are consulted on issues of interest to them

- Sub-regional/national participants (e.g. Southern Africa, Eastern Africa, Northern Africa, etc.); are consulted to scrutinise the issues and add or modify those issues that may be of interest at the sub-regional and national levels

- The public in general is informed of the progress of the consultations via the internet, national radio and television systems, and pamphlets.

Policy consultations with these various groups are held in various parts of Africa, or at UNEP in Nairobi, to ensure broad participation of a wide range of stakeholders. At the same time, the AEO process has to link up with international consultative and working groups for its input into the GEO process, and through UNEP, to the rest of the UN system. The broad involvement encourages scientists, policymakers and civil society to engage in policy-related discussions and debates, which is the very basis of integrated environmental assessment. A network of universities for capacity-building in environmental assessment has been established.

Table 4.2: Possible different levels of involvement in various integrated environmental assessment and reporting themes.

Focus of policy	**Section of civil society**	**Level of involvement**
Improvement of crop yield	Farming rural communities	Participate
	Agricultural extension officers	Participate
	Taxi drivers	Inform

Focus of policy	Section of civil society	Level of involvement
Sanitation in urban areas	Urban communities	Participate
	Peri-urban communities	Participate
	Rural communities	Inform
Assessment of the potential impact of an impending drought	All	Participate
Developing indicators for assessing deforestation	Rural communities in/near forested areas	Participate
	Scientists with interest in vegetation communities	Participate
	School teachers	Participate
	General urban communities	Consult
	Mining communities	Inform

4.4 Deciding important issues in the process.

The range of issues relevant to IEAare far more than can possibly be addressed in a report. A selection of the most important issues has to be made early in the process. Important issues differ at different levels of analysis (regional, sub-regional, national, sub-national, and community level). Stakeholders may have several meetings before they decide on a final list of issues to be addressed in the report. A suggested long list may be made by a small group of experts for a region from which sub-regions or countries may select those which are most relevant and/or add those issues which may be important at the national but not at the regional level. For example, a detailed analysis of the coastal marine environment may be a critical issue for Southern Africa as a sub-region. At the national level, however, it may be of great importance to Mauritius but not to Botswana which is a land-locked country.

It is important to clearly state how the issues will be addressed and how they will be used to achieve the objectives of the report. In the development of issues important for AEO-2, a consultative group on data and issues was formed which identified a long list of broad potential issues shown in Table 4.3. This list was then sent to national level stakeholders who either added or eliminated thematic areas proposed depending on their importance to the national environments and gave details of variables they wanted addressed within each broad theme. Trainees may note that the thematic areas in the Table are very broad and (with the exception of marine environments) would be general enough to be included at the national level.

Table 4.3: AEO-2 Consolidated (Africa) Regional Issues decided from a series of meetings of experts and participation of civil society throughout the Africa region

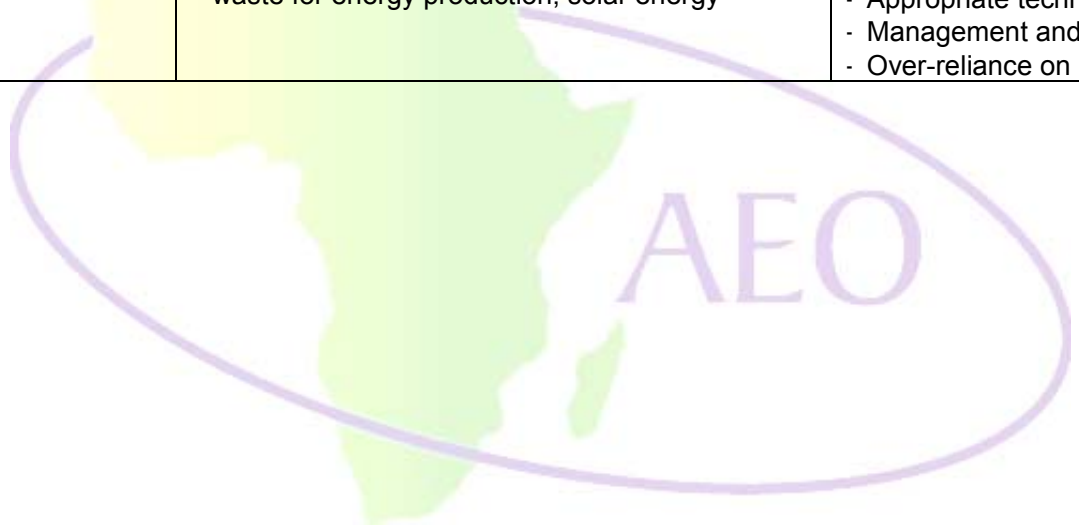
Thematic area	Asset	Opportunities	Issues/threats
Land	Land as a factor of production and wealth	- Production, e.g. food security, livestock - Development of dwellings/settlements - Other purposes, e.g. investment, collateral, ecotourism, urban development, transportation - Dryland for reclamation, restoration and use	- Land tenure/ownership - Land degradation: soil fertility, water scarcity, desertification, overgrazing, low lying lands - Land management:: land use planning and classification, poor agricultural practices, marginal lands, loss of arable land
Forests and Woodlands	Forest and woodland resources for use as energy, food, timber and non-timber products and potential for wealth	- Forest conservation: diversity of opportunities and returns through ecotourism, leisure activities for local communities, habitats, reservoir of biodiversity, medicinal benefits for incurable diseases through technological advancement and research, climate regulation, - Catchment protection: reservoir of soil and water - Source of wealth through carbon sinks and carbon trading, sustainable harvesting of timber and non-timber products - Afforestation as an opportunity for investment	- Deforestation and declining forest quality - Incomplete inventorying, monitoring and management - Governance (community involvement, decentralization) and valuation of natural resources (goods-and-services) - Unsustainable exploitation of forest resources

Thematic area	Asset	Opportunities	Issues/threats
Atmosphere	Potential for new and renewable sources of energy and modification of ecosystems	- Investment in renewable energy - Strengthen existing monitoring programmes - Source of water through untapped precipitation (water-harvesting) - Potential to support agriculture and tourism - Strategic investments in pollution control could lead to health improvement - Provides for the adoption of cleaner technologies - External costs of pollution could be internalized (polluter pays principle - PPP) - Development of early warning systems	- Climate variability: impact on health, food security, human settlements - Climate change - Air pollution
Freshwater	Africa's extensive surface and groundwater resources	- Water as a factor of production and investment (energy, agriculture, industry, fisheries, etc.) - Water as a social and economic good - Infrastructure and transport - Integrated water resources management (IWRM) providing opportunity for regional cooperation - Domestic utilization and sanitation	- Quality and quantity - Availability, variability and accessibility - Water management - Low investment (technology), exploration and assessment of freshwater potential - Legislative and institutional framework - Water-borne diseases: e.g. bilharzia, river blindness, sleeping sickness

Thematic area	Asset	Opportunities	Issues/threats
Wetlands	Ecosystem services and resources for human use	- Ecotourism development - Fish farming and agriculture - Buffering capacity (against pollution, flooding, siltation) - Ecological services (fish breeding ground, habitat for migratory birds, climatic modification, seasonal pastures)	- Health hazards - Pollution of wetlands - Rapid conversion (land filling, draining for agriculture, loss of habitat and biodiversity) - Management and legislation (includes attitude towards wetlands as wastelands) - Excessive sedimentation and dumping of solid waste and sewage
Human Settlements (rural and urban)	Existence of shelter with human resources for human welfare and services, space, labour, markets, and infrastructure	- Development of planned settlements using public-private-partnerships and NGOs - Centres for easy communication and joint use of infrastructure and trade (economic growth/economies of scale) - Cultural, social and economic exchange	- Access to basic social services (including security, electricity, transport, water, sanitation, housing, education, health, markets) - Pressures by population change: migrants, refugees, squatters - Pollution and waste disposal - Investment - Land use and management - Deterioration/erosion of social, economic and cultural exchange and values - Localized heat waves

Thematic area	Asset	Opportunities	Issues/threats
Coastal and marine	Existence of extensive and diverse coastal and marine resources. Long coastline with a large Exclusive Economic Zone with a lot of potential for marine fisheries, seaweed harvesting, tourism, oil exploration	- Ecotourism potential - Coastal and marine biodiversity and products, e.g. desalinated water, salt - Energy potential (tidal waves, oil and gas) - Potential for development of international maritime industry	- Coastal erosion and sea level rise - Destruction of coral reefs and loss of coastal and marine biodiversity - Integrated coastal area management (local and international legislation) - Pollution - Salt intrusion in low-lying areas
Biodiversity	Extensive reserve of biological resources	- Potential to support livelihoods (tourism, traditional medicine, food security, trade) - Potential to support education, science and technology - Ecosystem services (ecosystem and species diversity, gene pool variability, ecological integrity)	- Disturbance, loss of habitats, species and genetic diversity - Governance (management and legislation) - Alien invasive species (AIS)

Thematic area	Asset	Opportunities	Issues/threats
Energy	Energy as a driver for economic development through the existence of new and renewable and fossil fuel energy sources	- Potential for developing new and renewable energy sources through private-public partnerships - Potential for industry and technology development - Promoting renewable/alternative energy sources for environmental protection, e.g. incineration of waste for energy production, solar energy	- Appropriate economic framework for assessing options - Availability, access and cost including start-up capital - Efficiency: production, transmission, usage - [Vulnerability to disasters] - Appropriate technology - Management and legislation - Over-reliance on biomass

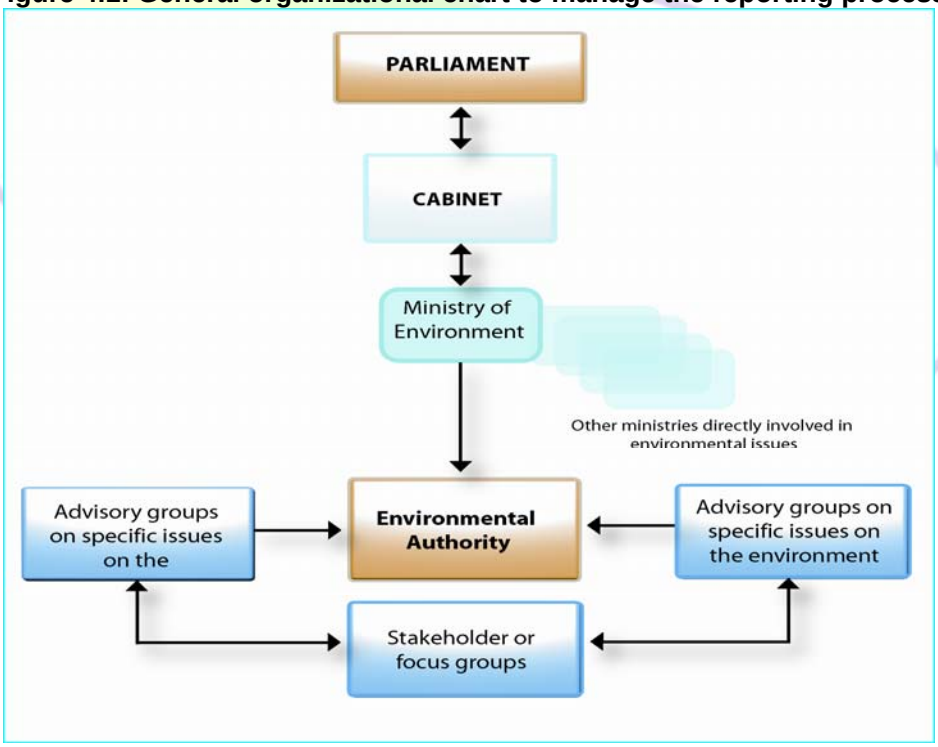


4.5 Management of the process at the national level

The importance of environmental assessment as a critical part of planning for sustainable development is quite recent in African countries. As was outlined in Table 2.1, many of the early assessments and reports soon after the Rio conference in 1992 were carried out at the encouragement of an external organization, institution or donor. But by the late 1990s environmental assessment and reporting was being conducted at the insistence of national governments usually with the assistance of UNEP. The African Ministerial Conference on the Environment (AMCEN) has been the end result of a long progress towards African governments owning and being responsible for their own affairs in environmental issues and many countries depend entirely on skills available locally. It provides overall direction for the region in environmental issues and has sought the assistance of UNEP in developing various aspects of national environmental outlooks as part of the GEO process.

There is no Africa-wide model in the management of the environmental assessment process, but in the more successful programmes (Ghana and Uganda are good examples), a department, directorate, agency, or authority in a relevant ministry champions the process. A possible generalized organizational chart based on many real organizational structures in many African countries is given in Figure 4.1.

Figure 4.1: General organizational chart to manage the reporting process



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

- *The Parliament:* IEA and reporting will be most successful under good governance. The final legislative and decision-making body under this arrangement would be a

body representing all society, preferably freely elected, such as a parliament. Members of Parliament should carry the views of their constituents on issues related to the environment

- *The Cabinet:* is the final decision making authority in all environmental matters, but under IEA and reporting receives its advice from the other groups below it.

- *The Ministry of Environment:* now a common ministry in many African countries coordinates all environmental matters. Its minister attends AMCEN meetings to link national environmental policy to that of other countries in the African region. Under IEA and reporting, this Ministry may have representatives in many other Ministries (the equivalent of help desks) considered more directly involved in environment-related matters and could chair a roundtable of these representatives and other multi-stakeholder representatives (e.g. a few NGOs, academia). The roundtable provides a forum for continuing dialogue throughout government and high level civil society representatives.

- *The Environmental Authority (or a similar group):* This may be an independent authority but is commonly the workhorse in the Ministry of Environment. It is the planning department for environmental issues. It may provide an alternative forum for some of the representatives of the committee discussed under the Ministry of Environment above.

- *Expert or technical advisory groups:* 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. 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 and others 1997).

4.6 Management of the process at the sub-national level

Many SOE reports using IEA and reporting are now being produced at sub-national levels by municipalities, NGO's, corporations, and district level governments. These reports should follow the framework used at the national level and add value to the national reporting process by providing synergies with a different but complimentary perspective. The institutional arrangement for reporting should particularly be consistent with the broader national arrangement. With more and more African countries setting up Ministries of Environment, it is common to have a department under this Ministry to manage the process. However, sub-national SOE reporting should more critically consider whether an existing Government department or an independent or semi-independent agency is more appropriate for managing the process. Each has advantages and disadvantages (Pinter and others 1999).

On the one hand, an existing Government department:

- Exercises more control in the management of the process. It reduces the possibility of the proliferation of competing special agencies in the establishment of the process. However, the department is likely to be saddled with its old loyalties and might not be recognized as independent by other Government departments.

- Will have the advantage of being part of its old and existing networks. This advantage, however, may not encourage the Department to vigorously seek new stakeholders to broaden participation essential for changing from traditional SOE to IEA and reporting.

- Will have the advantage of knowledge of and access to existing data in Government, but may as a result be willing to protect the status quo even where necessity of change may be obvious.

On the other hand, an independent or semi-independent agency:

- Starts off with a clean slate as an autonomous unit with a high profile and visibility and a potential for innovation. However, its mandate, authority associated with reporting, and powers to access existing data may have to be negotiated with existing institutions which may resist its innovations.

- May obtain a lot of donor funding or have direct funds from a line item in the budget in its early operations. Funds to sustain its innovations, however, may eventually be limited since it will have no minister championing its cause in cabinet.

- Easily links to NGOs, but it would have to build its own networks within Government, an unmistakable source of problems in obtaining data from ministries for IEA and reporting in African countries, which puts it at a disadvantage.

4.7 The legal mandate

Integrated environmental assessment (IEA) and reporting requires that a large number of organizations, institutions, ministries and individuals work together attending to specific responsibilities in a process that may have time limits. Each of the components participating in the process should have authorization to carry out what is expected of it. It should also have authority to demand what is expected of others for it to be able to carry out its responsibilities. Legislation at the national level must be included in any environmental policy at all levels of the IEA and reporting process to define the responsibilities of the reporting department or agency, its special relationship with other ministries or departments most relevant in the process (e.g. the central statistics authority and other Departments relevant to environmental monitoring programmes). Where common issues are assessed beyond the national level (e.g. by early warning systems), national governments should provide a mandate to the appropriate reporting institutions.

4.8 Developing an impact strategy for your Integrated Environmental Assessment

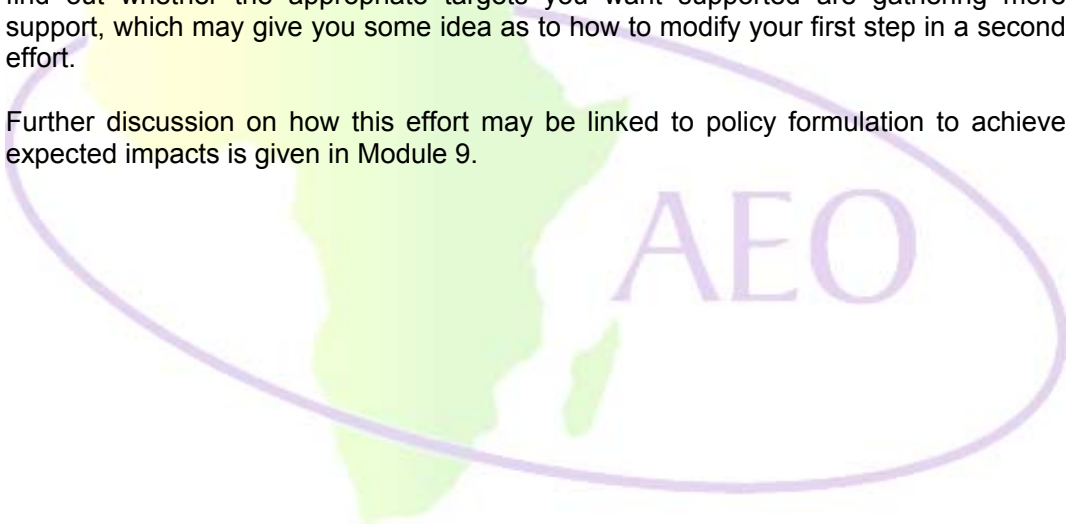
Environmental assessment and reporting is carried out continuously with specific objectives to be achieved. The first time the objective may be difficult to identify priority issues related to a specific policy. However, the report may be useful in creating

interest and political pressure on decision-makers to formulate policy and carry out planning recommended by the report. Decision-makers may have their priorities which may be different from environmental issues in the recommendations of the report. The impact strategy is designed to make sure that the right decision-makers pay attention and set their priorities in line with the recommendations of the report, either as a result of the knowledge that they themselves acquire from the assessment process, or through pressure from those who have access to them, or from the public.

An impact strategy should be set out from the beginning as part of the assessment process, consisting of clear steps to ensure that the work carried out will promote actual progress on key concerns or issues that the IEAaddresses. It is set out in advance of the activities of the assessment but should be adaptive to changes and shifts in the priorities of government and the public.

In attempting to develop the strategy, study the total environment in which you are working, including the potential supporters and detractors. Analyze available knowledge to determine knowledge needed by your helpers to help you achieve the impact. You may then continuously monitor and evaluate the results of your actions to find out whether the appropriate targets you want supported are gathering more support, which may give you some idea as to how to modify your first step in a second effort.

Further discussion on how this effort may be linked to policy formulation to achieve expected impacts is given in Module 9.



4.9 Questions for discussion

Use the following study questions to guide you

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: _____
_____
_____
_____

4.10 Exercise 4.1

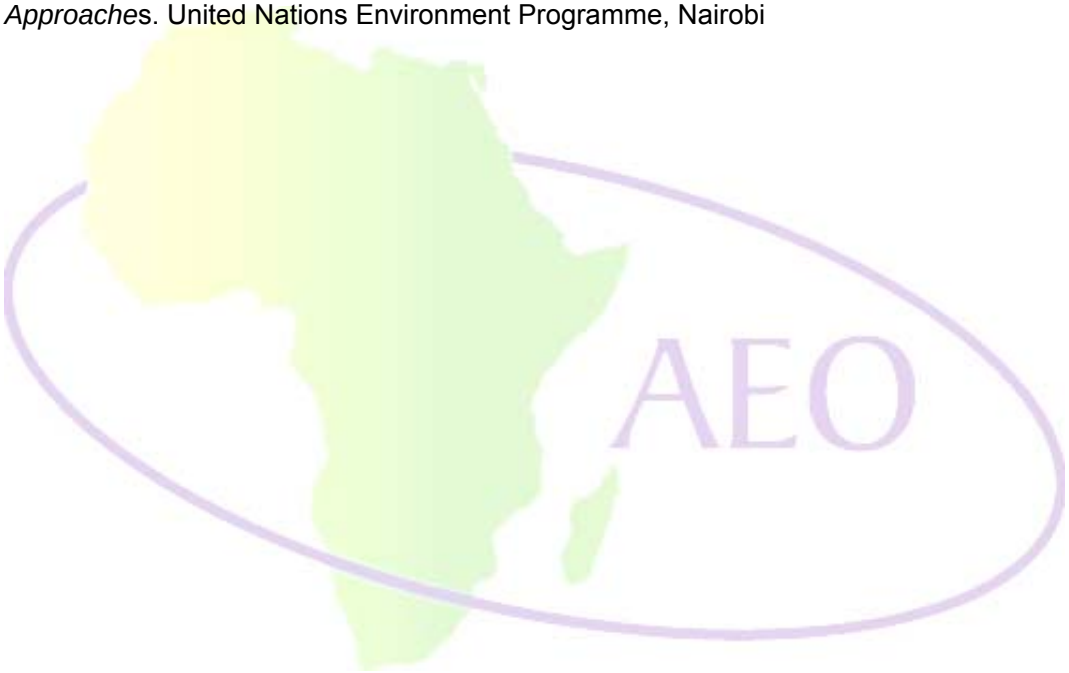
Before coming to the training workshop, participants should have been asked to fill out a questionnaire and draw the organizational structure for SOE reporting in their country. In groups of three or four, participants will present the organizational charts to each other. They will then present each to the rest of the participants comparing those in the group and pointing out the advantages and disadvantages in each.

4.11 References

Dürrenberger, G., Behringer, J., Dahinden, U., Gerger, Å., Kasemir, B., Querol, C., Schüle, R., Tobara, D., Tóth, F., van Asselt, M., Vassilarou, D., Willi, N. and Jaeger, C.C. (1997). *Focus Groups in Integrated Assessment: A Manual for a Participatory Too*l. Darmstadt. Ulysses Working Paper 97-2. ZIT - Centre for Interdisciplinary Studies in Technology, Darmstadt. http://www.jvds.nl/ulysses/eWP97-2.pdf

Pinter, L., Cressman, D.R. and Zahedi, K. (1999). *Capacity Building for Integrated Environmental Assessment and Reporting – Training Manual*. International Institute for Sustainable Development and United Nations Environment Programme, Winnipeg. http://www.iisd.org/pdf/geomanual.pdf

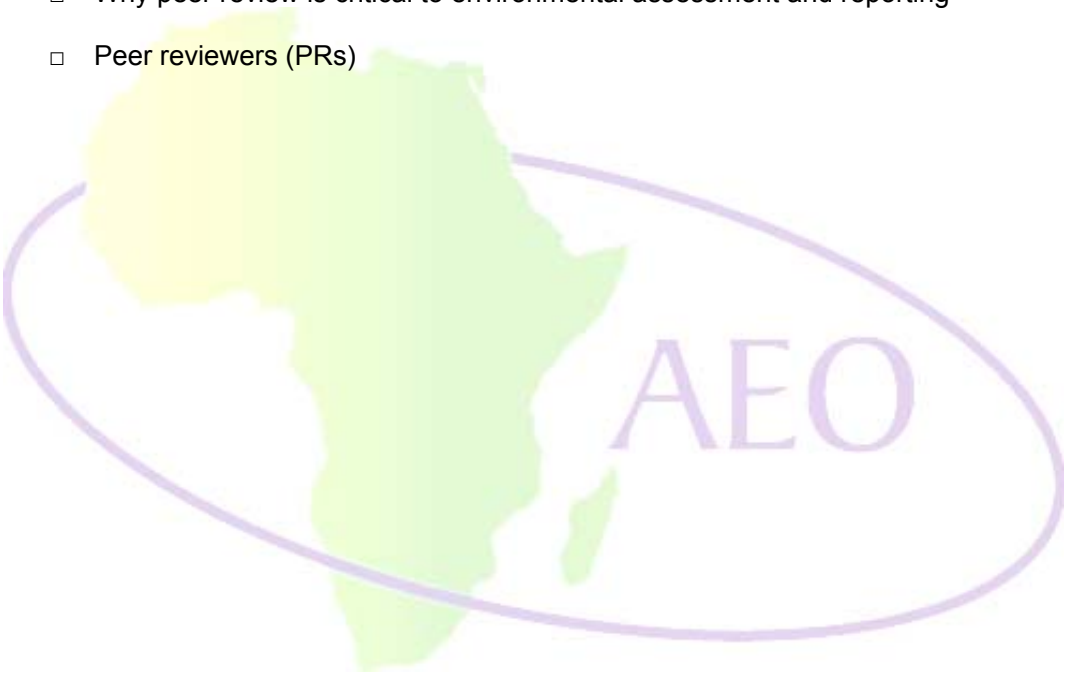
Rump, P.C. (1996). *State of the Environment Reporting: Sourcebook of Methods and Approache*s. United Nations Environment Programme, Nairobi



Module 5 – Peer Review

Overview
This module highlights the importance of peer review in Integrated Environmental Assessment and reporting (IEA), particularly in ensuring scientific credibility, policy relevance and legitimacy. By the end of the module, you will have learned about:

- The definition of peer review in the context of the AEO process
- Objectives of peer review
- Why peer review is critical to environmental assessment and reporting
- Peer reviewers (PRs)



5.1 Introduction

Scientific, technical and policy review has always been a key component of the AEO or any other environmental assessment reporting process, involving hundreds of stakeholders in and outside government structures. Such peer review takes different forms – from informal and non-official to formal and official. Activities have included formal sub-regional and regional review consultation meetings, CC network meetings, targeted expert review and input. For the AEO (or any environmental assessment report), draft sections are sent to scientists and government experts for review and comprehensive comment. The draft material is also reviewed during sub-regional and regional consultations to ensure good quality and accuracy.

5.2 Objectives of peer review

The objectives of the peer review is to check for, among others,:

- Adherence by the authors to the TORs provided by the coordinating agency at the start of the assignment
- Reliability and appropriateness of scientific basis of the analyses
- Reliability and appropriateness of the data and information used in the analyses
- Provide relevant and up-to-date data and information to enrich the analyses
- Reliability of the sources of information as well as citations used in the material
- Regional and sub-regional coverage of the issues
- Appropriateness of the conclusions/findings of the analyses
- Relevance and soundness of the selected indicators used in the analyses

5.3 The peer review process

Comments provided by the expert PRs are documented, with every input being logged in a comprehensive database for follow up, and assigned to different authors and staff to address. Where conflict between review comments arises, coordinators contact the experts to discuss and determine an acceptable compromise.

In terms of the AEO process, peer review builds upon previous activities by widening the review process to include more scientific input. This is in response to the outcomes of the UNEP-DEWA Science Initiative Consultations in January 2004 as well as other related consultation processes since then.

Participants to the Scientific and Technical Meeting on strengthening the scientific base of the United Nations Environment Programme, which was held in January 2004, recommended among others, the "need to harmonize methodologies (and) to improve and expand the peer review system and UNEP networks" (UNEP 2004b).

In terms of recommendations, the scientific community was explicit in terms of peer review, stating in **Recommendation 3:**

> GEO should be subject to an expanded and extensive peer-review process among science institutions, experts, international organizations and governments. This could be overseen by an independent review board or board of editors, which would increase the scientific credibility of GEO and ensure more ownership from the scientific community. Such a process could be applied to improve quality on regional inputs. There should be a clear strategy of the peer-review process, for example, in terms of how to deal with contrasting views. It was suggested that the establishment of a scientific advisory panel could assist in those matters (UNEP 2004b).

An Intergovernmental Consultation on Strengthening the Scientific base of the United Nations Environment Programme, also held in January 2004 soon after the science and technical meeting, reinforced the need for UNEP to further strengthen the scientific peer review process for GEO (UNEP 2004a).

The AEO peer review process has, therefore, become more systematic, adapting experiences from other processes. To quote the United States Environmental Protection Agency (EPA)'s *Peer Review Handbook* (2000), peer review of major scientific and technical work such as AEO reports and associated products "should not be looked upon as another hurdle" but a strategic input to widen the report's appeal across many different stakeholders.

5.4 Peer review definition

Peer review is a process for enhancing AEO reports so that the decisions or position taken by policymakers, based on the report, has a sound, credible basis (EPA 2000).

Peer review is a documented critical review of the AEO report. It is conducted by qualified individuals and organizations who/which are collectively equivalent in technical expertise (i.e. peers) to the experts who draft the contents of the report. The peer review is conducted to ensure that research and conclusions of the report are technically adequate, competently performed, properly documented, and satisfy established quality requirements.

The AEO peer review is an in-depth assessment of the assumptions, calculations, extrapolations, alternate interpretations, methodology, acceptance criteria, and conclusions of AEO reports and of the documentation that supports them.

The peer review process is characterized by a limited number of interactions by PRs. Peer review is undertaken during the whole AEO process, including method selection, research, and drafting to ensure that the report is scientifically and technically sound. Both internal and external experts to the AEO process are involved in peer review, as appropriate.

5.5 Peer reviewers

Peer reviewers should:

- have technical expertise in the subject matter for which they have been selected to peer review.

- agree to read all materials, participate fully, and protect confidential information. They shall not share any AEO material to a third party.

- maintain the confidentiality of the AEO report, perform the review within the set deadlines, and be unbiased and objective. They should notify the head of the GEO section should they encounter any problems in finalizing the peer review process.

5.6 Some peer review activities

- Advise on the treatment of the issues across the chapters, commenting on the key issues as highlighted.

- Point out other key issues which have not been highlighted but would be considered a serious omission if they were left out in the final environmental assessment report. Where such omissions are highlighted, the reviewer should present within a paragraph or two the issues, including the relevant full references.

- Indicate other sources of relevant data.

- Ensure that trend data have been presented in all chapters.

- Ensure that key indicators of the state of the environment and environmental policy performance are properly tracked.

- Pay special attention to the interlinkages between trends and policies (both specific to the issue under each chapter and more general policies that impinge on the issue), demonstrating the environment as a driver of policy and vice versa, and evaluating policy in terms of environmental impact (effective, ineffective, unexpected, etc.)

- Provide additional information and data, including boxes and other illustrations to enrich the sections, if necessary.

- Point out inconsistencies and/or contradictions of facts/data within and across the chapters and regional perspectives.

- Highlight the major messages from the state of the environment both at the regional and sub-regional levels.

- Provide a list of the major messages emanating from the state of the environment both at the regional and sub-regional levels.

- Highlight the major policy weaknesses clearly evident from both the regional and sub-regional thematic sections.

- Highlight the major policy strengths clearly evident from both the regional and sub-regional thematic sections.

- Provide a list of both the strengths and weakness emanating from the state of the environment both at the regional and sub-regional levels.

- Advise on possible alternative policy initiatives that should be considered to ensure effective environmental management at both regional and sub-regional levels.

- Indicate any priority and emerging issues, or areas of outstanding vulnerability related to the issue as analysed.

- Provide an assessment of the treatment of IEA both between the chapters, regional sections and across them.

- Provide detailed comments on all the points listed above. Reviewers should avoid sending questions on the sections but rather provide substantive comments, which can be considered during revision of the sections.

5.7 Finding peer reviewers and determining the Peer Review schedule

These can be recommended by government ministries/departments, scientific institutions, universities, CCs, and other stakeholders. The Peer Review schedule is a critical feature of the AEO process. The schedule shall take into account the availability of quality draft material, availability of appropriate experts, time available to use the review comments, deadlines for the AEO report, and logistics.

5.8 Documents to send peer reviewers

- Most recent and quality copy of the draft environmental assessment report. This could be the whole report or a section of it.

- Clear terms of reference, including specific activities and deadlines.

- Clear statement on how comments should be provided

- Clear reporting hierarchy

5.9 Questions for discussion

Q: What is a peer review process and why is it necessary in environmental assessment and reporting?

A:

_____

_____

_____

Q: Who is involved in the peer review process and why?

A:

_____

_____

_____

Q: Can you please highlight a situation where peer review is unnecessary in Integrated Environmental Assessment and reporting (IEA)?

A: _____

_____

_____

Q: At what stage of environmental assessment and reporting should a peer review process be undertaken?

A: _____

_____

Q: Taking your own sub-region or country as an example, how has a peer review process been undertaken and how successful was it?

A: _____

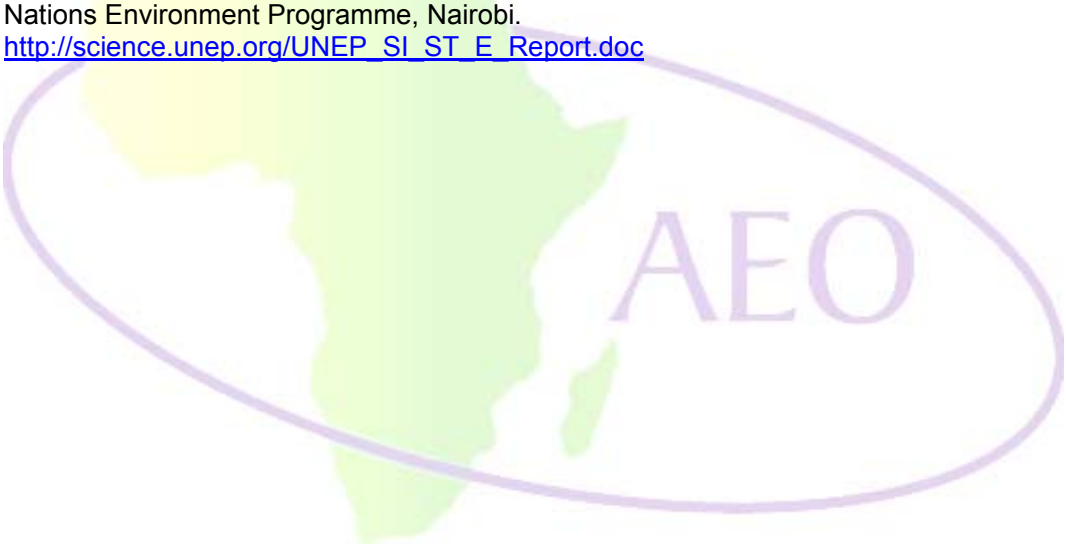
_____

5.10 References

EPA (2000). *Peer Review Handbook*: *2nd Edition*. U.S. Environmental Protection Agency, Washington, D.C. http://www.epa.gov/peerreview/pdfs/prhandbk.pdf

UNEP (2004a). Report of the intergovernmental consultation on strengthening the scientific base of the United Nations Environment Programme. UNEP/SI/IGC/3. Intergovernmental consultation on strengthening the scientific base of the United Nations Environment Programme
Eighty-fourth meeting Nairobi, 14–15 January 2004. United Nations Environment Programme, Nairobi.
http://science.unep.org/Documentation/MSWord/UNEP_SI_IGC_3%20report%20English.doc

UNEP (2004b). Report of the scientific and technical meeting on strengthening the scientific base of the United Nations Environment Programme. UNEP/SI/STM/1. Scientific and technical meeting on strengthening the scientific base of the United Nations Environment Programme, Nairobi, Kenya, 12-13 January 2004. United Nations Environment Programme, Nairobi.
http://science.unep.org/UNEP_SI_ST_E_Report.doc

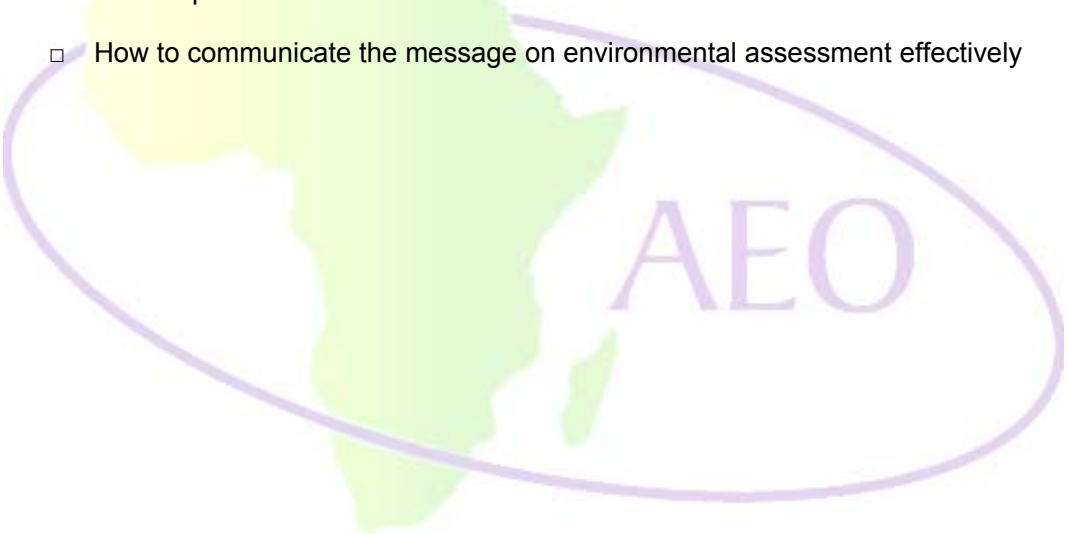


Module 6 – Preparing for the Assessment and Reporting Process

Overview
The module gives outlines on how to prepare for the assessment and reporting process.

By the end of the module you will know:

- How to prepare for the assessment process as a project
- How to outline the stages of the assessment, which will be associated with specific activities
- How to organize tasks by institutions responsible for each task and the output to be expected from each task
- How to communicate the message on environmental assessment effectively



6.1 Introduction

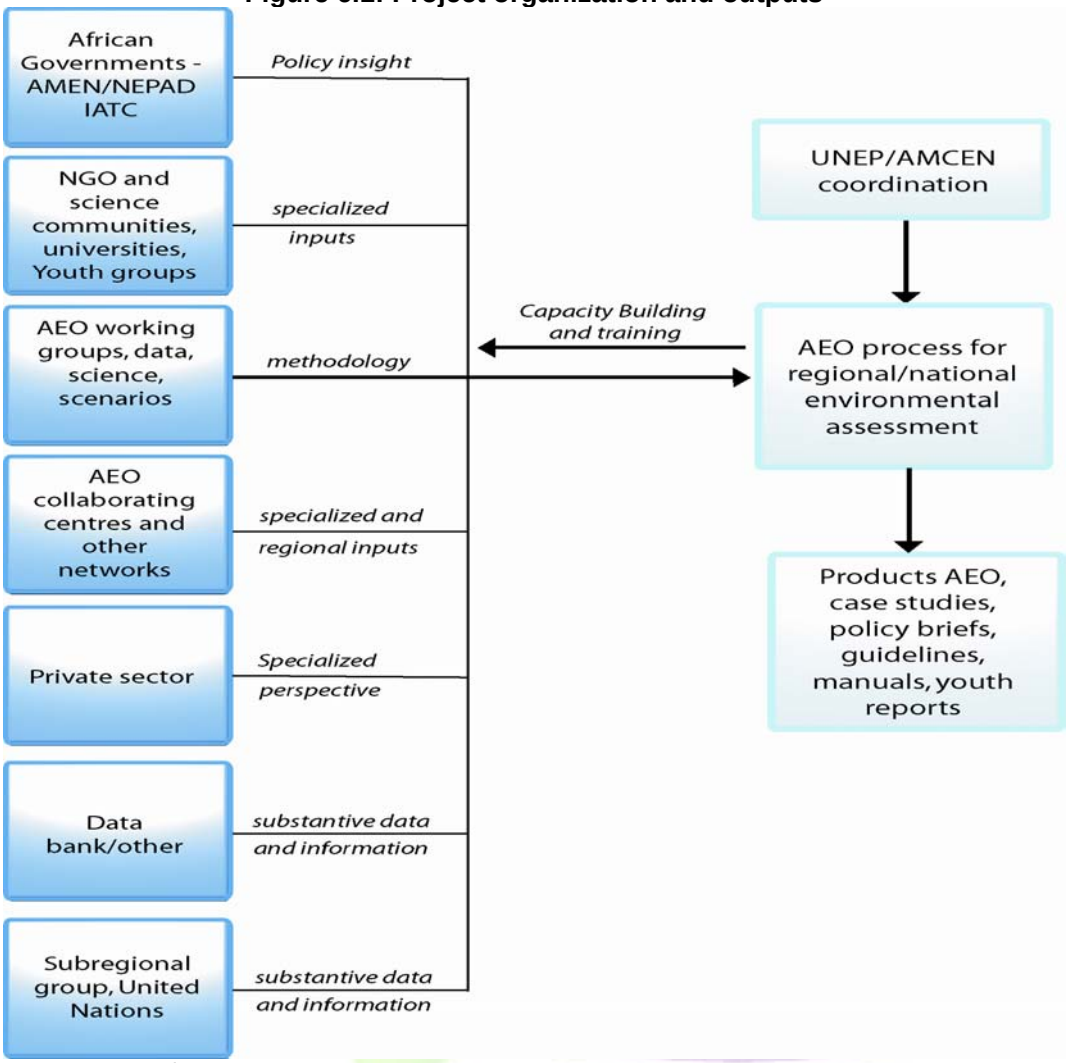
This module gives some basic outlines on planning for environmental assessment using IEA and reporting and provides examples from South Africa where this process has been used successfully in national and sub-national SOE reporting.

To prepare for the whole process from conceptualization to production to dissemination of the report, you should have a complete plan of all activities to be conducted before starting. Even if you may have to adjust some of the stages, include a plan which, at the time of planning, looks like the best option. Your preparation should also include a strategy for communicating the message of your activities to the public. It is essential for the public to be convinced that they should participate in your activities and that they will actually benefit. Currently there are many SOE reports that use IEAwhich have been carried out and from which important lessons have been learned. If you are starting the process for the first time, these would be particularly useful to learn from.

6.2 Outline the SOE report as a project

You may want to start planning for the process by drawing it out as a project. Outline the main participants by major groups, and state what the overall responsibility of each group is, what the organization of the project is expected to be like, and the major outputs in the various categories. Figure 6.1 illustrates how this planning was done for AEO-2. Clear guidelines for each of the major players should be developed in consultation with those players and other relevant stakeholders.

Figure 6.1: Project organization and outputs

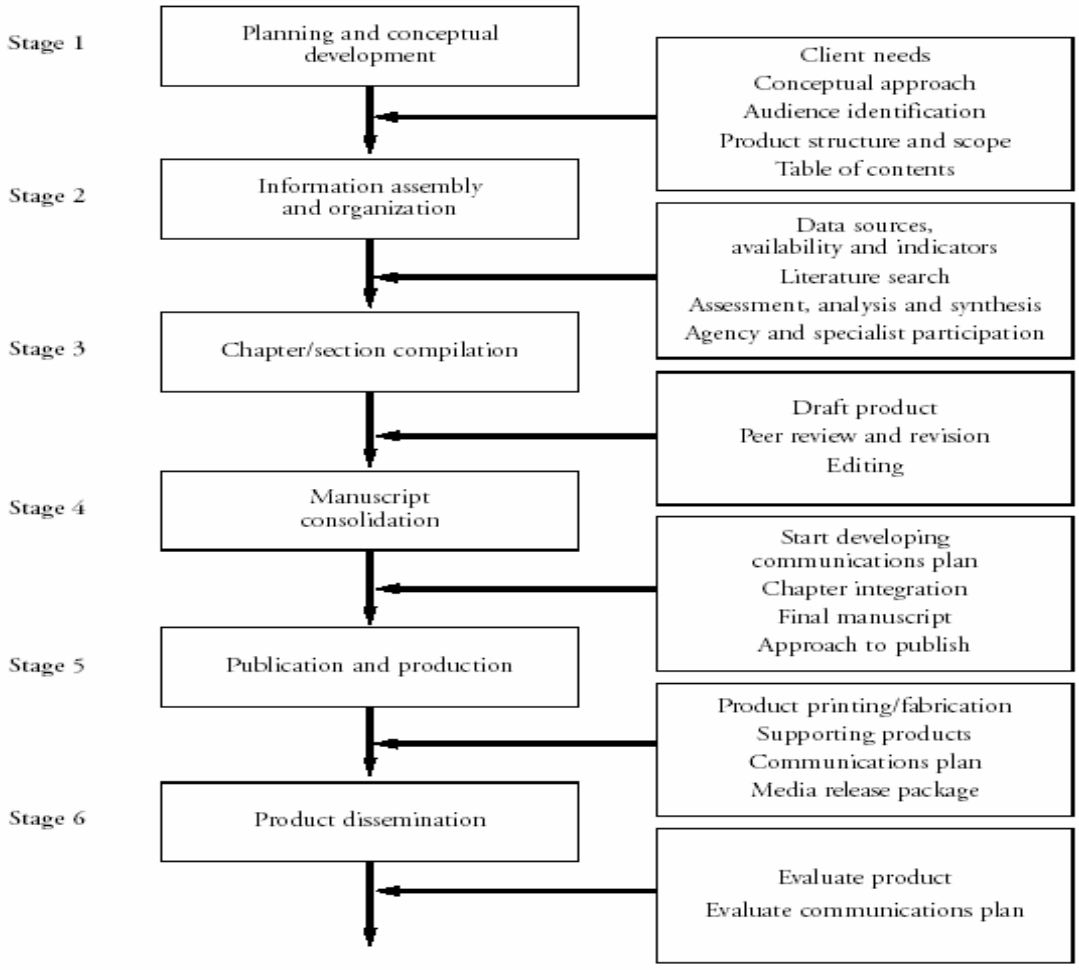


Source: UNEP/AMCEN 2004

6.3 Clearly state all stages and assign responsibilities

In preparing for IEA and reporting, make sure the sequence of activities is clear to all those who are managing the process. Several idealized and generalized schedules for planning SOE reports are available. The stages or steps in the plan may vary but they all suggest an outline that covers the whole process. Figure 6.2 shows an example developed by Rump (1996). It has six stages, with each stage associated with specific activities.

Figure 6.2: An ideal example of stages in the development of an SOE Report

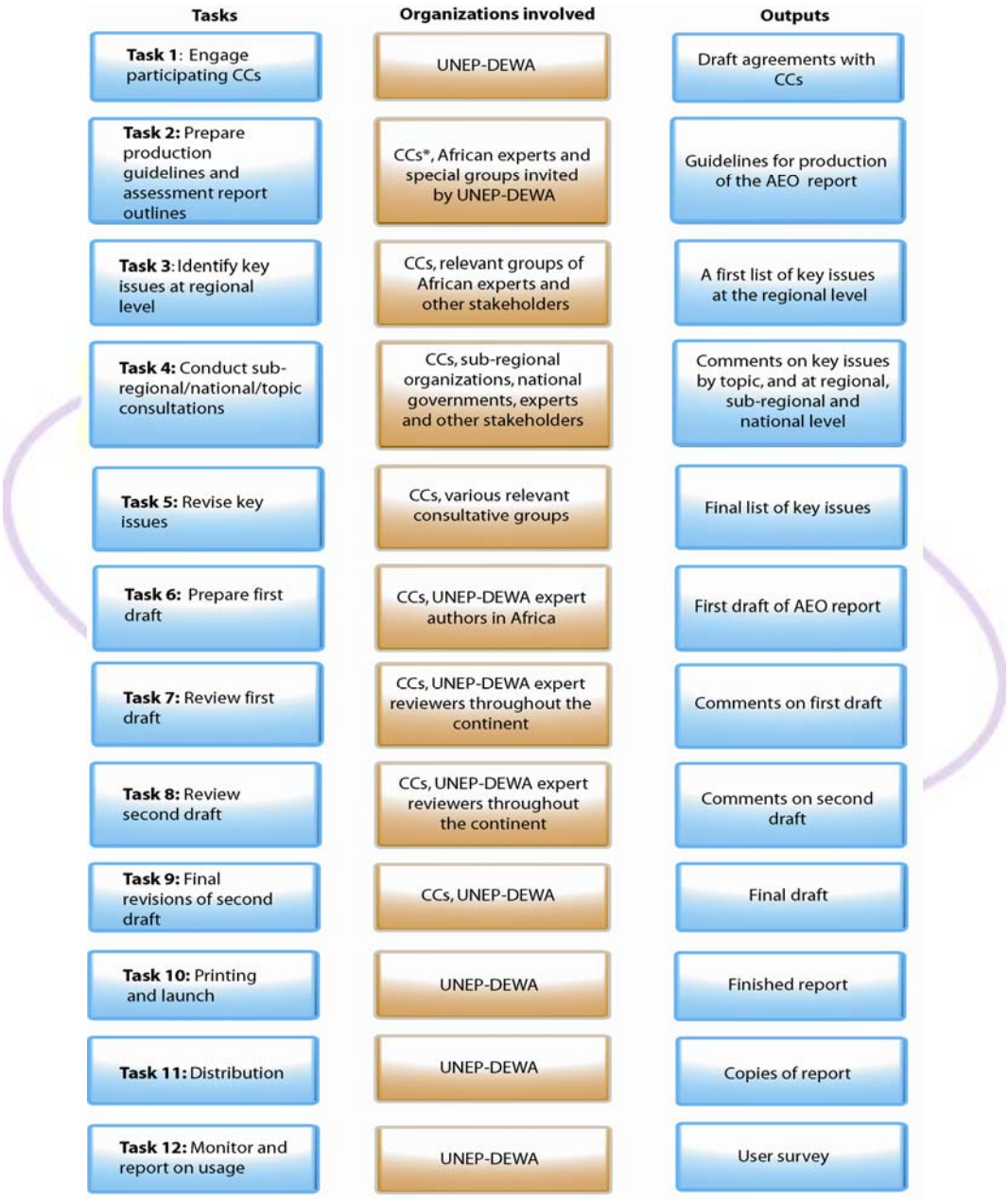


Source: Rump 1996

More flowcharts may be required to clearly communicate your plan to stakeholders and potential participants in all aspects. Supplement the main flowchart with others to communicate the different aspects of the plan. Figure 6.3 provides a real life example of the AEO-2 plan. Several groups participated in the definition of issues, outlining the contents of chapters, writing, and reviewing the chapters as they progressed. If you want to model your plan based on Figure 6.3, clearly state the tasks involved at each

stage, the organization involved in carrying out each task, and the output expected. It may be difficult to stick to a strict schedule, but draw up one anyway so that institutions know what to expect from others to help them complete their own tasks.

Figure 6.3: Consecutive tasks, responsibilities and results as outlined for AEO-2

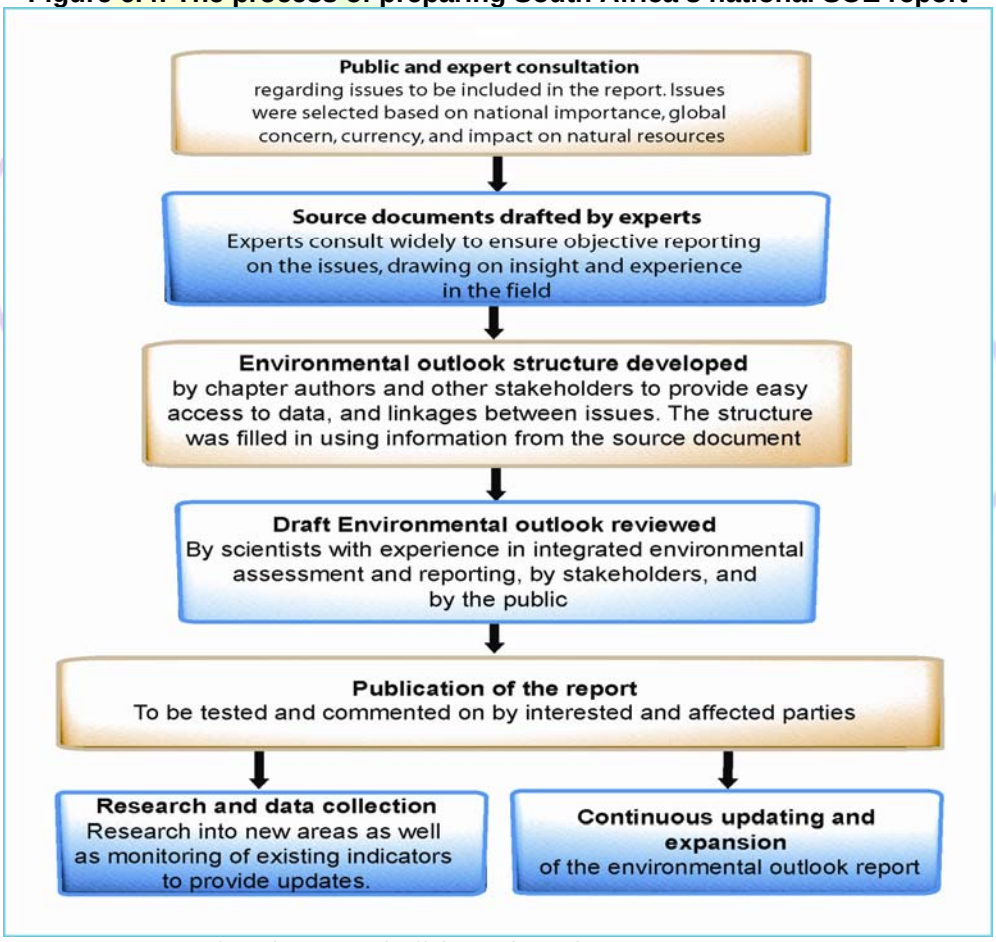


*CCs refers to African Collaborating Centres

6.4 A real life example from South Africa

South Africa has developed its capacity for national SOE reports since the early 1990s. The country's experience may prove very valuable as a best practice from which other African countries may learn. At the 1992 Rio Conference, South Africa was only an observer because it could not be allowed to be a full participant; however, it presented a plan that it intended to follow which culminated in the steps reproduced in Figure 6.4. It has experience in producing reports at national, provincial and city levels in response to a legal mandate. The National Environmental Management Act, Act No. 107 of 1998, states that "every person is entitled to have access to information held by the State and organs of state which relates to the implementation of this Act and any other law affecting the environment, and to the state of the environment and actual and future threats to the environment, including any emissions to water, air or soil and the production, handling, transportation, treatment, storage and disposal of hazardous waste and substances" (RSA 1998).

Figure 6.4: The process of preparing South Africa's national SOE report



Source: Department of Environmental Affairs and Tourism 1999

6.5 Communicating the SOE Report message with the plan as an activity

Within the overall planning for IEA and reporting, communicating the message requires special attention, especially at the national and sub-national levels where more detailed information on stakeholders might be appropriate. Communicate the message to a broad audience; it is essential to reach a very wide audience including many non-scientists. The message should therefore be:

- *Relevant*: Do not talk from your point of view (e.g. that contributing to environmental assessment is a duty for all) but seek out elements that may make your message desirable and of value to your audience. Find out what this is. For example, most small village groups would be eager to learn of anything that would improve their livelihoods and quality of life. Talk about how environmental assessment can be used to achieve those.

- *Understandable by the particular audience for which it is intended:* Skills in delivering an understandable message may be developed slowly over time. No message is appropriate for all audiences. Do not talk to village groups as you would talk to fellow scientific or environmental experts. Invest some time in understanding your audience, what it understands and what it may have problems comprehending, before you deliver your message.

- *Delivered by a very wide system:* People in your audience will have preference for the system that delivers your message. The same message may be packaged differently to suit different audiences. Short executive summaries or newsletters in print taking less than 15 minutes to read may be sufficient for Ministers, Permanent Secretaries and Directors. Longer documents may be more useful for academia.

Keep the full report for specialized groups. The majority of the people may prefer public media (e.g. internet, radio, TV) or performances (e.g. songs, theatre, etc.). Messages on the environment may be delivered in very unconventional ways very effectively (e.g. church groups) or other social groups (e.g. women's groups, youth). The most important rule of thumb for all these and others is that the delivery system should be determined after studying what will be an effective method for delivering the message for a particular audience.

Box 6.1 shows one way of communicating the SOE report message as part of planning IEA and reporting. A coordinated and careful communication of the message ensures that national and sub-national SOE reports complement the AEO with more detailed information on issues over limited areas.

Box 6.1: One possible outline for communicating the SOE report message as part of planning integrated environmental assessment and reporting

Step 1: Management, experts and key stakeholders decide there is an issue. This decision is made in consultation with a wide range of stakeholders.

Step 2: Create an advisory group: multi-stakeholder, collaborative, solution-seeking.

Step 3: Set long-term goals. Refine goals.

Step 4: Identify most important/representative stakeholders and audiences for the issue of interest

Step 5: Determine their knowledge, beliefs, opinions, where and how they get information.

Step 6: Research what communication is being done by various parties now.

Step 7: Build a communication plan. No medium of communication will be appropriate for all issues, since for each issue a different group of civil society may be primarily targeted. Examples of groups: youths, women's groups, church groups. Examples of media: radio, TV, flyers.

Step 8: Develop first message based on research. Build on existing credible messages.

Step 9: Pre-test message. Does it make sense? Train communicators in workshops.

Step 10: Deliver messages. Help others to deliver compatible messages.

Step 11: Consult, survey and determine effectiveness of messages (This testing process establishes a feedback loop).

Step 12: Refine message, based on feedback. Modify messages. Develop other messages as necessary. Retrain communicators as necessary.

Step 13: Advise others on their messages.

Step 14: Continue to deliver and modify messages over time.

6.6 Study/discussion questions

Q: How realistic is the implementation of the ideal process created in our group session or the one on Figure 6.3 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: _____
_____
_____
_____

6.7 Exercise: 6.1

You were requested to fill out a questionnaire that would have information on the state of environment in the country where you work. Now you are aware what stage your country has reached in state of environment reporting, what structure it has, etc. In groups of three or four:

1. Discuss the data each one of you has and help each other to draw out a chart that shows the relationships of the institutions involved in developing the SOE report in your country (similar to Figure 6.1)

2. Draw a process diagram (similar to Figure 6.3) to show the stages involved in producing the SOE in your country.

6.8. References

Department of Environmental Affairs and Tourism (1999). *National State of the Environment Report* 1999. Department of Environmental Affairs and Tourism, Pretoria. http://www.environment.gov.za/soer/nsoer/index.htm

RSA (1998). National Environmental Management Act No. 107 of 1998. Republic of South Africa. *Government Gazette* (Vol. 401, No. 19519), Pretoria. http://www.info.gov.za/gazette/acts/1998/a107-98.pdf

Rump, P.C. (1996). *State of the Environment Reporting: Sourcebook of Methods and Approache*s. United Nations Environment Programme, Nairobi

UNEP (1999). *Global Environment Outlook-2000,* United Nations Environment Programme, Nairobi

Module 7 – Assessing the State of the Environment

Overview
This module is designed to introduce you to assessing the state of the environment as a first step in IEA and reporting.

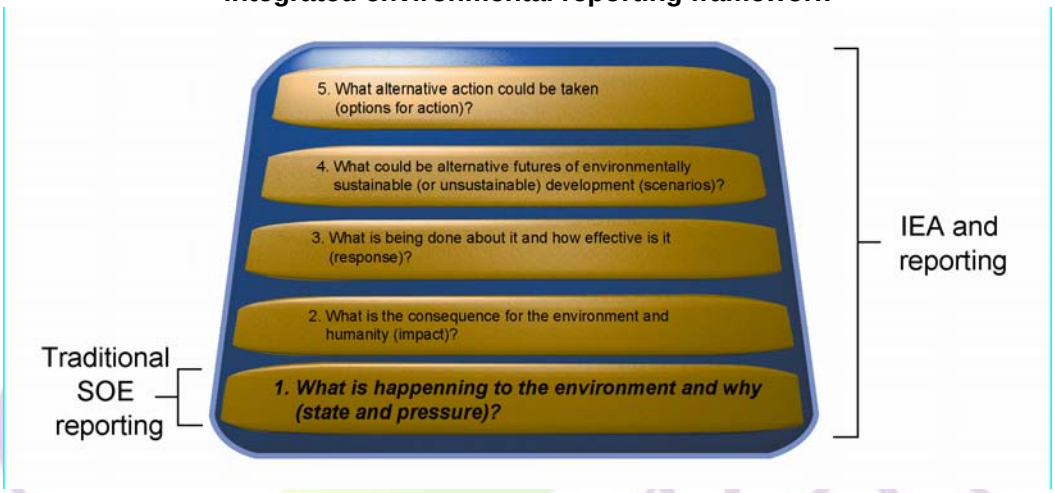
By the end of the module you will:

- □ Know the importance of reporting on environmental trends and conditions within an integrated system of environmental analysis.
- □ Learn a strategy for selecting the most important points in assessing the state of the environment.
- □ Learn about data and indicators and their importance in assessing the state of the environment and linking this assessment to environmental policy formulation.
- □ Learn about the value of unconventional sources of data such as remote sensing and the internet, and unconventional techniques of spatial data organization such as geographic information systems (GIS), in SOE analysis.

7.1 Introduction:

Reporting on the state of the environment is the first step in integrated environmental assessment. Traditional SOE reporting only answered the question "What is happening to the environment" (see Figure 7.1). While the reports were useful in informing about the state of the environment, they were not sufficient to ask questions required for influencing policy to do something about its state.

Figure 7.1: The place of SOE analysis in the integrated environmental reporting framework



Source: Pinter and others 1999

7.2 Important points in assessing "What is happening to the environment?"

In answering the first of the five questions in Figure 7.1, we get the basic environmental conditions and the pressures that are responsible for these conditions. An accurate understanding of the answer to the question lays a good foundation for IEA and reporting. Strategy for compiling information for the assessment may differ but the following points will be important:

- *What is the extent of the area to be covered by the assessment?*
  The area to be covered must be determined as the starting point. Data requirements vary with scale; what may be perfectly acceptable for decision making at one scale may be insufficient at another. Global data is good enough to compare regions of the world. On the other hand, there may not be sufficient capacity for data analysis if very detailed data is collected at the global level. At some level, too much detail blurs environmental trends and makes it difficult to link policy to the environment in the later stages of the analysis. At the other extreme, policy formulation may be difficult where data lacks sufficient detail. It is therefore important to determine the extent of the area to be covered before any plans for environmental assessment are made.

  How the area is demarcated may be important as well. The boundaries may be:

- an ecosystem: a more natural division of an area to be assessed with more meaningful ecosystem averages. The functioning of the ecosystem are much more easily understood. The Zambezi Basin State of environment report (Chenje 2000) is a good example of this area demarcation for assessment.
- political boundaries: more common at all levels of assessment (global to sub-national) because they already exist in all countries and have been used for data collection. Many policies are also based on political jurisdictions with administrative structures that can be used for environmental assessment.

- *What are the most important environmental trends and conditions?*
  Identifying the most important environmental trends and conditions at this stage helps us to see what the direction of deterioration or improvement of the environment is. If these are identified properly at the stage of assessing the state of the environment, linking environment to human activity will be easier in later analysis. The number of issues of general concern on which the report might be based is likely to be high. The most important of these for a specific interest must be put together as a set for further analysis. Each set of issues is unique and depends on the theme of interest and the area where the assessment of the state of environment is carried out.

- *What are the forces for environmental change?*
  Pressures that influence environmental trends and conditions (e.g. demographics, production and consumption, etc.) must be identified to understand the state of the environment. Some of these may be indirect (e.g. trade) but powerful in influencing environmental change. Identifying the wrong pressures may be very damaging to further analysis and linking policy and the environment because they would tend to misdirect policy formulation.

There may be many other important points to note depending on either the area of analysis, the themes of interest, or data organization.

7.3 Data and indicators

All environmental assessments need to be supported with appropriate, good quality data and indicators. Data for SOE reporting comes from many sources and in various forms, and some of it (e.g. satellite data) may require special techniques and skills to process. Each type of appropriate data, however, may add a new aspect to the SOE analysis. An environmental indicator is a sign or symptom that may be used to assist in identifying environmental change. For example, agricultural data showing tins of sorghum obtained from a given acreage may be processed to detect deterioration in agricultural yields over time by calculating the number of tins of sorghum per hectare, an indicator of land productivity. A comparison of this indicator over time will show (i.e. indicate) whether there is an increase or decrease in land productivity. Processing data to obtain indicators is useful to improving environmental assessment and communication among scientists, the public and decision-makers.

The emphasis of indicators may, in general, be influenced by the framework used in environmental assessment. When using the Opportunities Framework, indicators may be designed to reveal what opportunities are available in the environment and how they can be used to achieve sustainable development. For example, a deteriorating

ecological system will need a given level of effort to reach a stage where it will become self-sustaining. Instead of focusing on an indicator that will assess how much deterioration of the ecosystem is occurring over time we can be more positive and look for a threshold beyond which it will start "healing" itself. We should then be able to use it as a basis for deciding the appropriate action to take to prevent or reduce unwanted environmental change. Alternatively, it should be useful as an early warning sign to reduce the impact of the change on activities or livelihoods that might be affected. When using the DPSIR framework, indicators may be more focused on assessing changes in pressure, state, or response on any environmental issue. For all frameworks, however, indicators are useful in formulating policy and monitoring progress towards sustainable development.

Data and indicators also (Pinter and others 1999):

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

7.4 Data quality

Data quality and data availability are two of the most important problems for SOE reporting in Africa. Inconclusive debates based on poor quality data complicate the decision making process. However, using poor quality data may probably be more dangerous than having no data at all since it can build false confidence in environmental analysts and decision-makers that they are making appropriate responses when in fact they are not. While poor data collection techniques are responsible for much of the poor data, the worst problems in data quality relate to underestimates of the magnitude of various problems with political undertones, real or imagined, commonly as a result of ignorance of the potential dangers of intentional under-reporting (e.g. the rate at which HIV/AIDS is spreading) the problem. Table 7.1 gives some examples of the potential damage poor quality data may bring to decision making.

Table 7.1: Examples of potential damage to decision making by poor quality data

Variable	Potential error with poor quality data
Underestimate of the rate of land degradation	Insufficient attention to potential reductions in land productivity and desertification with a wide range of consequences for the economy and (on a large scale) climate. Reduction of biodiversity.
Underestimates of population growth	Errors in estimates of natural resources consumption. Poor planning for sustainable development.
Overestimates of crop yields	Insufficient attention to food security problems.
Mapping at inappropriate scales	(Scale too large) Excess and unsustainable expenditure on mapping at the expense of other problems deserving attention. (Scale too small) Insufficient information for all spatial planning.

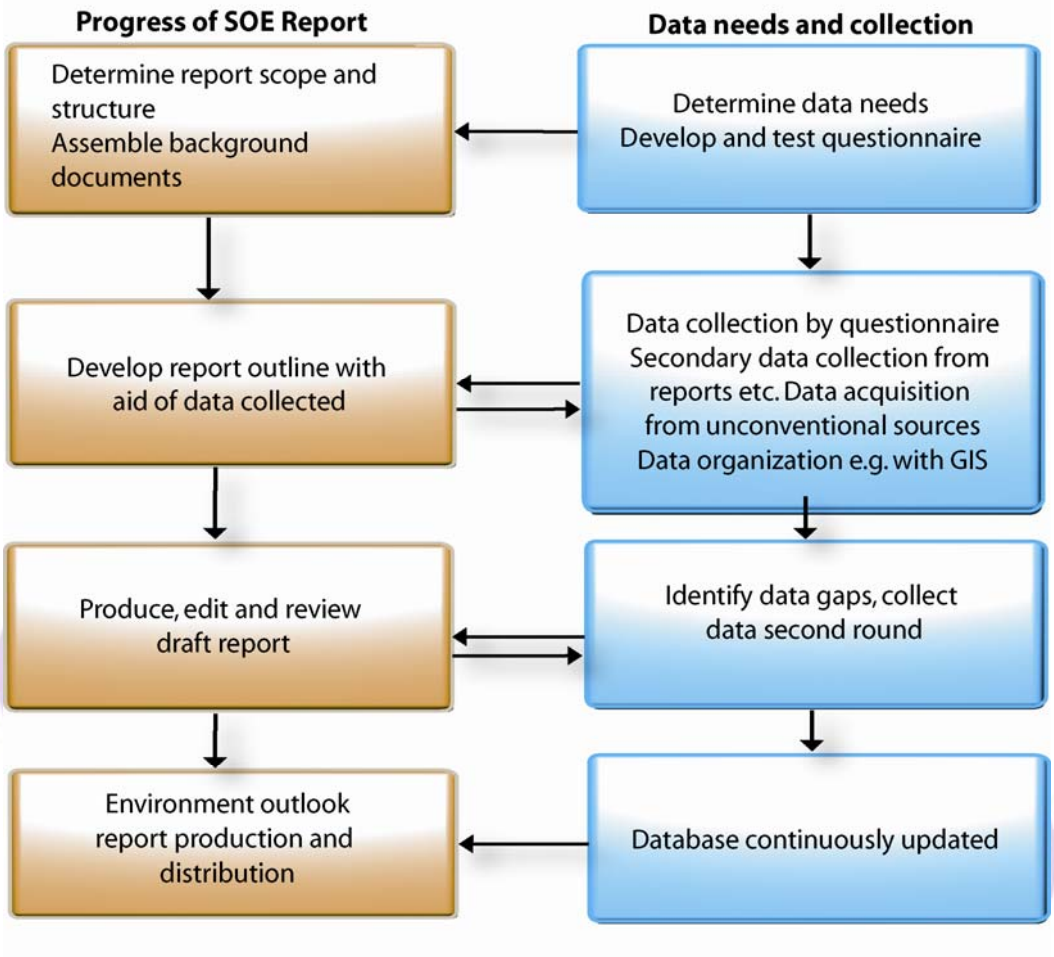
For example, data on rates of land degradation may show erroneously that degradation is progressing at a slower rate than is actually the case. Quality control should therefore be in-built in the data collection process.

7.5 Collection of data for an SOE Report

The range of data and the variables on which data is collected will be determined by the issues in the SOE report reflecting priorities of the area for the report (e.g. regional, sub-regional, national, etc.). SOE reporting may use data that might be discarded in scientific research, but even with this relaxation, availability of data may limit the issues on which analysis may be. A listing of the priorities may reveal gaps where new data has to be collected. It is advisable to first list the issues of interest regardless of whether data is available on some of them or not. The effort for data collection may then be directed at variables where gaps exist and various bodies may be identified to collect data to fill the gaps identified. For IEA and reporting, the range of issues will necessarily be wide requiring getting data from many government departments, NGOs and the private sector. Not all of these will have a keen interest in SOE reporting and maintaining data updates from their sources may be difficult.

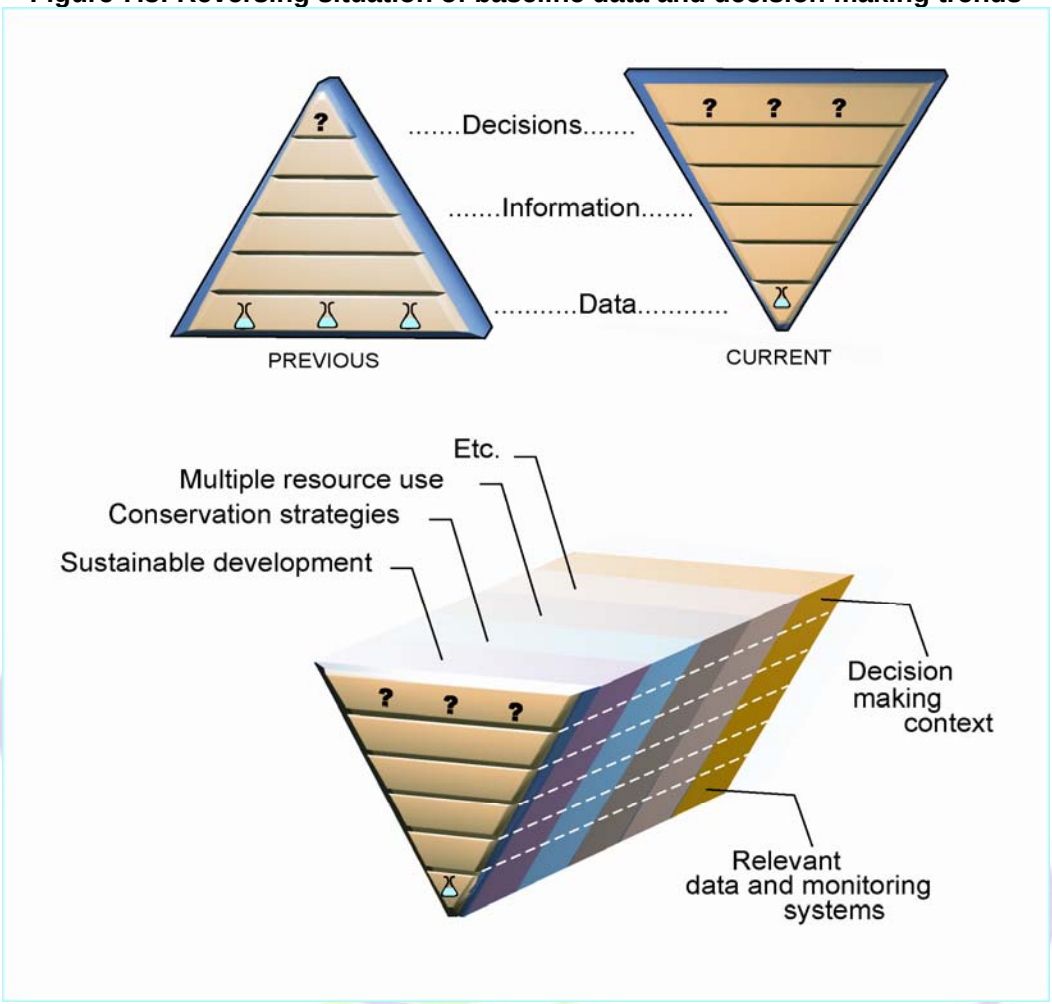
Managing the data for the SOE report is carried out in step with report development throughout the process. The arrangement of the stages may differ depending on what data relevant to the issues is already available. One illustrative development is given in Figure 7.2. Data should be collected and processed with a clear decision making process in mind rather than as an end in itself (see Figure 7.3).

Figure 7.2: An illustrative continuous data collection and acquisition effort as the development of the SOE report progresses



Source: modified from Rump 1996

Figure 7.3: Reversing situation of baseline data and decision making trends



7.6 Study/Discussion questions

Q1: Think of one example where an inappropriate indicator may be erroneously used and creates problems in assessing the state of the environment.

A1: _____
_____
_____
_____

Q2: How can you justify collecting and acquiring data being in step with the development of the SOE report? Why not decide on all the data you need and collect it all at the beginning of the process?

A2: _____
_____
_____
_____

7.7 Other unconventional sources of data

Many sources of data for SOE reporting are available on a global scale or from public domains. Many sources offer restricted access to their data. For the last of these categories, the AEIN is trying to negotiate wider accessibility for African scientists and decision-makers. For more on AEIN, see the AEIN implementation guidelines (www.unep.org/dewa/Africa/docs/en/AEIN_Implementation_Guide_en.pdf).

7.7.1 Remotely sensed data

Remote sensing is a technique which can be used to acquire data on features on the face of the earth without the observer being in direct contact with the object of observation. Data for many areas of Africa is difficult to acquire because they are difficult to access or lie across various types of boundaries. In other cases, the cost of acquiring data for extensive areas for which SOE reports are required is beyond the means of many governments. For these, remote sensing provides a partial solution for data acquisition for SOE reporting. But even for areas where conventional methods have been used to acquire data, remote sensing provides many advantages.

- Remotely sensed images provide good “pictures” for convincing the public and decision-makers to participate in discussions on issues of importance but which may not be part of their daily life (see Box 7.1).

- Remote sensing provides data with a standardized format. Standardization of spatial data has received a lot of attention in almost all the countries of Africa. However, problems of formats still exist over large areas and across national boundaries. Satellite systems (e.g. LANDSAT) take images over large areas with the same format over many years with no regard for political boundaries. Integrating this data with socioeconomic data for IEAbecomes easier.

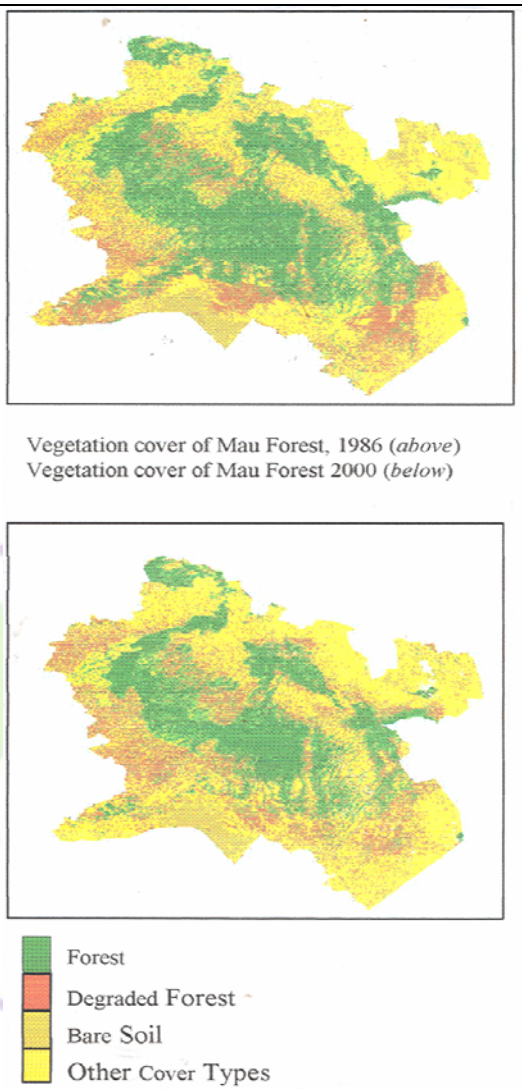
- Remote sensing may also be used to monitor the progress of projects resulting from policy decisions designed to improve the state of the environment. Proof of progress towards success may be essential for further investment (See Box 7.2)

- Remotely sensed data is available on a cyclical basis and has been used for providing data for monitoring the environment over long periods. This is particularly important for SOE reporting in very rapidly changing environments. For example, available data for the spatial expansion of urban areas in many African countries is commonly grossly outdated and makes it difficult to assess the pressures spatial urban growth is putting on available resources (See Boxes 7.3 and 7.4).

Box 7.1: Vegetation degradation in the Mau Forest on the Mau Escarpment, Kenya

Conservation of forest vegetation on the mountains of Kenya is critical to the water supply and daily life of many people in the Kenya highlands. However, without data it was difficult to prove that this was an important issue in the state of the environment of the country and a strong illustration of its importance was essential.

In February 2001, the Government of Kenya announced its intention to accept requests for licences for logging over a 353.01 km^2 area in the Eastern Mau Forest on the Mau Escarpment. The images in this box show forest degradation in the Mau Forest between 1983 (top) and 2000 (bottom). Conservationists used data acquired from remotely sensed images to argue the case against the Government's intention, pointing out that half the dense forest in Lake Nakuru's catchment area had disappeared between 1973 and 2001. Further destruction of the forest in the upper reaches of the basin would mean that the main rivers that feed Lake Nakuru would disappear. Using remote sensing, both UNEP and the Regional Centre for Mapping of Resources for Development (RCMRD) in Nairobi buttressed this argument with analyses of the importance, recent human activities in, and the potential fate of mountain forests in Kenya. Hardly a public in any African country can claim to be as charged about any natural resource as the Kenyan public is about its mountain forest resources now.



Vegetation cover of Mau Forest, 1986 (*above*)
Vegetation cover of Mau Forest 2000 (*below*)

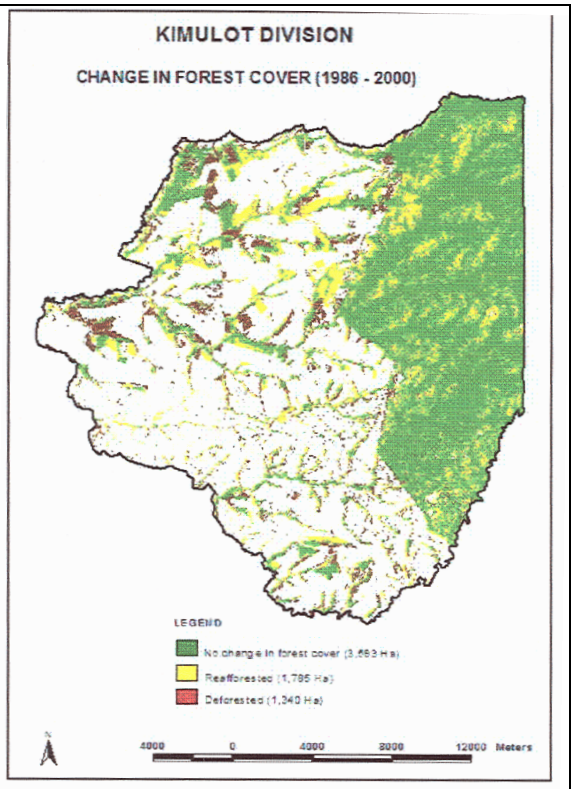
Source: RCMRD 2004

Box 7.2. Acquiring data to prove the success of the "Response" to deforestation in the Kimulot Division of Mau Forest

The decreasing forest cover on East Africa's mountains and the interest the East African communities have taken in its recovery has attracted attention from various organizations and donors. Forest recovery projects exist in many districts, sub-districts and localities.

In the Mau Forest in Kenya, forest recovery projects in Divisions have been in progress since 1986. Progress is slow and the acquisition of more funds from various sources has been largely dependent on proving that the forest recovery project is getting some success.

Data from the progress of the project from Kimulot Division in the Mau Forest of Kenya shows how remotely sensed satellite images were used to provide this data. As may be seen from the statistics, between 1986 and 2000, the reforested area was more than 91 per cent of the deforested area.



Area Statistics
Forest – 9,427 Ha (94.27 Km^2)
Deforested – 2,036 Ha (20.36 Km^2)
Reforested – 3,894 Ha (38.94 Km^2)

Source: RCMRD 2004

Box 7.3: Remotely sensed data to analyse Midrand's state of environment

Remotely sensed data for Midrand suggest that effective environmental management strategies are required now to avoid deterioration in environmental quality.

Midrand is strategically located halfway between the major urban centres of Johannesburg and Pretoria. It is 240 km^2 and had a population of 240 000 in 2001. The satellite images in this Box show the area in 1985 (top) and 2001 (bottom). Within this period, data acquired using remotely sensed images showed that 65 per cent of Midrand was transformed for human settlement, crops and industry. There are 232 ha of wetlands and river areas. The dominant ecosystem is a transition of grasslands that contains species that exist in both grasslands and in the bushveld ecosystems.

The rapid growth of Midrand's economy is expected to continue with associated impacts on the environment. Current development trends indicate that if effective environment strategies are not adopted soon, we can expect significant deterioration of the environment.

Source: USGS 2003

Box 7.4: Acquiring data from remote sensing for monitoring urban growth and its impact in changing the state of the environment: Banjul, the Gambia

Rapid urban growth is one of the greatest influences in changing the state of the local environment in many African countries. The potential growth of many African cities was grossly underestimated at a time when population densities were low and extensive land tracts could have been set aside for their growth. Recent growth of many cities has been very rapid due to immigration from poverty stricken rural areas. Getting data to assess the impact of this growth on the state of the environment both within and around the growing cities using conventional means would be very time consuming and costly. Remotely sensed data has been useful for acquiring this data.

Banjul, the capital city of Gambia, is one such city located at the end of a peninsula with land grossly insufficient for its growth. The satellite images in this Box show the extent of the city in 1973 (above) and 2001 (below) during which time the Greater Banjul city tripled in population size. It now has sprawled to include several outlying districts such as Serekunde and Kanifing. Technology to drain the mangrove swamps has so far not been introduced and the swamps that lie to the north-east border of Banjul have not been destroyed but this may not be for long unless an urban growth policy protects them in the future.

Source: USGS 2003

Box 7.5: Acquiring data for the protection of important tourist spots: Lake Nakuru, Kenya

Without time series data, the deterioration of the environment is sometimes difficult to detect if it is very slow. This is particularly the case with "protected areas" where the pressures on the land may overcome the protection. The satellite images in this Box show the deteriorating state of the environment for the "protected" area around Lake Nakuru between 1973 and 2001. Lake Nakuru, located southwest of the city of Nakuru in the Rift Valley, Kenya, is one of the most beautiful tourist destinations in Africa. It hosts the world's greatest concentration of flamingos, and has many of the more important animals that have made Kenya an important tourist destination.

In spite of its protected status, the Lake Nakuru area has a high degree of vegetation deterioration. The satellite images show the state of the vegetation in 1973 (above) and 2001 (below). The deterioration is having major impacts on the fluctuations of water flow and on water quality. The satellite images provide data to assess the changing state of the environment of the Lake Nakuru region.

Source: USGS 2003

7.7.2 World Wide Web sources

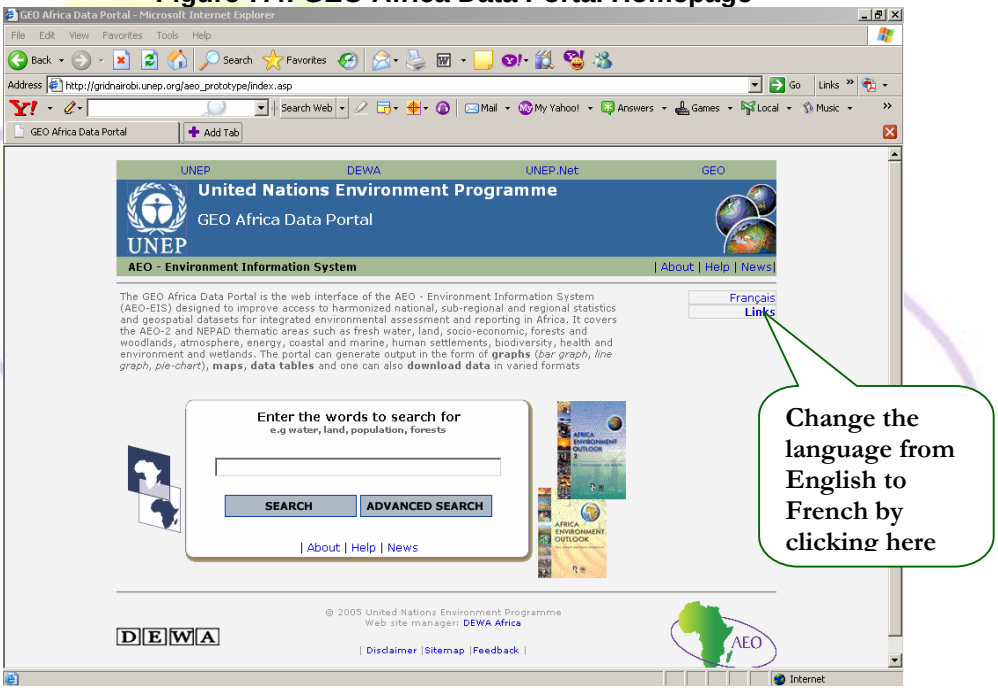
The internet has become a major source of data for SOE reporting. Internet mapping has been used very effectively by UNEP to communicate images, maps and other types of datasets to potential users. The most comprehensive is probably the family of GEO Data Portals which provide city, national, sub-regional, regional and global environmental data and information to all who may want to use it. The exercise below is a simple introduction to accessing this Africa-focused source.

7.8 Exercise: Introduction to GEO Africa Data Portal

This exercise is included in this module to give you an introduction to one of the most versatile sources of environmental information and data on the World Wide Web: GEO Africa Data Portal. The GEO Africa Data Portal is the web interface of the AEO - Environment Information System (AEO-EIS) designed to improve access to harmonized national, sub-regional and regional statistics and geospatial datasets for IEA and reporting in Africa. It covers thematic areas such as freshwater, land, socioeconomics, forests and woodlands, atmosphere, energy, coastal and marine environments, human settlements, biodiversity, health and the environment, and wetlands. The portal can generate output in the form of graphs (*bar graphs, line graphs, pie charts*), maps**,** data tables and one can also download data in various formats.

Step 1 – Open the webpage http://www.unep.org/geo/data/africa

Figure 7.4: GEO Africa Data Portal Homepage



The Homepage

The homepage (Figure 7.4) offers access to a wealth of information. In principle, it has three main areas of interest:

- The simple “free text search” which is simple and straightforward: type in a free (thematic, indicator or data variable) keyword(s) such as “emission”, “waste”, “forest”, click on “Search” and follow the instructions.

- Use the “Advanced Search” for more specific search options. Limit your search to an AEO/GEO Theme, a geographic region (AEO/GEO) or a scale/resolution (city, sub-national, national, sub-regional, regional, geospatial).

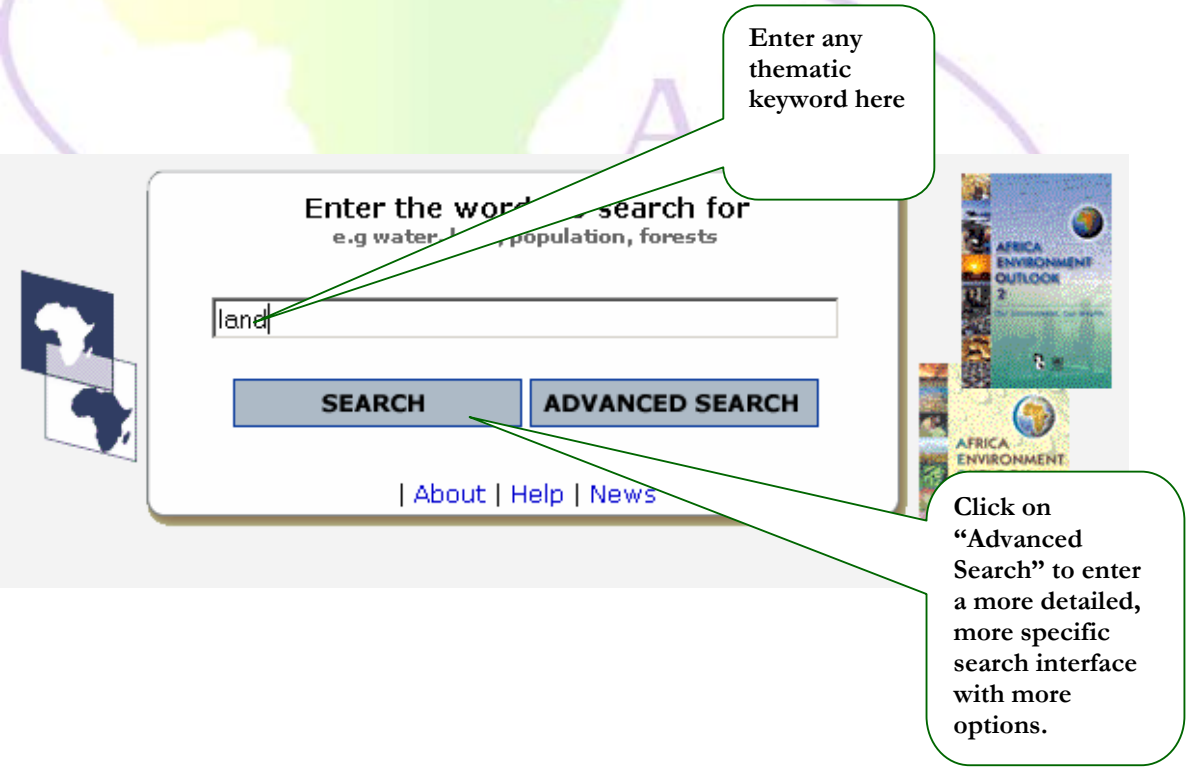
- In the section “links” one will find links to, the AEO-1 report, AEO-2 indicators and AEO-2 data compendium.

In addition, for French-speaking users, most of the Portal has been translated into French. Just click on the link "**Français**" above “links”.

Step 2 – Search for some data and indicators, graphics and maps that are contained in the database.

Free text Search
The primary function of the basic search is to provide users with an easy way of searching for an indicator or data variable based on a word or words related to the what they are searching for. The search is an easy to use interface, which will query different fields for the entered keyword(s). All words contained in the theme, data variable, or indicator name fields will be searched. Just enter any thematic keyword such as “water”, “forest”, “population”, “emission”, “trade”, etc.

Figure 7.5: GEO Africa Data Portal Search Box

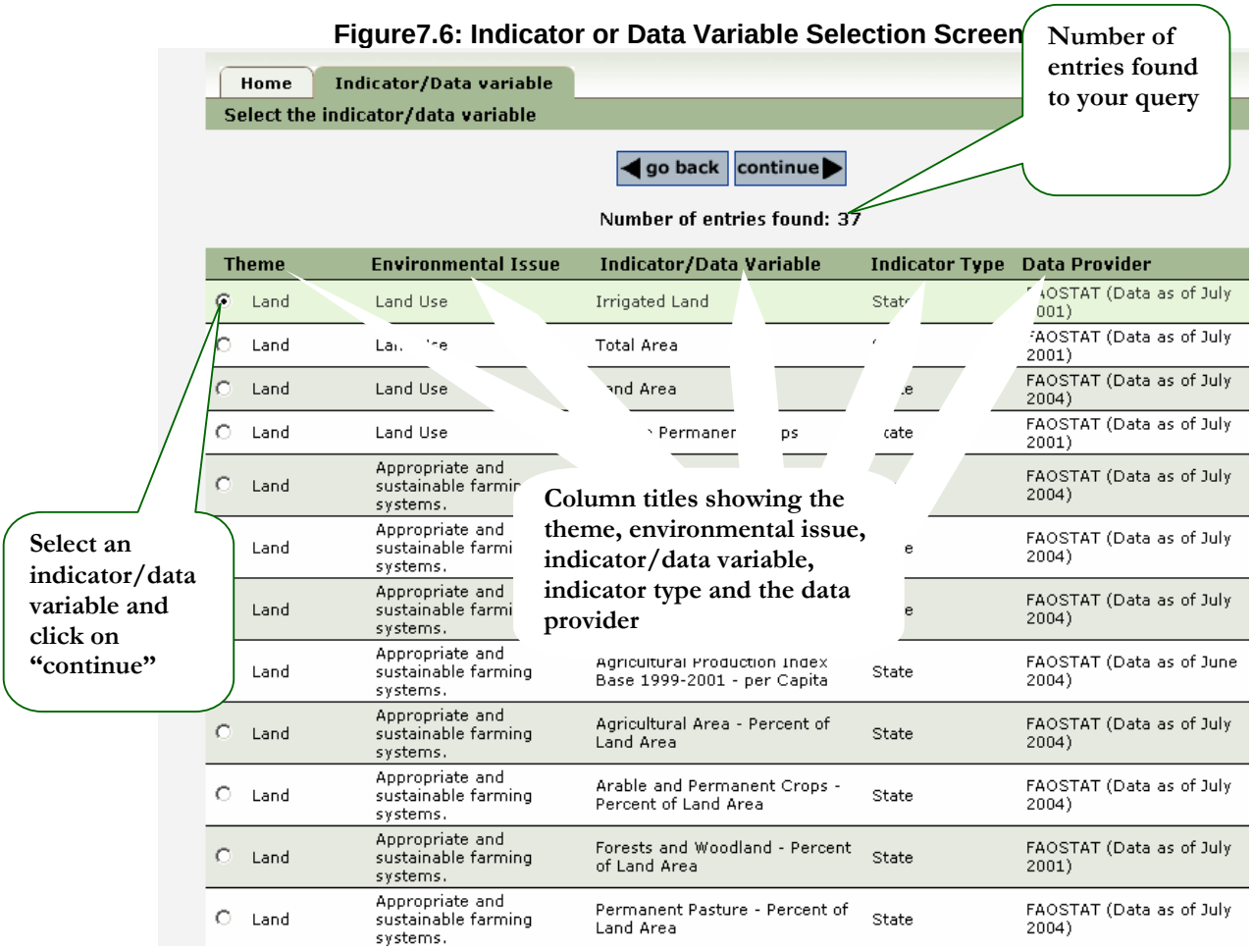


Step 3 – Indicator or Data Variable Selection

The keyword(s) entered on the homepage is searched through several fields of the theme, data variable, or indicator name. The number of entries found for the search, are displayed in the first line. One can try to limit the number by specifying several or more precise keyword(s), in order to avoid long lists of variables.

A variable can be selected by clicking on a circle in front of each data set name and then clicking on the "continue"-button at the top or bottom of the page (see Figure 7.6).

Figure7.6: Indicator or Data Variable Selection Screen



Theme	Environmental Issue	Indicator/Data Variable	Indicator Type	Data Provider
Land	Land Use	Irrigated Land	Stat	AOSTAT (Data as of July 001)
Land	La... ...e	Total Area		AOSTAT (Data as of July 2001)
Land	Land Use	...nd Area	...e	FAOSTAT (Data as of July 2004)
Land	Land Use	... Permaner ... ps	cate	FAOSTAT (Data as of July 2001)
Land	Appropriate and sustainable farmir systems.			FAOSTAT (Data as of July 2004)
Land	Appropriate and sustainable farmi systems.		e	FAOSTAT (Data as of July 2004)
Land	Appropriate and sustainable farmi systems.		e	FAOSTAT (Data as of July 2004)
Land	Appropriate and sustainable farming systems.	Agricultural Production Index Base 1999-2001 - per Capita	State	FAOSTAT (Data as of June 2004)
Land	Appropriate and sustainable farming systems.	Agricultural Area - Percent of Land Area	State	FAOSTAT (Data as of July 2004)
Land	Appropriate and sustainable farming systems.	Arable and Permanent Crops - Percent of Land Area	State	FAOSTAT (Data as of July 2004)
Land	Appropriate and sustainable farming systems.	Forests and Woodland - Percent of Land Area	State	FAOSTAT (Data as of July 2001)
Land	Appropriate and sustainable farming systems.	Permanent Pasture - Percent of Land Area	State	FAOSTAT (Data as of July 2004)

The different columns of the search result screen (Figure 7.6) give the following information about the dataset:

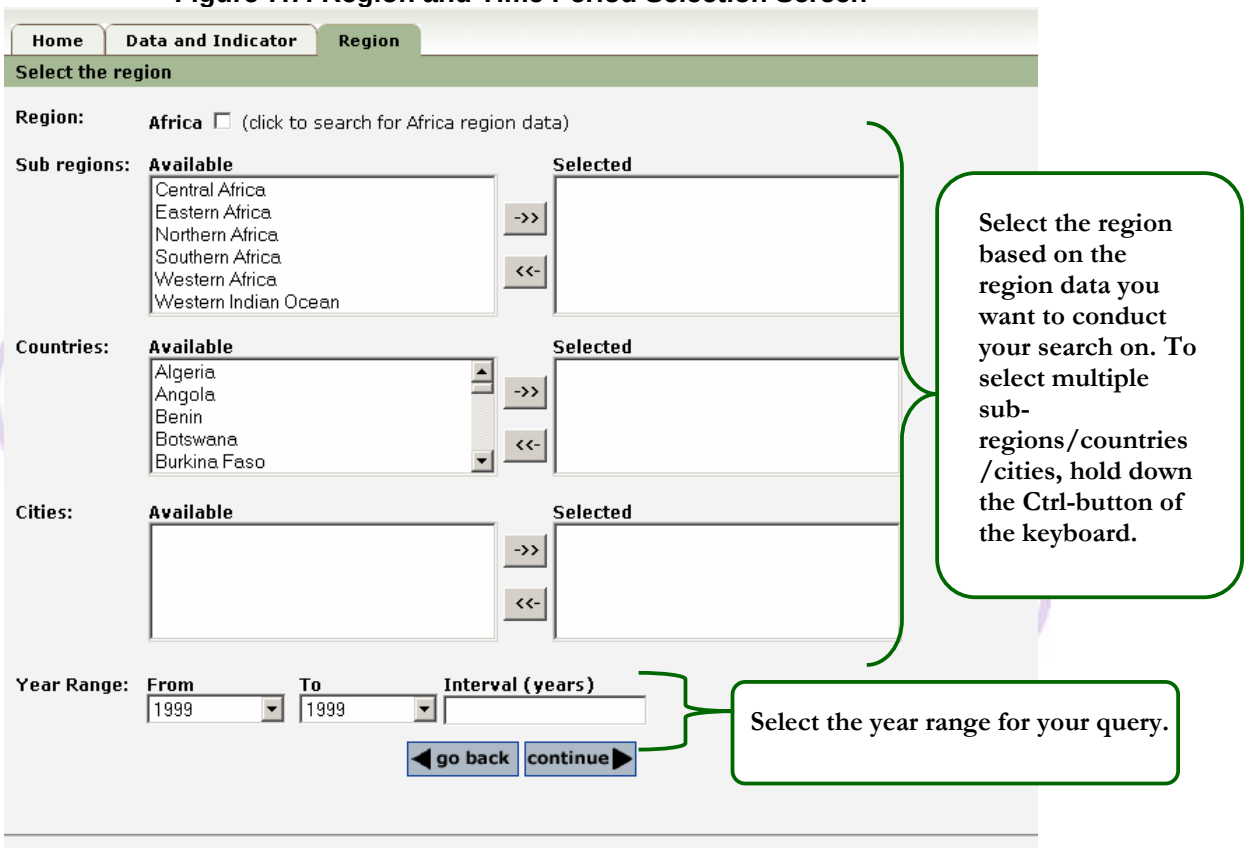
- The theme name of the indicator/ data variable,
- The environmental issue of the indicator/data variable,
- The indicator/data variable name,

- The indicator type(either driving force, state, pressure, response, or impact)
- The name of the data provider.

***Step 4* – Region and Time Period Selection**

After having selected a specific indicator/data variable, one has to choose the desired region and time period (See Figure 7.7).

Figure 7.7: Region and Time Period Selection Screen



The regions are categorized as follows:

- Africa region,
- the AEO sub-regions,
- countries, and
- cities.

The years are displayed in the “From” and “To” boxes, and are always ordered descending, so that one has the most recent year at the top of the list. The interval box gives one the option to indicate the interval in years of the expected output.

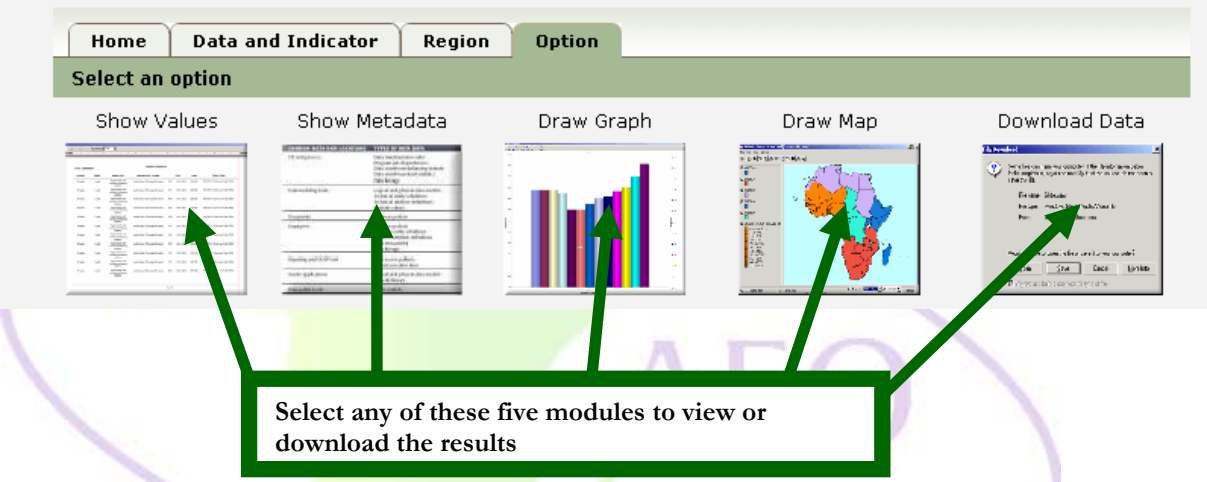
The availability of years for different data sets varies considerably. Where possible, data are available for a period of 30 or more years, but sometimes there are only a few years available.

Even though years are displayed in this box, it does not mean that the data are really available for all cities/countries/sub-regions/region. Missing values may occur occasionally.

Step 5 - Module Selection

The "Option" page is the "hub" for all further actions. It offers one access to different display and analysis modules, as well as to the download and metadata modules.

Figure 7.8: Module Selection Screen



- *Dynamic mapping (draw map):* This module is still being developed.

- *Customized graphing (draw graph):* The Portal also enables one to produce graphs for the selected data set. This helps to explore trends and analyze changes over time. The values of several countries or sub-regions can be compared to each other, and one can also show the value for Africa as a whole.

- *Generating data tables (show values):* One can display the selected variable in a data sheet.

- *Data download:* The Portal offers two different formats for the download of statistical data sets. The formats are Microsoft® Excel and comma delimited/separated values (CSV).

- *Displaying metadata:* This module offers detailed background information for the selected data set, such as data provider, source, publisher, date etc.

If one wants to switch from one module to another, then there are two possibilities to do this:

- By clicking on the “Back” button of one’s browser until the “Option” page appears again.

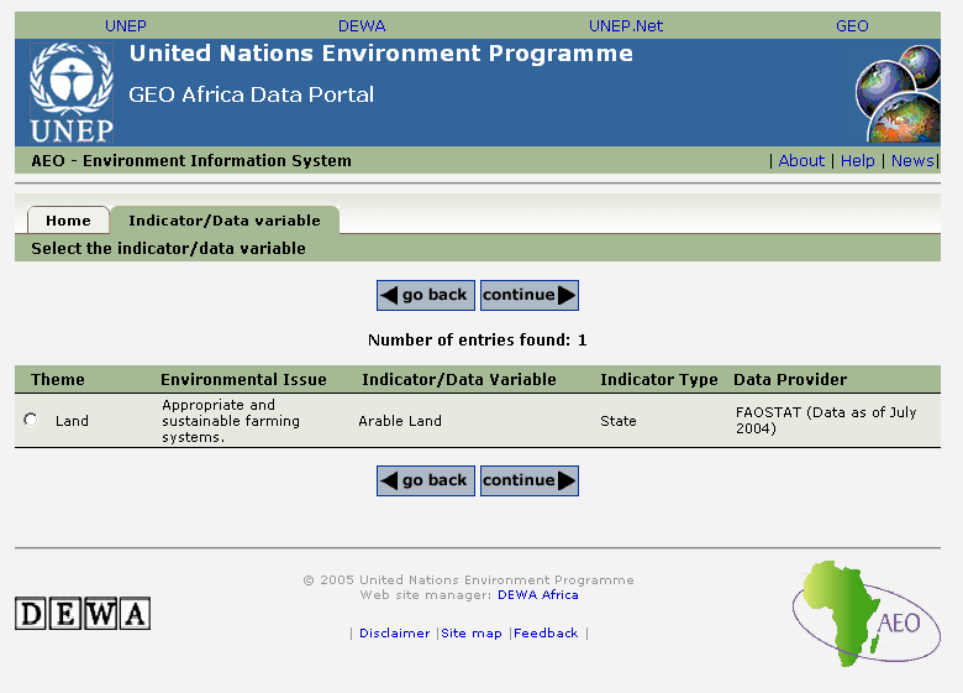
- By clicking on the “option tab” at the top of the selected module. The module one is using at the moment is highlighted in a green colour.

***Step 6* – Example of state of arable land in Ghana**

To extract data for the indicator (arable land), which is part of the land theme, for Ghana, a country in Western Africa, follow these steps:

- Enter the words ‘arable land’ and click on ‘Search’ button. The following screen appears (Figure 7.9).

Figure 7.9: List of indicators with the word ‘Arable land’

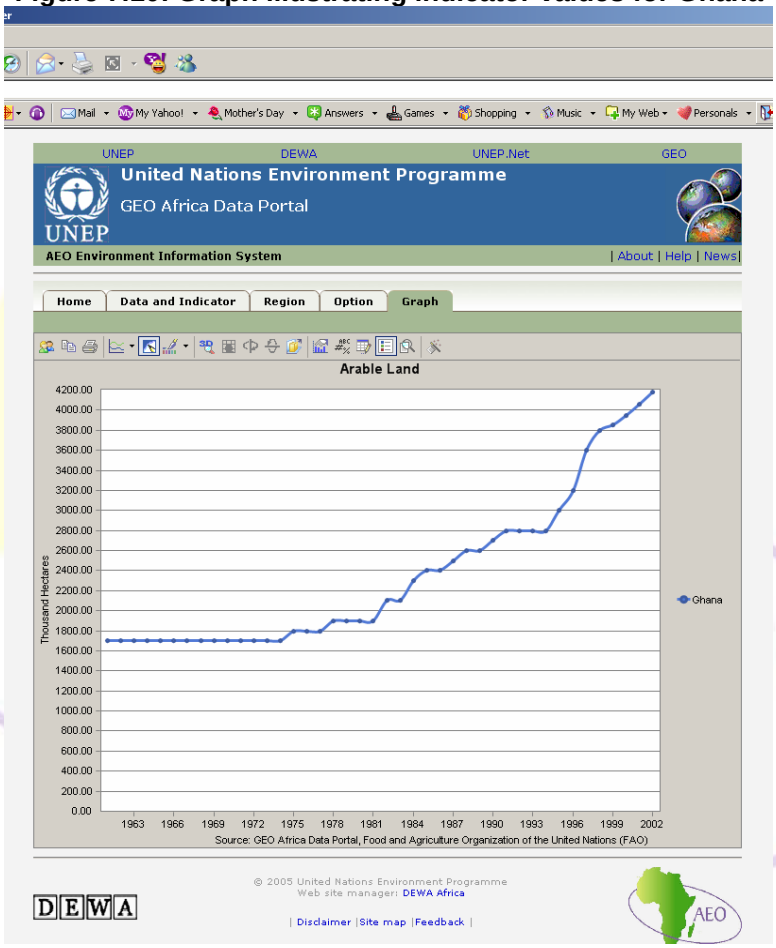


- Click on the “circle” to the left of the column with the indicator "Arable land" then click on the "Continue" button to proceed. The screen showing the different geographic regions appears.

- In the "Available sub-regions" list box click on "Western Africa". In the "Available countries" all the countries in western Africa will be listed. Select "Ghana" and click on the ">>" button to add it to the "Selected countries" list box. Select the "Year from" and "Year to" and click on the "continue" button to proceed.

- On the "Option" page listing the different modules, click on the image below 'Draw Graph'  , the graph will be generated as shown below (Figure 7.10).

Figure 7.10: Graph illustrating indicator values for Ghana



***Step 7* – using search results of GEO Africa Data Portal to support narrative in report**

Let us put the three illustrations together to assist us in writing an SOE report on arable land in Ghana.

Note that you can click the  button to print the graph or copy the graph onto a Microsoft® Word or Excel file by:

- Clicking  . Select "Bitmap" or "Metafile" to copy the image or "Text" to copy the figures.

- Opening a Word or Excel file.

- Opening the "Edit Menu", and clicking on "Paste".

Note: You can change the type of graph by clicking on the  button. (For more details about the features and functionality of the portal, please consult the GEO Africa Data Portal User/Training manual)

Discuss the results using the following sub-headings, illustrating your discussion with data from different countries in Western Africa.

1. Pressures on arable land in Ghana
2. State of arable land in Ghana
3. How does the situation compare with other countries in the Western Africa sub-region?
4. How does it compare with countries in other sub-regions in Africa?

Do the same for any other geographical selection (one country; several countries; one sub-region or several sub-regions) and analyse using the DPSIR framework.

7.9 Developing Indicators

There are many points to observe when developing indicators. Among these are the following:

a. Indicators express information in ways that are directly relevant to the decision making process. They are developed:

- within the limitations of available data. Where relevant data is available and is of high quality, very good indicators can be developed

- to be directly within the information needs of decision-makers

- to answer questions on key policy priorities

b. Indicators are powerful tools for assessing environmental change because:

- they are directly linked to assessment and evaluation

- they strengthen environmental accountability

c. There should be a criterion within which indicators are collected so that their selection is not haphazard. An example of a criterion for developing a set of indicators is given Box 7.6. No Criteria set is ever complete; criteria should always

be improved with participation of those who are using it. Quality control should be in-built in the discussions for the entire set.

Box 7.6: An example set of a criterion for developing indicators

Indicators should:

- Be developed within an accepted 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 is 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
- Reflect causes, processes or results (i.e. reflect pressure, state and response).

Source: World Bank 1997

d. Caution should be taken in developing indicators to make sure that they reflect aspects of a system that you want to measure. Indicators are central to how you perceive system performance. Developing the wrong set of indicators will encourage recommending the wrong policies and eventually to changing system performance. If, for example, the issue for which a new policy is required is ecological sustainability, and the indicators selected measure economic sustainability, the new policy, if approved, will change the environmental system in the direction for which it was not intended.

Table 7.2 below lists some indicators that have been suggested for AEO-2.

Table 7.2: Some Environmental Indicators suggested for AEO-2

Issue	**Indicators**		
	Pressure	**State/Condition**	**Response**
Climate change	- Fossil fuel - Greenhouse gas emissions	- Mean global temperature - Ambient levels of CO_2 or other greenhouse	- Change in energy use
Water quality/ eutrophication	- Nitrogen and phosphorus emissions - Wastewater	- Biological oxygen demand; dissolved oxygen; nitrogen and phosphorus levels in water	- Population served by treated water supply - User charges for

	discharges - Livestock density		waste water treatment
Urban environmental quality	- Air pollutant emissions - Traffic density - Rural-urban migration	- Urban air quality - Ground-level ozone concentrations	- Pollution abatement charges

7.10 Participatory indicator development

Indicators arise from the values of the people who use them. Different people living and working in different environments have different values and these must be reflected in the development of indicators. Many indicators exist that are developed by scientists for other scientists to use in environmental assessment. Many such indicators, for example, exist in rangeland management to detect whether rangelands are degrading or are sustainable. These tend to be too expensive and complicated for farmers and cannot be used by them to monitor and respond to environmental change. The aim of participatory indicator development is to replace such indicators with sets that local people can use effectively. For participatory indicator development to be effective, professionals and researchers should learn to solve environmental problems together from multiple perspectives. This is the true participatory approach to IEA and reporting. It ensures that local skills and knowledge are considered in the development of environmental indicators that the local communities can use and maintain. Figure 7.3 gives one example of a possible framework for participatory indicator development

When indicators are developed for indigenous people, their value system may be very different from that of the scientists. However, comparisons of scientific-based and indigenous knowledge-based indicators (see Box 7.7) have shown that:

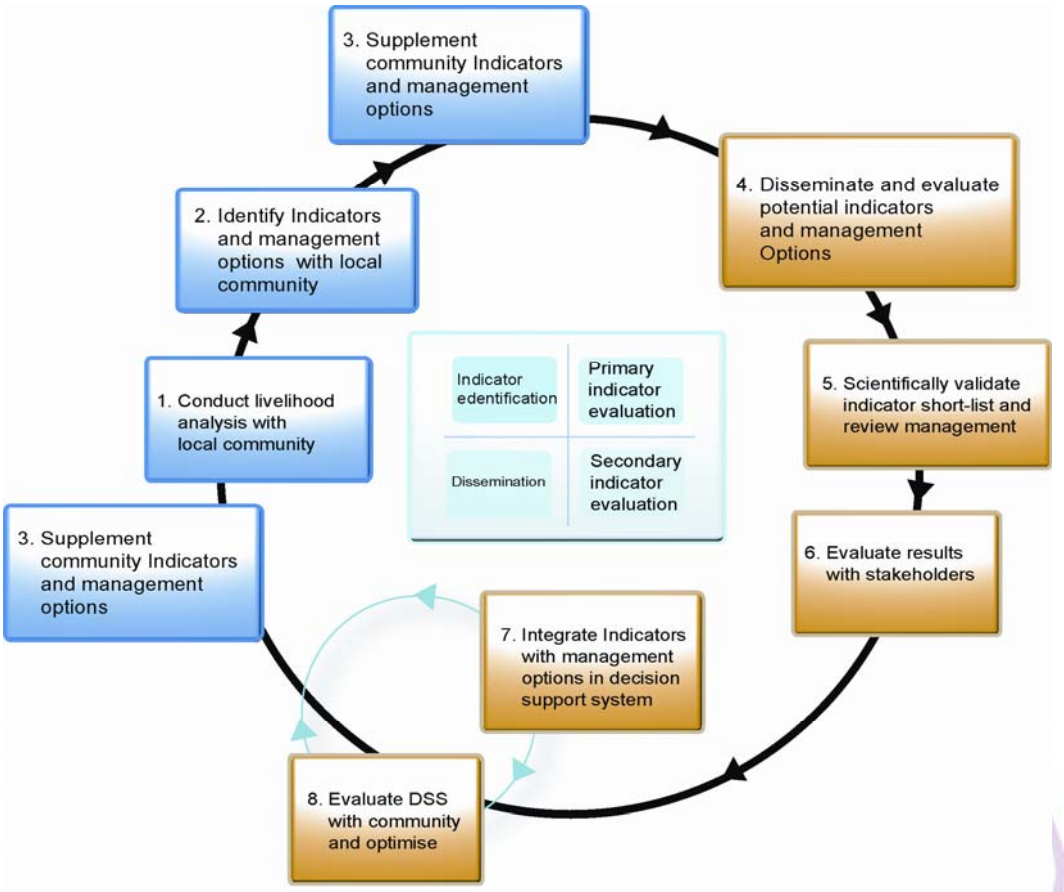
- there are many elements in both indicator sets that may be useful as a link in developing a combined set of indicators which will be more

- the indigenous knowledge-based indicators are easier to use and better locally understood descriptions of indicators; and

- not all scientific indicators considered relevant by scientists are accepted under local indigenous knowledge scrutiny; some are rejected as irrelevant.

These points emphasize the importance of integrating indigenous knowledge in indicator development wherever it is appropriate.

Figure 7.11: An example of a framework for participatory indicator development



Source: modified from Reed and Dougill 2003

Box 7.7: Integrating indigenous knowledge and scientific enquiry in participatory Indicator development for sustainable development in the Kgalahadi, Northern Botswana

Research work to integrate indigenous knowledge and scientific enquiry in participatory development of potential indicators of rangeland degradation in the Kgalahadi region of Botswana demonstrated a number of advantages associated with this approach:

- Each of the indicators developed by this approach was confirmed by the communities to be easily used
- There was a considerable overlap between scientific and local knowledge, suggesting that the majority of indicators cited by the communities have an empirical basis in scientific literature
- Communities provided non-technical, locally more meaningful interpretations of some indicators found in the scientific literature, e.g. “dirtiness” of sand as a

surrogate for soil organic matter which would require laboratory facilities to measure.

- Many indicators from the scientific literature were not cited, while others were rejected as irrelevant to their localities (e.g. abundance of earthworms)

- Communities cited a large number and range of indicators. The range elicited was far broader than any published scientific list encompassing vegetation, soil, livestock, wild animal, and socioeconomic indicators. Some of the indicators were new to science and require investigation. Examples:

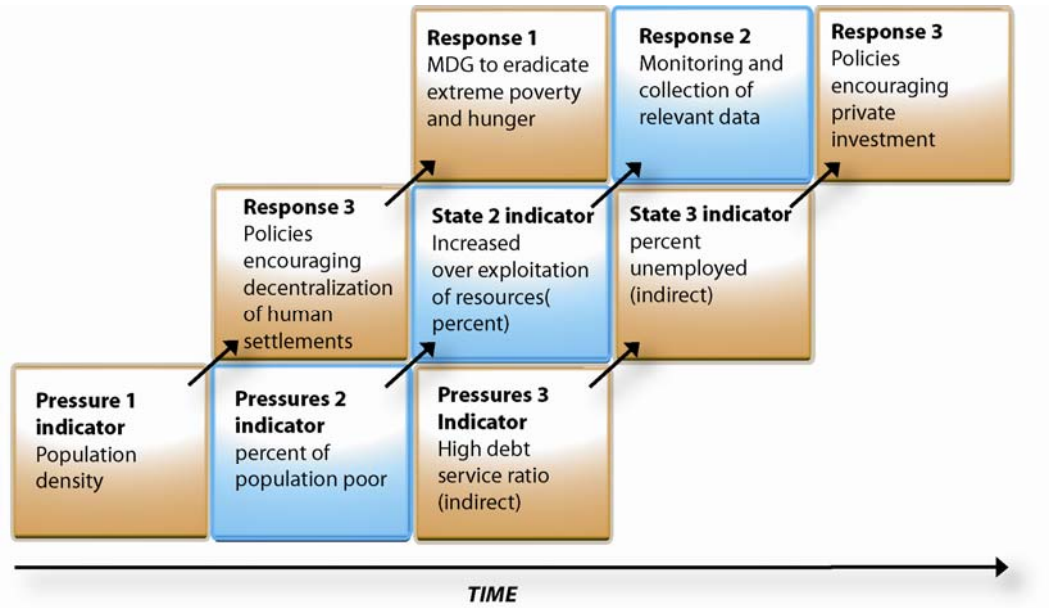
  - Soil — Decreased incidence of cattle tracks
  - Vegetation — Increased abundance of grasses with hollow tillers
    Tree growth increasingly stunted
  - Livestock — Increased abundance of livestock disease

Source:

7.11 Using indicators for environmental assessment

For any environmental issue for which time series data is available, indicators may be used to assess environmental change in pressures and state, and to assess whether the responses put in place are making any impact over time. This combined and holistic use of indicators is very powerful in environmental assessment and is useful in policy formulation and adjustments. Figure 7.12 is an illustration of how indicators for the pressures on the environment and the state of the environment may be linked to the society's responses over time. The Figure simplifies the links by introducing the pressures one at a time. In real life, multiple pressures would be impacting on the environment at the same time and those that are introduced as new are part of the set with the old ones.

Figure 7.12: An illustration of how to link Pressure/State indicators with Response

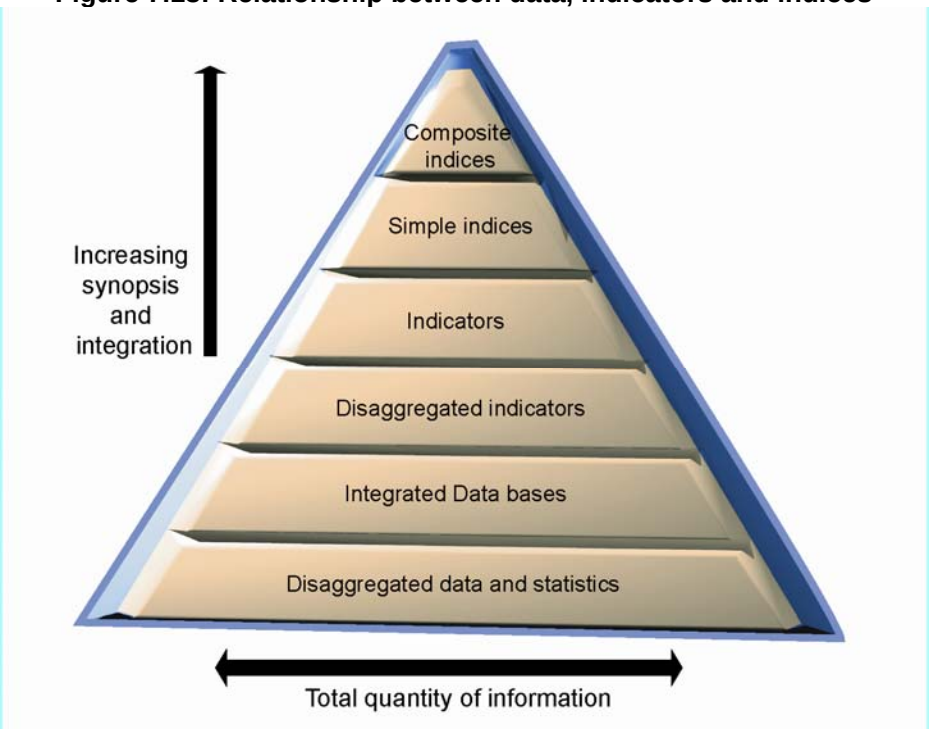


Source:

7.12 Data, indicators and indices

Data may be seen as being at the bottom of a hierarchy the peak of which are indices (see Figure 7.13). Data are collected from the field in a disaggregated format but are aggregated to build a database. From the database, variables are used to build indicators unique for each application, socioeconomic circumstances and geographic area. Indicators are used to communicate the performance of the system to all stakeholders and decision-makers. Simple indices may be built from indicators and composite indices from simple indices. The aggregation is necessary because scientists working at different scales will need different levels of aggregation to formulate policy for that level. Indices, such as the Human Development Index (HDI), and the Gross National Product (GNP) are attractive for scientists working at the national level because of their simplicity in use. However, highly aggregated indices may not give sufficient detail to decision-makers to see a realistic performance of a system.

Figure 7.13: Relationship between data, indicators and indices



Source: After Braat, in Kuik & Verbruggen 1991

7.13 Presentation of spatial data and indicators with GIS

The techniques of GIS have provided the ability to organize spatial data for many scientific investigations. GIS helps us to turn environmental data into spatial information and to use environmental indicators to reveal anomalies, for the purposes of decision making. The information obtained may also be used to influence the formulation or modification of policy. GIS helps the scientist to communicate spatial information with the public and with decision-makers.

Spatial environmental data has many characteristics. Some (e.g. rainfall, temperature, pollution levels) are continuous, others (e.g. water bodies, land parcels) are relatively discrete by comparison. Most current GIS software has the ability to map either of these categories and to work with both to reveal spatial patterns, anomalies and relationships in environmental data or environmental indicators that might otherwise not be obvious. The relationships are not uniform throughout any geographical area. The finer the scale at which you map the data, the more you are able to understand the real relationships on the ground. They may differ by tribal or ethnic areas, ecological zones, administrative districts, etc.. GIS provides the ability to map these relationships quickly and relatively cheaply. When using integrated environmental assessment, a wide range of data from different sources and using different formats must be used to link the environment to socioeconomic activities. The most important advantage GIS provides is probably that a spatial database with environmental and socioeconomic data (in addition to other data considered useful and relevant) are forced into a standardised format which makes it easy to observe spatial variations on

many themes. Not all the data relevant for IEA and reporting is mappable, but that which is mappable provides a good basis for understanding spatial variations in pressures on the environment, differences in its state, and the effectiveness of responses in different parts of the area of interest (sub-national, national, sub-regional or regional). Once a database has been developed, many operations may be performed to obtain spatial information to influence policy. The following are good examples:

- *Queries on spatial environmental data*
  This is the simplest of GIS operations that may be used to obtain information from raw environmental data in a GIS database. The interrogation of the database may be on any aspect of its contents, but two types of queries are common. The database may be queried to reveal the location of all features that meet a certain criteria. For example, it may be interrogated to show all areas whose rainfall is less than 25 mm. Further decisions may be based on this information. The areas identified may have populations that are most vulnerable to environmental change and the Government may formulate special policies to give more attention to them. The second type of query identifies specific features at given locations: reveal what is located at this point. These (and other categories of queries) are very powerful in providing information for decision making and policy formulation. With a lot of GIS software, answers to these queries can be obtained by pointing to certain locations. The returns to the queries may be in tabular or map view.

  When the datasets queried in the database are indicators, the information returned may be more useful for assessing the environment and formulating policy. If the indicator selected has a normative yardstick (e.g. the required level of water quality) we will be able to identify the spatial variation of areas that are below the required level and how far they are below that level.

  One of the most important aspects in IEA and reporting is the participation of a wide range of people in decision making. Multiple map views of different aspects of what is in the data and in the indicators are very useful for convincing people about the meaning of the data and indicators. Map *views* of answers to queries provide good visual impressions that are useful in soliciting for participation in environmental policy formulation.

- *Transformations*
  In transformation operations on datasets, simple (adding, dividing, etc.) or complex operations are performed on the datasets in the database to provide new perspectives of the data. Indicators may in fact be obtained in this way. Population density, for example, may be a pressure indicator and may be obtained by dividing the column “area” by the column “population”. We could compare the result with a threshold value or the carrying capacity yet in another column in the database. Other important transformations include:

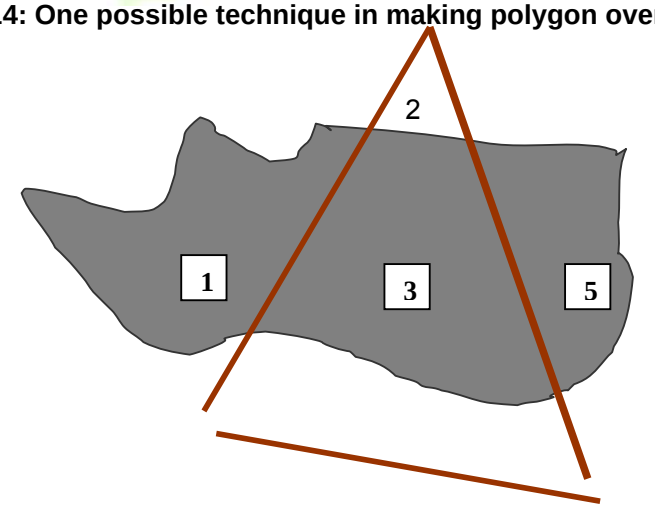
  - Buffering: This is a popular operation in the environmental protection of delicate areas. From a set of objects, which may include points, lines or areas, new objects are built by identifying all areas that are within a given specified distance of the original objects. For example, policy may be formulated to ban

all land clearance, grazing, and logging within a given distance of reservoirs in a country, the distance depending on the size of the water reservoir. It is not common to involve the public in the development of buffer zones for protecting objects in Africa. There are, however, many cases when the interaction of scientists, decision-makers and civil society is useful before policy is formulated. Subsequent enforcement of the policy becomes easier. In the Okavango Delta in Botswana, the government demarcated consecutive zones of buffer zones around the Moremi Game Reserve, the most attractive focus for tourists, the innermost zone is reserved for viewing and photography only. Activity increases in the outer buffer zones to the outermost zones where grazing and arable agriculture are allowed. Enforcing the regulations for this policy has been difficult because of challenges from local communities who were not consulted when the policy was formulated ().

- Polygon overlay: This operation is used in GIS to determine an area of overlap of two or more objects viewed in map form. In Figure 7.14, two polygons have been selected from two view maps: one showing an indicator of the state of the environment (*underground water polluted*) (grey polygon) (say, 4 times the average for the area where the polygon comes from). The polygon with thick lines shows a pressure indicator: population density. It has the highest population density, which is 4 times the average for the area. The overlay of the two polygons gives us 5 polygons with three combinations of state and pressure:
  - Polygons 1 and 5 have the highest levels of pollution but fall below the highest population density
  - Polygons 2 and 4 are included in the area with the highest population density but not in the area with the highest underground water pollution
  - Polygon 3 seems to be the worst: it is included in the area with the highest population density and the area with the highest underground water pollution.

  The GIS analysis in this case gives us the area which needs the greatest attention judging form the combination of the existing state and pressure. Probably in formulating policy, responses most suitable to polygon 3 will be given priority

Figure 7.14: One possible technique in making polygon overlays



4

- Spatial interpolation: This transformation is a process of intelligent guesswork in which the GIS attempts to make a reasonable estimate to obtain values for points where no values have been measured based on the measured values in a field. Spatial interpolation has been used for centuries in drawing isolines (e.g. contours, isohyets, etc.). GIS adds speed and constant algorithms being used in the estimates. The tourniquet is particularly useful in areas where there are limited environmental data recording stations (temperature, rainfall, etc.) as is the case in many African countries.

7.14 Key Internet resources on indicators

The following organizations offer key resources and data on indicators:

- UN Commission on Sustainable Development (UNCSD) (http://www.un.org/esa/sustdev/isd.htm)
- World Bank (http://www-esd.worldbank.org/eei/)
- IISD (http://iisd.ca/measure/compindex.asp)
- FAO (http://apps.fao.org)
- World Resources Institute (WRI) (http://www.wri.org/data/)
- UN 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)

7.15 Exercise 7.2: Monitoring systems, indicators and indices

1. 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

2. Give two examples where polygon overlay can be used in integrated environmental assessment. Clearly state what your overlay achieves in each case.

7.16 References

Abel, N.O.J. and Blaikie, P.M. (1989). Land degradation, stocking rates and conservation policies in the communal rangelands of Botswana and Zimbabwe. *Land Degradation and Rehabilitation,* 1, 101-123

Bossel, H. (1999). *Indicators for sustainable development: Theory, method, application*s – A Report to the Balatan Group. International Institute for Sustainable Development, Winnipeg. http://www.iisd.org/pdf/balatonreport.pdf

Chenje, M. (ed. 2000). *State of the Environment Zambezi Basin 2000*. Southern African Development Community / IUCN – The World Conservation Union / Zambezi River Authority / Southern African Research and Documentation Centre, Maseru/Lusaka/Harare

Cobb, C., Halstead, T. and Rowe, J. (1995). *The Genuine Progress Indictor: Summary of Data and Methodology*. Redefining Progress, San Francisco

Hammond, A.L. and Mathews, E. (2000). Measuring sustainable development: the case for a systematic physical framework. In *OECD Proceedings: Frameworks to Measure Sustainable Development: an OECD Expert Workshop* (OECD), pp. 83-5. Organization for Economic Cooperation and Development, Paris

Kuik, O & Verbruggen, H (1991). *In Search of Indicators of Sustainable Development*, Kluwer Academic Publishers, Boston

Longley, P.A., Goodchild, M.F., Maguire, D.J. and Rhind, D.W. (2001). *Geographic Information Systems and Science.* John Wiley & Sons, Ltd., Chichester

Pinter, L., Cressman, D.R. and Zahedi, K. (1999). *Capacity Building for Integrated Environmental Assessment and Reporting – Training Manual*. International Institute for Sustainable Development and United Nations Environment Programme, Winnipeg. http://www.iisd.org/pdf/geomanual.pdf

Reed, M. and Dougill, A.J. (2003). Participatory indicator development: IVP workshop manual. Indigenous Vegetation Project Publication 003/015. United Nations Development Programme, Gaborone. http://www.env.leeds.ac.uk/~mreed/IVP/TrainingManual.doc

Reed, M. and A. J. Dougill, A.J. (2002). Participatory selection process for indicators of rangeland condition in the Kalahari. *The Geographical Journal,* 168(3), 224-34. http://www.env.leeds.ac.uk/~mreed/Reed%20and%20Dougill%202002.pdf

Rump, P.C. (1996). *State of the Environment Reporting: Sourcebook of Methods and Approache*s. United Nations Environment Programme, Nairobi

World Bank (1997). *Expanding the measure of wealth: Indicators of environmentally sustainable developmen*t. Environmentally Sustainable Development Studies and

Monograph Series No. 17. The International Bank of Reconstruction and Development / The World Bank, Washington, D.C. http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/1997/06/01/000009265_3971113150949/Rendered/PDF/multi_page.pdf

Module 8 – Role Playing with Integrated Environmental Assessment[2]

Overview

This module is an exercise with the objective of assisting you to think through the SOE assessment process starting with conceptualisation and ending with a chapter outline of the SOE report.

[2] This section is largely based on Pinter and others 1999.

8.1 Introduction

In this section, the information you brought to the training workshop from your country or region is very important. From presentations made above in previous exercises, you now know, in general, the kind and quality of information from the other participants. We now use that information for role-playing, pretending that you are real stakeholders in developing a national (or sub-national) SOE report. The data you have for any country may not be sufficient to answer all the questions you would like to answer. This is more likely to be the case in real life development of SOE reports. For the purposes of this activity, the workshop depends on you as a professional: point out the data gaps where they exist, and "plan" the next round of data collection to fill these gaps.

Form groups of three to four depending on the total number of participants so that you have about four to five groups in total.

Within the Group

- *Decide on a country to use for role playing.* Each member of the group has information brought to the workshop from the questionnaire you filled out. Discuss which of the country within the group has the most information which you will use in the role-playing exercise.

- *Try to develop a database* which you will use in your role-playing based on the real-life data from the country you have selected, in addition, maybe, to some data you have to guesstimate.

8.2 Country profile

Based on the information you already have for the country you have selected, outline the basic country profile focusing on those parameters that are relevant to developing the country's SOE report. Table 8.1 provides a good example of some of the parameters. You may add others you think useful in the development of the report. Please add guesstimates where you think data may be needed but is not available.

Table 8.1: Basic statistics for Country Selected

Parameter	Past (Date?)	Present (Date)	Future (Date?)
Population			
Percentage living in cities			
Per capita GNP			
Distribution of income			
Food situation (per cent of food imported)			
Water supply situation. Is water a problem?			
Attraction as a tourist destination			
Energy supply			
Governance and political stability (on a scale of 10)			

Parameter	Past (Date?)	Present (Date)	Future (Date?)
Total commercial energy production (petajoules)			

8.3 Physical description

The physical description of the country you have selected for role-playing is important because it will give the course participants information on ecological differences, physiographic contrasts, climatic zones, etc. All these are important in human activity for the SOE report.

8.4 Settlements and sources of livelihoods

Outline the major settlements and their contribution to social, economic and cultural life. Point out any contrasts in sources of livelihoods in different parts of the country, and cultural contrasts which may intensify any conflicts over resources. Outline any recent or potential conflicts in natural resource use, for example, between: wildlife management and arable/livestock farming; urban expansion and agriculture, irrigation and human water consumption, etc.

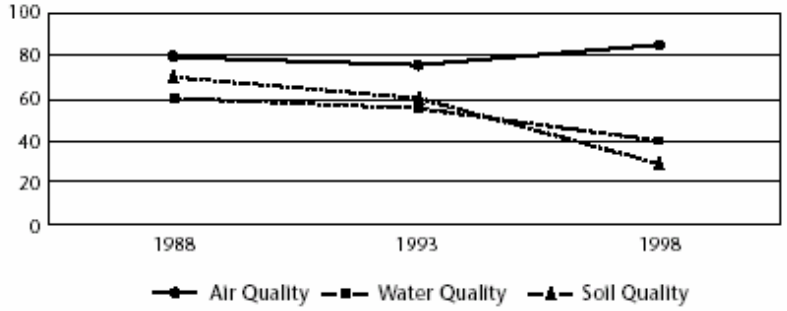
8.5 Environmental management

Outline any international commitments that the country selected has at different levels (sub-regional, regional and global) that may encourage or hinder the country's ability to conduct an IEA. Describe how the environment is managed at the national and sub-national level as a way of showing how easy it might be to conduct an IEA in the country you have selected. Decide what improvements in environmental management might be needed to encourage greater public participation in SOE reporting.

8.6 Information on trends

The questionnaire you filled out before the workshop requested you to get key information on environmental resources, social and economic trends, and any other trends you considered relevant (e.g. governance) to introducing or improving IEA in your country. If you have them drawn, just prepare them for presentation to the rest of the participants at the workshop. If you have the data but did not draw it out, sketch them as graphs or pie charts for presentation. Some of your data may be qualitative and might only need describing. An example of how you might draw a graph for environmental resources is given in Figure 8.1.

Figure 8.1: Air, water and soil quality indices for your selected country



Source: Pinter and others 1999

Other key trends may be obtained from the information that had been requested in the questionnaire.

8.7 The key sector and its impact and driving forces

Select a key industry or industries (e.g. agriculture, tourism, mining, manufacturing, etc.) and identify its major contribution to environmental problems (e.g. deforestation, land degradation). Summarise the driving forces for its activities, and its importance in the economy of the country.

8.7.1 Driving forces of the major sector

The driving forces of the key industry are the reasons why the industry maintains activities even if these are not fully acceptable for maintaining a clean or sustainable environment. Examples are given in Table 8.2. Each Impact will be associated with several activities each of which will have a driving force or forces.

Table 8.2: Examples of driving forces of major sectors in an economy

Sector	Impact	Activity	Driving force
Forestry	Deforestation	Cattle ranching and agriculture for export.	Forests are cleared to ranching to produce beef which is sold on the world market to earn foreign income . . .
Manufacturing industry	Pollution	Car manufacturing . . .	Increase in new car output because of new markets recently negotiated . . .
Fisheries	Fish depletion	Overfishing . . .	Increasing population with limited alternatives for protein-rich food . . .

8.7.2 Importance of the key sector in the economy of the country

Show the importance of the key sectors in the economy of the country (e.g. percentage of foreign earnings/revenue, percentage of labour force employed, etc.). You may do this over a number of years to show any relative importance of sectors.

The combination of the impact and driving forces and the importance of the sector(s) in the economy in most African countries you select are likely to reveal a dilemma for sustainable development. Integrated environmental assessment and reporting (IEA) is ideal for attempting to overcome the problems observed. The driving forces are probably difficult to reduce; they must be maintained to keep the economy buoyant.

Does this give you a good basis for writing your SOE report? Broad participation of various government departments, the private sector, and the public in general is essential to educate the country's population on current problems and to show them the dangers of not doing anything about these problems. Policy response should be used to break the circle of unsustainable resource use to achieve preferred future scenarios.

8.8 Preparing for the assessment process for your selected country

Now you are ready to prepare for the assessment of the selected country. You have environmental and socioeconomic data required for SOE reporting. Your job will be to integrate these data to get a good understanding of the current state of the environment under the existing socioeconomic conditions which serve as a baseline for evaluating alternative policy measures.

This exercise will assist you to appreciate the practical details and challenges to be faced when creating a state of the environment baseline. In your case, the challenges are in fact less than would be the case in a real life situation where the range of stakeholders is very broad and includes the public. However, the exercise is sufficient to give you a feel of the problems involved.

In your preparation you still need your mandate to be able to conduct the SOE report for your selected country. A law has just been passed giving the Ministry to which your National Environment Management Authority belongs the mandate to issue a national SOE report every four years. It is the champion within the Ministry for this task. The law provides only vague guidelines about what is required, so it is up to the National Environment Management Authority 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.

The National Environment Management Authority 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
- The report should deal only with the highest priority issues
- In spite of the limitations on the budget, all affected sectors of society should be involved following your selected country's motto: "Always do more with less"
- The report should use quantitative sustainability indicators as appropriate
- 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 is limited and cannot be stretched beyond the minimum required

The person in the group whose data is being used for the exercise should be the spokesperson of the group. S/he will present the deliberations of the group to the rest of the participants in this training workshop. You can now see why there are, at least four people in each group: one each to represent the government, the private sector, NGOs, and academia.

8.9 Stages of preparation

Stage 1 - Deciding on a work plan and a joint strategy to carry it out
You need to establish a work plan and assign responsibilities as the first step at your first meeting.

- To make role playing more real, make opening statements and record them as if you are in a national planning meeting. An example of how this can be done is given in Table 8.3 below. It is not expected that the different stakeholders will agree on the various points in the table. For example, the government is likely to want the scope to include a wide range of social issues while industry may be eager to limit social issues and emphasize profit-making ventures. Try to really think like the stakeholder you are. It would, for example, be strange for an NGO stakeholder to say (on funding) that he/she will pay for 50 per cent of all the cost of producing the SOE report.

Table 8.3: Views of stakeholders

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

Human resources required				

- Whatever your discussions on points in Table 8.3 you have to eventually have a joint strategy for making sure that the basic requirements for SOE reporting are met. Fill in Table 8.4 your joint strategy to make sure you cover the points listed

Table 8.4: Joint strategy for ensuring that the basic requirements of the report are met

	Agreed 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	

Stage 2 - Identify the issues to be addressed in the SOE report

Use Table 8.5 as a guide to identify issues to be addressed in the report and to roughly rank their importance

Table 8.5: Issues to be addressed in the SOE report

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

Stage 3 - Create a flowchart and timeline

Within your sub-group develop a flowchart (Table 8.6) to list steps to be followed and the time each step would take. One item will be missing from the Table: who is going to be responsible for each task.

Table 8.6: Task flowchart for producing the SOE report

Task flowchart	**Time required**

Stage 4 – Create a list of contents

Develop a list of the topics for your SOE report. Some examples have been provided in Table 8.7 to give you guidance Your Table, however, is expected to be unique based on the important issues in your selected country.

Table 8.7: Some examples of lists of contents of an SOE report

- **Southern African Development Community**
  - Regional Overview: People and Environment
  - Learning from History
  - Evolution of Policy
  - Southern African Eco-zones
  - The Climate Factor
  - Soils and Land Use
  - Woodlands and Forests
  - Wildlife and Protected areas
  - Freshwater Resources
  - Marine Ecosystems
  - Pollution
  - Armed Conflict
  - Global Atmospheric Change
  - Trends and scenarios
- **Zambezi Basin 2000**
  - Regional overview: People and Environment
  - Physical Features and Environment
  - Water and Wetland Resources
  - Biological Resources and Biodiversity
  - Agriculture
  - Industry
  - Energy
  - Tourism
  - Pollution
  - Poverty
  - Gender and Women's Roles
  - Environmental Management and Regional Cooperation
  - Trends and Scenarios
- **Uganda**
  - Environment and development
  - Land
  - Forests and woodlands
  - Wetlands resources
  - Freshwater resources
  - Biodiversity

- Urban areas
- Atmosphere
- Human health and environment
- Environmental disasters
- Policy responses
- The future
- Outlook and recommendations

Sources: Chenje and Johnson 1994, Chenje 2000 and NEMA 2000

Stage 5: Divide your list in Table 8.7 into chapters

Lastly, divide your list of topics in Table 8.8 and give the key issues for each chapter in your selected country. Identify an indicator(s) for each of the key issues you list.

Table 8.8: Chapters, key issues, and possible indicators

Topic/chapter title	Key issues in Selected Country	Possible indicators

You may wish, as a final stage in this exercise, to divide your topics into themes as they might appear in the final report. Each chapter might address a theme and show the major issues and policies under each theme. Table 8.9 below shows how West Africa's State of Environment report was divided into chapters. Your own themes and issues should not be the same; each report should be uniquely based on the specific environment it reports on.

Table 8.9: Division of topics into themes/chapters for West Africa's State of Environment (2004)

Themes	Majors issues and policies

General Introduction	The sub-region at a glance Geophysical characteristics Socioeconomic situation of west Africa Good governance, a priority for the development of the region Major environmental problems encountered in the sub-region
PART ONE: STATE OF THE ENVIRONMENT	
CHAPTER 1 ATMOSPHERE	Current situation Pressures (Causes) of Atmospheric degradation in West Africa Impacts of degradation of the Atmosphere Policy responses to conservation of the Atmosphere Conclusion
CHAPTER 2 BIODIVERSITY	State of the Biological diversity Pressures on Biodiversity in the Sub-region Impacts on Biodiversity Policy responses to conservation of Biodiversity Conclusion
CHAPTER 3 MARINE AND COASTAL ECOSYSTEMS	Coastal and Marine environment outlook Pressures on the Coastal and Marine environment Impacts of anthropogenic and natural activities Policies and options for conservation of the Coastal and Marine environment Conclusion
CHAPTER 4 FORESTS	State of Forests in the region Pressures on Forest resources Impacts of deforestation Policies on Management and Conservation of Forests Conclusion
CHAPTER 5 WATER RESOURCES	Water Resource Outlook Pressures on Water Resources Impacts of Anthropogenic activities Policy Responses for Sustainable Management of Water Resources Conclusion
CHAPTER 6 SOILS	State of the Soils Pressures on the Soil Impact on Soils Policy responses to Soil conservation Conclusion
CHAPTER 7 URBAN ENVIRONMENT	Urbanization outlook Urban pressures in West Africa Impacts of Urbanization on the environment in West Africa Policy responses to Urban problems Conclusion

CHAPTER 8 HUMAN HEALTH AND ENVIRONMENT	Current situation The pressures Impacts of the Environment on health Policies initiated to control Environmental diseases Conclusion
CHAPTER 9 NATURAL DISASTERS	Current situation Pressures Impacts Policies on protection against Natural disasters Conclusion
PART TWO: POLICY REVIEWS	
CHAPTER 1 REVIEW OF CURRENT ENVIRONMENTAL POLICIES	Introduction General overview of the Trend of macro-economic and Social policies Conclusion
CHAPTER 2 TRENDS IN SECTOR POLICIES IN WEST AFRICA	Agricultural Policies Industrial Policies Energy Policies Conclusion
CHAPTER 3 MULTILATERAL ENVIRONMENTAL AGREEMENTS	
CHAPTER 4 REGIONAL AND MULTILATERAL ENVIRONMENTAL AGREEMENTS	The Permanent Interstate Committee for Drought Control in the Sahel (CILSS) and Environmental conservation in the Sahel The Algiers Convention The Bamako Convention The Abidjan Convention
General Conclusion	**Recommendations**
ANNEXES	ANNEX 1: LIST OF PARTICIPATING COUNTRIES ANNEX 2: STATUS OF RATIFICATIONS
CONTRIBUTORS	
INDEX	

Source: UNEP and NESDA 2004

8.10. 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 socioeconomic 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: _____
_____
_____
_____

8.11 References

Chenje, M. (Ed. 2000). *State of the Environment Zambezi Basin 2000*. Southern African Development Community / IUCN – The World Conservation Union / Zambezi River Authority / Southern African Research and Documentation Centre, Maseru/Lusaka/Harare

Chenje, M. and Johnson, P. (Eds. 1994). *State of the Environment in Southern Africa.* Southern African Research and Documentation Centre, Harare

Hardi, P. and Pinter, L. (1995). Models and methods of measuring sustainable development performance: Revised Draft Discussion Paper Prepared for the Sustainable Development Coordination Unit, Executive Council, Government of Manitoba. International Institute for Sustainable Development, Winnipeg. http://www.iisd.org/pdf/measure_models_methods_sd.pdf

Meadows, D. (1998). *Indicators and Information Systems for Sustainable Developmen*t: *A Report to the Balaton Group*. The Sustainability Institute, Hartland Four Corners. http://www.iisd.org/pdf/s_ind_2.pdf

NEMA (2000). *State of Environment Report for Uganda 2000/2001.* National Environmental Management Authority, Kampala. http://www.nemaug.org/UPLOADS/SOE/SOE2000.pdf

Pinter, L., Cressman, D.R. and Zahedi, K. (1999). *Capacity Building for Integrated Environmental Assessment and Reporting – Training Manual*. International Institute for Sustainable Development and United Nations Environment Programme, Winnipeg. http://www.iisd.org/pdf/geomanual.pdf

Rump, P.C. (1996). *State of the Environment Reporting: Sourcebook of Methods and Approache*s. United Nations Environment Programme, Nairobi

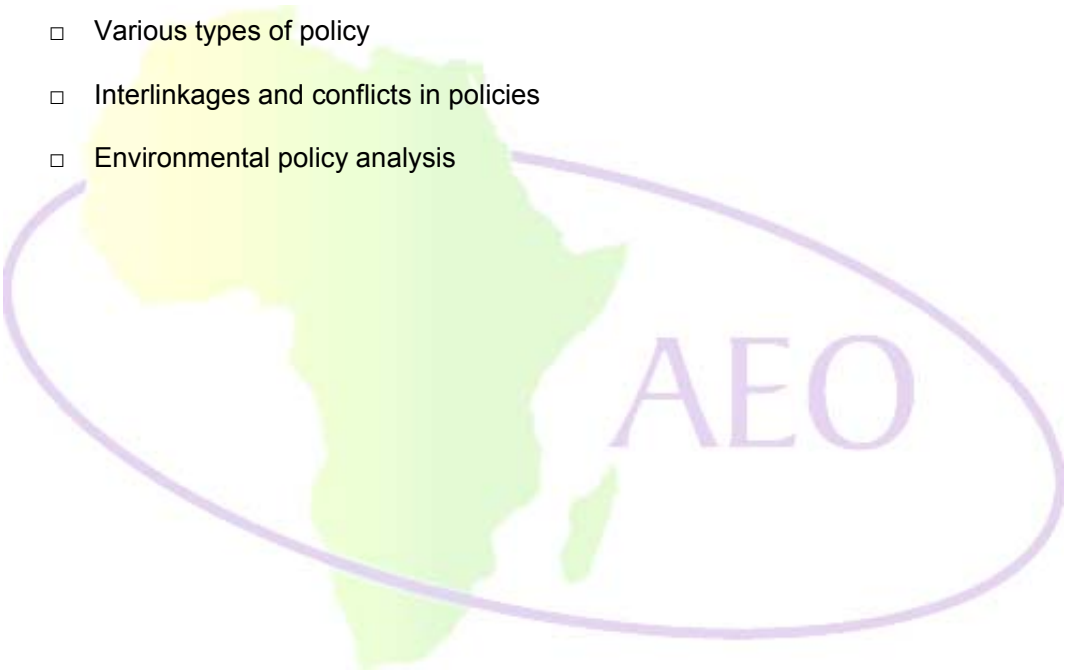
UNEP and NESDA (2004). *Rapport sur l'Etat de l'Environnement en Afrique de l'Ouest.* United Nations Environment Programme and Network for Environment and Sustainable Development in Africa, Nairobi

Module 9 – Linking Integrated Environmental Assessment to Policy

Overview
This module highlights policy responses in the context of IEA and reporting.

In this module, you will learn:

- Definition of policy
- Link between IEA and policy
- Various types of policy
- Interlinkages and conflicts in policies
- Environmental policy analysis



9.1 Introduction

The ultimate objective of any IEA and reporting process is to strengthen policy processes and decision making by providing up-to-date and reliable data and information on the state-and-trends on the environment at different levels. Policymakers have access to a myriad of stakeholders and interests, all of whom require the policymaker to either introduce, implement, or enhance policies to advance their objectives in society. The environmental voice is part of the "noise", and it is important that it is delivered in a reasoned manner, is clear and articulates the interests of society as a whole – not just a special interest group.

In keeping under review the state-and-trends of the environment, IEA and reporting inevitably assess the whole foundation and structure of policy processes, and the policies which have been adopted by authorities. The objective is to determine the effectiveness of those policies and to provide options for further action where it is required. Policy response is a key component of both the DPSIR and Opportunities Framework methodologies.

- *Definition of policy:* The word policy is often difficult to define to satisfy different interests. In Africa, policies are both traditional, having been passed down generations; and contemporary, responding to modern forms of governance and evolution. Environmental policies in Africa are therefore a mirror image of the region's people and their different cultures and the way countries have evolved since colonialism and attainment of independence.

  Keeley and Scoones (2003) recently highlighted their own understanding of environmental policy processes in Africa by trying to "prise open the black box of policy-making. The traditional starting point of defining policy is that policy comprises decisions taken by those with responsibility for a given policy area, and these decisions usually take the form of statements or formal positions on an issue, which are then executed by the bureaucracy."

  They, however, acknowledge: "…in practice, policy is notoriously difficult to define." Quoting an unknown British civil servant, Keeley and Scoones (2003) write: "Policy is rather like the elephant – you know it when you see it but you cannot easily define it."

  These statements just about sum up the complexity of policy analysis in IEA and reporting, and the adequacy of environmental assessment reports to effectively provide scientifically impeccable information for the policymakers to make sound policy decisions for the benefit of both society and the environment.

- *Policy as a process:* Policy processes have time and space, and respond to political processes which are bound by other demands and deadlines. It is generally argued that many policymakers often make policy decisions based on pertaining local politics with eyes on the next general election. Therefore, unpopular policies sometimes suffer.

- *Policy as a response:* Responses are understood to be actions undertaken to address an environmental problem. An assessment of the effectiveness of past

and present policies relevant to or specifically designed to improve the environment and the sustainability of resource use should be carried out.

Responses can be either formal environmental policies and mechanisms, or societal developments such as public participation and action, and consumer pressure and movements. Not all of these policy categories will be relevant in Africa at the different spatial levels. 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 take into account all of these contextual issues.

Effective policy responses depend on "a mix of small-scale, bottom-up solutions and large-scale, top-down solutions: individual steps to manage our shared resources and governmental actions to prevent degradation" (Diamond 2004). Such responses should not be only at the national level but also sub-regional, regional and international. Africa should use its human diversity to strengthen collective advocacy and action, and minimize the obvious differences among its peoples and sub-regions.

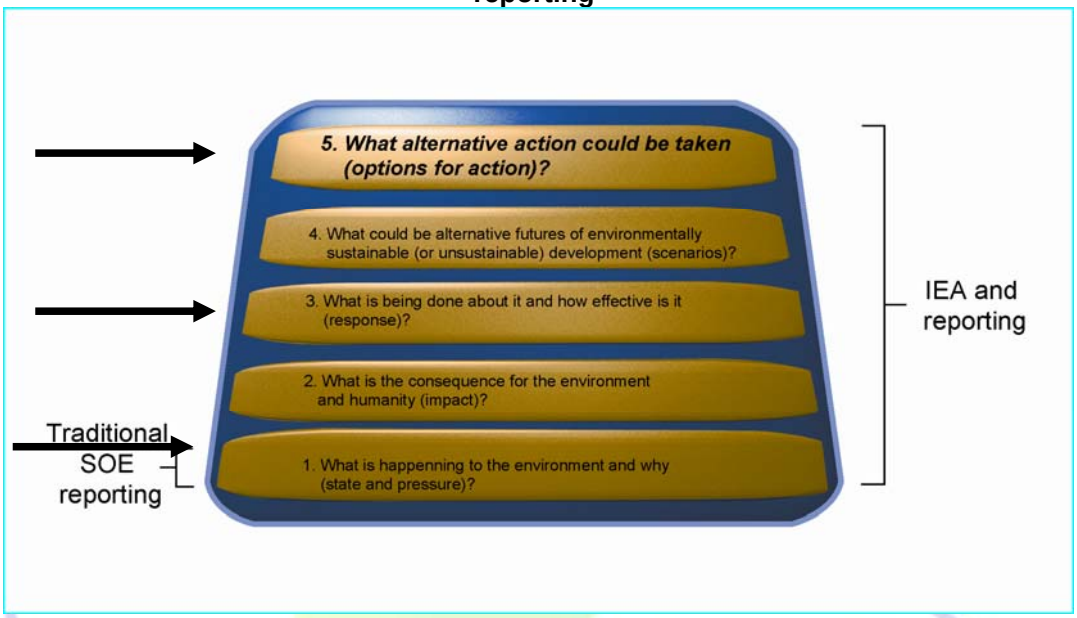
- *Policy in IEA and reporting:* Traditional African environmental policy was generally not scientific, being based on taboos, social sanctions, and religious beliefs. Policy formulation was limited to those who set taboo rules, but practice within the existing environmental policy had very wide support and the public felt it owned the environmental policy formulated. Instead of introducing science within the strongly supported environmental practices, colonial and post-colonial African governments had the view that the environment had to be protected from “primitive” decision making. Consequently, much of the public lost interest in using environmental resources within any specific rules of a policy. Integrated environmental assessment (IEA) and reporting introduces the science in environmental policy decision making and seeks to regain the support in environmental practices soliciting for broad public participation in the formulation of environmental policy.

  Within the step-by-step set of questions answered under IEA and reporting (see Figure 9.1), policy assessment answers the following questions:

  - What policies are in place to deal with the current environmental issues and how effective are they? **What is being done about it?** Some effort may have been attempted to formulate environmental policies to influence current environmental conditions. **How effective is (what is being done)?** There may be a lag time before effects are visible.
  - To link up with the first question in the sequence of questions asked in Figure 9.1., we ask: **Do current policies have anything to do with what is happening?** This question enables us to look for weaknesses in existing policies and plan to formulate new policies to improve the environment. Sometimes governments are caught between promoting positive environmental policies (as what they want to do) and being realistic enough about the current

situation and allowing some bad environmental policies, at least temporarily. Policies may affect the environment positively or negatively.

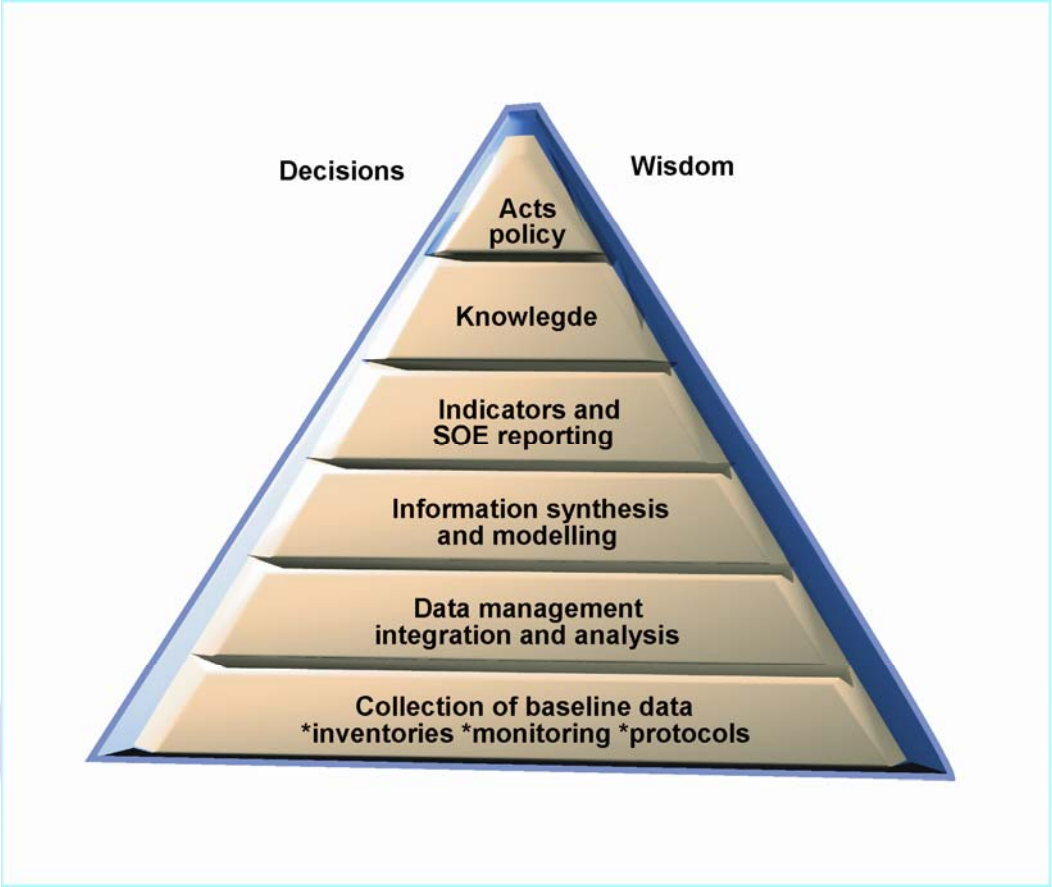
Figure 9.1: The place of policy in integrated environmental assessment and reporting



Source: Pinter and others 1999

Figure 9.2 below shows a progression that starts with data collection and as the primary and starting point in a hierarchy, through the creation of indicators and eventually leading to policy formulation at the decision making level. Policy not based on data is likely to be defective.

Figure 9.2: From data collection to policy formulation



9.2 Types of policy

Environmental policies may be categorized based on how they are formed. Three key types may be:

- *Routine decisions:* The normal process of formulating policies is characterised by routine, deliberate and slow progression of pre-determined steps leading to a decision. Responsibility may be given to a group of people, an institution, or an arm of Government such as a Ministry of Environment to provide leadership in making policy decisions in a specified policy area. A policy is discussed at length by meetings of the relevant committees, councils or other groups of people that may be appropriate.

- *Urgent, reactive policies:* Policies may be formed outside the normal policy formulation process because they are required faster than the normal process would demand. Emergencies like droughts, floods, landslides, sudden outbreaks of diseases, etc. may require immediate attention with policies formulated urgently to react to the situation.

- *The grey zone:* Some policies are not urgently formulated or deliberated upon over long periods. They just evolve and are routinely used as if they are formal policies

though they may not be backed by formal documentation. Policy enforcement agencies or social or economic pressure groups use these policies and expect a set of behaviour patterns stipulated by these policies. Botswana has a grey zone policy that requires government to consult major village councils (*Kgotla)* on any major policy formulated that affects rural life and society. This is not a documented policy and in many cases greatly delays the execution of major policies. However, if the village councils are not consulted, they may refuse to participate in any policy and the Botswana Government will accept their complaints ().

It is common for grey zone policies to evolve into policies based on routine decisions. Over time, the circumstances under which such a policy is practised may become formalised (see Box 9.1).

Box 9.1: Evolution of a policy: Botswana's Revised National Policy on Destitute Persons

In the 1960's, Botswana's population was almost totally rural (the urban population was less than 4 per cent) and the extended family system was very effective in providing support for members of various communities in need. Although there was no written policy demanding support for destitute persons, this was expected and people who did not assist their relatives could be taken to a *Kgotla* (Village Council) for discipline through various social sanctions. This was a grey zone policy. With increasing urbanization, it became difficult to enforce extended family support. In 1980 a National Policy on Destitute Persons was formulated to provide support for those who needed it especially in times of crisis. In its 2002 revised form. the policy has been more clearly defined, defining a destitute person as one who receives an income of less than P150 (US$31.25) per month. In addition to orphans, elderly people, and the sick, particular attention has been given to those who are vulnerable to environmental changes either of a temporary or a permanent nature. Drought is specifically mentioned and a supplementary directive from the Ministry of Local Government has ordered local governments to construct roads during drought using labour-intensive techniques to create jobs.

Source: Republic of Botswana 2002

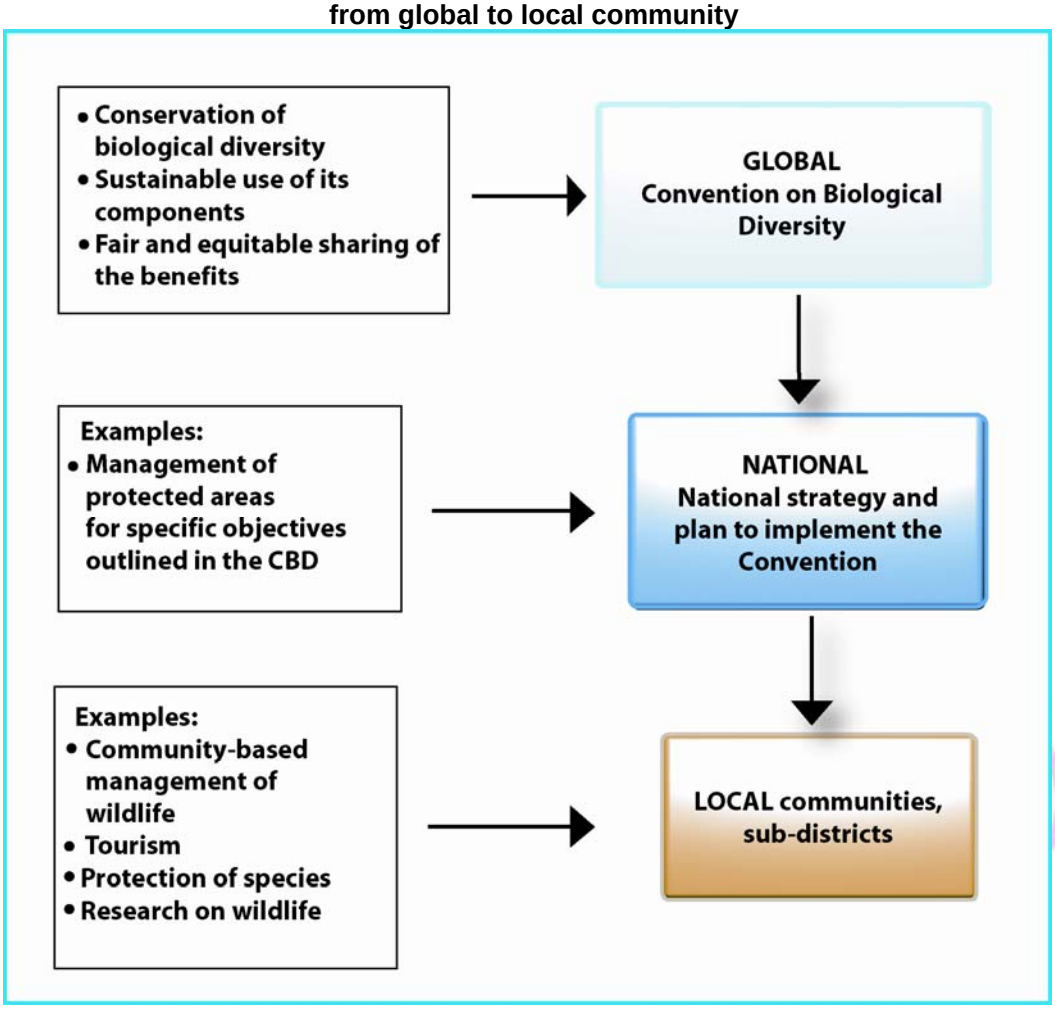
The formulation process of the three types of policies are different, but all should be subjected to assessment to see how they impact on the environment, and what gaps may require filling to make them more effective. The assessment should also be holistic, not exempting any type of policy. In particular there would be a temptation to exempt reactive policies as a special category whose impact on the environment need not be scrutinised.

9.3 Policies in hierarchies

Policies may 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 and has the very important element of streamlining objectives of policies directed at a particular issue. There may be various levels of expectations from those who are affected by the policy. If, for example, a national policy is formulated in support of a globally accepted convention, at the national level violators may be prosecuted and fined while at the

global level there may be a much looser level of expectation from countries that have signed the convention.

Figure 9.3: An example of a hierarchy of nested policies: from global to local community



9.4 Exercise 9.1: The web of influence of policies on each other

Environmental policies are always interlinked, influencing each other either positively or negatively. In your groups, use the diagram below to show the web of influence of policies on each other. Use thick lines where you think the policies conflict. You may re-arrange the diagram in any way you want. With the experience of each member of the group, let each member try the exercise separately before discussion.

1. Take a real issue in your own experience where one environmental policy is central and is influenced by other policies (e.g. other environmental policies, population policy, immigration policy, agricultural policy, etc.). Put the environmental policy you would like to focus on in the centre (marked “policy”)

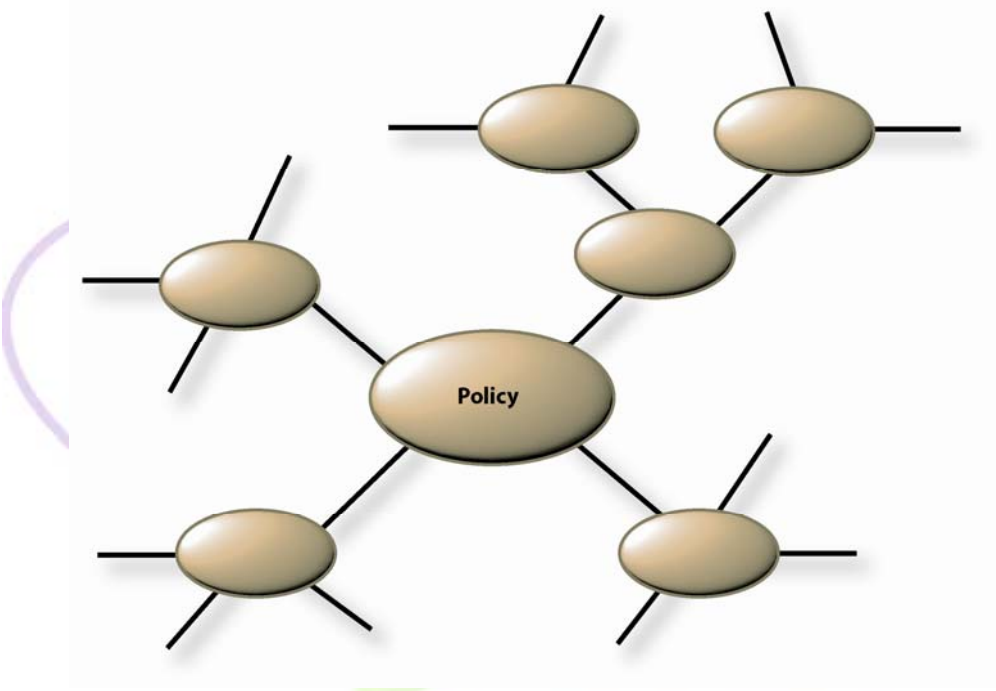
and fill the other circles with other policies that influence it (and each other). You may add circles if you wish.

2. Draw arrows to show the direction of influence of each policy on the policy at the centre or other policies in your diagram.

3. Let each member make his/her presentation to the group with clear explanations of the web of influence of the policies discussed.

4. The group will then select which of the diagrams to present to the rest of the participants.

Figure 9.4: The web of influence of policies on each other



Source: Pinter and others 1999

9.5 Conflicts in policies formulated independently

Integrated environmental assessment (IEA) looks at environmental policy formulation with a holistic approach which has the advantage of revealing potential synergies among policies. In addition, by working on linkages among environmental, social, and economic issues, the approach makes it possible to avoid potential conflicts in the objectives of various policies. Isolated or sectoral policies have a tendency to focus on narrow aspects of issues of interest which may conflict with the overall effort to achieve sustainable development (see Box 9.2).

Box 9.2: Botswana's conflicting environmental policies in the 1970's and 1980's

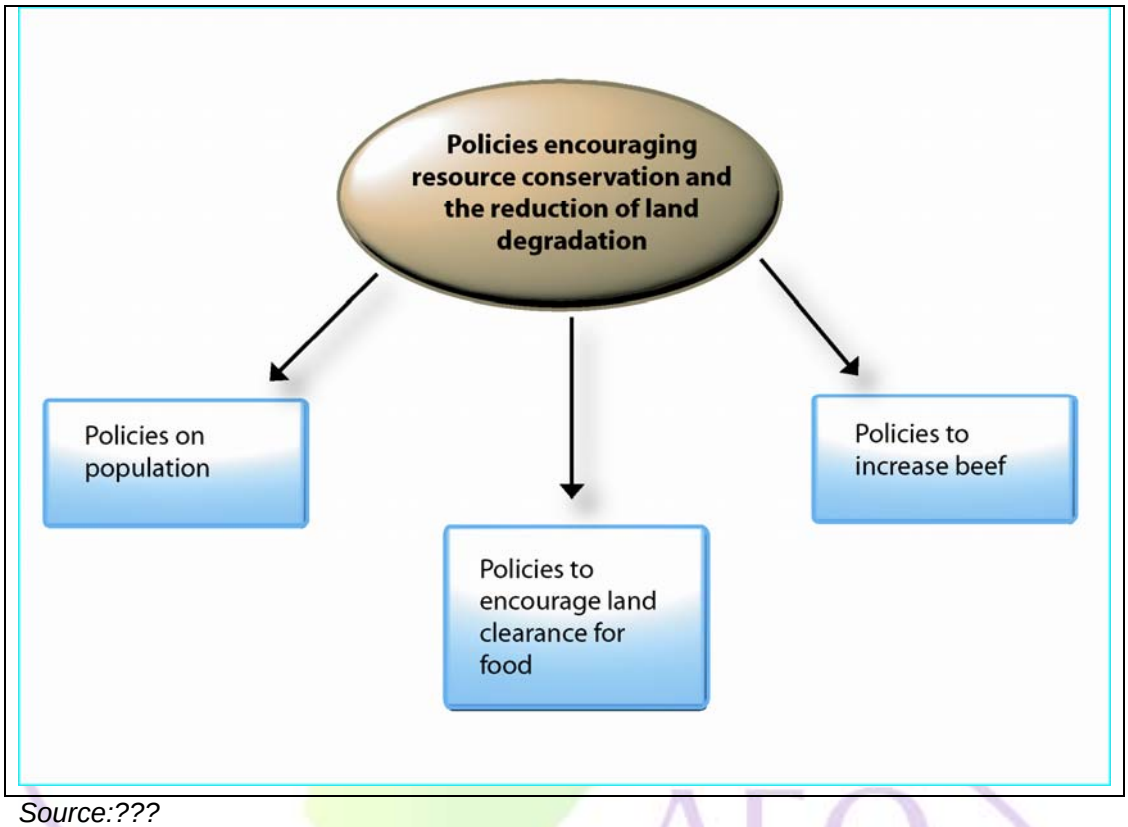
Botswana is a semi-arid country with a higher potential evapotranspiration than average rainfall. The distribution of rainfall in any one year is critical to agriculture. The country has experienced extreme droughts continuously, some of which have decimated livestock and completely destroyed crops. The brittle environment has encouraged the formulation of policies directed at environmental conservation in planning for the utilization of natural resources.

At independence in 1966, Botswana was greatly dependent on food imports from apartheid South Africa and was eager to reduce this in any way it could. The country decided in the 1980's to promote policies that would move it towards self-sufficiency in food. With the then existing technology used for agricultural production in the rural areas, emphasis was put on clearing new lands for crop production, and sinking boreholes in dryer areas to extend livestock grazing for export. Very little supervision was provided for land clearing and much of the land cleared was left idle.

Furthermore, the demand for food increased as the population grew. Population growth rates were completely neglected with the argument that "for a country as large as France, there was room to accommodate higher population densities", an argument that was completely irrelevant to the balance between the growth rates of population and resources.

There were conflicts in the policies shown below. Land clearance left extensive areas bare for erosion, while livestock grazing in dryer areas resulted in increasing land degradation. A population policy was also required to reduce the population growth rate. These realities were not realized until the early 1990's when a comprehensive National Conservation Strategy was formulated.

Botswana's conflicting environmental policies in the 1970's and 1980's



Source:???

9.6 Exercise 9.2: Nested and conflicting policies

1. Individually, draw a diagram to show conflicting policies that you are aware of in your country.

2. Individually, draw a diagram that shows nesting of policies by sectors (sub-sub-sectors, sub-sectors, sectors, integrated sectors and so on) e.g. Step 1 - livestock**,** arable farming… Step2 - Agriculture and so on

3. List from your own experience in your country, policies that belong to the three categories discussed in Section 9.2 above.

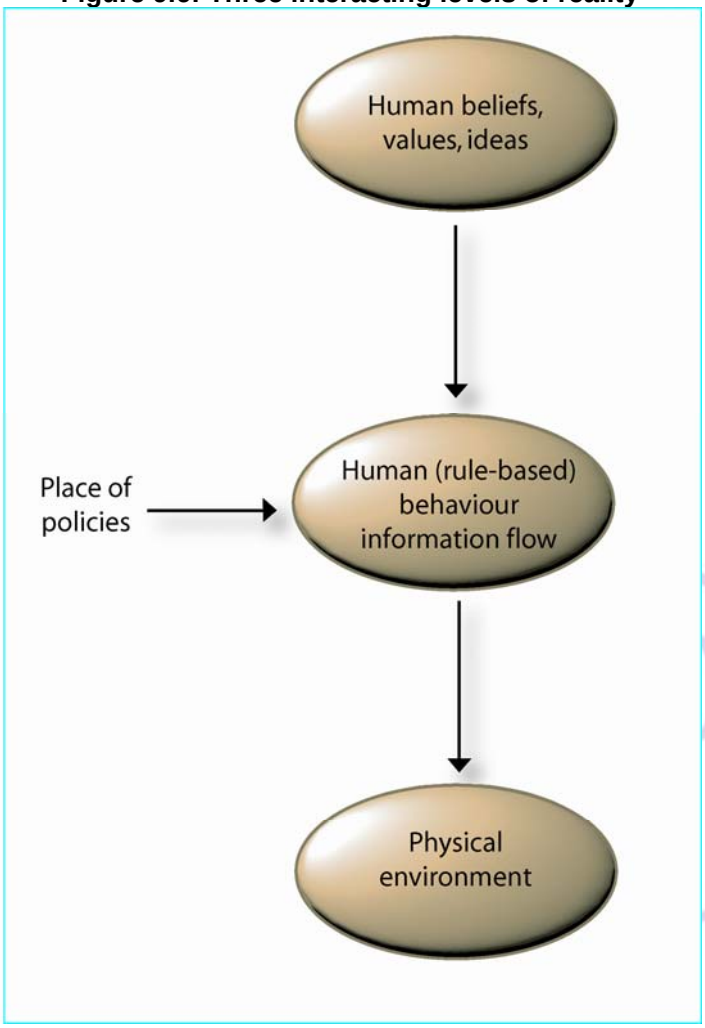
9.7 Links between policy and environment

Policies provide **rules** by which individuals or groups of individuals in a society are expected to wisely use the **physical environment** within society's **beliefs, values, and ideas** (see Figure 9.6). Some of the rules may restrict individuals' values or provide incentives to modify their beliefs for the greater good. For example, to promote sustainable use of the rangelands (physical environment) a cattle owner may find rules in a policy restricting him/her from overstocking (rule of behaviour) although his/her desire to show that he/she is an important person in the community (value?) is that he/she should have a lot of cattle. Policies are important to guide behaviour based on competing beliefs, values and ideas among individuals in society on one hand, and the principles of sustainable development on the other. By allowing each individual to have only a limited number of heads of cattle, the range can be shared, and overgrazing of the range is avoided.

Competition for the range may be more complex requiring more complicated policies. Part of the range may be set aside as a wildlife sanctuary. Arable farming may expand into part of the range as population increases. This introduces people, groups, and

institutions with different beliefs, value systems and ideas competing for the rangelands. A more comprehensive policy for rule-based behaviour for using the physical environment (i.e. rangelands) may be needed.

Figure 9.6: Three interacting levels of reality



Source: modified from Rotmans and others 1997

It is not always possible to predict what the effectiveness of a policy will be when it is formulated. Human behaviour is unpredictable and to formulate a policy to guide it is just as difficult. Individuals may hijack the policy to their advantage while a combination of policies may completely change the expected behaviour of individuals to patterns of behaviour not expected for any one of the policies. More importantly, a community may consider that a policy is unfair and take every opportunity to undermine its objectives (see Box 9.3).

Box 9.3: Changing impacts of wildlife management policies at the community level in southern Africa

Many countries in southern Africa have had policies on illegal poaching of wildlife in animal sanctuaries. Illegal was defined to mean "hunting without a licence bought from a relevant Department" usually from the capital city. Tourists were attracted to visit various wildlife sanctuaries where they hunted big game for sport, but the local people who hunted wildlife for subsistence generally had problems getting permission to hunt and, if caught, were liable to prosecution. The policies had little impact for many reasons among which were:

- The local people had not participated in the formulation of the policies and considered them unfair.

- Enforcement of the policies was difficult. In spirit, it seemed as if the local policemen and magistrates sided with the rest of the local people.

With increasing populations on the outskirts of wildlife sanctuaries, banning hunting by the local people as a conservation measure had failed. New wildlife conservation policies have been drawn up and introduced in a selected number of local communities in wildlife sanctuaries with the participation of the local people in Botswana, Zimbabwe, Namibia and Zambia, aiming at making local communities appreciate the value of wildlife by putting them in charge of managing it as their own resource from which they reap benefits. Although the widespread impact of these community-based wildlife sanctuaries is still being evaluated there are many cases where it has been found to have changed societies' attitude to wildlife conservation.

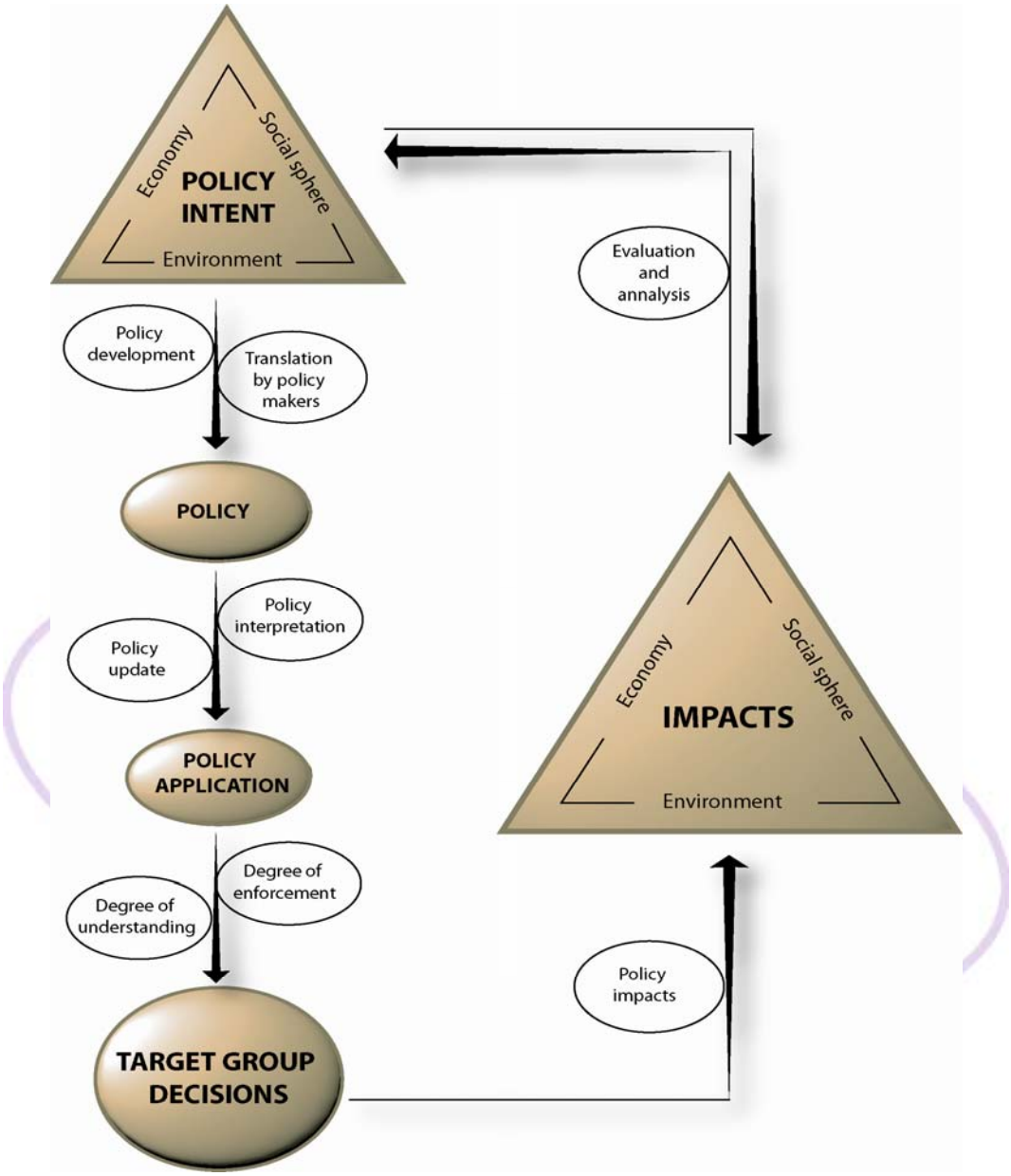
Source:

9.8 Exercise 9.3: The impact of policy on issues

1. Divide into groups of three or four. From your own experiences, let each member of the group select two real issues in his/her country and discuss them together with major policies that were formulated to influence each. Of those discussed, select one successful and one unsuccessful policy from all those presented in the group for presentation to the rest of the participants.

2. Use the diagram below to assist you to prepare your presentation. You may want to draw a simplified diagram on a transparency before the presentation. Skip some of the steps if you do not know how they were carried out in the real issue.

Figure 9.7: Policy intent and expected impact



Source: Modified from Pond 1996 in Boyle, Kay and Pond 1996

9.9 Environmental policy analysis

The most critical part in linking policy to the environment relates to evaluating what policies currently exist, where such policies fall short of meeting what is required in promoting sustainable development, and what new policies are needed to plug the gaps. Policy evaluation and analysis is part of a continuous and cyclical process by which policy may be improved. It provides a basis for adjusting existing policy and/or adding new policies to existing policies as socioeconomic priorities and environment al conditions change. Some policies may achieve their objectives within a given time,

while others may fail to perform due to mistaken perceptions when they were formulated and may need adjusting.

There are many methods of performing policy evaluation and analysis. The one outlined below has three steps:

Step 1 - Identify and list current environmental policies and legislation

- Study which of the available policies are relevant to the issue of interest. For example, if the issue is land degradation, the relevant available policies will include those on population growth, livestock stocking rates, opening up of new lands for arable cultivation, etc.

- Determine which of the available policies will be included in the analysis. Look at the major issues of concern (environmental, economic, or social) and decide which of the available policies have direct impact in driving these concerns. The shrinking of mountain forests may be one of the key issues where it has:

  - health implications through its potential impact on water quality and availability,
  - economic implications because it is a major earner of hard currency,
  - biodiversity and social implications for mountain forest communities as some ecological systems are permanently changed, etc.

  In this case, include in the analysis key policies that are relevant to this issue.

- Identify policies to include in the analysis in a holistic view. The range of potential policies to have impact on the environment, positively or negatively, will go beyond what may seem obvious. In the example stated above, policies to create jobs in mountain communities will be relevant to mountain deforestation.

- Note that causes and solutions to environmental problems can lie outside the domain of the environment and environmental policies.

- Select only a manageable number of the most relevant policies since the range of policies with environmental implications is very broad

- Decide on a consistent criterion for selecting policies to include in a current environmental policy analysis. Pinter and others (1999) have given the following set of suggestions to include in a criteria

  - Relevance for the public and decision-makers
  - Link with key environmental priorities
  - Affecting the health, income and well-being of a large number of people
  - Importance of policy responses to an environmental situation that is:
    - physically severe
    - changing rapidly
    - irreversible

- Do not neglect the importance of the country's international obligations in selecting policies to include in the analysis. Some of these may put limitations on what may seem simple at the local or national level.

- Policies that have the following characteristics should also be given priority for inclusion in the analysis:

    - Potential for policy to cause disruption or conflict either in environmental issues or socioeconomic activity
    - Potential for providing an easy and feasible solutions
    - Uniqueness of current policy initiative for the region

The relative importance of the suggested criteria above will depend on the individual circumstances of the key issues in the environment, and the socioeconomic situation.

Step 2 - Identify performance criteria for the selected policies

By the end of Step 1, you would have a manageable number of key policies and you have to develop criteria to evaluate their performance. The criteria used may range from very general and descriptive to very specific and quantitative. The following are good examples of criteria for evaluating policy performance:

- *Threshold*: a value in a key variable may be identified as a point beyond which an environmental system may become self-sustaining. If a mountain forest ecosystem is being destroyed through deforestation, ecologists may identify and try to target a certain percentage of canopy cover through reforestation that will be sufficient for the forest ecosystem to start a "self-healing" process. The assessment to show the success of the selected policy in such a case would estimate how close the results of the policy are to achieving the threshold. Alternatively, and probably more true to life, there may be a point in a key variable below which change may be considered irreversible and the assessment criteria for the success of a policy would be based on how successful the policy has been in moving the ecological system away from the point of irreversible damage.

- *Benchmark*: the evaluation of the performance of a policy may be based on its relative performance when compared to the known best cases under similar circumstances.

A well formulated policy should have its performance criteria developed at its formulation. For example: a reforestation policy may target a certain acreage of reforestation within a specified period; a clean water supply policy may target a certain percentage of the population being within a given distance of a clean water stand pipe within a given number of years. These targets will be the yardstick against which the performance of a policy would be evaluated. There are cases when:

- the indicators provided are not directly related to environmental issues; e.g. with trade, economic or industrial policies. Some of these policies may have extensive impacts on the environment. An economic policy to increase disposable income might have no environmental indicators, although its impact on environmental issues might be more important than that of many environmental policies.

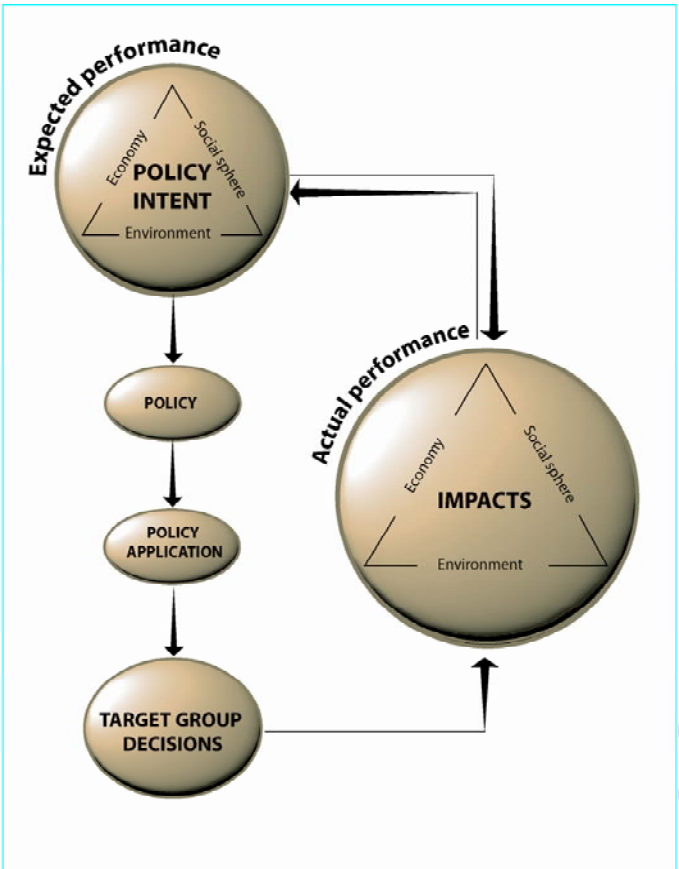
- the cumulative impact of individual policies may exceed the original individual impact given in the indicators of a single policy. The cumulative impact of various issues may be positive or negative. Their total influence on human choice is impossible to foretell even under integrated environmental assessment.

Step 3 - Evaluate selected policies

The evaluation of the performance of a policy is carried out on the policies selected in Step 1 using the criteria determined in Step 2. Each evaluation should be unique for any one environment based on the combination of the choices of these two. This section shows how important it is to select appropriate indicators. The evaluation is made to assess where and when policy change may be required to improve policy performance. Different sets of indicators will illustrate different aspects of policy performance on the same issue. The recommendation to initiate policy change may similarly be based on the indicators originally selected. This stage also shows the importance of having appropriate stakeholders in IEAfrom an early stage to participate in the assessment.

Ideally, expectations of policy performance should be outlined at the policy formulation stage and these would be useful in guiding the evaluation by comparing actual performance with what was expected (see Figure 7.4). However, not achieving the original expectations may only mean that some key components of the policy need to be changed. Adjustment in policy is one of the objectives of policy performance evaluation. It may therefore useful to change input variables to achieve what was originally expected, change the level of effort, or change expectations. Policy performance evaluation could also be used to retrace what should have been expected with the original inputs and level of effort.

Figure 9.8: Linking expected and actual policy performance



Source: Pinter and others 1999

9.10 Action impact matrix

Real life policy performance evaluation is very complex because of the multiplicity of influences of policies on each other. As these influences occur, people's choices change unpredictably. Some simplification may, however, be made by using an action impact matrix (AIM) that shows some of the more direct impacts of policies on each other. An example of such a matrix is given in Table 9.1.

Table 9.1: Simplified example of an action impact matrix

Action/Policy	***Main objective***	**Effect on key sustainable development issues**			
		Land degradation	***Air pollution***	***Resettlement***	***Others***
Macroeconomic and sectoral politics	Macroeconomic and sectoral improvements	Positive effects because of removing distortions; negative effects because of remaining constraints			
Exchange rate	Improve trade balance and economic growth	(-H) (deforest open areas)			
Energy pricing	Improve economic and		(+M) (energy		

	energy use efficiency		efficiency		
Others					
Investment Projects	Improve efficiency of investments	Investment decisions made more consistent with broader policy and institutional framework.			
Project 1 (Hydro dam)	Use 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 forest)		(+M) (relocate people)	
Project N					

9.11 Exercise 9.4 - Current policy analysis for your selected country (modified from Pinter and others 1999)

In your groups, you have carried out some analysis on a country you selected from those you have data on. Read this whole exercise and decide whether you will carry it out on the same country or you will select one of the other countries from one of the members of the group. Hopefully, you would have enough data to do it on the same country.

Your assignment is to analyse environmental policy in the country of your choice in the group and its implications on sustainable development.

- Choose one of the environmental conditions that has been identified as an issue for the country you select in your group. This will be the heading of your AIM in the Table 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.
Go back to your groups to finish the second part of this exercise

Action impact matrix (AIM) for policy analysis
Issue……

Pressures contributing to the environmental issue	***Action policy***	***Original policy intent***	***Environmental issue selected***	***Second environmental issue***	***Third environmental issue***
Pressure 1	*Policy 1*				
Pressure 2	*Policy 2*				
Pressure 3	*Policy 3*				

Back in 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 the country you selected. Let the trainee from the country selected provide leadership on this discussion. What should be done differently in the future? Use the table below to help you 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.

Again, make your presentation to the rest of the participants.

Policy evaluation regarding sustainable development goals for country your team selected

	Overall performance (goal: sustainable development)	***Major successes or failures regarding the goal***	***Priority action for future***

Policy 1			
Policy 2			
Policy 3			
Policies as a group			

9.12 Study/discussion questions

Q: Explain how the stage of policy formulation in IEA and reporting shows the importance of having the right indicators?

A:

_____

_____

_____

Q: State one example from your own actual experience when the performance of a policy was poor because of poor data sources.

A:

_____

_____

_____

9.13. References

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

Diamond, J. (2005). *Collapse: How Societies Choose to Fail or Survive*. Penguin Books Ltd., London

Hill, M. (1997). *The Policy Process in the Modern State.* Prentice Hall, London

Jenkins, W.I. (1978). *Policy analysis: A political and organizational perspectiv*e. Martin Robertson, London

Keeley, J. and Scoones, I. (2003). *Understanding Environmental Policy Processes: Cases from Africa.* Earthscan, London

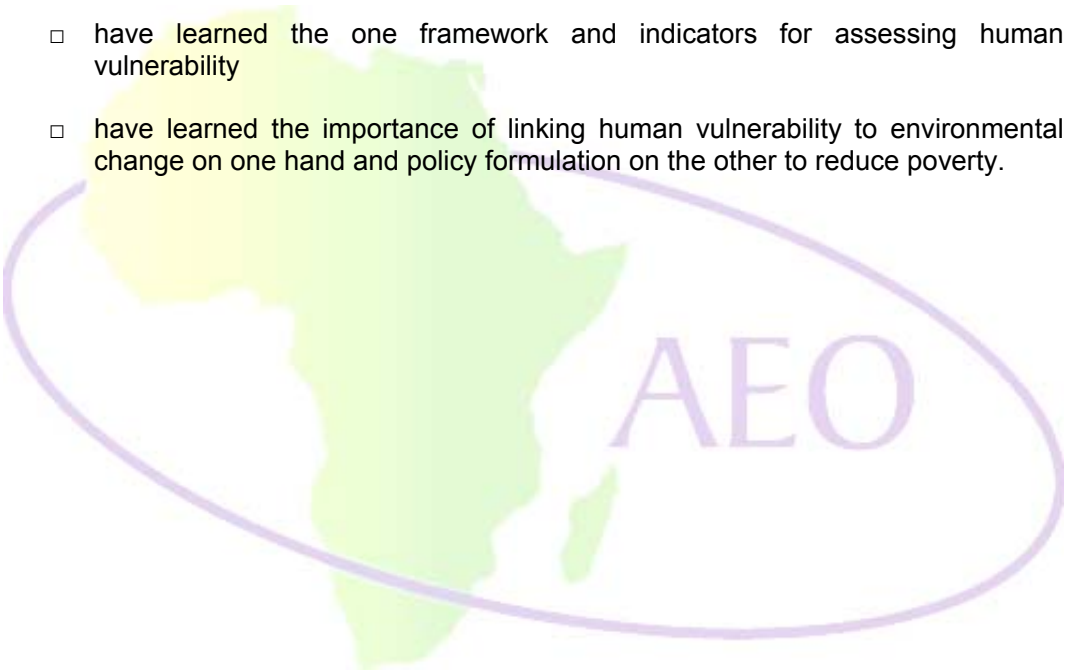
Pinter, L., Cressman, D.R. and Zahedi, K. (1999). *Capacity Building for Integrated Environmental Assessment and Reporting – Training Manual*. International Institute for Sustainable Development and United Nations Environment Programme, Winnipeg. http://www.iisd.org/pdf/geomanual.pdf

Module 10 – Targeting a Theme in Environmental Assessment: Human Vulnerability Due to Environmental Change

Overview
This module serves as an illustrative module to show the importance of environmental assessment in linking socioeconomic and environmental issues to develop a basis for policy formulation.

By the end of this module, you will:

- □ be aware of the different concepts of vulnerability
- □ have learned the one framework and indicators for assessing human vulnerability
- □ have learned the importance of linking human vulnerability to environmental change on one hand and policy formulation on the other to reduce poverty.



10.1 Introduction

Integrated environmental assessment (IEA) and reporting brings together scientists, policymakers, and the public to develop comprehensive policy sets relevant to individual themes. Each policy set, however, is made within a given theme of interest. This module introduces a theme of great concern to the AEO: vulnerability to environmental change for trainees to think about for policy formulation.

Recent analyses of environmental hazards suggest that increases in population numbers and increasing per capita consumption of resources are putting unprecedented pressure on the aggregate stock of world resources. In 2000, the world population was 6 086 million, but by 2050, it is projected to rise to 9 076 million (United Nations Department of Economic and Social Affairs 2004) with higher per capita consumption of resources in all regions of the world. Subsequently, the 21st Century is expected to have unprecedented expansion in all human activity and greater pressure on resources. It is already evident that the impact of this pressure will not be equitably distributed throughout the world's communities, being stronger on those who are more vulnerable to environmental change. The challenges will be particularly critical in Africa unless policies take a path that will overcome some of the evidence of suffering and conflict already visible among communities where fighting over environmental resources is a common occurrence.

Current problems in the inability of many African communities to cope with environmental change are causing concern. Many are becoming more and more vulnerable to droughts, floods, and air and water pollution; and conflicts over resources are increasing. Before we show how to link present day policies and problems to future policy formulation, let us address one theme that shows how important it is to make this link. A holistic assessment of human vulnerability to environmental change can provide future guiding principles to environmental policy and equitable resource allocation.

This module is included in this training manual for two main reasons.

- It provides a comprehensive example that employs several aspects of what has been discussed in the manual so far and links it to the next module. Most vulnerability studies recognize a "state of the environment" whose change, impact of the change, and societal response to the change may be the focus of study on human vulnerability. For example, climate change provides a starting point for the analysis of the impact of change in the state of the environment on socioeconomic variables, ending with the policy response to that change.

- It addresses a theme that has been considered important in the AEO process. Human vulnerability, particularly in view of environmental change, has become important in African countries because of the prevalent levels of poverty and the limited capacity to cope with environmental hazards. Many African countries have communities that are particularly vulnerable. These include communities that have not been integrated in the mainstream economy and social structure of a country such as indigenous communities, and communities living in arid or semi-arid areas. National and sub-national environmental outlooks will take this as a theme and

exposure to the issues and methods relevant to this problem is considered important.

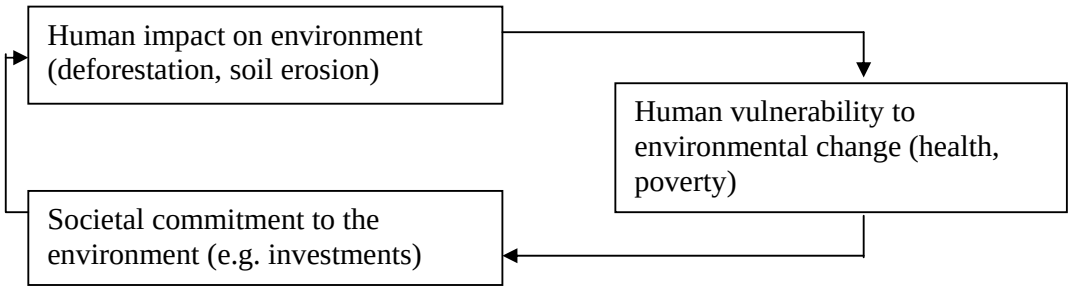
10.2 Concepts of human vulnerability

There is an ongoing process to review various concepts of vulnerability to increasing environmental change. These concepts get re-defined as the process continues, but it is clear that there are different concepts of vulnerability related to social, economic, environmental, food security, and climatic change impacts. In communities where poverty is prevalent all these impacts are relevant to human vulnerability. Traditional approaches to assessing these impacts selects a particular environmental stress (e.g. climate change) and tries to assess its most important consequences for a social group or ecosystem. The starting point of human vulnerability is a selected group, such as an indigenous community. It attempts to assess the risk of potential outcomes given a variety of stresses. It also identifies the range of factors that may reduce response capacity and adaptation of the selected group.

10.3 Framework for assessing human vulnerability

In assessing human vulnerability, do not look at the human impact on the environment as being one way. Feedback loops exist as shown in Figure 8.1. Changes in the environment bring about an impact on human welfare and in turn encourage human response, commonly in the form of an alteration in behaviour. The alteration reduces the problem. To follow the examples given in Figure 8.1, pollution/deforestation may increase health problems/poverty which may in turn increase societal concern for the environment, encouraging investments in it, and changing attitudes to its value. With these concerns there is a decrease (or even an improvement) in pollution (e.g. by changing policy to punish polluters or changing methods of production to cleaner ones) or deforestation (e.g. by reforestation). This is a typical pressure-state-response framework. In more vulnerable communities, the response fails or is ineffective. Without outside intervention, health continues to deteriorate and poverty cannot be reduced. Other weaknesses in the community also increase, such as loss of subsistence or economic means of getting livelihoods, food insecurity, degradation of biodiversity, etc. The list is endless. Such communities become extremely vulnerable to any extreme event such as a drought or flood.

Figure 10.1: An overall framework for assessing human vulnerability to environmental change



Source: UNEP/DEWA 2003

The degree of vulnerability of a community may be estimated on a continuum with "extremely vulnerable" on one side and "extremely secure" on the other. More vulnerable communities have:

- Limited choices. Technological levels are relatively low and any exposure to a hazard may strain the choices available. Often, the only alternative is to expand operations or move to new areas leading to conflicts in resource use with other communities.

- Limited ability to adapt to changing environmental circumstances.

- Limited political/economic/social power to make their views heard. Thus, they remain marginalized in decision making.

- Limited control of their destinies. They are highly dependent on external intervention and easy to victimize.

10.4 Indicators for assessing human vulnerability

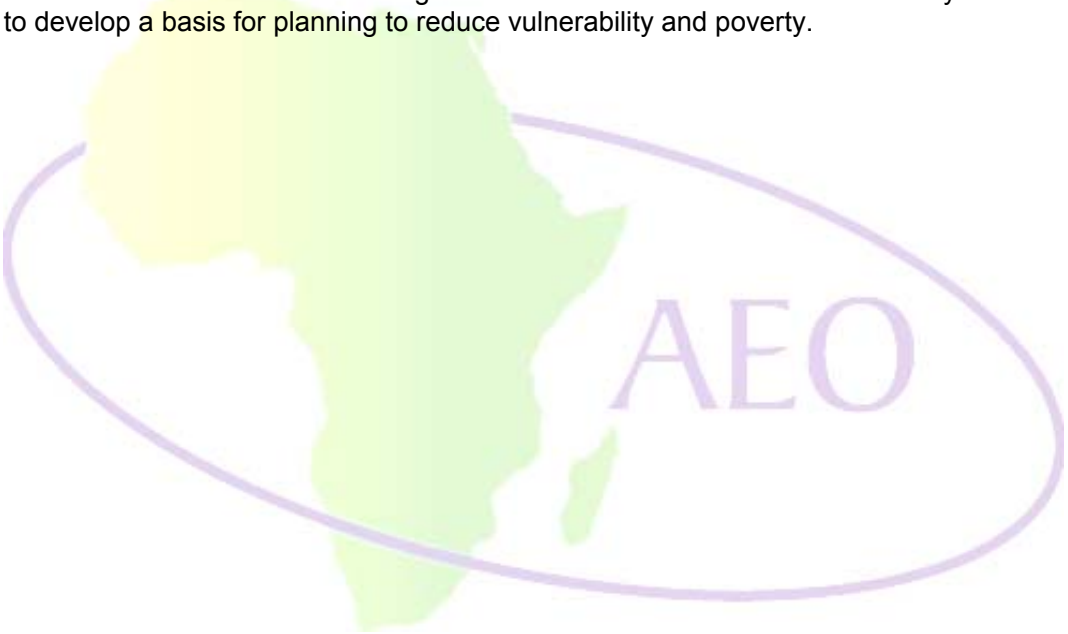
The weaknesses above may be used to develop indicators for assessing human vulnerability for a community. Probably more than for any other category of indicators, human vulnerability indicators must have extensive participation by the affected community. Many important issues and variables are likely to be overlooked by outsiders. Suggested potential indicators are listed in Table 10.1. Since constant monitoring of human vulnerability is essential for early warning of potential catastrophes, time series data on indicators is useful. However, in more vulnerable communities, such data is not available and surrogate data may be used to monitor change in indicators.

Table 10.1: Some potential indicators for assessing human vulnerability to environmental change

Human vulnerability	Environmental causes	Indicators
Health	- Urban air pollution - Water pollution/sanitation	- Number of people affected by environmental diseases - Number of people who have access to safe drinking water and sanitation
Economic losses/gains	- Environmental diseases - Soil erosion - Deforestation - Siltation	- Hours of labour lost due to environmental diseases - Food productivity loss due to soil erosion, deforestation, etc. - Reduction in yield (e.g. fish) from water bodies
Poverty	- Depletion of resource base to meet the basic needs of food, firewood, income, and employment	- Percentage of labour force affected by resource depletion

Food security	- Loss of natural vegetation and biological diversity - Soil erosion - Surface and ground water depletion - Rainfall amount and distribution	- Percentage of natural vegetation cover - Percentage of people directly dependent on land resources - Extent and distribution of degraded land - Rainfall amount and variability
Conflicts	- Scarcity of water - Depletion of natural resource base	- Number of people living in areas where water is scarce - Number of people dependent on vegetation resources

Two illustrations are given in Box 10.1 and 10.2 to show how human vulnerability may increase with environmental change and how environmental assessment may be used to develop a basis for planning to reduce vulnerability and poverty.



Box 10.1: Environmental change and communal conflicts in the Darfur Region of Western Sudan

The Darfur region of Western Sudan has one million inhabitants made up of 90 ethnic groups. The central belt of the region, an area of medium rainfall, is inhabited by a mixture of agriculturalist and pastoralist tribes and clans. The latter have long migrated seasonally with their animals from the drier north to the more agriculturally productive south in regular and mutually agreed patterns. The area has been continuously affected by Sahelian drought cycles and is experiencing very slow desertification. Traditional migration patterns have been changed in desperation as a result. Farmers complain that pastoralists and their livestock migrate at inappropriate times for the growing seasons for their crops. Pastoralists on the other hand complain that farmers have expanded their farms to encroach on their customary routes as the latter attempt to maintain the aggregate output of crops on land with declining productivity by clearing new areas.

Darfur Region in Western Sudan
Source: Huggins 2004 adapted from OCHA Regional Support Office – CEA Nairobi 2002

No effective communication among ethnic groups has been attempted to improve environmental governance. Instead, different groups are arming themselves to defend their "rights" and get a greater share of the resources. The official government response is not comprehensive but rather inconsistent and patchy. Meanwhile, vulnerability of the communities in the Darfur region is increasing with further environmental change and increased tribal conflicts.

The problems of the region attracted a lot of attention from donors and other African countries in 2004, but too much emphasis was put on ethno-political conflicts without paying attention to the contribution of environmental change, the very root of the problems. A more useful integrated approach to reducing vulnerability to environmental change should be adopted. IEA and reporting would:

- educate the different tribes on the role of the changing state of the environment in creating conflicts, which might change the attitude of the people in the region from looking at the source of the conflict as being based on ethnicity;

- emphasize improved communication networks on the environment among the various tribes with different means of getting livelihoods; and

- encourage participation of all the region's public in policy formulation, and make them feel that they own the policies formulated.

Any effort based on this approach would be a major improvement on emphasizing ethnicity in solving conflicts in the Darfur region of Western Sudan.

Source: Huggins 2004

Box 10.2: Reducing human vulnerability to environmental: Sedentarization of nomadic herders of the Eastern Morocco

The Eastern region of Morocco has a population of 76 800, almost all of whom depend on pastoralism as a prime economic activity. A key landscape of the region is the small mountain chain (1 800 m above sea level) that separates the Dahara from the drier land on the edge of the Sahara. In the Dahara, rainfall reaches 450 mm and supports woody shrubs and perennial grass. Towards the Sahara it decreases to 150 mm and can only support shrubs and succulents. Rules and regulations governing seasonal migratory patterns of livestock between these two regions, pasture and water user rights, and the relationships between small and large herd owners, have been respected and effective for centuries.

Eastern Region of Morocco

Sedentarization of much of the population of the region has been rapid since the 1960's, discouraging seasonal large-scale migration of livestock between the Dahara and the Sahara. Consecutive years of drought from 1980 and in the 1990's adversely degraded the rangelands and created great pressure on the land due to overgrazing. By the mid-1980's, herds had been decimated, debts were rising and overall living conditions for the majority of the people were very difficult and harsh, especially for those who owned small herds.

Response to the increased vulnerability of the farmers went from the farmers to the government for assistance. The Ministry of Agriculture drew up a multi-year project executed with financial assistance from the African Development Bank (AfDB) and the International Fund for Agricultural Development (IFAD). The administrative structure of the project was based on cooperatives and partially used the old mutual negotiations of agreed upon limits of tribal and ethnic limits of grazing lands. The project specifically targeted improving the well-being of the poor. It was particularly aimed at pasture improvement, livestock development; extension, research and vocational training; credit for small farmers; and institutional strengthening. The success of the project in all these was phenomenal: by 1998, all farmers and various types of livestock herders had joined the cooperatives.

Lessons may be learned from the success in the attempt to reduce vulnerability to environmental change in Eastern Morocco relevant to the principles and practice of IEA and reporting. Successful interventions may be promoted by:

- Demand driven initiatives with active beneficiaries
- Respect of local ideas and culture

- Equitable contribution of input if ideas, encouraging those whose voice is normally neglected to contribute.

Source: Salem 2004

10.5 References

Huggins, C. (2004). Case Study 1: Communal Conflicts in Darfur Region, Western Sudan. In *Africa Environment Outlook Case Studies: Human Vulnerability to Environmental Change* (UNEP), pp 1-9. United Nations Environment Programme, Nairobi

Salem, O. (2004). Case Study 7: Reducing Vulnerability to Herders in the Eastern region of Morcco. In *Africa Environment Outlook Case Studies: Human Vulnerability to Environmental Change* (UNEP), pp 93-103. United Nations Environment Programme, Nairobi

United Nations Department of Economic and Social Affairs (2004), *World Population Prospects: The 2004 Revision*. United Nations, New York

Module 11 – Assessing the Future

Overview
This module addresses the future outlook regarding the environment. The future is difficult to assess because much of it depends on human decisions and choices, as well as the possible efforts by people to change their environmental destiny if, when they look at it, it seems bleak.

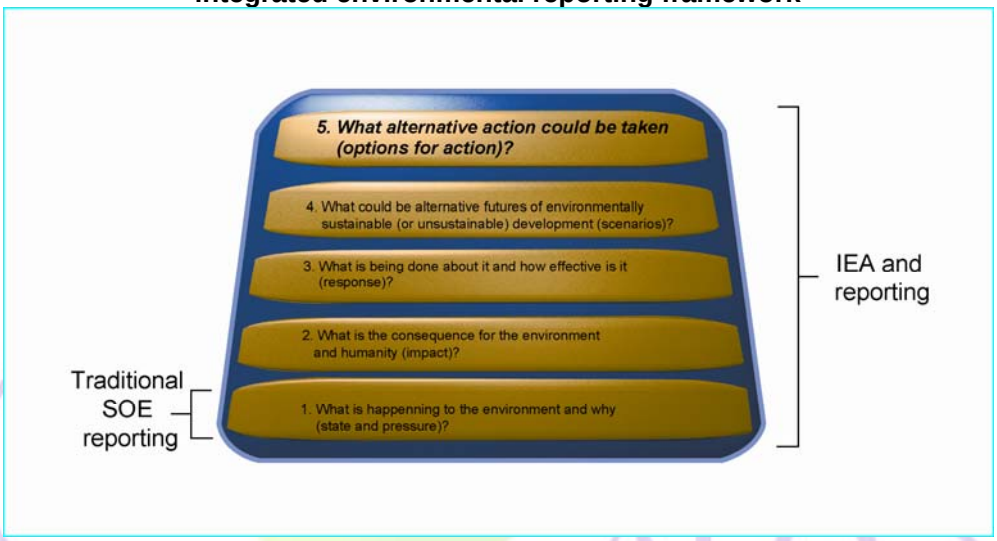
By the end of this module you should:

- have a good understanding of how present environmental policy formulation can be linked to the future;
- know why forward looking policy (i.e. into the future) environmental assessment studies are conducted;
- realize the importance of emerging issues in understanding forward looking environmental assessment studies;
- have learnt about the range of driving forces that are likely to influence environmental changes and decisions that may be taken to address such changes;
- have learnt about the underlying assumptions underpinning each of the four scenarios used in the AEO report;
- have developed some skills in scenario development for environmental assessment; and
- have learnt different modelling approaches.

11.1 Introduction

This module answers the last two questions in the set of questions asked in IEA and reporting using DPSIR. It addresses the future of the environment by asking questions the answers to which assist us to do two things highlighted in Figure 11.1: look at alternative futures of the environment (Question 4); and analyse the alternative options for action – Question 5 – in view of the answers to Question 4.

Figure 11.1: Future environmental assessment in the integrated environmental reporting framework



Source: Pinter and others 1999

We have to choose and/or weigh compromises on how our future actions will influence environmental quality and the possibility of sustainable development. Our choices may not completely be within the preferences we have and they may be influenced by other circumstances beyond our control. If we have the privilege of influencing the future of environmental policy, we may have to act NOW. In answering these questions, other implied questions must also be answered**:**

- Where are our policies taking us?
- Is this where we want to go?
- What other policies could be more useful?
- What consequences might various policy alternatives have on the environment in future?

This set of questions opens up debates that advise the decision making process on the advantages and/or dangers of selecting certain paths in looking forward in policy formulation in the integrated environmental reporting framework.

11.2 Reasons to conduct futuristic environmental policy studies

In looking at future environmental policy, we are doing more than just giving numbers and figures of what the future is to be. We are like fortune-tellers, trying to be visionary beyond numbers. But fortune telling is a very imprecise art. Yet, although it is clear nobody can predict the future, it is important for society to know the alternative potential trajectories because it can facilitate making critical decisions today by:

- looking at present actions and policies and be aware of the consequences of their impacts on the environment in future;
- providing a basis for detecting and avoiding the dangers that could happen in future;
- providing a basis for developing proactive strategies which can be used to avoid future catastrophes; and
- providing a yardstick for desired futures against which we can measure our performance in advancing preferred alternatives.

11.3 Exercise 11.1: Problems that could have been avoided

In groups of four in which you have worked before, fill up the table below with policies that would have worked but failed because there was no forward looking policy.

Table 11.1: Examples of problems that could have been avoided

Country	Original objectives of the policy	Major problems of the policy
Example: Botswana	The Tribal Grazing Land Policy (TGLP) started in 1975, was intended to mitigate bad practices on tribal grazing lands. It demarcated 64 km^2 ranches from communal grazing lands and gave them to "large herd" cattle owners hoping that they would be good examples of livestock rearing and range management practices. It was also hoped that land degradation would be reduced through a reduction of stocking on the rest of communal areas.	The objective of the policy failed in all its primary objectives related to the reduction of land degradation. With no clear guidelines or supervision, both of which should have been part of a forward looking policy, many ranches were heavily overstocked and badly degraded even relative to the rest of the communal lands. Ranch owners claimed they had, in addition to exclusive rights to graze on their ranches, an additional right to graze on communal range as members of the tribes that owned the range. This defeated the purpose of the whole policy and ended in worse land degradation than had been the case before the policy

Source:

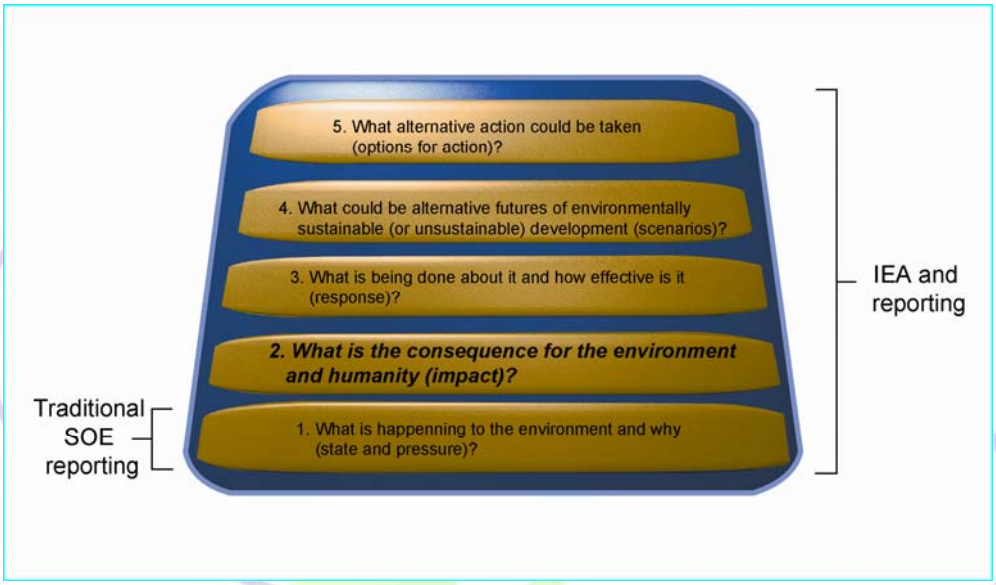
11.4 Emerging environmental issues

At any given time, there are environmental issues whose potential impact (negative or positive) may not be fully realized by the public and/or decision-makers. Their future impact on the ecosystem and human activity may be speculated upon by a few scientists, but knowledge by the majority of this impact will be vague. For example, the

potential socioeconomic and environmental impacts of HIV/AIDS in Africa have been speculated on by a number of scientists, but are not clear to the general public. The greater interest is on its effect on demographics and health issues.

Within the step-by-step questions asked when using DPSIR in IEA and reporting, emerging issues belong to the potential impact of up-and-coming environmental issues on the future of the environment. The key question is on their "potential": "**what is the consequence (of emerging issues) for the environment and humanity?"** We can then ask the subsequent question to refer to the possibility of reducing their negative impacts.

Figure 11.2: Place of emerging environmental issues in the integrated environmental assessment framework



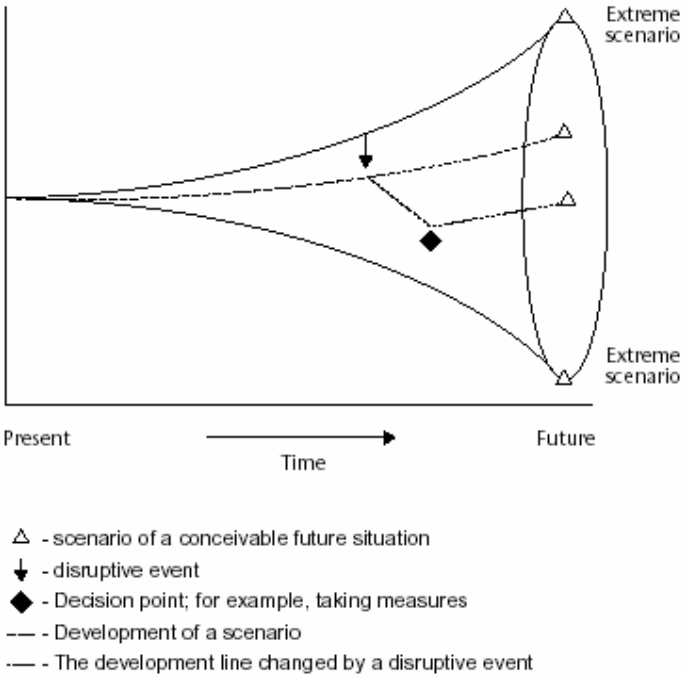
Source: Pinter and others 1999

In recent history, some of the following now accepted practices must have been emerging issues when a limited number of scientists had knowledge of their potential impacts:

- New technologies in agricultural production which culminated in the Green Revolution (1970s)
- Communication via the internet (late 1980s)
- Global warming (early 1990s)
- Loss of biodiversity (1990s)
- Global trade and its impact on environment (1990s)
- Long range transport of atmospheric pollutants (1960s)

Planning for the future and developing possible trajectories on issues of interest is very uncertain, labour-intensive, and hard work. You could limit the range of paths that you consider in your forward-looking policy planning, but the consequences of getting the final results wrong may be tragic. Alternatively, you could include all possible occurrences in a holistic setting and hope to adjust your plan as the environmental issues develop. This latter approach is referred to as "building scenarios". It gives alternative paths that arise from policy decisions and events looked at from a holistic setting. Holistic approaches that include possible but less likely development paths are also less likely to end in tragic errors through adaptation than those that limit their basis for development to the most likely paths. A scenario funnel, referring to the broadening range of possible outcomes is shown in Figure 11.3.

Figure 11.3: Conceptual diagram showing the effect of a disruptive event on the range of possible scenarios



Source: Reibnitz 1988

Emerging issues must be included in the development of scenarios for similar reasons. They help to:

- raise awareness of the general public of the issues concerned so that participation in formulating policy on the issues can be effective;

- start preliminary discussions for formulating a policy about the issues before the issues become a crisis; and

- guide environmental research and data collection on the issues at an early stage.

11.5 Exercise 11.2

In groups of four (new groups), list some possible emerging issues at both the national and sub-regional level as indicated in Table 11.2.

Table 11.2: Possible emerging issues from the national and sub-regional level

Example of emerging issue	What is being done about it
Regional	
Sub- regional	
National 1	
National 2	

11.6 Scenario development

Potential environmental developments within limited periods of years may be assessed using trend analysis or mathematical modelling. But as the interest changes to longer terms extending to decades or generations, conventional methods of looking at the future of environmental issues become inadequate for many reasons:

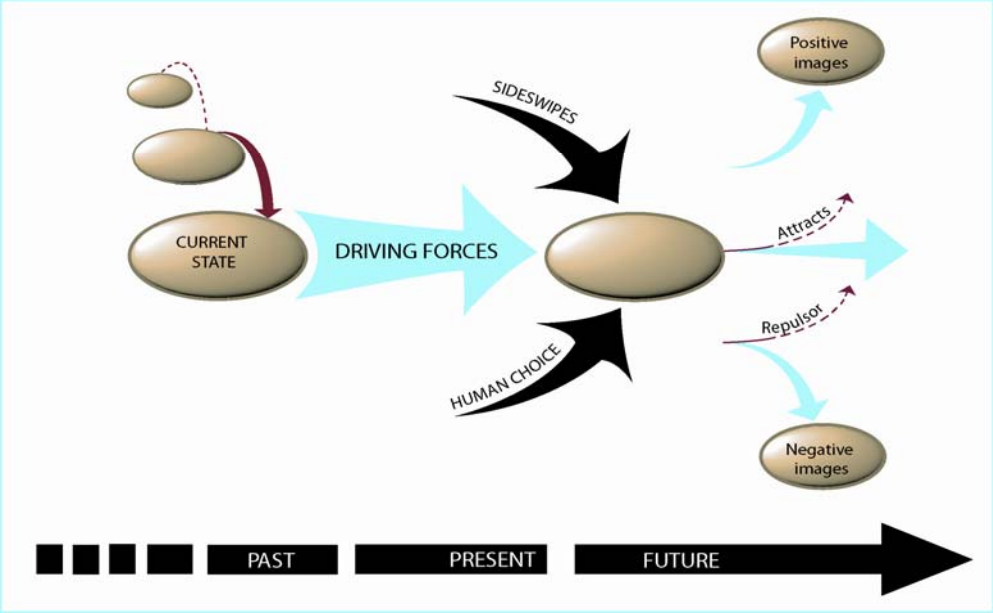
- There is always insufficient information on the current environmental system and the forces governing its dynamics. With the current policy implementation this ignorance is taken care of by continuously adjusting policies or adding new ones. We would not know what adjustments would be required over decades. This is particularly the case with what are emerging issues at the time of planning the future.

- Even if precise information were available for the current situation, the environmental system by itself, but more so when linked to socioeconomic systems, is extremely complex capable of producing turbulent behaviour which makes accurate projection impossible.

- Maybe most importantly, the future that depends on human choices is unknowable. Future human choices may be made completely outside what is currently feasible or acceptable. For example, physical changes in the environment, human-induced catastrophes such as wars and changing international relationships, may all produce an environment under which choices we might not currently be able to comprehend may be considered appropriate.

- The current state of the environment results from a history of previous states of environment (see Figure 11.4) which have experienced different pressures. Some of the pressures may have changed in character or may have dissipated. Looking at the history of pressures and driving forces gives us some idea of how difficult it might be to predict future states with any certainty. For example, changes in technology in telecommunications and data transfer techniques make it much easier for stakeholders in any part of the world to participate instantly and effectively in a decision making process, dramatically cutting down the time required to make a decision.

Figure 11.4: A simplified illustration of the general scenario dynamics of an environmental system



Source: Raskin and Kemp-Benedict 2004

- Current driving forces and pressures condition the path to the future of the current state. The future state is, however unpredictable. Human beings look at the present and create attractive and repulsive images of the future based on current driving forces on the environment. It is not known how “Human Choice” will be made possible with changing technology. Besides, awareness of the potential impact of negative images may encourage people to do something about negative driving forces which may redirect “Human Choice”. All this is in addition to future driving forces (as was the case with history).

- Sideswipes – surprising and extreme occurrences (e.g. extremes in climate or other natural disasters, an epidemic, etc.) may change the path of development

11.7 Some significant driving forces influencing scenarios in Africa.

At the Africa regional level a number of important driving forces are significant for environmental change, and critical in scenario development. The following list of driving forces were developed by the AEO-2 Scenario Working Group and have been used in preparing the second AEO report:

- **Demographics** – population size/growth, structures, characteristics
- **Health** – HIV/AIDS, malaria, Tuberculosis, emerging and re-emerging diseases
- **Economics** – trade, agriculture, debt, economic integration/cooperation, Foreign Direct Investment (FDI)
- **Social** – poverty, gender/youth, HDI, human vulnerability
- **Culture** – plurality of cultures, religion, influence of globalization
- **Technology** – Information and Communication Technologies (ICT), Research and Development (R&D), appropriate technology, biotechnology and genetically modified organisms (GMOs), renewable energy
- **Governance** – good governance (environmental budgeting, transparency, political will, public participation, access to information), policy failure, conflict, international obligations, legal and institutional, transboundary mechanisms such as peace parks, NEPAD peer review mechanisms
- **Peace and security** – terrorism, local and regional conflicts (resource-based conflicts, refugees), illegal trade in banned substances such as hazardous waste [Bamako/Basel conventions], and products such as ivory [CITES])
- **Other driving forces** – climate change and natural disasters.

11.8 Important steps in developing a scenario

In developing a scenario, generally, a series of steps are followed, though not in the sequence given below

- Specify the boundary of the analysis. This may be in several senses:
    - Spatially: in terms of area covered; e.g. global, regional, sub-regional, national, etc.
    - Thematically: e.g. coverage of sectors, issues
    - Temporally: i.e. the time horizon of the analysis
- Describe the current conditions. Be careful here to limit yourself to those aspects of current environmental conditions that are directly relevant to your specified

boundaries. You may include here data conditions; trends and existing policies; and economic, environmental, demographic and institutional conditions.

- Estimate the consequences of the current situation on the environment issue of interest. Introduce the driving forces and trends that are currently influencing and changing the system.

- Provide a narrative giving the plot by which the scenario stories unfold. Include here policy options and estimate how each option may be influenced by the plot provided.

- Estimate the changes in impact for each option

- Give an image of the future with conclusions about the range of possible outcomes at one or more points in time.

11.9 An analytical framework for assessing policy options and scenarios

There are many possible alternatives for developing scenarios. Whichever analytical framework is used, the massive range of possible options cannot be included in the analysis and each framework attempts to reduce possible options to a few manageable alternatives. Qualitative and quantitative methods are used widely in explaining the scenarios. Each of these has advantages and disadvantages.

- Qualitative narratives underscore the very uncertain nature of environmental scenarios. Many important factors can best be expressed in qualitative terms (e.g. culture, values, behaviour). These narratives however, lack scientific vigour.

- Quantitative techniques seem to provide the scientific rigour which may be misinterpreted by non-specialists to imply scientific precision. But model-based scenario development tends to assume continuity and cannot very well handle surprise and discontinuity. Many important qualitative aspects cannot be addressed.

- The most useful development scenario research today combines the strengths of the (qualitative) narrative approach and that of the (quantitative) modelling approach. It attempts to retain the scientific rigour wherever it is available while using qualitative descriptions.

Table 11.3: One example of an analytic framework for scenario development

Classes	**Conventional Worlds** ***Essential continuity with today's evolving development pattern*** - No major surprises, discontinuities, or major transformations - Continued evolution and globalization of current values - Continued current socioeconomic relationships of an industrial society	**Barbarization** ***Fundamental but undesirable social change*** - Major (deteriorated) transformations in the organization of society over the 21st century - Social, economic and moral underpinnings threatened with emerging problems	**Great Transitions** ***Fundamental and favourable social transformation*** - Major (improved) transformations in the organization of society over the 21st century - Pro-environment fundamental change in values - High levels of welfare - Equitable distribution of opportunities - Strong sense of social solidarity - Stable population levels - Reduced consumerism
Variants in each Class	1..Market forces: market driven development leads to convergence towards values and development patterns. - *Mid-range population and development projections* - *Typical technological change* 2. Policy Reform: incremental policy adjustments steer conventional development towards environmental and poverty reduction goals - *Government action to achieve greater social equity* - *Comprehensive policy for environmental protection* - *Promotion of environmentally friendly technology* - *Sustainability proactively pursued as a strategic priority*	1. Breakdown - conflict, institutional disintegration and economic collapse 2. Fortress - Authoritarian response to the threat of breakdown: manage and squander resources, repress majority and protect own privilege - Repression, environmental destruction and misery	1. Eco-communalism - retreat into localism in caring for the environment - face-to-face democracy - small technology 2. New Sustainability paradigm - Focus on more humane environmental concerns.

Source: Raskin and Kemp-Benedict 2003

Table 11.4: Uganda's scenario development framework for the 2001 SOE report

Scenario	Sub-Scenario
The Ostrich (Conventional Worlds) Uganda will develop without any major surprises or discontinuities. Implies: - rise in consumption, urbanization - higher per capita use of commercial energy, freshwater, automobiles - more and better health facilities	***Conventional Development:*** envisions emphasis as economic growth. Population of 22 million will increase to 54 million (27 million in urban areas) by 2032. Urbanization will lead to excess land conversion to urban use. Use of commercial energy will reduce deforestation, but increase should be expected in air pollution. An additional 2 million ha of land will be cleared from rangelands, forests and wetlands to provide more food for increasing population. Also increase in fish farming to triple current available fish catch from fresh water bodies
	Policy Reform: A policy-neutral environment is not acceptable to let the problems under Conventional Development arise. Policies required to improve land use planning, reduce population growth, effectively govern the rate and level of urbanization, and introduce economic value prices for energy and other resources.
The Moribund (Barbarization) Envisions Uganda under a situation similar to what it experienced in the 1970's and 1980's. A radical change in governance introducing irresponsible leaders, or a resurgence of secessionist	***Breakdown:*** Economic stagnation and a complete breakdown of the country will occur. Population will remain mainly rural and poor, with only about 25 per cent being urban. More land will have to be cultivated for crops with very poor methods. There will be overgrazing on the limited land left and both arable and grazing would contribute greatly to land degradation. No investment in: (i) energy production will increase dependence on fuelwood leading to even more land degradation ;(ii) urban infrastructure will lead to urban slums and deteriorating urban environment in general; (iii) health and clean water distribution will lead to a deteriorating health situation; (iv) new economic ventures and industries will raise unemployment, crime and general lawlessness

Scenario	Sub-Scenario
attempts would lead to civil strife and the inability of government to enforce or formulate coordinated environmental laws.	***Fortress World:*** In addition to what would be experienced by Ugandans under "Breakdown", under this sub-scenario it is envisioned that the elite will coerce subsistence farmers to grow crops from which the elite will directly benefit. This may well be cash crops, neglecting food crops and introducing food insecurity. Some of the protected areas may be degazzetted to encourage growing cash crops as was the case with the double production campaign under Idi Amin in the 1970's. A greater inequitable distribution of wealth will be expected with the few rich agglomerating wealth and encouraging corruption as the increasingly poor seek favours from the rich for survival. The poor will become so desperate that environmental concerns will become unimportant to the majority of Ugandans.
The Flying Crane (Great Transitions) Future development requires visionary leadership. Many changes are required including: a population growth rate of 1.5 per cent per annum; rapid urbanization to reach a 70 per cent urban population by 2032; a high level of investment in infrastructure; universal education at all levels; sustained peaceful coexistence	***Eco-Communalism:*** Uganda's population between 2000 and 2032 will rise only from 22 million to 35 million. The rural population will be smaller, well organized, more educated, living in harmony with the environment in a partial retreat to localism. Productivity of the land and of the people on the land will be higher.
	New sustainability paradigm: Uganda should build a humane and equitable urban and industrial society rather than retreat into localism. Between 2000 and 2032, the country's urban population will increase from 3 million to 24 million Careful planning is required to avoid crime and pollution problems for this population. Standards must be set and enforcement of laws must be effective to guard against problems that will arise from increases in manufacturing, processing, petroleum production and mining.

Source: NEMA 2000

11.10 Additional resources on modelling and scenarios

The scenario analysis and modelling examples given in this module are only examples and there are many approaches that may be used. If you are interested in getting more information about other approaches the list below will be useful. Some of those listed may be more relevant to the work you may be engaged in, or have free software you could use (Pinter and others 2000):

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 modelling: 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

11.11 Study/discussion questions

Q: Explain how realistic it may be to expect scenario development would improve planning for the future of the environment in your country?
A:

_____
_____
_____
_____

Q: What would be the outstanding problems?
A:

_____
_____
_____
_____

Q: Has any scenario development been used before in any way? If not, why?
A:

_____
_____
_____
_____

Q: Compare the problems of scenario development in your country to that of your sub-region of Africa? In which of the two might you expect greater impact on planning for the future and why?
A:

_____
_____
_____
_____

11.12 References

NEMA (2000). *State of Environment Report for Uganda 2000/2001.* National Environmental Management Authority, Kampala. http://www.nemaug.org/UPLOADS/SOE/SOE2000.pdf

Pinter, L., Cressman, D.R. and Zahedi, K. (1999). *Capacity Building for Integrated Environmental Assessment and Reporting – Training Manual*. International Institute for Sustainable Development and United Nations Environment Programme, Winnipeg. http://www.iisd.org/pdf/geomanual.pdf

Pinter, L., Cressman, D.R. and Zahedi, K. (2000). *Capacity Building for Integrated Environmental Assessment and Reporting – Training Manual: Second Edition*. International Institute for Sustainable Development and United Nations Environment Programme, Winnipeg. http://www.iisd.org/pdf/geomanual.pdf

Raskin, P. and Kemp-Benedict, E. (2002). *Global Environment Outlook Scenario Framework.* UNEP/DEWA Technical Report. Nairobi, United Nations Environment Programme

Reibnitz, U. von (1988). *Scenario Techniques*. McGraw-Hill, Hamburg

APPENDIX 1

Preparatory Questionnaire for the Training Workshop on Integrated Environmental Assessment and Reporting

Please send this questionnaire back as soon as possible. The several questionnaires from different potential trainees for the workshop will be collated and will be used during the workshop. Participants should be prepared to assist the workshop understand the answers provided by making a short presentation at some point in the workshop.

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

Section I: Contact information

1. Country	
2. Organization	
3. Primary contact person	
4.Full address	
5. Telephone	
6. Fax	
7. E-mail	
8. Address on WWW	

Section II: SOE report structure

9. Title of initiative	
10. Year of first SOE	
11.Frequency of reporting	

12.Geographic coverage	
13. Framework used in report (check all that apply)	Resource sector-based Environmental media-based Pressure -state-response Geographic sub-region based Others (specify)

Please attach/bring map for (12) if available and bring diagram for (13)

14. Main sections and subsections in report.

Main Section	**Sub-section**

Section III: Information sources and tools

Main sources of environmental information for the SOE/sectoral reports	National census : census frequency ----------years Reports from Government Departments Municipal/Local Governments International organizations NGO's Schools and Universities Private sector Special surveys
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 (specify)

Section IV: Key environmental issues, policies and indicators

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

Section in report	1 2 3 4 5			
	1 2 3 4 5			
	1 2 3 4 5			
	1 2 3 4 5			

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 Gov't Departments**	**Academic institutions**	**NGO's**	**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 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 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)

APPENDIX 2

EVALUATION OF THE TRAINING WORKSHOP

Please complete the following form as your evaluation of the training workshop

Please indicate your opinion about each section of the training workshop by circling the appropriate number.
1 = strongly disagree 2 = disagree 3 = neutral 4 = agree 5 = strongly agree

Overall objectives and content:

1. The objectives were clear and precise?	1	2	3	4	5
2. The objectives were attained?	1	2	3	4	5
3. The contents were linked to the objectives?	1	2	3	4	5
4. The workshop was well structured?	1	2	3	4	5

5. Give your evaluation on the overall

_____
_____
_____
_____
_____
_____

6. What part of the training programme did you find least valuable? Why?

_____
_____
_____
_____
_____
_____

7. What part of the training programme did you find most valuable? Why?

_____
_____
_____
_____
_____

Methodology

8. The methodology used for the training workshop was appropriate for me as a professional? 1 2 3 4 5

9. The approach used helped me to share my own knowledge and experience?

1 2 3 4 5

The following elements of the training workshop were very useful.

10. Case studies	1	2	3	4	5
11. Presentations	1	2	3	4	5
12. Group exercises	1	2	3	4	5
13. Group sessions	1	2	3	4	5
14. Demonstrations of tools (e.g. models)	1	2	3	4	5

15. The following may be improved in the methodology used. (How?)

_____
_____
_____
_____
_____
_____

Training materials

The following training materials were easy to use

16. Visual aids (e.g. transparencies)	1	2	3	4	5
17. The manual	1	2	3	4	5

Trainers

The trainers:

18. Had a good command of the training materials	1	2	3	4	5
19. Presented the materials clearly	1	2	3	4	5
20. Cared about trainees problems during training	1	2	3	4	5
21. Were eager to assist me whenever I had a problem	1	2	3	4	5

22. The manual could be improved in the following way.

_____
_____
_____
_____
_____
_____

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

_____
_____
_____
_____
_____
_____

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

_____
_____
_____
_____

_____

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

_____
_____
_____
_____
_____
_____

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

Excellent Good Average Unsatisfactory Poor

27. General remarks

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Abbreviations

ADIE	Agence Internationale pour le Développement de l'Information Environnementale
AEIN	Africa Environment Information Network
AEO	Africa Environment Outlook
AEO-EIS	AEO - Environment Information System
AfDB	African Development Bank
AIM	Action impact matrix
AIS	Alien invasive species
AMCEN	African Ministerial Conference on the Environment
AMCOW	African Ministerial Council on Water
APELL	Awareness and Preparedness for Emergencies and the Local Level
CAPCO	Chief Air Pollution Control Officer
CC	Collaborating centre
CEDARE	Centre for Environment and Development in the Arab Region and Europe
CIESIN	Center for International Earth Science Information Network
CILSS	Permanent Interstate Committee for Drought Control in the Sahel
CITES	Convention on International Trade in Endangered Species
CODI	Commission on Development Information
CSO	Civil society organization
CSV	Comma delimited/separated values
DEPI	Division for Environmental Policy and Implementation
DEWA	Division of Early Warning and Assessment
DPSIR	Driving forces-pressures-state-impacts-responses
DRC	Democratic Republic of Congo
EIA	Environmental impact assessment
EIS-SSA	Environmental Information Systems in Sub-Saharan Africa
EMS	environmental management system
ENRIN	Environment and Natural Resources Information Network
EPA	United States Environmental Protection Agency
FAO	Food and Agriculture Organization of the United Nations
FDI	Foreign Direct Investment
GC/GMEF	Governing Council/Global Ministerial Environment Forum
GEO	Global Environment Outlook

GIS	Geographic information systems
GMO	Genetically modified organism
GNP	Gross National Product
GRI	Global Reporting Initiative
HDI	Human Development Index
ICT	Information and Communication Technologies
IEA	Integrated Environmental Assessment and reporting
IFAD	International Fund for Agricultural Development
IISD	International Institute for Sustainable Development
IOC	Indian Ocean Commission
IWRM	Integrated water resources management
KPI	Key Performance Indicator
MA	Millennium Ecosystem Assessment
MDG	Millennium Development Goal
MEA	multilateral environmental agreement
NCS	National Conservation Strategy
NEAP	National Environmental Action Plan
NEMA	National Environment Management Authority (Uganda)
NEPAD	New Partnership for Africa's Development
NESDA	Network for Environment and Sustainable Development in Africa
NGO	Non-governmental organization
NIER	National Integrated Environmental Reporting
OAU	Organization of African Unity
OECD	Organization for Economic Cooperation and Development
OSS	Sahara and Sahel Observatory
PPP	Polluter pays principle
PR	Peer reviewer
PSR	Pressure-State-Response
R&D	Research and Development
RCMRD	Regional Centre for Mapping of Resources for Development
REIMP	Regional Environment Information Management Programme
ROA	Regional Office for Africa
SADC	Southern African Development Community
SAIEA	Southern African Institute for Environmental Assessment
SANTREN	Southern African Network for Training and Research on the Environment
SARDC	Southern African Research and Documentation Centre

SEA	Strategic environmental assessment
SETES	Environmental Training and Education Sub-programme
SI	Sustainability index
SISEI	Environmental Information Systems on the Internet
SOE	State of the environment
TGLP	Tribal Grazing Land Policy
UCLAS	University College of Lands and Architectural Studies
UNCED	United Nations Conference on Environment and Development
UNCSD	UN Commission on Sustainable Development
UNDP	United Nations Development Programme
UNECA	UN Economic Commission for Africa
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNGA	UN General Assembly
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
WCED	World Commission on Environment and Development
WFP	World Food Programme
WRI	World Resources Institute
WSSD	World Summit on Sustainable Development