

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.

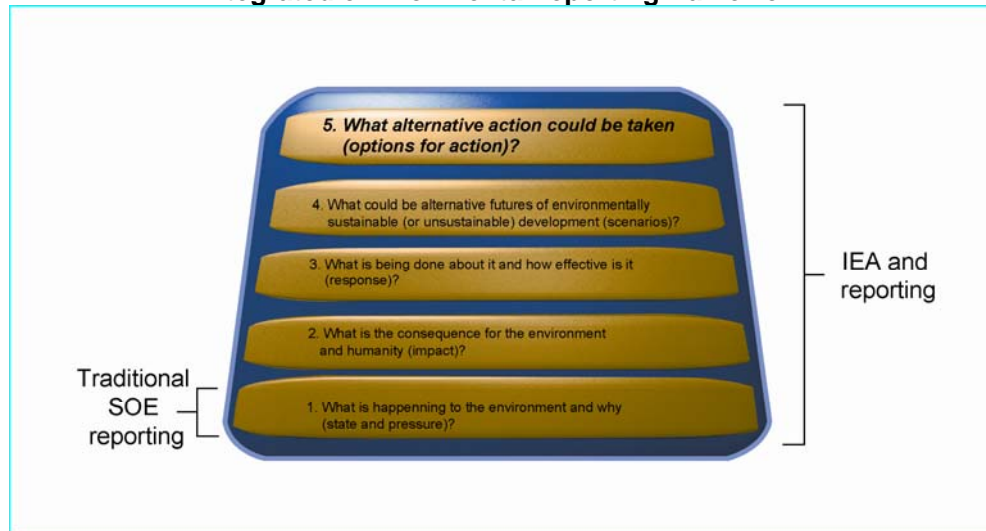
By the end of this module you should:

- 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 TGLP 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: paraphrased from Peters 1994 and Perkins and Thomas 1993

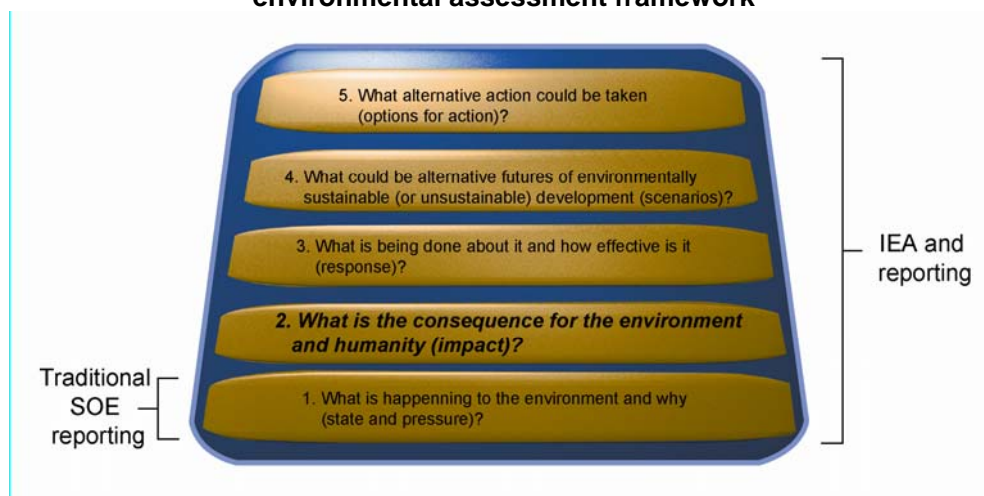
11.4 Emerging environmental issues

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



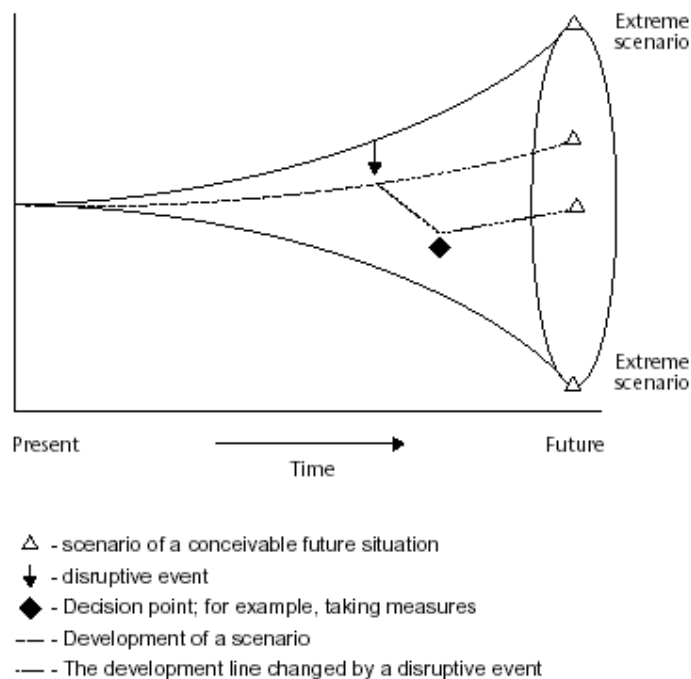
Source: Pinter and others 1999

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
<i>Regional</i>	
<i>Sub-regional</i>	
<i>National 1</i>	
<i>National 2</i>	

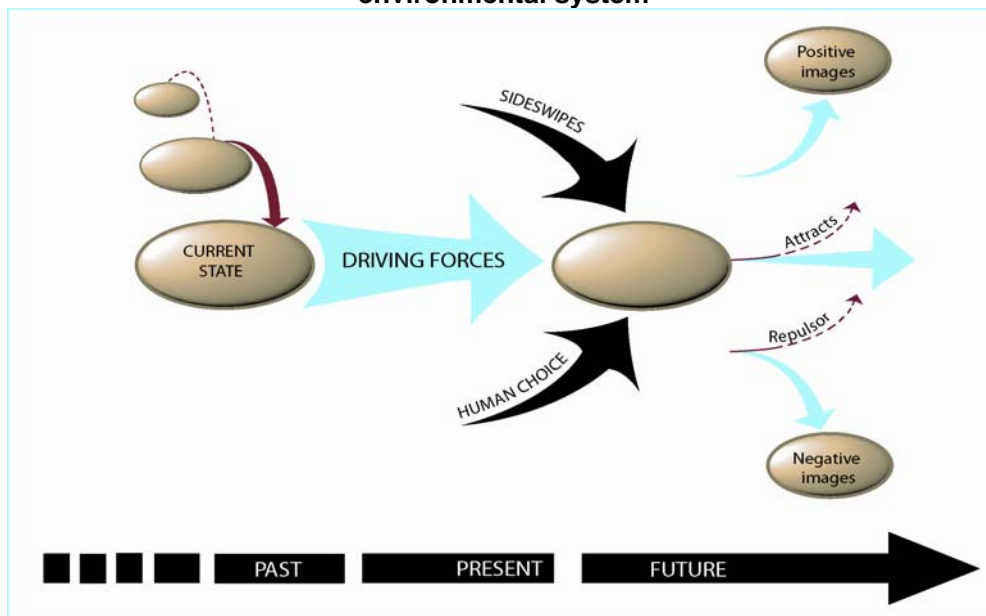
11.6 Scenario development

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	<p>Conventional Worlds <i>Essential continuity with today's evolving development pattern</i></p> <ul style="list-style-type: none"> - No major surprises, discontinuities, or major transformations - Continued evolution and globalization of current values - Continued current socioeconomic relationships of an industrial society 	<p>Barbarization <i>Fundamental but undesirable social change</i></p> <ul style="list-style-type: none"> - Major (deteriorated) transformations in the organization of society over the 21st century - Social, economic and moral underpinnings threatened with emerging problems 	<p>Great Transitions <i>Fundamental and favourable social transformation</i></p> <ul style="list-style-type: none"> - 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	<p><u>1..Market forces:</u> market driven development leads to convergence towards values and development patterns.</p> <ul style="list-style-type: none"> - <i>Mid-range population and development projections</i> - <i>Typical technological change</i> <p><u>2. Policy Reform:</u> incremental policy adjustments steer conventional development towards environmental and poverty reduction goals</p> <ul style="list-style-type: none"> - <i>Government action to achieve greater social equity</i> - <i>Comprehensive policy for environmental protection</i> - <i>Promotion of environmentally friendly technology</i> - <i>Sustainability proactively pursued as a strategic priority</i> 	<p><u>1. Breakdown</u></p> <ul style="list-style-type: none"> - conflict, institutional disintegration and economic collapse <p><u>2. Fortress</u></p> <ul style="list-style-type: none"> - Authoritarian response to the threat of breakdown: manage and squander resources, repress majority and protect own privilege - Repression, environmental destruction and misery 	<p><u>1. Eco-communalism</u></p> <ul style="list-style-type: none"> - retreat into localism in caring for the environment - face-to-face democracy - small technology <p><u>2. New Sustainability paradigm</u></p> <ul style="list-style-type: none"> - 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
<p>The Ostrich (Conventional Worlds) Uganda will develop without any major surprises or discontinuities. Implies:</p> <ul style="list-style-type: none"> - rise in consumption, urbanization - higher per capita use of commercial energy, freshwater, automobiles - more and better health facilities 	<p>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</p> <p>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.</p>
<p>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</p>	<p>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</p>

Scenario	Sub-Scenario
<p>attempts would lead to civil strife and the inability of government to enforce or formulate coordinated environmental laws.</p>	<p>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 degazetted 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.</p>
<p>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</p>	<p>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.</p> <p>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.</p>

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

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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.

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