

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

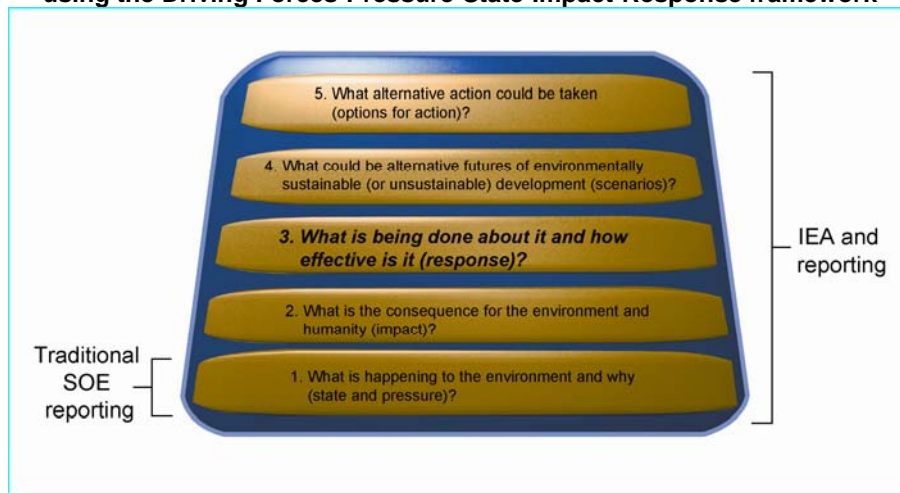
3.1 Introduction

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:

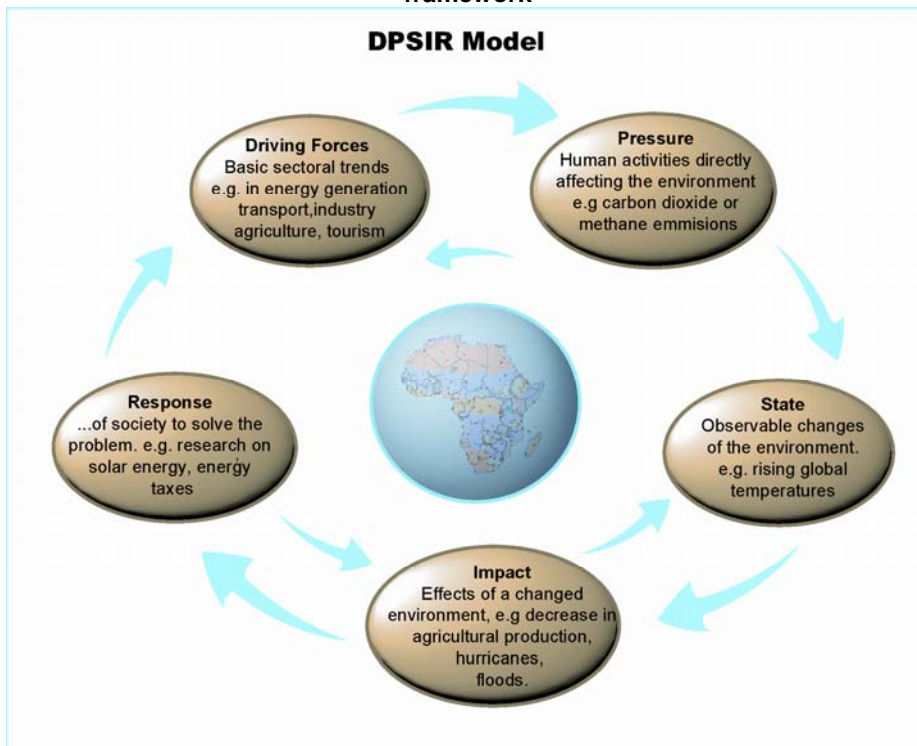
- Sections 1 and 2 together answer Questions 1 and 2 in Figure 3.1. Section 1 specifically identifies the driving forces that have created pressures (and how the pressures have impacted on the environment). Pressures in the DPSIR framework may be divided into two categories: underlying pressures (e.g. 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



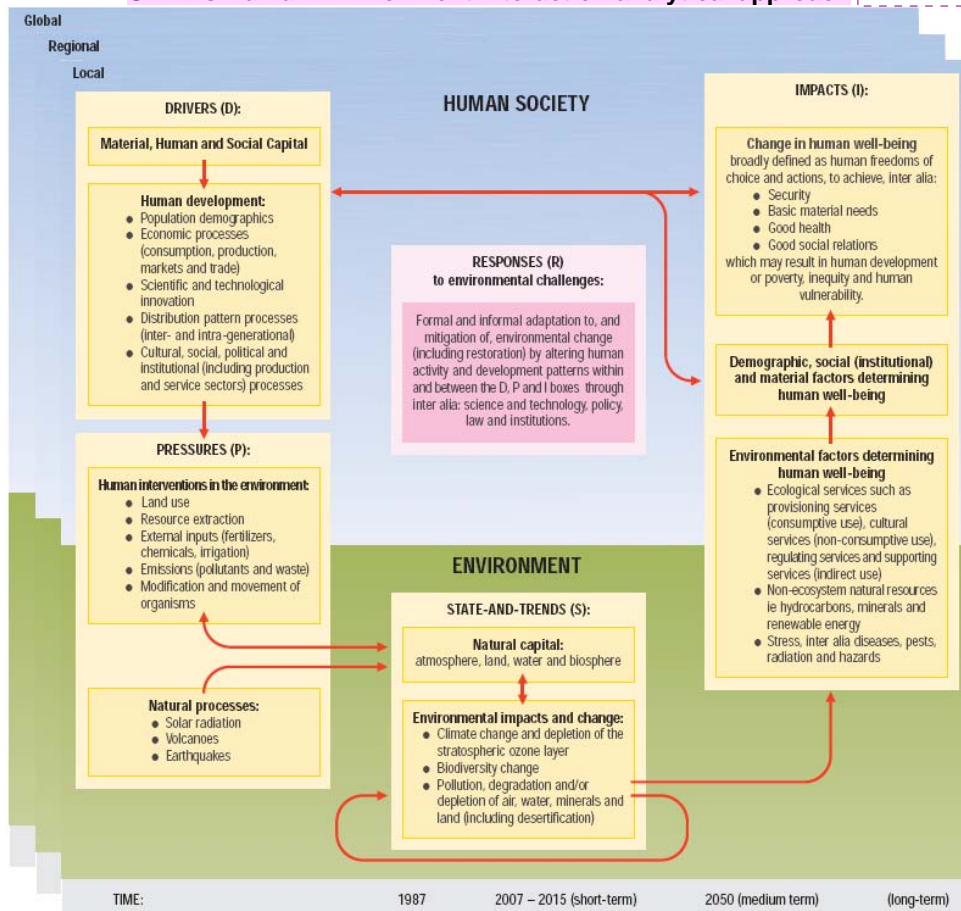
Source: Adapted from [Shah 2000](#)

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 Driver-Pressure-State-Impact-Response Framework based on UNEP's Human-Environment interaction analytical approach



Comment [M1]: CHRIS TO PROVIDE HIGH RES.

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.

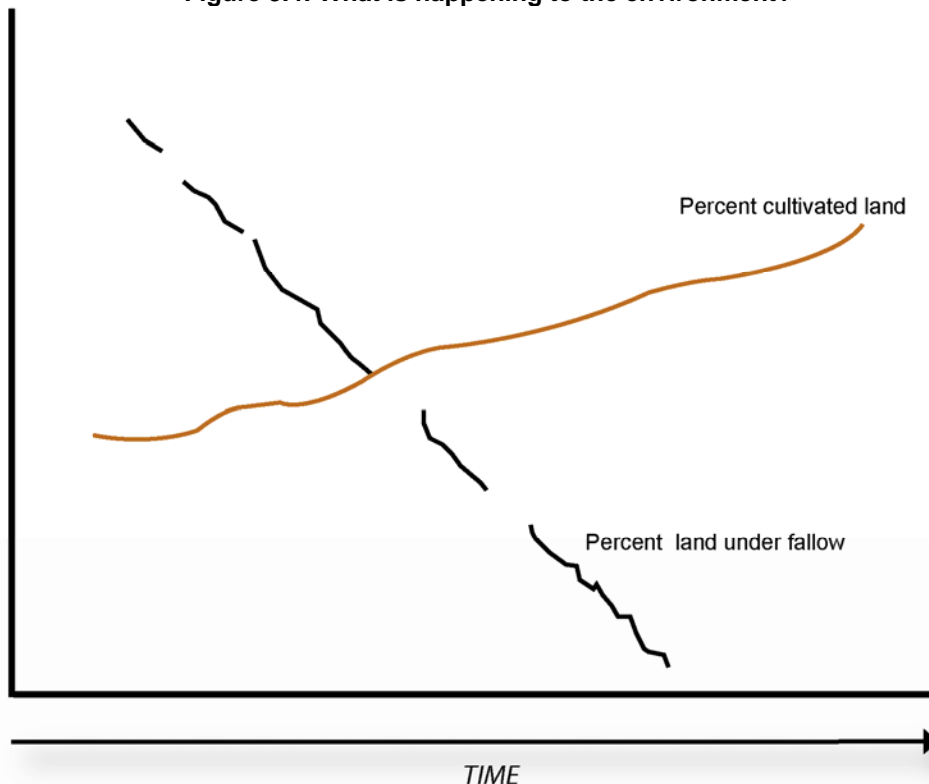
3.4 The Driving Forces-Pressure-State-Impact-Response framework at the local level

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?

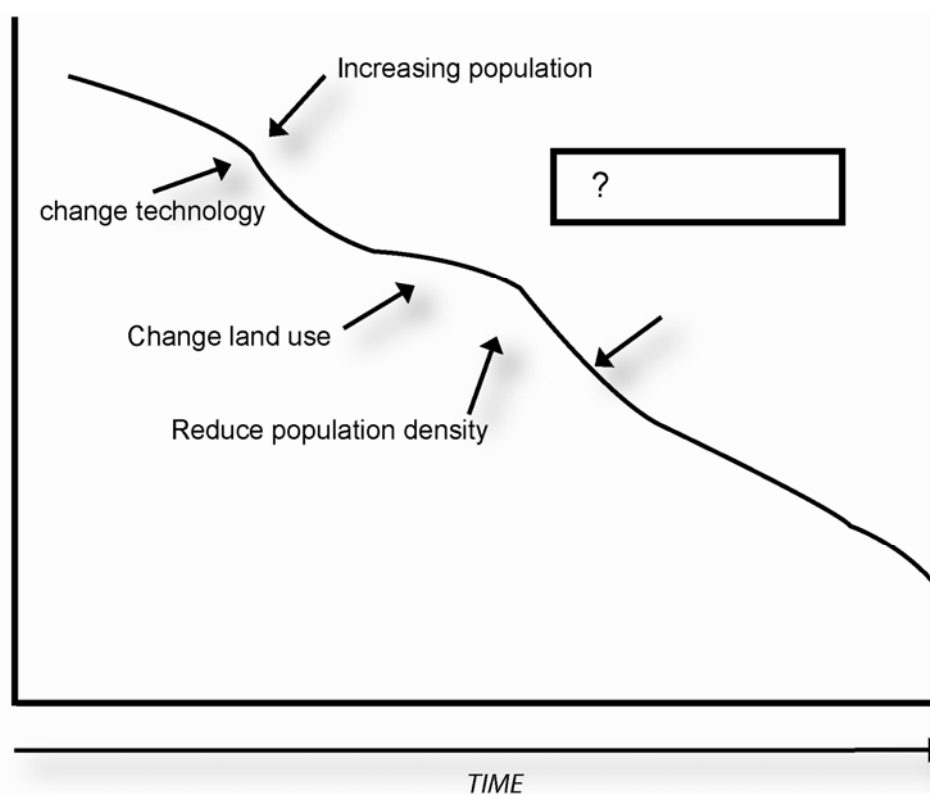


Source: M. Nkambwe

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).

Comment [MS2]: Figures 3.4 and 3.5 were developed specifically for this manual by Musisi Nkambwe, so I guess this sourcing is correct?

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



Source: M. Nkambwe

3.5 The Opportunities Framework

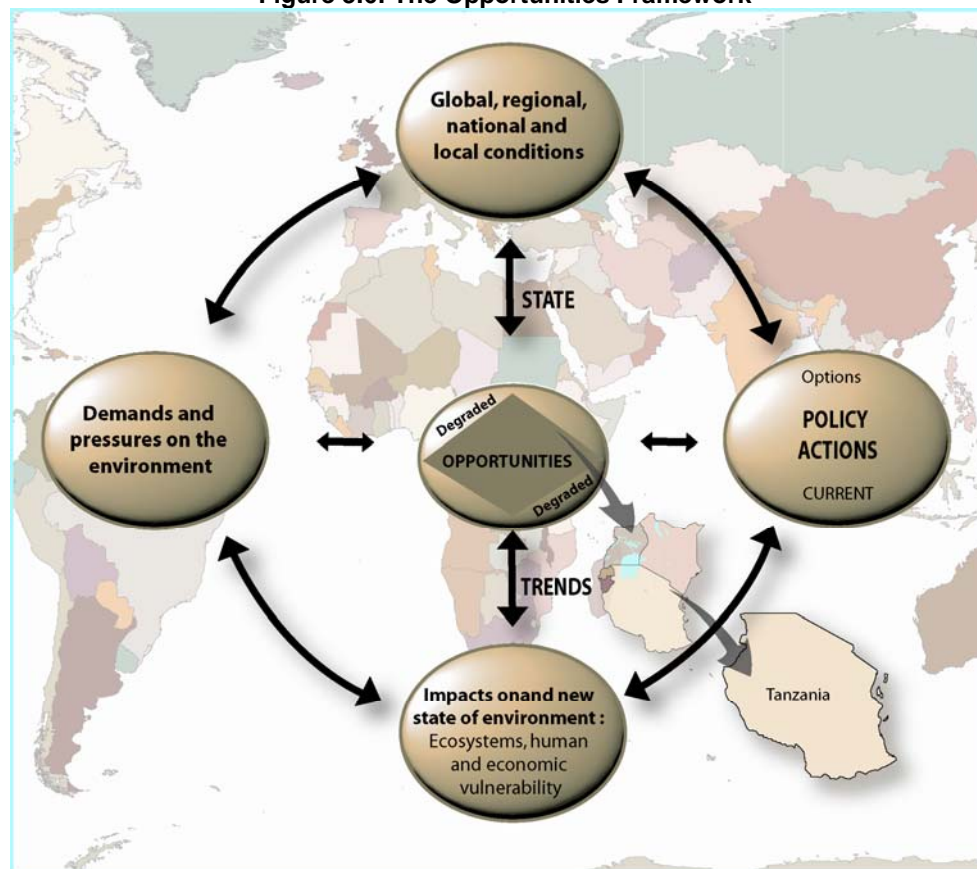
This approach, as used in AEO-2, is particularly focused on looking at potential opportunities for reducing poverty and promoting sustainable livelihoods. It starts by taking an inventory of existing resources and looking at trends in the recent past at the scale of interest (local, national, sub-regional 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



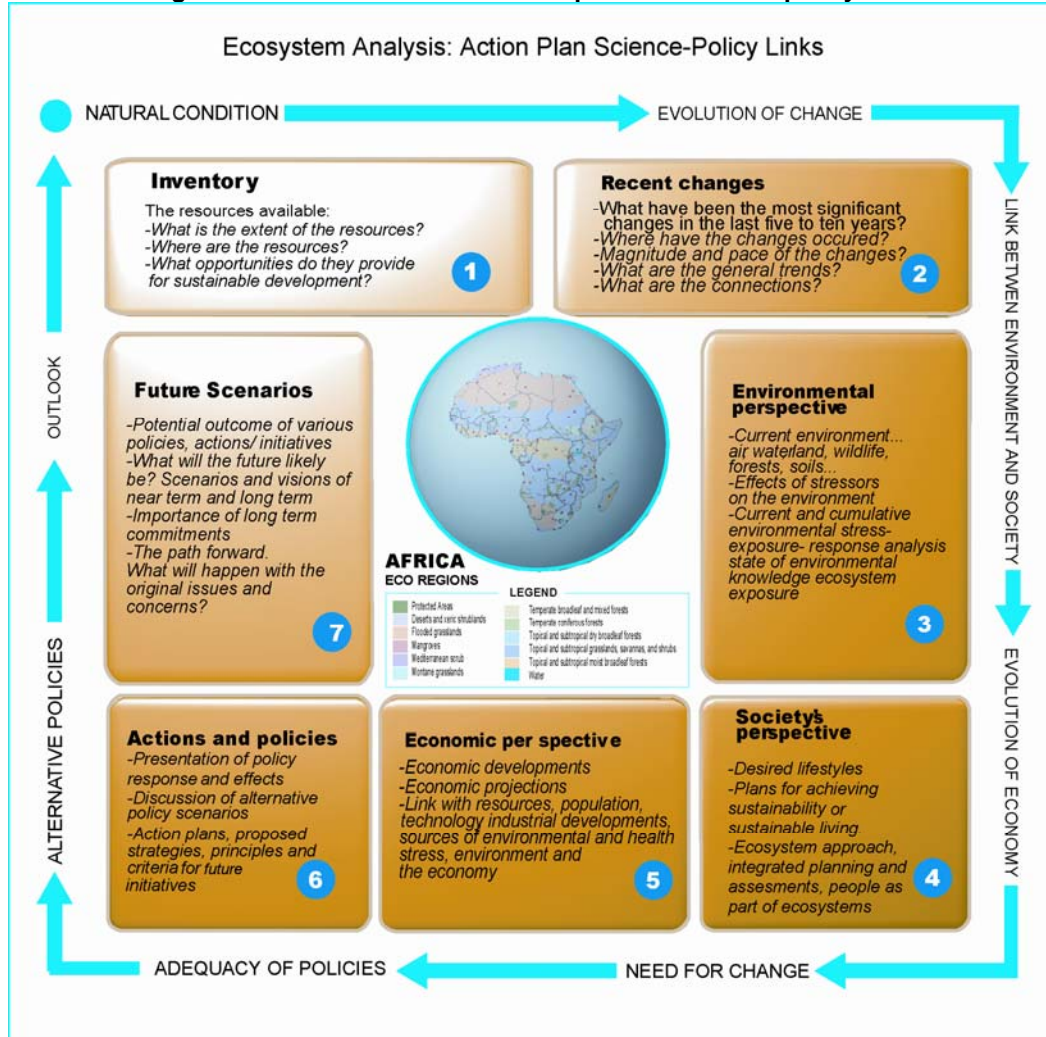
Source: M. Chenje.

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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

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