

## **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 21<sup>st</sup> 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.

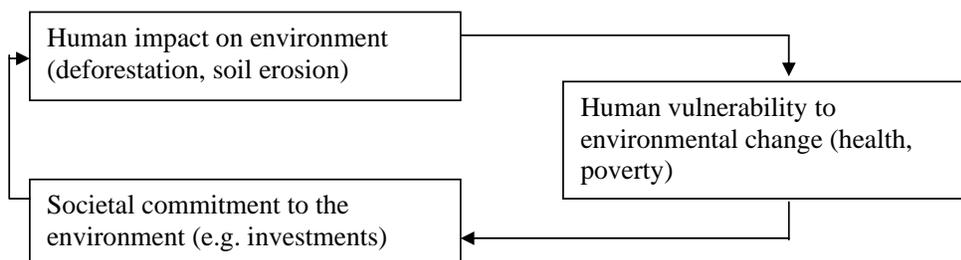
## **10.2 Concepts of human vulnerability**

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

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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	<ul style="list-style-type: none"> <li>- Urban air pollution</li> <li>- Water pollution/sanitation</li> </ul>	<ul style="list-style-type: none"> <li>- Number of people affected by environmental diseases</li> <li>- Number of people who have access to safe drinking water and sanitation</li> </ul>
Economic losses/gains	<ul style="list-style-type: none"> <li>- Environmental diseases</li> <li>- Soil erosion</li> <li>- Deforestation</li> <li>- Siltation</li> </ul>	<ul style="list-style-type: none"> <li>- Hours of labour lost due to environmental diseases</li> <li>- Food productivity loss due to soil erosion, deforestation, etc.</li> <li>- Reduction in yield (e.g. fish) from water bodies</li> </ul>
Poverty	<ul style="list-style-type: none"> <li>- Depletion of resource base to meet the basic needs of food, firewood, income, and employment</li> </ul>	<ul style="list-style-type: none"> <li>- Percentage of labour force affected by resource depletion</li> </ul>
Food security	<ul style="list-style-type: none"> <li>- Loss of natural vegetation and biological diversity</li> <li>- Soil erosion</li> <li>- Surface and ground water depletion</li> <li>- Rainfall amount and distribution</li> </ul>	<ul style="list-style-type: none"> <li>- Percentage of natural vegetation cover</li> <li>- Percentage of people directly dependent on land resources</li> <li>- Extent and distribution of degraded land</li> <li>- Rainfall amount and variability</li> </ul>
Conflicts	<ul style="list-style-type: none"> <li>- Scarcity of water</li> </ul>	<ul style="list-style-type: none"> <li>- Number of people living in areas where water</li> </ul>

	- Depletion of natural resource base	is scarce - Number of people dependent on vegetation resources
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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.

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



Darfur Region in Western Sudan

Source: Huggins 2004 adapted from OCHA Regional Support Office – CEA Nairobi 2002

**Comment [M2]:** This is the source of the first two paragraphs. However, the rest of the box is original, so I am concerned about the accuracy of putting the label "source" on this reference. I propose we exclude the "source" line and use the reference within the text where appropriate. You had indicated that I should check AEO-2 but I could not find this there.

**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 Morocco. 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