CHAPTER 6

Threats to Biodiversity and the Underlying Causes of Biodiversity Loss

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INTRODUCTION

Biological diversity in Africa, and many other parts of the world, is experiencing serious threat of decline and extinction. This is manifested by the reduced viability, endangerment and extinction of several species and communities of plants and animals, and by the breakdown in the functioning of ecosystems. Large acreages of forest, wetland, coastal and agricultural ecosystems as well as arid and semi-arid areas have been degraded and as a result several plant and animal species have been lost, others are endangered and genetic diversity has seriously eroded. Available evidence indicates that about 17 million hectares of tropical forest are being cleared annually and scientists estimate that at this rate, up to 10 per cent of the biodiversity in forests may face extinction in the next 30 years.[1]

The current losses of biodiversity have both direct and indirect causes. The direct causes include:

1. Habitat loss and fragmentation
2. Invasion by alien/exotic species
3. Destructive exploitation and over-use of the natural resources
4. Pollution
5. Modern agriculture/forestry
6. Natural factors – climate change, wildfires, natural disasters, etc.

The indirect causes (or underlying factors) include:

1. Population growth and high consumption rates
2. Poverty
3. Inappropriate macroeconomic policies
4. Inequity in resource ownership/management and benefit-sharing
5. Deficiencies in knowledge and its application
6. Poor policies and bad institutional arrangements.

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[1] Reid, 1992; Wilson and Peters, 1988

Often combinations of these processes/factors occur simultaneously, linked by causal relationships. The overall effect is often more than the sum of the partial impacts.

DIRECT CAUSES

1. Habitat degradation and fragmentation

The main cause of the loss of biological diversity is the degradation of natural habitats for plants and animals due to human activities. In many countries, there have been considerable loss and fragmentation of wild lands. The fragmentation of an ecosystem results in the development of 'wildlife islands' in which populations of wild species become isolated from their fellows elsewhere. As a result, the species become more vulnerable to external influences due to reduced genetic diversity and inbreeding. If habitats become too small (without a wider context of large areas), many species are lost.

The loss or fragmentation of habitats can result from:

- the conversion of wild lands into land for agriculture, ranching, industry, roads or housing;
- the drainage, reclamation or filling-in of wetlands;
- exploitational activities which cause extensive damage to ecosystems, such as mining, logging in natural forest ecosystems or the use of dynamite for fishing in coral reefs.

2. Over-exploitation of Natural Resources

Over-exploitation is an important cause of the impoverishment and destruction of ecosystems and species. If meadows are too heavily grazed, for example, their carrying capacity will be exceeded. If too great a pressure is placed on perennial grasses, they do not recover, and in the long run this leads to the degradation and desertification of areas where rainfall is very seasonal. Sea-fishing has already exceeded the sustainable catch rates in a number of important fisheries and are thus threatened. The endangered status of many species is caused by over-exploitation. Examples of threatened species due to over-exploitation include: the fur-bearing animals, e.g. the vicuna, otter and felines; marine turtles which are at risk due to the fact that both their meat and their eggs are eaten; the black rhinoceros whose population has declined by 97 per cent over 30 years (1968: 65,000; 1992: 2,000) and the Indian elephant whose population has reduced by 30 per cent over 8 years. International trade and high market prices for these species or their parts has been

the major stimuli for their over-exploitation. The exploitation methods used also unintentionally harm other species. For example, the use of drag-nets several kilometres in length for fishing results in the death of many marine mammals and birds. Activities in rainforests often have disastrous consequences for the local forest biodiversity.

3. Pollution

Biological diversity is increasingly threatened by water, soil and air pollution. Settlement and industrial areas deposit or discharge large quantities of pollutants, which radically alter the natural environment (water bodies, air, soil etc.), with effects which include: an increase in primary production; changes in the species composition; degradation of vegetation; the development of toxic algal blooms; and adverse effects on the fauna. The discharge of waste by industry and others and the use of fertilisers and pesticides by agriculture can have wide-ranging consequences for biological diversity. Most pollutants eventually end up in the water ecosystems which include high diversity of aquatic life. On the other hand, emissions of the greenhouse gases has resulted in changes in climate. Acid deposition, a consequence of emissions from traffic, industry, power stations and agriculture, is also causing problems for the soil and for vegetation in rapidly developing countries (as has been documented in Brazil).

4. The introduction of exotic species

The introduction of exotic species of flora and fauna can have major consequences for local species. This can occur not only through the inadvertent introduction of 'undesirable' species of animal, but also through the conscious introduction of domesticated species. Islands, with their small populations of often endemic species, appear to be particularly vulnerable. The introduction of exotic species often occurs as an unintended side-effect of agricultural or other production activities. Examples include:

- Virtually all the indigenous flora on the Cape Verde Islands have disappeared following the introduction of goats which systematically devour all the vegetation.

- The giant land turtle population on the Galapagos islands is under threat because rats introduced there eat their eggs.

- The Nile perch, a predatory fish introduced intentionally into Lake Victoria, has led to the disappearance of many native species of fish.

- The water hyacinths are affecting the aquatic biodiversity of many freshwater ecosystems in Africa.

5. Climate change

There are grounds for believing that the emissions of the so-called greenhouse gases into the atmosphere as a result of the combustion of fossil and other fuels and of expanses of forest can result in changes in the earth's climate. It is not known whether complex natural ecosystems will be able to adapt to such a rapid change in temperature and hence in climate. If there is a rapid rise in sea level (1–1.5 metres over a hundred years) this will have major consequences for coastal, delta and estuarine areas, mangrove swamps and coral reefs.

UNDERLYING CAUSES OF BIODIVERSITY LOSS

The root causes of the depletion of the biological diversity are often socio-economic and political. The socio-political acceptance of the need to conserve biological diversity is often still low in many countries and this is contributing to degradation of biodiversity.

1. *The unsustainably high rate of human population growth and natural resource consumption*

Global population will continue to grow for at least the next half century and the rates and magnitude of this growth have serious implications for biodiversity. As numbers have increased, humanity has appropriated an ever-increasing share of the earth's resources. People consume, divert, or destroy an estimated 39 per cent of the terrestrial productivity, a trend which is unsustainable. The world's biotic system simply cannot accommodate an ever-growing claim on primary productivity to meet further growth in human population and consumption. New patterns of development are essential if projected population growth is to be accommodated without straining the planet's carrying capacity.

2. *The steadily narrowing spectrum of traded products from agriculture, forestry and fisheries*

The global exchange economy that has emerged over the past century, based on principles of comparative advantage and specialisation, has increased both uniformity and inter-dependence.

In agriculture, producers now specialise in the relatively few crops that provide an edge in the world economy and as result, the number of crop species declines and traditional agricultural systems die out. The use of fertilisers, pesticides, and high-yielding varieties to maximise production and profits over the short-term exacerbates biodiversity. Similarly, large global markets have fostered the development of what might be called blanket fishing.

3. *Economic systems and policies that fail to value the environment and its resources*

Many conversions of natural systems such as forests or wetlands to farmlands and rangeland are economically and biologically inefficient. There are several reasons for the mis-valuation of biological resources. First, many biological resources are consumed directly and never enter markets. Second, biodiversity's benefits are in large part "public goods" that no single owner can claim. Wetland protection, for example, benefits the public tangibly and quantifiably, but the benefits are so defuse that no market incentives for wetland conservation ever develop. This undervaluation then justifies government policies such as tax incentives that further encourage wetland conversion to use with greater "market" value. Correctly valued, biologically diverse natural systems are major economic assets. But when undervalued, biodiversity conservation is seen as a cost rather than an investment.

4. *Inequity in the ownership, management and flow of benefits from both the use and conservation of biological resources*

In most countries, ownership and control of land and biotic resources, and all the benefits they confer, are distributed in ways that work against biodiversity conservation and sustainable living. The rapid depletion of species and the destruction of habitats are the norm in many countries where a minority of the population owns or controls most of the land. A second problem arises from the concentration of resource control and responsibility for environmental policy decisions being primarily in the hands of urban dwellers. A third issue is the way international trade, debt and technology transfer policies and practices foster inequities that resemble those found within nations. If the developing countries continue to be shut out of international markets, deprived of access to technology, and burdened with debt, they will have neither the means nor the incentive to conserve their resources for the future.

5. *Deficiencies in knowledge and its application*

Scientists still do not have adequate knowledge of natural ecosystems and their innumerable components. Even where knowledge exists, it does not flow efficiently

to decision-makers who have in consequence often failed to develop policies that reflect the scientific, economic, social and ethical values of biodiversity. A final difficulty stems from public reluctance to accept policies that reduce excessive resource consumption, no matter how logical or necessary such policies may be.

6. Legal and institutional systems that promote unsustainable exploitation

Ecological and economic realities clearly call for a cross-sectoral approach to biodiversity conservation and management. Yet, many national and international institutions operate along rigidly sectoral lines. A second problem is the over-centralisation of government and corporate planning, which hinders local implementation, discourages local participation, and closes the process to citizen's groups and non-governmental organisations. A third problem is the structural weakness of most agencies and organisations. Their efforts are commonly fragmented and overlapping; what conservation planning they do is neither comprehensive nor strategic, and they do not integrate *in situ* and *ex situ* conservation tools and technologies. Many developing countries still lack adequate policies, legal frameworks and other instruments for ensuring protection of the environment and the sustainable use of its resources. In many countries, customary laws that conserved biological resources well have been replaced by less effective legal systems. Because of these and institutional constraints, biodiversity conservation has typically been piecemeal and concentrated on traditional wildlife protection techniques.