

CHAPTER 1

Introduction

1.1 What is Biological Diversity?

‘Biological diversity’ encompasses all species of plants, animals and micro-organisms and the ecosystems of which they are part. It is an umbrella term for the degree of nature’s variety, including both the number and frequency of ecosystems, species or genes in a given assemblage. It is usually considered at three different levels, ‘**genetic diversity**’, ‘**species diversity**’ and ‘**ecological diversity**’. Genetic diversity is a concept of the variability within a species, as measured by the variation in genes (chemical units of hereditary information that can be passed from one generation to another) within a particular variety, subspecies or breed. Species diversity refers to the variety of living organisms on Earth and has been variously estimated to be between 5 and 30 million or more, though only about 1.4 million have actually been described. Ecological diversity relates to the variety of the habitats, biotic communities and ecological processes in the biosphere, as well as the tremendous diversity within ecosystems in terms of habitat differences and the variety of ecological processes.

Ecosystems cycle nutrients (from production to consumption to decomposition), water, oxygen and carbon dioxide (which affect the climate), and other chemicals such as sulphur, nitrogen and carbon. Their integrity is essential for maintaining the biological resources in forests, plains, mountains and wetlands which are the physical manifestation of the globe’s biological diversity.

1.2 How Biological Diversity Contributes to Sustainable Development

The contribution of biological diversity to sustainable development was acknowledged in 1987 by the World Commission on Environment and Development (WCED): “Today, the conservation of wild living resources is on the agenda of governments, nearly 4% of the Earth’s land area is managed explicitly to conserve species and ecosystems, and all but a small handful of countries have national parks. The challenge facing nations today is no longer deciding whether conservation is a good idea, but rather how it can be implemented in the national interest and within the means available to each country”.

While biological resources are essential to human welfare, the biological diversity of the planet is under greater threat than ever before. It faces problems from the local level (poaching, encroachment of protected areas) and the global level (deforestation, global climate change). Despite the best efforts of biologists, ecologists, wildlife managers and park planners, biological diversity is now under siege throughout the world. More species than ever before are threatened with extinction, with hundreds – perhaps thousands – disappearing each year, many before they are even described. The genetic resources of the Earth’s natural heritage are barely understood, let alone utilised, by the world, yet those resources are disappearing before their myriad life forms can even be named and counted. And the

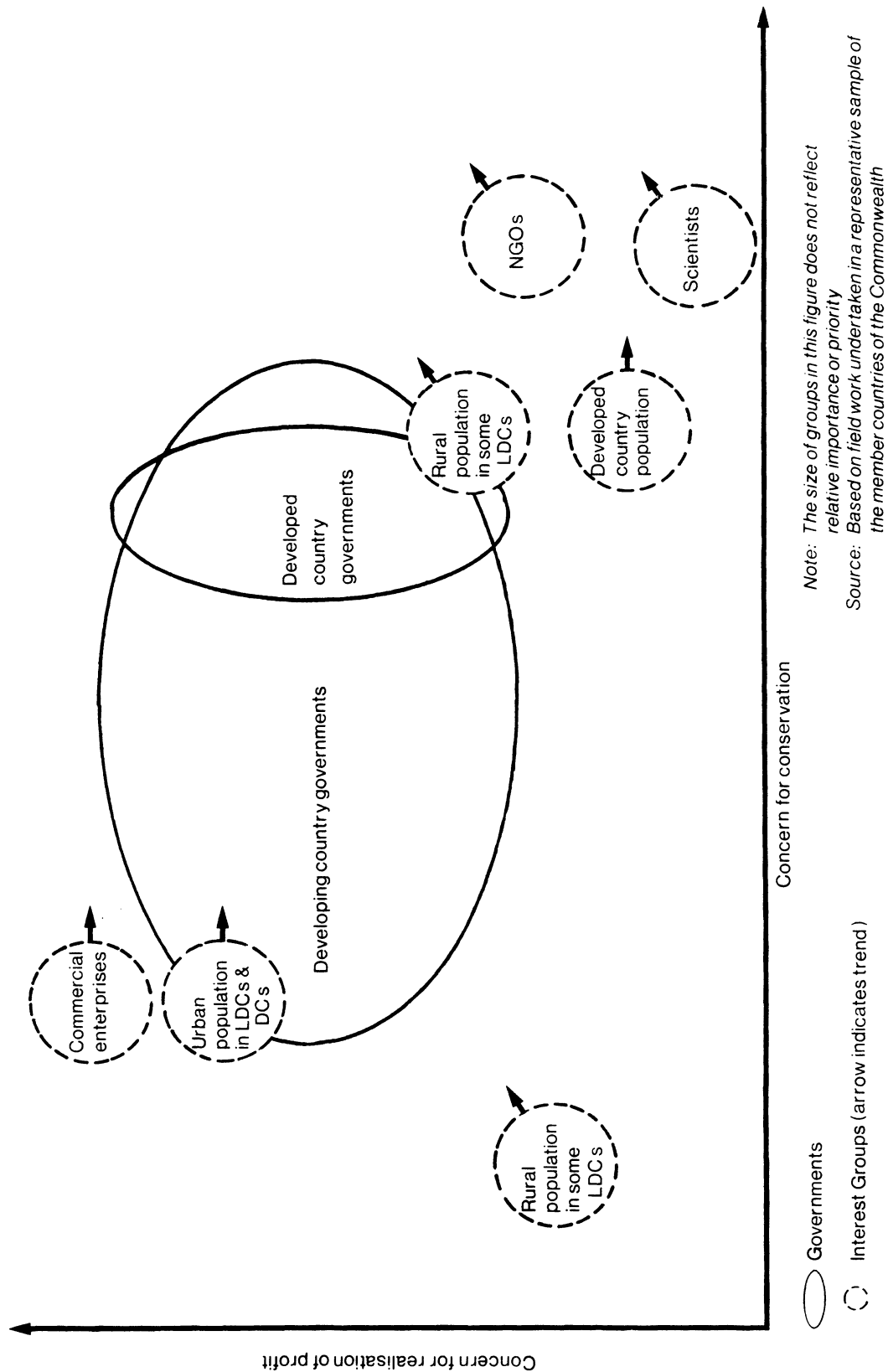


Figure 1.
A range of views on conservation of biodiversity

knowledge of the possible uses of plants and animals, which is held largely by indigenous peoples living in remote undeveloped areas, is being lost as forest habitats are destroyed relentlessly.

About a quarter of all drugs dispensed in the world, including anaesthetics, sedatives, stimulants, antitumour agents, analgesics, cardiotonics, antimalarial agents, aspirin and birth control pills, are derived from forest plants. Perhaps the best known example from Africa is Madagascar's rosy periwinkle, a small flowering plant that yields chemicals which have enhanced the chances of the successful treatment of childhood leukaemia from 1 in 5 to 4 in 5. Moreover, some of the most commonly prescribed and fundamental drugs used throughout the world are derived from less than 90 species of higher plants. Only 5,000 species have been thoroughly screened for their medicinal properties, and most of these grow in temperate climates, leaving the vast potential resources of the tropics unknown to the world.

The possible uses of genetic resources are not restricted to medicine. Plant and animal products have benefited agriculture, forestry, fisheries and industry. Advances in biotechnology, plant breeding and genetic engineering have enabled the genes of a wild species to confer new properties such as disease resistance or improved yield upon a domesticated species. But the source of wild varieties is being diminished. Diversity in genes, species and ecosystems provide the raw materials with which we can adapt to change; and the loss of each additional species reduces the option for nature and people to respond to changing conditions.

The distribution of centres of origin of species is unequal geographically due to historical factors, especially the continental drifts. Areas with richer diversity are essentially in tropics and subtropics and in the less advanced countries but are least understood due to lack of infrastructure; there is therefore need for international effort to harness biological resources for human welfare.

The World Conservation Union (IUCN)'s List of Endangered Species is growing quickly (compare the 1986 list with the 1988 list). IUCN's List of Threatened Protected Areas of the world is now twice as long as it was only four years ago (IUCN/CNPPA, 1988). A recent comprehensive review of the world's avifauna concluded that, of the globe's 9,000 bird species, over 1,000 (11%) were at some risk of extinction, up from just 290 bird species threatened in 1978. These increases are however partially due to more complete information becoming available in the past several years.

It should be noted that biological diversity constitutes an invaluable source for the discovery of natural resources. Its identification and authentication is crucial. The germplasm of this planet contains a repository of genes which can potentially be used to enhance the quality of natural products, many of which are uneconomical to synthesise. Also, a knowledge of naturally occurring diverse genetic systems will give us an insight into the mechanisms required for the synthesis and manipulation of desired genetic material which may well provide the cornerstone for solving complex environmental problems that face us today or may do so tomorrow.

Though we cannot determine whether the biological resources within one biogeographic region are potentially more valuable than those in another region, even if the number of species differs vastly between regions, equal weight would initially be given to all ecosystems, each with its own characteristic biological diversity and its own importance to the

people living in and around the ecosystem. Priorities are to be established on the basis of uniqueness, present and potential future value, and threat of extinction.

The conservation of biological wealth is not simply a traditional protection agenda, but a scientific, economic, social, political and development issue. New modes of financing, co-operation and the integration of conservation into the developmental process are required. It is not simply a problem of the tropical poor countries. While more than half of Earth's biological wealth lies in the tropics, and at least 40% of the total in the 20 countries containing significant amounts of the remaining tropical moist forests, **all** nations carry responsibilities to conserve the biodiversity within their own borders. Any scheme to establish priorities for the conservation needs of biological resources must recognise that, from a national perspective, the maintenance of local biological resources is essential to support sustainable development even if the nation's biological diversity is not particularly high from a global perspective.

In a desire to simplify the definition of biodiversity and in order to make it more acceptable to policy agencies, conservation advocates began to use biodiversity to mean simply the number of species and, occasionally, the diversity of ecosystems as well. This abbreviated definition has been used by the many national and international organisations charged with biodiversity conservation.

International and national development agencies cling to this over-simplified definition of biodiversity while the academic scientific community has been constantly refining and debating the meaning of biodiversity. Scientists have identified several critical deficiencies in the simple definition, including the lack of a spatial and temporal framework and the lack of any component of process. Feedback from the scientific community, which would allow conservation policy makers to incorporate new understanding of biodiversity, is absent.

Conservation of biological diversity and its sustainable utilisation evokes a multitude of responses depending on the perceptions of different groups of people. Figure 1 gives a comparative view of various such groups. Axis one gives the concern for conservation while axis two describes the concern for realisation of economic value. The diagram is based on subjective information collected as a result of field work undertaken in developing countries of the Commonwealth. Most of the sovereign governments are concerned about biodiversity loss for both reasons, to varying degrees: they recognise the intrinsic value of biodiversity, but are also concerned about the potential loss of commercial value from over-exploitation. As a generalisation, the developed countries are more concerned about the loss of commercial value though they want to show concerns for conservation and can afford to place greater emphasis on conservation for its own sake. It should be noted that the rural population of LDCs fall into two classes. In LDCs that are under extreme economic and political trauma the concern for conservation among the rural population is very low for they are fighting for survival, while in others where the basic needs of human existence are met the population is more concerned about maintaining their ecologically sound traditional life style. This dichotomy is also reflected in the concerns expressed by developing country governments in that the range of their views *vis-à-vis* conservation spans a much wider spectrum than that of developed countries.

Environmental pressures such as climatic change, acid rain, pollution and depletion of natural forests and wetlands that support biological diversity are causing great concern to all humans. The capacity of natural habitats to sustain their innumerable plants, animals and

micro-organisms is today being eroded. To stop this decline it is essential to have consensus on international priorities for maintaining the diversity of life forms and to provide a framework for detailed action plans at the national level. National level plans will, in turn, address priority needs for protection of critical ecosystems, related strengthening of institutional capabilities, and computerised information databases.

A fundamental issue which needs to be addressed by member countries is determining the optimal distribution of benefits from utilising biological resources. Most of today's benefits from harvesting the forests, grasslands and seas flow to the global community at large. Relatively few benefits are provided to the local people who bear the bulk of costs. For example, worldwide sales of the drug made out of the rosy periwinkle now total around US\$100 million a year, while indigenous populations of Madagascar lack money for conserving their unique flora and fauna. If biodiversity is to be conserved effectively, appropriate mechanisms will have to be developed with speed, to redress this imbalance.

The need for co-operation between the users and owners of biological resources can no longer be ignored. Concrete steps at the policy planning and operational level are needed to protect our biological resources, before irreversible damage has been done. Leading ecologists consider the loss of biological diversity as an even more urgent and immediate problem than the well known ecological disasters such as ozone depletion and the greenhouse effect, though it is less well appreciated by the world's leaders and organisations at present due to lack of information on the problem. The designers and implementers of any programme to conserve biological diversity and genetic resources also have to undertake the task of dissemination of knowledge and information on the critical issues contained in the loss of biodiversity which has begun to threaten human existence.

1.3 International Efforts to Conserve Biodiversity

The overall strategy of the United Nations system is based on concerted efforts to implement the principles propounded in the *World Conservation Strategy, Caring for the Earth: A Strategy for Sustainable Living*, the *World Charter for Nature*, the *Action Plan for Biosphere Reserves* and *From Genes to Ecosystem: A Research Agenda for Biodiversity*. These entail collaborative action between international organisations such as FAO, IBPGR, IUBS, IUCN, SCOPE, UNEP, UNESCO and WWF. The Commonwealth countries are also indirectly involved in this exercise but there is so far no effort within the Commonwealth as a whole to formally provide guidance on practical implementation of the strategies being formulated. To speed up much needed action for the conservation of the biological wealth of the member countries of the Commonwealth, there is an urgent need for Commonwealth Heads of Governments to issue a mandate for creating forthwith an implementing agency within the institutional mechanism of the Commonwealth Secretariat.

Various development agencies have tried to incorporate conservation of biological diversity into their programmes and it stands out among the four thematic concerns of the Global Environment Facility. The governments of many countries have also started declaring biodiversity conservation as one of their domestic and foreign policy objectives. All the countries except the USA have signed a global convention on biodiversity at the Earth Summit held in June 1992 at Rio.

A Global Biodiversity Strategy has been developed jointly by UNEP, IUCN and WRI, with inputs from several partner organisations including the Commonwealth Science Council (CSC). It recommends 85 actions. These actions do not yet have practical plans for implementation. Specific algorithms need to be formulated to do this. CSC's BDGR programme seeks to provide these. The Global Biodiversity Strategy has recognised the distinctive role of CSC in this regard.

1.4 A Biodiversity Convention

North-South differences have deadlocked the negotiations aiming to create binding global agreements for the conservation of biodiversity. A convention was drawn up, however questions remain over the rules governing access to genetic resources, availability of technology and appropriate financial mechanisms. It is also not clear as to how these will be affected by changes in intellectual property rights. Many countries of the South are demanding agreements and funding for the transfer of biotechnology, to compensate them for the stewardship and conservation of biodiversity. Governments of countries of the North, in contrast, oppose this, arguing that biotechnology has little role to play in the conservation of biodiversity. They place more emphasis on setting aside protected areas to ensure their continued supply of genetic resources. This form of *in situ* conservation (which could affect up to 10% of global land) would further threaten the livelihood of many farmers with small holdings. These farmers, who are in a position to implement their own *in situ* strategies for maintaining diversity on their farms, are being completely ignored by the North in the debate. The treaty on biodiversity has been signed by 170 governments with the exception of the USA at the Earth Summit. However, the details of appropriate financial and institutional mechanisms for implementing the agreement will take some time before being finalised. The text of the Convention on Biodiversity signed by Heads of Governments in Rio de Janeiro is given in Part II of this report.

1.5 Commonwealth Countries and Biodiversity

Commonwealth member countries are among the richest repositories of the biological diversity of the Earth, a substantial proportion of which in many of these countries is lying intact. It was, therefore, only natural that a pan-Commonwealth programme be launched to conserve this most valuable resource. Commonwealth concern over the maintenance of biodiversity and genetic resources and sustainable development was expressed in the 1989 Langkawi Declaration on Environment and further underlined by Heads of Commonwealth Governments in the Harare Communiqué of their summit meeting in 1991. The following chapters of this report describe the Commonwealth Science Council's BDGR programme in detail and seek to: (a) consolidate the work done to date under the aegis of this programme; and (b) indicate a direction for future action required to conserve what is perhaps our most valuable asset.