Available from:

The European Commission
EuropeAid Cooperation Office
Environment and Social Development Unit
Rue de la Loi/Wetstraat 200
B-1049 Brussels, Belgium
Tel. +32 2 2959845 / 2967325
http://europa.eu.org

IUCN
28 Rue Mauverney
CH-1196 Gland, Switzerland
Tel. +41 22 999 0001
Fax +41 22 999 0015
http://www.iucn.org

Biodiversity IN Development

Strategic Approach

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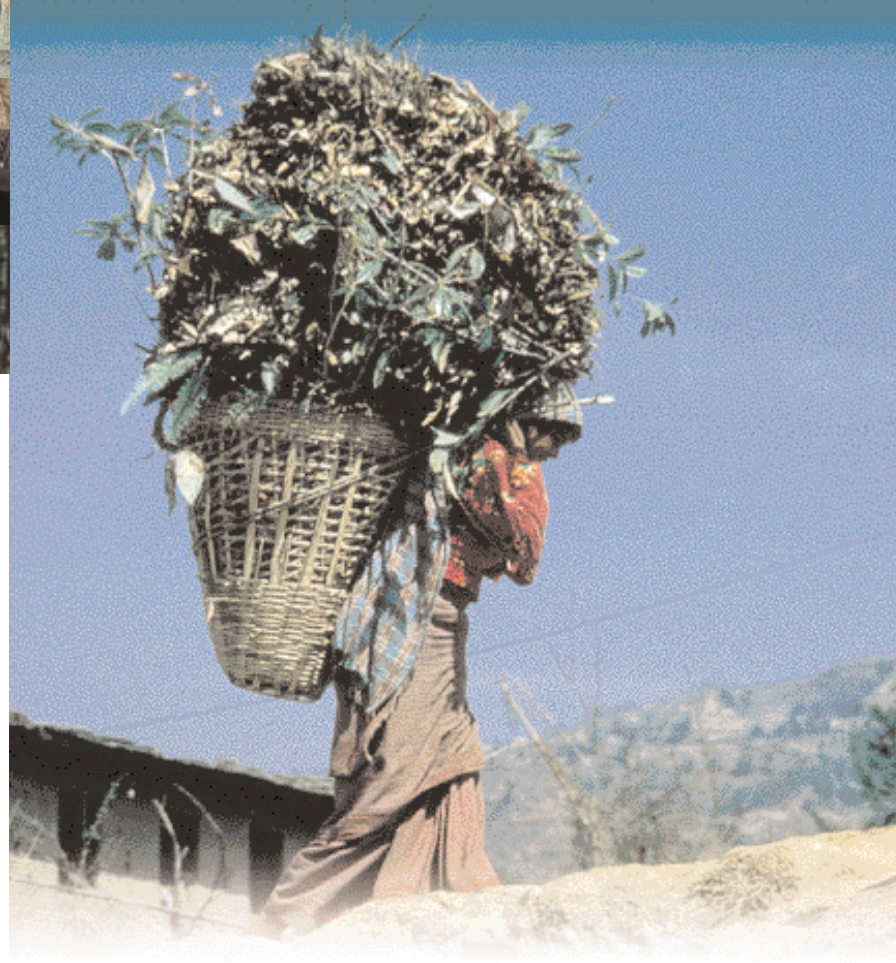

European Commission

DFID Department for International Development

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Strategic Approach for Integrating Biodiversity in Development Cooperation

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Protected Areas Programme
Rue Mauverney 28,
CH-1196 Gland, Switzerland
Tel.: +41 22 999 0001
Fax: +41 22 999 0015
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Acronyms, abbreviations and glossary

ACP	Africa, Caribbean and Pacific
ALA	Asia and Latin America
ASEAN	Association of Southeast Asian Nations
BB	Biodiversity Brief (BDP)
BDP	Biodiversity in Development Project (EC/DFID/IUCN)
CBD	Convention on Biological Diversity
CBO	Community-Based Organisation
CEFDHAC	Dense Humid Forest Ecosystems of Central Africa *(Les Ecosystèmes de Forêts Denses et Humides d'Afrique Centrale)*
CEP	Country Environment Profile (EC)
CHM	Clearing House Mechanism (CBD)
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
COM	Communication (EC)
COP	Conference of the Parties
CSP	Country Strategy Paper (EC)
CSS	Country Support Strategy (EC)
DAC	Development Assistance Committee (OECD)
DFID	Department for International Development (UK)
DG	Directorate General (of the European Commission)
EC	European Community
ECOWAS	Economic Community of West African States
EDF	European Development Fund (EC)
EIA	Environmental Impact Assessment
EU	European Union
FAO	United Nations Food and Agriculture Organization
GDP	Gross Domestic Product
GEF	Global Environment Facility
GMO	Genetically Modified Organism
IDT	International Development Target
IPR	Intellectual Property Rights
IUCN	The World Conservation Union
LMO	Living Modified Organism
MERCOSUR	Common Market of the South *(Mercado Común del Sur)*
NGO	Non-Governmental Organisation
NSSD	National Strategy for Sustainable Development
NTFP	Non-Timber Forest Product
OECD	Organisation for Economic Co-operation and Development
PA	Protected Area
POP	Persistent Organic Pollutant
SADC	Southern African Development Community
SBSTTA	Subsidiary Body on Scientific, Technical and Technological Advice (CBD)
SEA	Strategic Environmental Appraisal
TOR	Terms of Reference
UNCLOS	United Nations Convention of Law of the Sea
UNEP	United Nations Environmental Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
WCMC	World Conservation Monitoring Centre (UNEP)
WTO	World Trade Organization

Contents

Agrobiodiversity is important in supporting local livelihoods.

Preface

1 Background

The *Strategic Approach for Integrating Biodiversity in Development Cooperation* is a product of the Biodiversity in Development Project (BDP). The BDP was conceived in response to an expressed need by the European Commission and European Union (EU) Member States development cooperation agencies for increased coherence in their approach to biodiversity issues, and is a partnership of the European Commision, DFID and IUCN.

The BDP outputs represent the culmination of an extensive programme of consultation. The *Strategic Approach* document is the product of consultation between EC policy advisers and task managers dealing with biodiversity and the environment, and those working on natural resource and non-natural resource issues. The EC/EU Tropical Biodiversity Advisers' Group was involved at all stages, providing guidance and comments on drafts. In addition, early drafts of the Strategic Approach were discussed at four regional workshops, held in Cameroon (west and central Africa), Sri Lanka (Asia), Botswana (southern and eastern Africa) and Peru (Latin America and Caribbean). These workshops involved almost 100 participants from 38 countries[1].

2 What does the Strategic Approach cover?

The BDP aims to support the EC and EU Member States in meeting their obligations under the legally-binding Convention on Biological Diversity (CBD). While respecting the sovereignty of individual nation states, and the efforts they are making in biodiversity conservation and sustainable use, the CBD provides for international support to developing countries in meeting the objectives of the Convention through bilateral, multilateral and other channels. From the perspective of development cooperation, any such support to developing countries should be in the context of achieving sustainable development and take account of the global values of biodiversity.

Many poor people rely on a wide range of plant and animal species for subsistence and trade.

Countries in the Organisation for Economic Cooperation and Development (OECD) have agreed to eight International Development Targets (IDTs) which were compiled by the Development Assistance Committee (DAC) (see Figure 7). They focus attention on economic well-being, social and human development, and environmental sustainability and regeneration, with poverty reduction as an overarching goal. In line with these targets, the *Strategic Approach* addresses the related and important issue of integrating biodiversity into development cooperation policy and practice. The document highlights the need to realise biodiversity's full poten-

[1] Details of the BDP process and outputs can be found on DG Development's environment web page: http://europa.eu.int/comm/development/sector/environment.

TEXT BOX 1

Technical EC publications relating to biodiversity in development cooperation

The *Strategic Approach* report is complemented by other EC publications and reports:

- *Guiding Principles for Biodiversity in Development: Lessons from field projects* (BDP 2001) presents both opinions from developing countries and an elaboration of best practice principles (summarised in the Programming Chapter of the *Strategic Approach*). It is especially for the attention of EC officers in delegations, private sector actors and non-government organisations (NGOs) working in developing countries.
- twenty *Biodiversity Briefs* – BBs[2] – (BDP 2001) provide an overview of the biodiversity aspects of a variety of issues, to raise awareness amongst policy makers.
- the *EC Environmental Integration Manual* (EC 2001) covers the procedures to be followed and the tools available for integrating environmental issues at policy, programming and project levels of all development cooperation activities.

These documents can be found on the Directorate General (DG) for Development website http://europa.eu.int/comm/development/sector/environment

An important component of poverty reduction is food security. Biodiversity offers a range of nutritious foods for a varied diet.

tial to support development, while addressing the direct and underlying causes of its loss. In doing this, it offers technical support to the *EC's Biodiversity Action Plan for Economic and Development Cooperation* (COM (2001) 162).

The *Strategic Approach* covers all terrestrial biodiversity, inland waters, coastal areas and some marine issues relevant for development cooperation. It focuses principally on the conservation and sustainable use of biological resources in developing countries, from both natural and farm habitats.

EC institutions group tropical countries into two blocks: the countries of Africa, Caribbean and the Pacific (ACP) and those of Asia and Latin America (ALA), and this geographic grouping is followed here.

3 Who is the Strategic Approach for?

The *Strategic Approach* is intended for use by the environment and biodiversity task managers of the European Commission's development cooperation programmes. However, it is expected that the *Strategic Approach* will also prove useful to both EU Member State development agencies, and to biodiversity and environment task managers of partner countries.

Other documents produced by the BDP (see Text Box 1) are complementary to this volume, but have different primary target audiences.

4 What is the Strategic Approach for?

The *Strategic Approach* report defines biodiversity, clarifies misconceptions surrounding this relatively new term, and elaborates on its importance for development. It also describes both the direct and indirect causes of loss of biodiversity, at genetic, species and ecosystem levels. In light of these issues, the *Strategic Approach* defines the challenge for development cooperation investments in balancing the need to reduce poverty with the need to reduce the loss of biodiversity.

[2] Cross reference is made to Biodiversity Briefs throughout this report.

The report then lists key actions that need to be taken by policy makers, programme designers and coordinators, and project implementers to ensure that biodiversity is integrated into development cooperation. The emphasis is on using biodiversity to contribute to, rather than compete with, efforts to fight poverty worldwide by considering conservation and sustainable use of biodiversity in the context of sustainable development and poverty reduction.

The costs and benefits of conservation and sustainable use of biodiversity should be shared equitably.

Chapter 1

The Challenge

Biodiversity and conservation are two separate, but commonly-linked concepts. It is important to separate them when considering biodiversity in a development context. Conservation refers to a set of objectives, or management activities, designed to maintain populations of genes, species and areas of ecosystems. Biodiversity, on the other hand, provides: the raw material for evolution, breeding programmes and genetic technology; the wealth of species that supply products for subsistence, trade and cultural artefacts; and the ecosystem processes and functions that support productive landscapes. Biodiversity can be conserved, used, or destroyed.

A second misconception about biodiversity arises because we commonly refer to components of biodiversity – timber resources; staple crops; indigenous fish, etc. – as *natural resources*. In perceiving them as natural resources of immediate and visible use we forget that they are also a part of biodiversity – the living part of the environment. The role of these natural resources within ecosystems is of critical importance to maintaining the health of the environment. Although less visible, the role of biodiversity components in maintaining soil fertility, forest habitats and productive wetlands and other ecosystem services is also crucial to sustainable development. Moreover, many components of biodiversity little-used today, may be important to meet changing needs in the future.

The world is losing its biodiversity at an increasingly rapid rate. This loss commonly bring benefits to a few powerful actors, but deprives many people of the natural capital which is the foundation of their livelihoods. The links between biodiversity and poverty are complex and somewhat circular as loss of biodiversity can lead to increased poverty, but poverty can also be an underlying cause of loss of biodiversity. Addressing poverty issues through development cooperation, therefore, requires an assessment of the links between biodiversity and poverty.

Biodiversity supports these women farmers through the many varieties of potatoes they grow, through the diversity of organisms ensuring the health of the soil, and through the ecosystem services which help to regulate soil erosion, water flow and nutrient recycling.

1.1 What is biodiversity?

The term 'biodiversity' was only coined in the 1980s (Wilson, 1988), and there is still much misunderstanding about what it means. People commonly think of spectacular large mammals in an African savannah or pandas in China when they hear the word. While such animals are indeed

TEXT BOX 2

Definition of biodiversity

Biodiversity is *'the variability among living organisms from all sources, including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems'.*

CBD, Article 2

components of biodiversity, the concept encompasses much more that is less easily seen, less obviously interesting to humans, and yet crucial for human development. Biodiversity is shorthand for biological diversity, and for all life on earth. It comprises the plants and animals that we can see, but also the microscopic organisms that live in the soil, the bacteria in our digestive tracts, and the myriad biological processes that sustain life on earth.

In their efforts to understand the term people have considered it from various perspectives. For example, it can be described in terms of its composition, structure and function; the information it holds; its energy and mass; as various combinations of human and natural capital; the goods and services it provides; its spiritual and religious importance; and the options it represents for the future.

Of these aspects, which are important in the context of development cooperation? It is sensible to begin with the definition given in the CBD (see Text Box 2), and to consider genetic, species and ecosystem biodiversity from a development perspective:

Diversity within species *(genetic biodiversity)* refers to the frequency and variety of genes within and between populations of the same species. Genetic biodiversity is reflected in differences in the heights of adult rice plants, the flavour of maize varieties, or the yields of pine trees, for example.

One key characteristic associated with genetic biodiversity is the **capacity to evolve**. Evolution occurs through adaptation in response to natural selection, or artificial selection in the case of human-directed breeding. Populations adapt to new selection pressures, which may lead to locally-adapted varieties of crops and stock, but equally can lead to new varieties of pests and pathogens. For example, resistance to new anti-malarial drugs can evolve in malaria parasites within 10–15 years.

A second key feature of genetic biodiversity is the vast amount of **molecular information** held in species' 'genepools'. This information is the product of millions of years of evolution, and has been drawn on by plant and animal breeders, and more recently genetic engineers, to develop desired characteristics in populations. Any loss of genetic biodiversity is permanent.

Some species are useful to humans because they are easy to domesticate and provide food – such as carp which can be farmed in fishponds.

Diversity between species *(species biodiversity)* refers to a combined measure of the **number** of species and the number of individuals in a species **(abundance)**; species number alone is termed species richness. A species is defined as a group of organisms that are able to inter-breed freely, and species biodiversity incorporates characteristics such as size and structure, population dynamics and reproductive cycles, behaviour patterns and taxonomic differences.

The current best estimate of the number of species on earth is 13 million (Heywood and Watson, 1995), of which over 70 per cent are tiny animals without backbones. From the perspective of development, a number of **species' qualities** need to be kept in mind: Are they pathogens or disease vectors? Do they have subsistence, commercial, social or cultural values? Are they migratory or endemic to a restricted area? Are they abundant and capable of recovering quickly from harvesting? These 'bio-qualities' need to be added to quantitative measures of species number and abundance when species biodiversity is assessed.

The pesticidal qualities of plant extracts, such as those from the neem tree, are of particular value to poor farmers

Diversity of ecosystems refers to the variety within and between different ecosystems. An ecosystem is a *dynamic complex of plant, animal and micro-organism communities and their non-living environment, interacting as a functional unit* (CBD, Article 2). Within ecosystems, **biological processes** such as pollination, predation and symbiosis fulfil important functions. Interactions between living and non-living components are essential in providing **ecosystem services**: soil formation, nutrient recycling and water purification, for example.

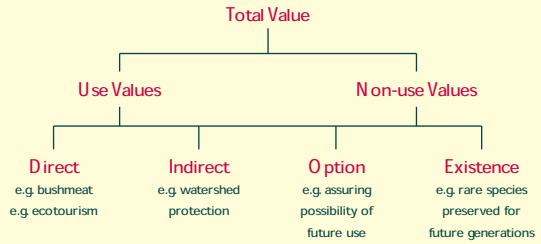
Humans have long been a component of ecosystems, and the interplay between biological processes and human impacts have shaped each other, giving rise to productive landscapes that combine biological and cultural diversity. Since humans have long had an impact on natural ecosystems, the term 'wildlands' will be used in this report to denote areas with low, or only historical human impacts, and which do not rely on human intervention to be maintained.

These trees have evolved a resistance to fire which helps them survive harsh conditions.

1.2 Why should we care about biodiversity?

To understand the importance of biodiversity for human development, we need to evaluate the products that can be used (both species and genes), and the ecosystem services that support human development. An accurate valuation of biodiversity needs to consider the direct use values (products), and indirect use values (services), and combine consumptive and non-consumptive use. In addition, it needs to take into account the value of biodiversity components that are not used (see Figure 1).

Figure 1 – Total economic value of biodiversity (with examples)



Source: adapted from Pearce and Moran, 1994.

Unless public goods and services are included in valuations, then short-term, unsustainable land-use practices are likely to appear more profitable. This can be seen in many tropical countries, which have mined natural resources for short-term development benefits and are now impoverished as a result (World Bank 2000).

1.2.1 Products

People rely on a wide range of products including domesticated crops, livestock, fish and trees, and products gathered from fallows and wildlands. The wide range of uses to which these products are put are illustrated below, with examples given in Text Box 3:

- **Food**: people and their livestock eat a range of cultivated and wild products, such as fruits, nuts, leaves, vegetables, roots, insects, fish, mammals, and birds.
- Wood is used for **fuel, building material, tools, household implements, and furniture**.
- Grasses, reeds, and other leaves are used for food, **thatch, mats, baskets, wrapping, livestock feed, and compost**.
- Oils, resins, and bark are used in variety of ways, including **medicine and soap manufacture, and in rituals**.

It is estimated that roughly 80 per cent of the rural population in Africa depend to some extent on products harvested from the wild. Taking one recent example, a study on household resource use in Zimbabwe between 1994 and 1997,

TEXT BOX 3

Examples of components of biodiversity upon which communities rely

- Communities in Indonesia use up to 800 species of plants and over 100 animal species.
- The diet of the Tukanoan Indians of the Amazon includes more than 20 species of insects.
- Small fish species with no commercial value can account for up to half the total catches in many floodplains; because they are eaten whole, such fish provide significant nutritional benefits (fats, protein, minerals and vitamins).
- The Kayapo of Brazil plant more than 45 species of tree for food or to attract game; they also cultivate 86 varieties of food plants.
- The Siona-Secoya of Ecuador routinely cultivate 15 varieties of manioc, 15 varieties of plantain, and nine varieties of maize.
- In Papua New Guinea, the Gidra get more than half their calories and more than 80 per cent of their protein from the wild.
- Of food items consumed by villagers adjacent to the Gola Forest in Sierra Leone, 14 per cent were hunted, 25 per cent were from fallow land, 8 per cent were from plantations, 19 per cent were from farm, swamp or garden, 21 per cent were from streams and 13 per cent were bought or given.
- In Java, home gardens in a single village can support up to 500 species.
- The Hanunoo of the Philippines practised a system of inter-cropping that involves up to 40 crops in a single field.
- In Huastec of Mexico, more than 300 useful species can be found in managed forest plots.
- Some 21,000 medicinal plants have been listed by WHO. It is estimated that 80 per cent of all health care in developing countries relies on biodiversity components gathered from the wild .
- In Sri Lanka, *ayurvedic* medical preparations form part of the traditional system of health care, developed over the past two millennia. Some 1,414 plant species are used, and are widely held to be effective, particularly for treating long-term illnesses

Sources: IUCN Sri Lanka (personal communication); WHO website; Davies and Richards, 1991; FAO, 1999; Campbell and Beardmore, 2000; Groombridge and Jenkins, 2000

shows that wild products provided 37 per cent of total income of rural householdsin one area. Moreover, poorer sections of the community depended far more on these wild products than richer groups. The products provided 40 per cent of the income of the poorest 20 per cent of the community, whereas the richest 10 per cent of people derived only 29 per cent of the income from these sources (Cavendish, 2000).

The range of wild and domesticated plants and animals that people use for subsistence and trade is enormous.

TEXT BOX 4

Food security

The nutritional quality of foods is an important aspect of food security. In fish ponds in north-east Bangladesh, for example, recent experiments have shown that the introduction of small indigenous species of fish (once called 'weed fish') can play an important role in improving the nutrition of poor communities. One particular species, locally called *mola*, has high concentrations of Vitamin A in and around the eyes, and because it is eaten whole also provides calcium. Thus, by introducing this indigenous fish into carp fishponds, high yields of animal protein, vitamin A and calcium can all be provided.

Source: Roos et al, 2000

In 34 developing countries, fuelwood meets of 75 per cent of the national energy demand.

A safety net for vulnerable groups

Groups on the margins of the market economy depend on biodiversity products freely gathered from wildlands or fallows, and cultivated on-farm. Yet these common property resources are often overlooked and under-valued in national and international accounting systems. Where biodiversity is not managed, losses can make poor groups poorer and even more vulnerable to shocks and stresses.

Furthermore, external shocks, such as the collapse of market prices for export crops, droughts or flood, new pests or diseases, hit hardest at the poor, who have little or no financial reserves or credit to fall back on. Wild biodiversity can provide a 'safety net'. In one area of dryland India, for example, the rural poor normally derive 14–23 per cent of their income from wild products; in times of drought this rises to as much as 57 per cent (Jodha, 1986). The genetic diversity of crops and livestock (see below) may also buffer the poor against shocks such as crop failure.

Wildland biodiversity for economic activities

In addition to their subsistence value, wild species are also of commercial importance to rural peoples and local, national and international companies.

For example, research shows that forest products from tropical zones contribute 10 per cent of GDP in 18 countries of Africa. Worldwide, tropical countries contribute 25 per cent of the international timber trade of over US $330 billion annually (with Malaysia and Indonesia accounting for half of the trade from tropical countries). However, many traded products do not enter formal markets, and domestically consumed timber is not included in the international trade figures: more than 80 per cent of timber felled in Brazil, for example, is not exported (Bernales, personal communication).

Bushmeat hunting is important for food and trade, and often reduces crop losses.

Non-timber forest products (NTFPs) are also of economic significance. Bushmeat revenues, for example, are very important throughout west and central Africa, as well as Latin America: some 370,000 monkeys are killed annually in Loreta department, Peru, for trade and local consumption (Robinson and Redford, 1991; Ntiamoa-Baidu, 1997). Specialist sport hunting can also be an important source of income, with trophy hunting fees in Tanzania, Zimbabwe and Namibia ranging from US$ 3.6 to 6 million a year (Wilkie and Carpenter, 1999; Chardonnet *et al*, 1995).

Turning to marine environments, fish captured anually from the sea and inland waters amount to 94 million tonnes (FAO, 1998) and provide 75 per cent of the primary source of animal protein for over one billion people worldwide. The export trade in fish exceeded US$52 billion in 1996, of which 32 per cent gave a net trade surplus to developing countries.

Domestication – biodiversity pyramids

The biodiversity management that has contributed most to human development is the domestication of wild species (plants, mammals, birds, fish, insects and even micro-organisms) as crops and stock. Selection and breeding programmes have focused on only the most useful and productive species, breeds and varieties (see Text Box 5). As a result, human development rests on the apex of a biodiversity pyramid, with a few species, breeds or varieties being used intensively and many others undomesticated or little-used. This domesticated component of biodiversity is the product of human selection, and often depends on human knowledge, technology and management to survive, and its careful management is important to keep options alive for future development.

Genebanks – hidden natural capital

Breeding new varieties to cope with new conditions and changing needs is one way of reducing risks. Because high-technology, high-input solutions are out of reach of most small-scale farmers, risk is managed by using a number of genetically-distinct varieties of each crop, livestock or fish species. Such varieties are adapted to local conditions, and possess the genetic variation to allow on-going adaptation. For example, 98 shifting-cultivator households in Sierra Leone were using 59 different rice varieties with four to eight varieties in each field (Thrupp *et al*, 1997).

Fish, often caught by artisanal and small-scale fishers, are an important source of dietary protein, oils, vitamins and minerals in many developing countries.

TEXT BOX 5

Biodiversity pyramids

- Around 7,000 plant species have been recorded as **food and agricultural crops** (from an estimated 270,000 higher plant species). Only four crops (wheat, rice, sugar and maize) account for 63 per cent of the world's plant-derived calorie intake (FAO, 1996).
- Over half of all **timber** plantations comprise trees from just four genera: *Pinus*, *Eucalyptus*, *Acacia* and *Tectona* (FAO, 1999).
- Of the 4,763 mammal and 9,946 bird species on earth, about 40 have been domesticated and, of these, only 14 account for more than 90 per cent the world's **livestock** production (FAO, 1998).
- Domesticated **fish** provide 25 per cent of the fish we eat and are also used to produce fish meal and oil (FAO, 1998). Four carp species (silver, grass, common and bighead) account for more than one-third of world aquaculture production.
- Commercial butterfly farming and silkworm production relies on a tiny fraction of the 120,000 or more **butterfly and moth** species to choose from.

Domesticated rice is the staple diet of millions of people.

The commercial value of the genetic biodiversity of domesticated species, as well as the genes in wild relatives of domesticated plants and animals, is seldom accurately valued. To give some idea of its importance, a gene taken from an ancestral population of barley plants in Ethiopia has been used to protect California's barley crop from yellow dwarf virus. The crop is worth US$160 million

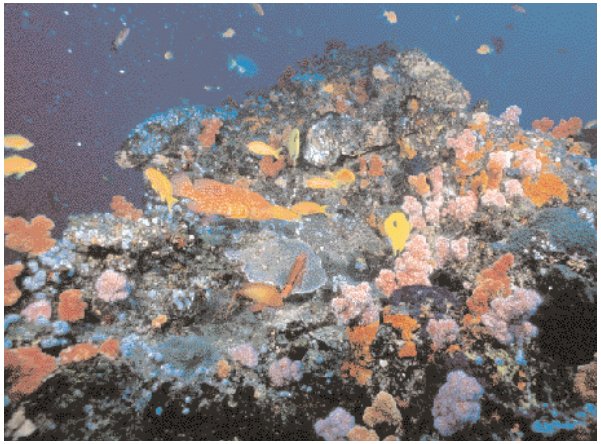
Four thousand or so domesticated and semi-domesticated livestock breeds depend on local knowledge to maintain viable populations. Many are at risk of extinction.

annually. Similarly, populations of wild coffee have provided genetic material that has conferred resistance to rust fungus infection in domestic coffee-tree plantations (Oldfield, 1984). In the highlands of central Asia, semen from wild yaks has improved the productivity of domesticated yak populations (Blench, 2001).

The molecular information contained within biodiversity has considerable value in the pharmaceutical, horticulture, crop and biotechnology industries (Ten Kate and Laird, 1999). Of the 150 most-prescribed drugs in the United States, some 56 per cent derive in some way from wild sources. The crop-breeding industry spent over US$300 million on research and development of new crop varieties (Swanson, 1998), making use of traditional variety sources where possible. If carefully regulated, this type of bioprospecting for new genetic resources can even benefit local communities, although this seldom happens.[3]

1.2.2 Non-consumptive use

It is possible to use biodiversity without consuming it. The non-consumptive use of the scenic beauty of certain areas is valuable as a recreation and tourism resource, for example. The market in tourism accounts for 11 per cent of global GDP, and is increasing at about 12 per cent annually. More than 20 per cent of Costa Rica's foreign exchange earnings come from tourism, largely ecotourism. However, ecotourism is not an option for all countries. Open savannahs with large mammals, and coral reefs with flashing assemblages of fish have high earning-capacity, as do mountainous areas, coastal regions and wetlands. But forests generally have limited potential for tourism revenue unless linked with other resources, such as nearby beaches.[4]



The rich marine life associated with coral reefs can be a strong attraction for tourists who wish simply to look at it.

[3] See Biodiversity Brief 3.

[4] See Biodiversity Brief 9.

Fungi play an essential role in helping to breakdown dead materials, contributing to soil formation and the recycling of nutrients within an ecosystem.

The parasitic wasp which helped reduce mealy bug numbers.

1.2.3 Services

The benefits of ecosystem services to human development are difficult to quantify. This is partly because the impacts are invisible, long-term and not traded in conventional markets. But it is also partly because many ecosystem services continue to be delivered even when species and genetic biodiversity have been reduced (see Figure 8). This consistently results in an under-valuation of ecosystem services, despite ample evidence showing their importance.

The importance of bees to honey production is well understood; 21 tropical countries produced almost 490 billion tonnes of honey in 1997. However, the role of bees as pollinators and, therefore, their contribution to agriculture and horticulture is less well appreciated. Flowers must be pollinated if crops are to fruit, and the annual value of bee pollination for eight crops in the USA has been estimated to be in excess of US$ 3.6 billion. Similarly the export trade in palm oil from tropical countries was worth US$ 698 million in 1996, and oil palm production is greatly enhanced (over 40% improved fruit set in some areas) when they are pollinated by a weevil imported from West Africa.

Biological pest control is another important ecosystem service. Cassava is a vital staple crop for 200 million people in west and central Africa (FAO, 1996). In the 1970s, the cassava mealy bug was accidentally introduced from South America and, by 1986, was destroying cassava crops in 25 countries. In Nigeria, the pest accounted for as much as 58 per cent of cassava crop losses. When a small wasp which parasitises the mealy bug was intentionally introduced from South America, there was a 20-30 times reduction in African mealy bug numbers, saving on average 2.5 t/ha of cassava in savannah regions (Speight, 2001).

Diversity of soil micro-organisms is critical for soil fertility. In semi-arid African fields, the productivity of cowpeas is enhanced by the presence of soil termites, which improve the release of nutrients into the soil. At the microscopic level, *Rhizobium* bacteria form nodules in some plants roots (especially legumes), which can fix nitrogen, and mycorhizal fungi improve nutrient uptake. Both substantially improve plant growth and productivity. Fungi are also vital in decomposing plant and animal matter, and recycling nutrients.

Other ecosystem functions, which are a product of the interaction between the biological and non-biological parts of an ecosystem, provide important services including:

- climate regulation – the regulation of global temperature, precipitation, and other biologically-mediated climatic processes at global and local levels;
- disturbance regulation – providing storm protection, flood control, drought recovery, mainly controlled by vegetation structure;
- water regulation – regulation of hydrological flows;
- water supply – storage and retention of water;
- erosion control – retention of soil within an ecosystem;
- waste treatment – recovery of mobile nutrients;
- biological control – removal or breakdown of pollutants and toxins.

The importance of these services can be appreciated from very rough estimates of their global value (Table 1). Conversion of wetland to farmland in the USA, for example, may cost as much as US$15,000/ha in lost flood regulation and waste management services.

Soil erosion can result from the destruction of vegetational cover. Once an area is degraded, it is an expensive and complex task to rehabilitate.

Table 1 – Ecosystem services and functions

Ecosystem service	Estimated economic value (global, US$ ha/year)		
	Wetland	Forest	Rangeland
Climate regulation	–	141	0
Disturbance regulation	4,539	2	–
Water regulation	15	2	3
Water supply	3,800	3	–
Soil formation	–	10	1
Erosion control	–	96	25
Nutrient cycling	–	361	–
Waste treatment	4,177	87	87
Pollination	–	–	25
Biological control	–	2	23

Source: Constanza *et al* 1997.

Despite the practical difficulties of assigning monetary values to many ecosystem services, recent initiatives under the UN Framework Convention on Climate Change indicate their importance and how they may be 'traded' internationally. A recent study has estimated that the Amazon rainforest could be worth hundreds of billions of US$ for its role as a carbon sink. The forest has the ability to store between 200 million and 300 million tonnes of CO_2 a year – amounting to up to 5 per cent of global output of the gas. Based on an estimate of US$10/tonne of CO_2, the Amazon is worth between 2–3 billion dollars/year over the next century (Chambers *et al* 2001). However, from a biodiversity perspective, such trading systems run the risk of biodiversity-rich forests being converted to fast-growing plantations.

The environment has long had spiritual and cultural relevance to human society, far beyond its ecological importance.

1.2.4 Non-use values

It is important to recognise that biodiversity is valuable in ways that cannot be measured in purely monetary terms. Biodiversity has religious and cultural significance that may make a sacred grove, for example, priceless to a particular community. The intrinsic worth of biodiversity is enough for some people to leave it untouched and to recognise its **existence value**.

A second form of non-use value relates to **future options** for use. Since we cannot be certain of how our needs will change, we cannot say with certainty when we will need biodiversity components in the future, however irrelevant those components may seem today. Therefore keeping them for potential future use, by present or future generations, is an important value.

1.3 The loss of biodiversity

1.3.1 Direct causes of biodiversity loss

Loss of genetic diversity

The loss of genetic biodiversity (without loss of species) has been well documented for domesticated species. A review of the direct causes of crop genetic erosion (FAO, 1996) cites the main cause of loss as the spread of **modern, commercial agriculture**, which includes conversion to monocultures. The introduction of new crop varieties, often associated with commercial agriculture, has led to the replacement and loss of traditional varieties developed by subsistence farmers for their high variability.

Up to 90 per cent of cabbage, field maize, and tomato varieties have been lost in recent times (FAO 1996). The estimated 10,000 land races of wheat originally existing in China have been reduced to 1,000 (Shah and Strong, 1999) and, in Indonesia, an estimated 1,500 rice varieties have become extinct in the past 15 years (McNeely *et al*, 1995). Similarly, 30 per cent of 1,400 breeds of livestock have become extinct or are threatened with extinction (FAO, 1998). This means that the genetic base on which production systems rely is being eroded through loss of local varieties of crops and breeds of livestock.

Records of other causes of genetic erosion include destruction of forests and bushlands in Africa; overgrazing and/or over-exploitation; and over-use or loss of forest species of economic importance in Latin America. Linked with these losses, is the loss of vital knowledge about how different varieties and breeds were produced and when they best flourish (FAO, 1996).

Loss of species

Even more genetic material is lost when species go extinct. Current estimates of species extinction are 1,000 to 10,000 times faster than baseline rates over geological time: that is, we appear to be approaching a period of human-induced 'mass extinctions' (Lawton and May, 1994). This warning is supported by the fact that over 12 per cent of flowering plants, at least 10 per cent of all trees, and 24 per cent of mammals are presently threatened with extinction (Table 2).

Table 2–Threatened[5] species

Groups	Mammals	Birds	Reptiles	Amphibians	Fishes	Higher plants
Number of species in group	4,763	9,946	7,970	4,950	25,000	250,000+
Percentage of total in group threatened	24	12	25	20	30 (mostly freshwater groups)	12.5% (22–53% in some groups)

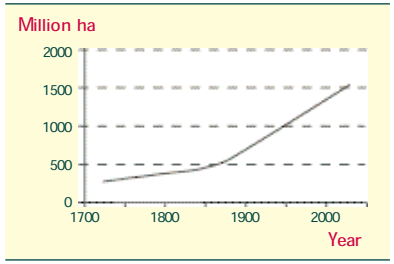
Source: IUCN 2000.

Since many species cannot survive outside of their habitats, **habitat loss** is held to be the main direct cause of species losses. This is compounded by the degradation of habitats through **unsustainable harvesting** of plants and animals. For example, 28 per cent of the 8,600 threatened tree species are declining because of unsustainable felling (Oldfield *et al*, 1998), and high **trade demand** is a common cause of commercial exploitation to levels beyond the capacity of the resource to replenish itself. Timber and fish are commonly harvested at unsustainable levels, but so too are many plants and animals traded internationally as living specimens: in 1994 this trade included 26,000 primates, 2 million orchids and cacti, 1 million birds, 45,000 wild cats and 9 million reptiles (Heywood and Watson, 1995).

The introduction of species into new areas has played an important role in human development. However, if the newcomers are **invasive species** that oust indigenous species, they can radically alter the ecosystem. Alien species are cited as the most common cause of mammal extinctions, accounting for 40 per cent of disappearances where the cause of extinction has been determined (Groombridge 1992). The damaging effects of invasive species are particularly pronounced in closed systems such as lakes and islands, and often lead to multiple extinctions of native fauna and flora.

[5] Threatened includes Critically Endangered, Endangered and Vulnerable.

Figure 2–Rapid expansion of croplands (million ha)



Source: WRI website.

Loss of ecosystems

Ecosystems and habitats can be lost entirely, degraded or fragmented. These processes can be detrimental to ecosystem functions, as well as causing loss of species and loss of genetic diversity. The rates of loss of some ecosystems are recorded in Table 3 below.

The most common cause of terrestrial wildland ecosystem loss is its **conversion** to farming, urban development and infrastructure, and **over-exploitation** of ecosystem resources. **Natural disasters**, such as floods and fires, also do great damage. Some 1.5 million ha of forest were lost to fires in Mexico and Central America during 1987 and 1988 (FAO, 1999), and changes in sea temperature have killed more than half of the coral reefs of the Indian Ocean in the past decade (CORDIO, 1999).

Nearly half of the world's forests have been converted to farms, pastures and towns/infrastructure in the past 8,000 years.

Table 3– Global loss of selected habitats

Habitats	Losses	Source
Wildlands	37% of wildlands converted to agriculture in developing countries between 1960–80 (3% converted in USA & USSR in same period)	Swanson, 1990
Forests	20% tropical forests lost between 1960–1990	FAO, 1999
Wetlands	50% of global wetlands destroyed between 1990–2000, because of dam-building, water abstraction, sedimentation and pollution	IUCN, 2000; World Bank, 1998
Coral reefs	35% coral reefs expected to be lost in the next 30 years, caused by sedimentation, unsustainable use, climate change	CORDIO, 1999
Mangroves	60% mangroves in Thailand & 40% in Philippines lost to fishponds in 1980s	Tolba *et al*, 1992
Drylands	Annual rate of desertification 60,000 km^2; in Africa, Asia and Latin America 70% of rangelands are degraded	UNEP, 1991; Biwas, 1994

Overgrazing accounts for over one third (almost 700 million hectares) of the world's total of degraded drylands.

Floods, whether natural or due to human intervention, cause serious loss of life and property, hitting poorer people hardest.

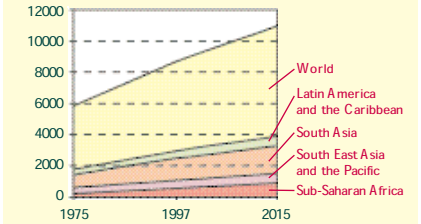
1.3.2 Underlying causes of biodiversity loss

Much attention has been given to the **direct** causes of biodiversity loss. However, there are usually **underlying** factors, including policies and laws, which provide the conditions for biodiversity loss (Stedman-Edwards, 1998). These factors are interrelated, and have indirect and variable impacts (Wood *et al*, 2000):

a) **Population growth**, distribution and migration patterns are significant factors in environmental degradation, combining with various patterns and intensities of natural resource use. There are 6 billion people in the world and the number grows by 1.4 per cent per year. The distribution of the world's biodiversity is concentrated in developing countries, which also account for 80 per cent of the world's population (UNDP 1997).

The movement of large numbers of people can also damage the environment. Mass migration as a result of war or civil disturbance, government settlement schemes and the search for work, increase demands for natural resources. It also often results in the introduction of new technologies, and/or the rejection or ignorance of traditional methods of land management, which lead to unsustainable use of natural resources and loss of biodiversity.

Figure 3– Human population by region

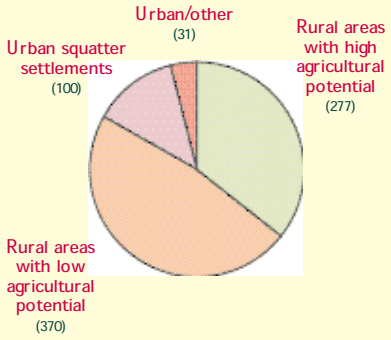


Source: UNDP 1999

As well as the direct, physical impacts of large human populations on natural habitats, urban centres are major markets for goods from wildlands and farmlands.

Estimates are that 60 per cent of the world's poor live in areas of high ecological vulnerability (Leonard 1989 cited in Stedman-Edwards 1998).

Figure 4—Where the poorest people in all developing countries live (millions)



Source: Stedman-Edwards 1998.

b) **Poverty** and **inequality** shape resource use at all levels. Poor people without access to financial resources, skills and secure land tenure, are forced into short-term strategies that can damage the environment. The poor and weak are often forced by more powerful groups onto marginal land or land in protected areas, where conversion to agriculture results in loss of biodiversity.

c) **Macro-economic polices and trade practices** have a major impact on biodiversity in developing countries because foreign exchange revenues are generated through the export of agricultural produce and natural resources. National economic reforms, such as structural adjustment programmes, have focused on generating foreign exchange to buy imported goods and to service international debts, and reduce the costs of the civil service. Although economic advancement has been achieved through these measures, more effective efforts are needed to ensure that these initiatives, and associated policies of market liberalisation and global trade, take account of environmental and social costs. Otherwise natural resources will continue to be destroyed for short-term profits, the poor who depend on such resources deriving few benefits.

d) **National policies** that fail to address the perverse incentives (policy failures) leading to biodiversity losses and environmental damage can be considered at a number of levels:

- Where government lands are made available to people with no **ownership** or direct interest in the area (for example remote forest reserves) then unsustainable management practices tend to ensue, with inevitable loss of biodiversity.

- **Subsidies** for agriculture development, livestock rearing and other intensive production systems have often resulted in unsustainable development programmes and large-scale but avoidable losses of biodiversity. Worldwide, governments spend about US$700 billion a year subsidising environmentally unsound use of water, agriculture, energy and transport (WRI, 2000).

- **Centralised** planning prevents local stakeholders from participating in decision-making concerning land use and research. This consistently leads to unsustainable harvesting and environmental damage.

Mangroves, which are important for coastline stabilisation and fish and prawn nurseries, have been destroyed on a large scale for shrimp farms.

- **Low commitment to biodiversity management** gives rise to a number of problems. First, environment laws are either weak or not enforced so, for example, environmental impact studies are seldom carried out. Second, government agencies with responsibility for environment and natural-resource management are often under-staffed and under-resourced and, therefore, prime areas for breeding corruption.

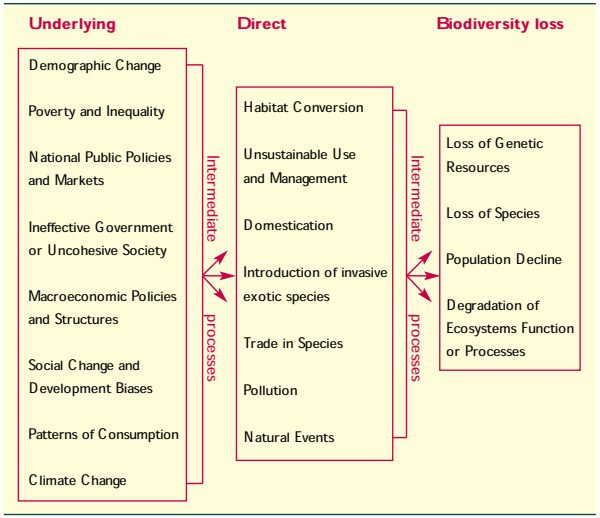
- Better biodiversity management is hindered by **lack of knowledge** and ignorance of how human use and management systems affect different ecosystems (McNeely *et al*, 1995).

e) Natural or human-induced **climatic variation** can cause significant loss of biodiversity.

If climatic change leads to more severe storms, biodiversity losses are likely to occur.

Tackling the direct causes of biodiversity loss alone is like tackling the symptoms rather than the cause of an illness: both need addressing. A comprehensive approach that acknowledges the linkages between different underlying causes, and between underlying and direct causes, is needed (Wood *et al*, 2000).

Figure 5– Underlying and direct causes of biodiversity loss



1.4 Who benefits and who loses?

The consequences of losing biodiversity vary according to the stakeholder in question. For rural people who rely on gathering foods from the wild, the loss of an area of wildland has immediate and often dramatic impact. For an urban dweller, the immediate consequence of clearing a wetland for farming may not be noticed in the short-term, but in the medium- to long-term, water supplies to the urban centre may be disrupted. The consequence to a school teacher in Lagos of the decline in a species of bee as a result of pesticide application may be negligible, but to the owner of a commercial farm whose crop was pollinated by the bee the losses are likely to be considerable.

Loss of biodiversity is worst for people with no alternative assets to protect them from falling into poverty.

TEXT BOX 6

Examples of biodiversity stakeholders

- **Hunter/gatherers** who rely entirely on natural ecosystems for life and livelihood.
- **Shifting cultivators and pastoralists** who combine biodiverse cropping and pastoralism with the use of wildlands.
- **Settled agriculturalists** who may 'mine' natural ecosystems for useful products until they are obliged to plant, rear or buy equivalent products themselves; they depend on genetic stocks for new varieties and breeds.
- **Urban dwellers, traders and companies** who exert a major market force for biodiversity products, for example, traditional medicines or timber, which further drives exploitation.
- **Those who do not use biodiversity** but whose activities have an impact on it, for example, road builders.
- **Global interest groups** who wish to use and/or maintain biodiversity goods and services – including governments, multinational companies and NGOs.

Any assessment of the importance of biodiversity must consider the requirements and values of different stakeholders who will assign different values according to their needs, and the availability and demand for biodiversity products. Examples of stakeholder classes are listed above (Text Box 6); some will fall into more than one class.

Conflicts of interest inevitably arise between these groups. Depending on who has the greatest power and influence over decision-making (see Table 4) different 'development pathways' will be followed, with different effects on both livelihoods and biodiversity.

A win-win scenario, in which biodiversity is maintained or increased and livelihoods are enhanced (Table 4, scenario 1) is seldom achieved. The literature indicates that such situations do arise, and can remain viable so long as:

1) communities maintain a level of dependence on local natural resources;
2) communities have control over use of the local resource base;
3) communities retain a sufficiently high level of social cohesion;
4) market forces do not encourage unsustainable use of common property resources.

Table 4– Livelihood and biodiversity change scenarios

	Livelihood improvement	Livelihood decline
Biodiversity maintained or increased	**1.** Poor and **indigenous communities** (with marginal agricultural potential) will maintain and enhance biodiversity – either because they have no purchasing power to obtain commercial products and therefore no alternative support for their livelihoods, or because they choose to, for cultural or religious reasons.	**2.** Exclusionary PAs that yield conservation benefits for the **international community**, but at a cost to **local communities** whose access to resources is restricted.
Biodiversity loss	**3.** Land is converted to industrial agricultural plantations of high-yielding varieties for domestic and export markets. Efficiency gains from economies of scale can reduce product prices, benefiting the **urban poor**, who spend up to 80 per cent of their income on food.	**4.** Intensive and large-scale extraction of resources such as timber **by distant companies** can lead to losses of other biological resources, such as NTFPs, which may be critical sources of income or subsistence food for **small-holder agriculturalists**

Source: Koziell, 2001

Wildlands provide many useful products, of cultural importance, but little market value.

Often, the sustainability of such systems is maintained because of a coincidence of low density of population and small-scale technology, together with traditional methods of land management and weak links with markets.

Diametrically opposed to this is scenario 4 in Table 4, where people who construct livelihoods from common land resources, are dispossessed of these resources by people who are politically more powerful. The latter reap short-term benefits from the land, or its resources, at the expense of local communities, and to the detriment of ecosystem services and products in the long term. This satisfies neither poverty reduction nor environmental security objectives, but is very common.

By recognising the needs of the poor and the part biodiversity plays in their lives, productive landscapes can be maintained, as in scenario 3. The impact of this pattern of development on biodiversity loss will vary according to how much wildland is converted to villages, fields, gardens and pastures. Where natural habitats are maintained, and consumptive use is managed sustainably, biodiversity losses can be reduced.

If a representative sample of wildland biodiversity is to be maintained, then a system of protected areas (PAs) has to be established in which human activities

The interests of large-scale commercial concerns – such as industrial farmers supplying urban populations – need to be balanced with the needs of the rural poor.

are carefully controlled. These areas should account for an appropriate proportion of a country's land area, and provide maximum benefits (flood control, water supply, religious importance, etc). Furthermore, where PAs compromise the livelihoods of local communities, through restricting their access to natural resources (scenario 2), then special attention needs to be focused on addressing the needs of local peoples (EC/IUCN, 1999).

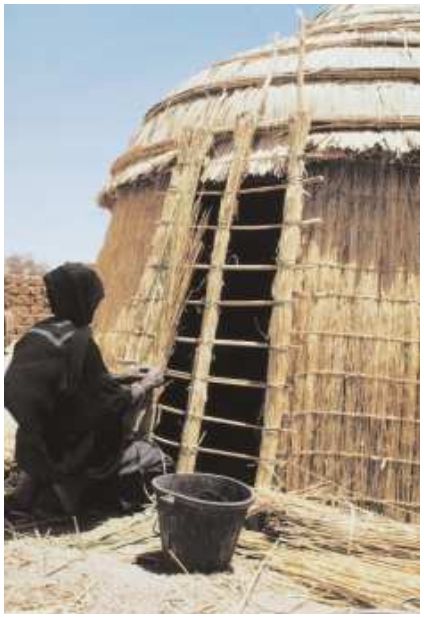
1.5 Linking the sustainable use of biodiversity with sustainable development

The underlying causes of biodiversity loss (section 1.3.2), are very similar to the underlying causes of poverty: centralised planning; constraints on access and ownership; unregulated markets; weak political voice, etc. The challenge for development cooperation therefore is to ensure that:

a) **biodiversity continues to provide goods and services needed for human development.** This means: maintaining a broad base of genetic resources; managing natural habitats so they continue to support livelihoods, especially in areas of low agricultural productivity; addressing activities that impact on biodiversity, such as infrastructure, to prevent, minimise or mitigate negative impacts on biodiversity and poor communities; maintaining the integrity of the environment to ensure the continued protection of ecosystem services.

b) **costs and benefits from all levels of biodiversity are equitably shared.** This requires decentralisation, securing access to components of biodiversity for communities dependent on them, defining intellectual property and other rights, and capacity building to allow effective participation and negotiation between stakeholders.

Actions to address these two objectives are covered in the chapters that follow, at policy, programme and project level.



Wild grasses are an important source of thatching material and fodder.

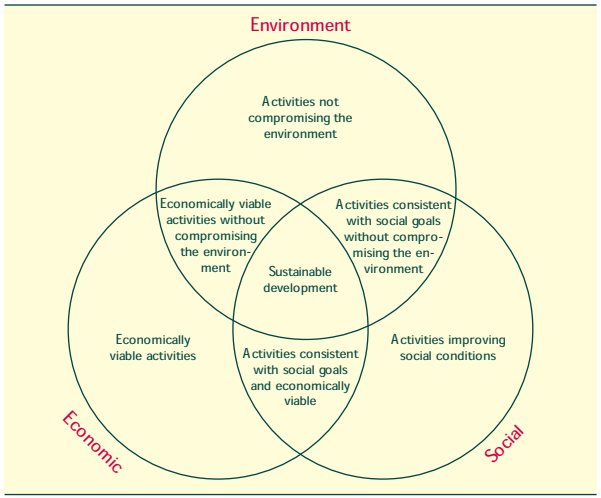
Chapter 2

Policy framework

This Chapter deals with the policy issues that need to be addressed to overcome many of the underlying causes of biodiversity loss. It is targeted at policy-makers and decision-takers in Brussels. As noted at the end of the preceding chapter, the challenge is to achieve sustainable development that gives lasting poverty reduction without 'mining' the natural resources needed to support future development.

This challenge can be conceptualised using the three pillars of sustainable development: poverty reduction through economic advancement that is socially responsible and environmentally sound (see Figure 6). This model for looking at sustainable development obviously needs to take account of policy and institutional contexts at local, national and international levels.

Figure 6– Sustainable development: integrating social, environmental and economic issues into development

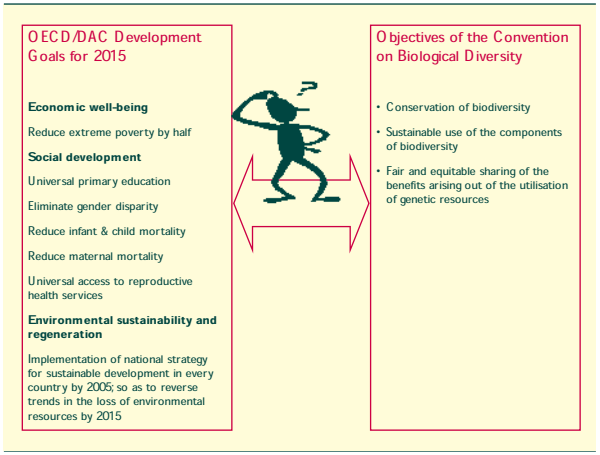


However, there are two major obstacles to using this approach for conservation and sustainable use of biodiversity. The first is the widespread 'conceptual blindness' to the wider meaning of biodiversity. It is easier to plan and legislate for the protection of rare species, or sustainable extraction of timber, than for the long-term health of genetic, species, and ecosystem biodiversity. The second obstacle is that biodiversity components are called 'natural resources' as soon as they are found to be useful, and therefore managed sectorally rather than as part of a wider multi-sectoral ecosystem.

2.1 International context

The international policy context for linking biodiversity and sustainable development is set by inter-relating the international development targets with the objectives of the CBD (see Figure 7).

Figure 7 – Integrating biodiversity aims into development cooperation, and vice versa



In an effort to build consensus on what development agencies can measure to assess their impact in supporting sustainable development, a set of International Development Targets (IDTs) was compiled. For integrating biodiversity into development, the IDT of immediate relevance is: *national strategy for sustainable development in the process of implementation in every country by 2005, so as to ensure that current trends in the loss of environmental resources are effectively reversed at both global and national levels by 2015.*

From the other side, the CBD objective which links most directly with the economic well-being and social development targets is: *the fair and equitable sharing of benefits arising out of the utilisation of genetic resources.* However, this calls for an obvious modification: poor people require the equitable and fair sharing of both costs and benefits that arise from biodiversity use, in particular loss of resources upon which they rely. Moreover, benefit-sharing needs

to be considered beyond just genetic resources use, to include benefits from species and ecosystem use. This broader perspective is adopted in this document.

Biodiversity's relevance to livelihoods and poverty-reduction programmes makes it a cross-cutting issue of concern to all sectors. Moreover, biodiversity issues should not be construed as either anti-development or pro-conservation.

Forests are important for biodiversity, even if they are being used to produce timber.

2.2 EC context

Moving from an international context, to focus on the challenge of integrating biodiversity issues into EC development cooperation, the first step is to look at EC development cooperation and biodiversity policies. These are official documents, intended to guide all development cooperation investments.

2.2.1 EC development policy

The Amsterdam Treaty identifies sustainable development as a strategic area, in particular through the promotion of equitable growth, investment, employment, social and human development and environmental protection. This implies sustainable use and management of biodiversity. The strategic areas of the Treaty, and guiding principles, are shown in Table 5.

TEXT BOX 7

Environment and the Amsterdam Treaty

The importance of biodiversity, and the environment more generally, in the EU is underlined in the Amsterdam Treaty (1999), which states: *'Environmental protection requirements must be integrated into the definition and implementation of other Community policies'* (Article 6).

Table 5– Integrated framework for EC development cooperation activities

Central Objective	**Poverty Reduction**
Strategic Areas deriving from the Treaty	**A. Sustainable development, in particular through promoting equitable growth, investment, employment, social and human development and environmental protection** B. Integration into the world economy, including through support to regional cooperation and integration C. Fight against poverty D. Democracy, human rights, rule of law and when necessary peace-making and conflict prevention
Guiding Principles (mainstreaming)	1. Effect on poverty reduction 2. Support for institutional development and capacity-strengthening 3. Gender equality **4. Sustainable management and use of environment and natural resources** 5. Enhancement of economic, social, political and cultural rights

Source: EC Development Policy (COM(2000)212)

TEXT BOX 8

EC regional development agreements

While the *Development Policy* is global, EC development cooperation still shows a distinct regional character. The *Cotonou Agreement*, between ACP countries and the EC, mentions support for *specific measures and schemes aimed at addressing critical sustainable management issues and also relating to current and future regional and international commitments concerning mineral and natural resources such as:*

i) tropical forests, water resources, coastal, marine and fisheries resources, wildlife, soils, biodiversity;
ii) protection of fragile ecosystems (e.g. coral reef); … (Article 32).

The Agreement also supports enhanced cooperation with a view to reinforcing the mutual supportiveness of trade and environment (Article 49).

Cooperation with ALA countries, which is oriented by the *Council Regulation No. 443/92 on financial and technical assistance to, and economic cooperation with, the developing countries in Asia and Latin America*, supports the protection of the environment and natural resources, and sustainable development as long-term priorities. In addition, 10 per cent of financial resources are to be set aside from budget lines for technical and financial assistance to ALA regions for the protection of the environment and natural resources (see section 3.2).

The EC's approach to development cooperation has been summarised in its Communication: the *European Community's Development Policy* (COM (2000) 212), adopted on 26/4/00. The *Development Policy* identifies six priority areas:

TEXT BOX 9

Forests and development: the EC approach and biodiversity

The overall objective for forests in EC development cooperation is *to maintain adequate forest cover and improve forest management in development countries, as a contribution to the local, regional and global environment and overall sustainable development.*

Within this goal, specific objectives which concern direct losses of biodiversity include the control of deforestation and degradation; increasing the extent of areas under sustainable forest management; and the maintenance of genetic resources through conservation of natural forest ecosystems. Underlying losses are addressed through creating institutional frameworks for accommodating stakeholder interests and through expanding research. As a positive incentive, the Community also aims to increase, and equitably share, revenue from the markets of forest products.

Source: Communication on Forests and Development: the EC approach [COM (1999) 554]

- Trade and development
- Regional integration and cooperation
- Macroeconomic policies linked to social sector programmes (especially health and education)
- Transport and infrastructure
- Rural development and food security
- Institutional capacity building, good governance and the Rule of Law.

The *Policy* states that environmental issues are cross-cutting and must be integrated to ensure sustainable development for poverty reduction. Each of these six priorities will be discussed in relation to biodiversity in either this chapter, or the following two chapters on Programming and Projects.

As well as the overall development policy, EC development cooperation sectoral polices for transport and rural development have also noted the links the importance of integrating environment/biodiversity (see Text Boxes 9, 10 and 11).

TEXT BOX 10

EC transport sector commitments to the environment

The EC commitment is to ensure the impact of transport networks does not threaten ecosystems, while supporting sustainable development.

Source: Promoting sustainable transport in development cooperation (COM (2000) 422).

TEXT BOX 11

EC Rural Development policies

The *EC Policy and Approach to Rural Development* (April 2000) identified six pillars of the EC policy addressing rural poverty, based on the principles of the Amsterdam Treaty:

- Progressing towards more peaceful, equitable, open and democratic rural societies,
- Establishing more effective and accountable rural institutions,
- Supporting economic policies which enable rural growth,
- Enhancing the individual assets of rural dwellers,
- Promoting more sustainable natural resources management, and
- Improving the coherence between EC development policy and other related EU polices such as agriculture, trade, fisheries, environment and immigration.

Four of these pillars address underlying causes of biodiversity loss, in particular the lack of coherence between EC development and other EU polices. The 'promotion of sustainable natural resources management' focuses more on direct causes of biodiversity loss, as well as a cause of poverty.

Building on these pillars, the *EC Guidelines for the design of a rural development profile and strategic framework* (Dec 2000) notes a number of problems in achieving sustainable natural resources management, which are elaborated in three detailed sub-sector strategy papers (Oct 2000):

Fisheries sub-sector strategy
The specific issues relevant to biodiversity include: support for protected areas or reserves that can underpin ecosystem health; control of fishing gear and fishing seasons; institutional approaches such as adherence to the FAO Code of Conduct for Responsible Fisheries; enhancing development considerations in EU Common Fisheries Policy agreements; and supporting capacity building in developing countries.

Livestock sub-sector strategy
A list of negative impacts of livestock rearing on the environment, which commonly lead to the loss of biodiversity, is given; it is also pointed out that livestock farming can have positive environmental effects. Two key areas for sustainable resource management to reduce biodiversity losses are: management of waste and effluents, using polluter-pays polices where appropriate; and assessing what domestic (genetic) biodiversity is being lost.

Agriculture sub-sector strategy
The key issue discussed in this paper relates to the ownership or access of land, and common property resources – especially those from rangelands, forests and water resources/wetlands. Current policies are not conducive to sustainable management of these resources. Furthermore, misuse of agro-chemicals, salination as a result of poorly-managed irrigation, and loss of traditional crop varieties are all issues that affect biodiversity.

2.2.2 EC environment policies

The EC is a signatory or contracting party to 37 environmental conventions, protocols and amendments (listed in COM (2000) 264), as well as a number of non-legally-binding agreements, such as the Forestry Principles drawn up in Rio (1992). Equally important are influential conventions and agreements not primarily concerned with biodiversity, but with great impact upon it, such as World Trade Organization (WTO) agreements and the United Nations Convention on Law of the Sea (UNCLOS).

EC Biodiversity Strategy and Integrating the Environment Communication

As part of the process of integrating environmental issues, and to fulfil its obligations under the CBD, the EC has adopted a Biodiversity Strategy (COM (1998) 42) to *'anticipate, prevent and attack the causes of signification reduction or loss of biodiversity at source'*.

Recognising the impacts of policies for which the EC has competence – trade, agriculture and fisheries – on patterns of land and marine resource use in developing countries (for example, Farquarhson, 1999), the *Biodiversity Action Plan for Economic and Development Cooperation* identifies priority actions for integrating biodiversity into the policies, programmes and projects and calls for a review of the impact of all EU polices on tropical biodiversity.

There is a need to address coherence between these various policies, and development cooperation and foreign polices, through a comprehensive policy framework, as noted in the EC *Communication on Integrating Environment and Sustainable Development into Economic and Development Cooperation Policy* (COM (2000) 264). This Communication discusses integrating environmental issues into policy development, and illustrates how environmental management, including biodiversity, underpins sustainable development.

Coastal areas are under threat from human pressures; the sustainable use of coastal resources – such as mangroves – is a priority for the EC Biodiversity Action Plan, and accords with the articles of the Cotonou Agreement.

Government subsidies have been used to encourage the clearing of tropical forests for ranching and agriculture.

2.2.3 Strategic Environmental Assessment

The Declaration on environmental impact assessments, annexed to the Amsterdam Treaty, states that the Commission will undertake Environmental Impact Assessments (EIAs) on any proposed action with potential negative implications for the environment. The EIA Directive of 1985 (amended 1997) requires that the environmental consequences of projects be identified and assessed before authorisation is granted. This reinforces the importance of environmental considerations to sustainable development.

Strategic Environmental Assessment (SEA) is a type of EIA, which has been developed to assess policy impacts. It differs from EIA (which is used for project assessments) by considering impacts over wider geographical areas, longer time scales, and the cumulative effects of different policies and actions. SEA procedures follow the standard EIA steps (section 4.4.2) and should be applied as early as possible in the development of policies and programmes.

In an effort to support EC officers to carry out this work, an *Environmental Integration Manual* (EC 2001) has recently been drafted, which can be supplemented with the checklists in this document.

2.3 Macro-economic policies and trade practices

Trade and macro-economic policies set the general framework for investments, and public and private expenditure. At the level of macro-economic policy, the first priority must be to remove or reform policies that accelerate unsustainable use of natural resources and loss of biodiversity. This is generally referred to as removing perverse incentives, and thereby addressing underlying causes of biodiversity loss. These actions can be complemented with policy instruments that encourage conservation, sustainable use and equitable benefit-sharing.

2.3.1 Removal of perverse policies

Structural adjustment programmes and other macro-economic reforms have been established to encourage effective government and efficient management of national economies. Their social and environmental impacts, however, have not always been given sufficient attention in policy reforms. If such impacts are negative, they become perverse incentives, which encourage biodiversity losses. They can include: tax relief, direct payments, market price support, credit guarantees, and below-cost resource pricing in the agriculture, forest and fishery sectors, and for energy, mining and transport. A clear example is the subsidies offered to develop cattle ranches in Amazonia in the 1980s, where more than half the pasture-land has been abandoned because the soil was too poor to support pastures (Steinfeld *et al*, 1998). Other perverse incentives in the agriculture sector include market restrictions, and seed distribution systems that encourage a narrower range of agricultural species and varieties.[6]

Reform of such polices can be a cost-effective way of encouraging conservation and sustainable use of biodiversity, and can also bring other long-term benefits by blocking unsustainable development pathways. The impact of such reforms, however, is difficult to predict, and improving reforms may even be opposed by stakeholders who benefit from the *status quo*, whether farmer or multinational. This makes corrective policy action politically complex, but central to addressing the underlying causes of biodiversity loss.

EC development investments include substantial support to structural reform programmes, and there is a commitment to ensure that such programmes count environmental costs. Every effort needs to be made to ensure that economic growth is not achieved at the expense of liquidating natural capital assets, with short-term economic growth that is not sustainable. Such pitfalls can be brought to light in the earliest stages of developing structural adjustment programmes, comprehensive development frameworks, or poverty reduction strategies, by using SEAs.

TEXT BOX 12 CHECKLIST

Strategic Environmental Assessment (SEA): Biodiversity checklist for policy reforms

Key issues to consider with regard to biodiversity:

1) To what extent are the proposed policy reforms or new policies likely to contribute directly or indirectly to biodiversity loss, or impoverishment of rural communities?
2) What information is available to assess environmental and social impacts of new policy initiatives (see Country Environment Profile – Text Box 17)?
3) What is the likely magnitude and significance of new policy initiatives?
4) What are the cumulative and long-term impacts of different sector policies on biodiversity and poor livelihoods?
5) What measures can be put in place to avoid, minimise, mitigate or adapt to negative impacts on biodiversity?
6) How might incentives encourage the development of new ways of sustainably using biodiversity, which contribute to development?

Bearing in mind the OECD / DAC criteria for assessing fulfilment of the objectives of the CBD, to what extent do proposed policy initiatives:

- Promote conservation and/or sustainable use of the components of biodiversity, and encourage fair and equitable sharing of the benefits of biodiversity (genetic resources) use?
- Integrate biodiversity concerns into development objectives?
- Strengthen environmental (biodiversity) policies?
- Develop and implement SEA tools and procedures?
- Support policy research on integrating improved biodiversity management into poverty reduction strategies?

2.3.2 Policy incentives for improved biodiversity management

Policy incentives can be developed to improve biodiversity management. These have been categorised in four groups (after OECD, 1999), although they are interlinked and can be used in conjunction:

a) Trade liberalisation and property rights;
b) Standards, regulations and restrictions;
c) Fees and environmental charges;
d) Public financing, environment funds and other financial inducements.

[6] See Biodiversity Briefs 2 and 4.

Taking account of social and economic impacts is essential if activities are to be biodiversity-sensitive. For example, this affordable, small-scale technology for preserving fruits can provide a balanced diet throughout the year.

a) Trade liberalisation and property rights

These two policy strategies – removal of trade barriers and assignment of property rights – are interlinked and can go a long way to addressing some of the underlying causes of biodiversity loss. They are particularly effective in curtailing the damage caused by short-term, outside investors (see scenario 4 in Table 4). Securing rights of access and ownership allows local stewards of biodiversity resources to benefit from the sale of biodiversity goods, which in turn encourages more sustainable management practices.

If the sale of products from wildlands, or indigenous crop and stock varieties, is to help to reduce poverty, property owners must get fair prices. Furthermore, increased trade needs to improve the long-term prospects for securing benefits from the biodiversity products that they manage. However, liberalising trade has uncertain outcomes, depending on the overall policy and economic framework. Some of the consequences of trade liberalisation for biodiversity and sustainable use of natural resources include:

- Increased consumption of natural resources in the South, with Northern economies leaving large ecological footprints.
- Increased production of goods that command the highest prices, resulting in a narrower range of products being over-exploited and an increase in low-biodiversity monocultures.
- Increased availability of imported, manufactured goods and new technologies. This may either benefit biodiversity and the environment (for example, more efficient wood stoves or pollution control) or may be detrimental (for example, high-powered rifles for hunting).

TEXT BOX 13

Incentive measures

An incentive is a specific inducement designed and implemented to influence government bodies, business, non-government organisations, or local people to conserve biological diversity or to use its components in a sustainable manner. Incentive measures usually take the form of a new policy, law or economic or social programme.
UNEP/CBD/COP/3/24

CBD Article 11 states that '*each contracting party shall, as far as possible and as appropriate, adopt economic and socially sound measures that act as incentives for the conservation and sustainable use of components of biological diversity.*'

Long-term management initiatives – such as the cultivation of tree seedlings intended for rehabilitation of a degraded area – are unlikely to occur unless users have secure land/resource tenure.

The global nature of export markets means that trade regulation has to be done through international agreements. The World Trade Organisation (WTO) has been set up as a forum for this purpose. Biodiversity-sensitive trade needs to be supported through the WTO Committee on Trade and Environment, which in turn can be supported by other arrangements.

The EC Sustainable Trade initiative will look at issues such as free access for least developed countries to European markets; free trade with MERCOSUR; and regional economic partnerships with ACP countries. Biodiversity issues and broader environmental concerns need to be incorporated into all these negotiations (EC COM 000/264) with immediate attention to:

- using the Generalised System of Preferences for preferential treatment of countries which respect minimum social and environmental standards;
- reducing tariffs for countries that conform with various certification schemes;
- improving market access for specialist goods that are produced or processed and traded in ways that bring benefits to the poor and support maintenance of biodiversity, using voluntary labelling and customer awareness programmes.

Both the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), and the Biosafety Protocol of the CBD have implications for trade. CITES depends on mutual agreements between exporting and importing countries to regulate the trade in endangered species, backed by each nation's own legislation.[7] When ratified, the recently established Biosafety Protocol will make international movement of Living Modified Organisms (LMOs, including Genetically Modified Organisms) controlled through rigorous risk and impact assessments, and the advance informed agreement of recipient countries.

TEXT BOX 14

Access and benefit sharing from the use of genetic resources

A central feature of biodiversity found on communal lands, and of genetic biodiversity in particular, is that establishing ownership is problematic. Also, it is difficult to determine who are the owners of local/traditional knowledge about biodiversity. Detailed negotiations are therefore being carried out through the CBD working groups, and other fora, to develop protocols that will help determine the intellectual property rights of providers (especially local indigenous people), and set frameworks that will require prior informed consent from any provider before genetic resources are used. Mutually agreed terms of export or trade between providers and users of genetic resources also need to be developed (Byström *et al* 1999).

There are many potential uses of genetic resources, but of special concern are the large numbers of locally developed crop and stock varieties that have been collected and stored in national and international research centres. First, if these public goods come into private ownership then patents can be assigned without any benefit to those who first developed them. Second, even if they remain public goods, the benefits from their use need to reach poor people.

[7] See Biodiversity Brief 20.

CITES is an international agreement intended to reduce the negative impacts of trade on endangered species.

b) Standards, regulations and restrictions

Standards, regulations and restrictions are easily prescribed and regulated for. These common management tools are used to set the maximum acceptable levels of resource depletion, through, for example, restricting access to PAs, setting limits on the size of products that can be harvested, or establishing harvesting quotas. Such measures must take into account the genetic, species and ecosystem biodiversity in a region, including non-harvestable species and activities in adjacent areas.

If regulatory agencies are weak, regulations are ignored. One way of counter-acting this problem is to offer the opportunity of improved sales through independent certification, and related premium pricing schemes. These ensure that higher prices are paid for goods produced in biodiversity-sensitive ways. Many markets, however, are not biodiversity-sensitive: most tropical hardwood is traded nationally (90 per cent) to customers who are not overly concerned about timber production systems – although public awareness campaigns are beginning to address this problem. So effective certification must link sets of producers with specific markets.

Finally, recent WTO rulings have indicated that using environmental standards to limit trade is considered unfair protectionism, although food safety standards can be used to restrict trade.

TEXT BOX 15

The Cartagena Protocol to the CBD

The Cartagena Protocol on Biosafety was adopted on 29 January 2000. As of March 2001 the Protocol had 86 signatories and two ratifications; it will enter into force 90 days after the 50th ratification. It deals with potential risks to human health and the environment posed by the movement of Living Modified Organisms (LMOs), including Genetically Modified Organisms (GMOs). LMOs are *any living organisms that possesses a novel combination of genetic material obtained through the use of modern biotechnology* (Article 3, Biosafety Protocol).

It establishes procedures for ensuring that adequate information is available to allow countries to make informed decisions before LMOs are imported, and is based on the Precautionary Principle which stipulates that, *'where there is a threat of significant reduction or loss of biological diversity, lack of full scientific certainty should not be used as a reason for postponing measures to avoid or minimise such a threat'.*

c) Fees and environmental charges

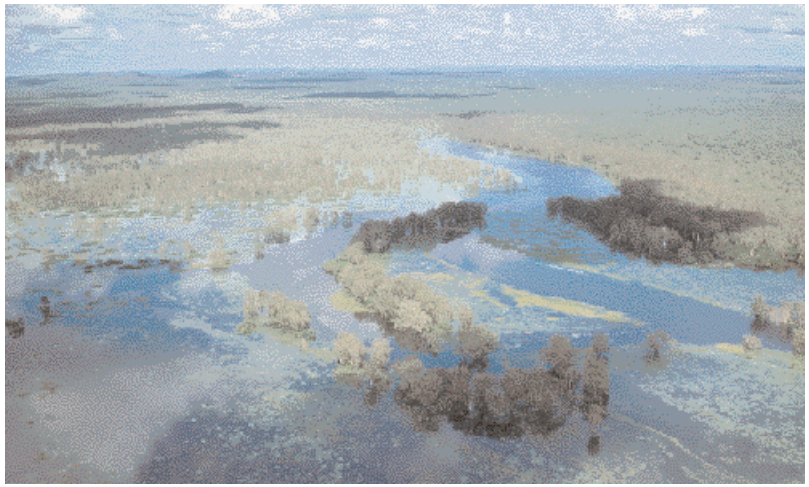
Users of biodiversity can be required to pay for the full cost of maintenance or replacement. The funds generated can be redistributed to cover costs (including benefits forgone) to local or national stakeholders who might otherwise have used those resources. The funds can also be used to contribute to the costs of sustainable management activities. Conversely, any activities that support improved management of biodiversity can be exempt from taxes and fees in order to make such activities more profitable.

Individuals and corporations can be required to pay fees and taxes such as entry fees for national parks, fishing licence fees and pollution taxes. Water companies in Costa Rica, for example, pay for the maintenance of distant forested water catchment areas. If such market-based instruments are to be effective, the benefits of the biodiversity products and services need to be valued accurately so that the users can be charged appropriately. Furthermore, these types of incentive measures depend on well-functioning and well-regulated markets, which are often scarce in poor countries.

d) Public financing, environmental funds and other financial inducements

Financial incentives can be offered to improve management for biodiversity. International support is important because most biodiversity is concentrated in tropical countries, where there are insufficient funds for improved management. Environmental conservation or trust funds, such as Global Environment Facility (GEF) grants, offer a vehicle to transfer international funds to bring the global benefits and costs closer to national benefits and costs for maintaining some sites.

There is the risk that such funds may not be effective because they do not provide direct incentives to the resource users, and can result in inefficient resource allocation. However, they are targeted to a particular impact on biodiversity, and have been successful when managed by independent organisations that build effective, responsive and focused programmes.



Global benefits of biodiversity can be safeguarded using international conservation funds.

The EC, as a multilateral institution, could take greater responsibility for maintaining a representative sample of global species and habitats than bilateral donors. To some extent this role is addressed through the CBD and associated GEF. However, since the EC does not contribute to GEF and does not participate in its Board decisions, more attention needs to be given to EC policy itself, and to EC-GEF complementary funding opportunities. This is a stated action in the *EC Biodiversity Action Plan* (COM (2001) 162).

2.4 Capacity building

As noted in the *Integrating Environment and Sustainable Development into Economic and Development Co-operation Policy Communication* (COM (2000) 264) and the *Biodiversity Action Plan* (COM (2001) 162), the EC presently has a limited capacity for integrating environmental issues into macroeconomic and trade policy discussions. Capacity building of the Commission services is therefore needed. This requires action at three levels in headquarters and the delegations:

a) Human resources

There are too few environmental advisers in DG Development, DG External Relations and the EuropeAid Office to be able to review country investment programmes and ensure that there is coherence between development cooperation policies and those of trade, fisheries, agriculture and environment. More environmental advisers need to be recruited.

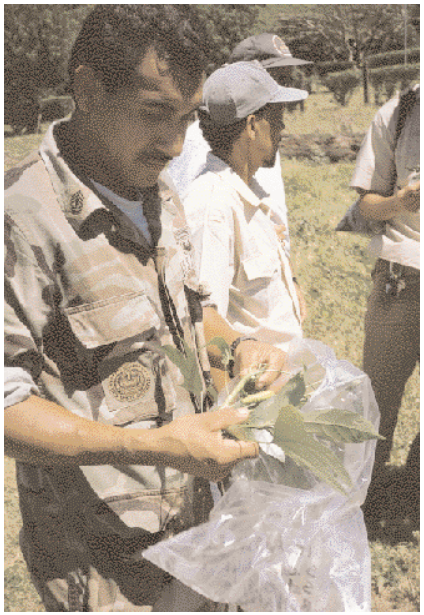
These advisers need access to reliable and consistent technical support, such as might be supplied by an environment Help Desk. Training on key issues such as developing and monitoring SEA contracts, and making use of the *EC Environmental Integration Manual* (2001) is also essential. Any such training will need to focus on issues relevant to development cooperation.

TEXT BOX 16

Commitments of developed country Parties to the CBD

- *Each contracting party undertakes to provide, in accordance with its capabilities, financial support and incentives in respect of those national activities which are intended to achieve the objectives of this Convention, in accordance with its national plans, priorities and programmes.*
- *The developed country Parties shall provide new and additional financial resources to enable developing contracting Parties to meet the agreed full incremental costs to them of implementing measures which fulfil the obligations of this Convention*
- *The developed country Parties may also provide, and developing country Parties avail themselves of, financial resources related to the implementation of this Convention through bilateral, regional and other multi-lateral channels.*

CBD Article 20



Involving a range of stakeholders in information gathering is important to build rapport and agree on shared objectives, including for policy development.

b) Information

Integrating biodiversity issues requires various types of information (OECD, 1999). The results of on-going reviews, showing the impact of current policies on the environment, should inform future policy and institutional reforms. Information from institutions and individuals in partner countries should likewise inform future policy. In many instances, capacity building will be required in both the Commission and partner countries to gather appropriate information and monitor the impacts of policies.

c) Coherence and complementarity

Another reason for the uncertain outcome of policy reforms is that the institutional and legal framework is unsupportive and ineffective. This needs to be addressed at two levels. Within the Commission different services need to develop greater policy coherence, possibly through an EC Inter-Service Committee on biodiversity. Within partner countries receiving EC development assistance, there is also much need for coherence between different donors.

It is generally recognised that activities will be more successful and sustainable if all stakeholders are involved.

Chapter 3

Programming

The focus in this chapter is on sustainable development and biodiversity issues that need to be incorporated into EC Country Support Strategies and Papers, and sector programming. The chapter will be of most interest to delegation-based officers and their partner country counterparts. It also concerns geographical desk and technical support officers in Brussels.

3.1 Country Support Strategies

EC development policy for ACP countries, signed under the Cotonou Agreement, now integrates National Indicative Programming into Country Support Strategies (CSS), in a new approach, comprising four basic steps:

i) Country programmes are allocated funds based on factors such as per capita income, population size, vulnerability, levels of indebtedness; and also on performance indicators, such as progress with reforms, macroeconomic policies, and impact of past EC investments.

Small islands are vulnerable to severe storms and alien species introductions.

ii) A five-year **country support strategy** will be compiled, which includes an analysis of political, economic, social and environmental conditions, in the context of comprehensive development frameworks that include poverty reduction strategies.

iii) The five-year country strategy provides the basis for the selection of two or three **key sectors** for further investment and a national indicative programme (work plan) will be appended to the CSS. This is negotiated by the EC with the partner country, and in consultation with EU Member States.

iv) **Reviews** are to be carried out every two to three years to assess the efficiency and effectiveness of the programme.

TEXT BOX 17 CHECKLIST

Country/regional Environmental Profile: biodiversity checklist

- **Ecosystem vulnerability** – what degree of protection should be available for fragile ecosystems such as forested hillsides and wetlands?
- **Key ecosystems** – what habitats underpin economic activities and local livelihoods (e.g. fish breeding grounds, dry season pastures), what is the economic value of their contribution to development?
- **Land suitability** – what is the suitability of different ecosystems/regions for intensifying agricultural/stock production, improved management of natural ecosystems, etc?
- **Biodiversity and livelihoods** – Who depends on biodiversity products, especially those gathered from wildlands, and how large a group are they? What is the social and economic value of these goods?
- **Over-exploitation of natural resources** – how sustainably are natural resources being used, and who will be the losers and winners if components of biodiversity are lost?
- **Genetic resources** – where are the areas that support wild relatives of domestic crops (trees and food crops) and stock (fish and livestock), and what is the range of locally developed varieties of crops and stock? Where are these genetic resources maintained – on local farms or stored in *ex situ* collections?
- **Land tenure and resource access** – what is the institutional and policy framework for poor people to own or get secure access to land and natural resources?
- **Biodiversity losses** – what are the main direct and underlying causes of biodiversity losses? Are there migratory species/ regional issues?
- **Protected areas** – is there a representative sample of the country/region's species and ecosystems in PAs (including forest and wildlife reserves), and are these PAs effectively managed, supported by national policy and local communities?

see Programming check-sheets for comments on:

- **Biodiversity Action Plan** (Text Box 19)
- **Institutional and financial capacity** (Text Box 20)

New funding from the 9th European Development Fund (EDF) will supplement funds being spent under previous EDFs. Furthermore, separate budget line activities, such as food security, will be negotiated as a separate process.

This is a significant change from the previous funding of a wide portfolio of sectors and projects in ACP countries. For ALA countries the current Country Support Paper (CSP) process is soon to be reviewed, so the procedures for selecting sectors for EC funding is yet to be determined.

Once focal sectors are identified, an SEA should be carried out in the preliminary phases of developing sector programmes. Where macro-economic policy changes are planned, the SEA checklist for policy reforms and incentives can be used (see Text Box 12).

The integration of environment and natural resource management information into CSS/CSPs should be guided by the Country Environment Profile (CEP). The CEP must provide clear and relevant information. It needs to be prepared **before** the CSS/CSP is negotiated and the priority sectors selected. Specifically, environment and biodiversity issues need to be identified that are central to supporting the livelihoods of poor peoples and that underpin landscape productivity (see Section 1.2).

Under the CBD, a country study is a national baseline assessment of biodiversity, its national importance and the threats which it faces. The UN Environment Programme (UNEP) has prepared *Guidelines for Country Studies on Biological Diversity* (1993). If such a study already exists, it can be used in compiling the CEP, ensuring that the full spectrum of biodiversity issues is incorporated (see Text Box 17).

For agriculture to be productive and sustainable it is essential to select crops that are suited to the soil and the conditions.

Country (and regional) environment profiles rely on the rapid compilation of available information, because there is very little time for new research during the CSS or regional negotiations. As a result, the EC must clearly specify what biodiversity-poverty information is required, in advance, to ensure that the CSS/CSP contributes to sustainable use of natural and environmental resources and poverty reduction. Moreover, CEPs should be regularly up-dated to take account of new findings.

3.2 Regional initiatives

One of the six priority issues for EC development cooperation investments is regional integration and cooperation (see Section 2.1.1)[8]. The EC has a comparative advantage over bilateral donors in addressing this issue, because it is represented in most countries, and is a large donor with widespread programmes and projects. Thus the country strategy steps can be scaled up to include a number of countries in a multi-national regional programme.

Various regional organisations have been established to encourage sustainable development by setting up free trade areas, and agreeing fair and equitable systems for regulating competition between them. Such organisations include ECOWAS in central and west Africa, SADC in southern Africa, MERCOSUR in Latin America, and ASEAN in south-east Asia. Since natural resources drive development in many countries in these regions, biodiversity concerns must be integrated into regional negotiations, as indicated in the Country/Regional Environmental Profile checklist (see Text Box 17).

Biodiversity management has already been linked with regional programmes including the ECOFAC programme and the CEFDHAC process for forests in central Africa, and the multi-national Mesoamerican Biological Corridor. Even at the level of two nations, trans-border cooperation has been developed in a number of southern African states through 'Peace Parks'. These parks are a good example of cross-border cooperation, indicating 'tangible evidence of goodwill between friends' (Hamilton *et al* 1996). Successful regional programmes have also developed around strong commercial interests, focusing on careful management of natural resources, such as the South Pacific Regional Tuna Resource Assessment and Monitoring Project.

[8] See Biodiversity Brief 5.

Biodiversity does not respect political boundaries. Here, the Dominican Republic and Haiti share a common watershed – crucial for water supplies in both countries.

A regional approach is important because biodiversity does not respect national boundaries and regional cooperation may be necessary to ensure sustainable use of ecosystems. Migratory species pose particular problems that demand cooperation between countries. The 1979 **Bonn Convention** on Migratory Species coordinates regional and global efforts to protect some 10,000 migratory species, including birds, dolphins, and marine turtles. This Convention needs to be taken into account in any EC Regional programme.

A regional approach has the advantage that neighbouring countries may have cultural and language ties, share environmental problems (such as pollution of the same river basins), and it may be relatively easy to use shared facilities (such as regional training centres), and cooperate on monitoring and research activities. However, the transaction costs for negotiating regional agreements is high, and subsequent implementation is often complex.

3.3 Reversing the loss of biodiversity

Pro-active attention to environmental issues is needed to achieve the international development target that each country will have National Strategies for Sustainable Development (NSSDs) should be implemented by 2005 to *ensure that the current trends in loss of environmental resources are effectively reversed at both national and global levels, by 2015.* This obviously includes biodiversity losses.

The NSSD is a consultative process that integrates environmental concerns into development processes in all sectors, and at all levels of government.

TEXT BOX 18

Existing environmental policies and action plans

There are already a large number of policy documents and action plans on management of environmental resources, and these should be used as inputs for the NSSD processes.

- National Conservation Strategies
- National Environmental Management/Action Plans
- National Development Plans
- Sector action plans such as: Tropical Forestry Action Plans
- Other plans, such as Green plans, National Plans to Combat Desertification, National Climate Change Plans
- National Biodiversity Strategies and Action Plans

The strategy does not need to be presented as yet another report, nor does it have to be called a NSSD. It is whatever a country wishes to use to encourage sustainable development by taking account of environment. It should build on the many existing policies and action plans (see Text Box 18), including national Biodiversity Action Plans.

3.3.1 National Biodiversity Strategies and Action Plans

Under the CBD (Articles 6, 6b and 10) all Parties are required to draw up National Biodiversity Strategies and Action Plans. Biodiversity Action Plans should recommend institutional and legal reforms, guidance on decision-making processes and management structures and encouraging stakeholder participation. This includes mainstreaming biodiversity strategies so that they do not become the preserve of the Ministry of Environment alone, and ensuring that civil service reforms allow for the inclusion of environment/biodiversity advisers in Finance and Planning Ministries.

The importance of locally-adapted species and varieties needs to be taken into account in national biodiversity action plans.

In fulfilling CBD obligations, the national Biodiversity Strategies and Action Plans should record whether polices conform with the OECD DAC criteria (see Text Box 19), and make appropriate recommendations.

There are major constraints to compiling and implementing Biodiversity Action Plans (WCMC, 1998) relating to limitations in:

- Information and awareness
- Management capacity
- Technical capacity
- Financial resources
- Policy and legal framework for participatory biodiversity management.

TEXT BOX 19 CHECKLIST

Checklist for fulfilling CBD objectives at programme level

- Develop or strengthen legislation or administration for implementing CBD;
- Develop incentive measures to support conservation and sustainable use of biodiversity;
- Develop legislation and programmes of access and benefit-sharing from the use of genetic resources;
- Develop legislation and regulations for protection of threatened species
- Transfer of technology for implementing the CBD
- Preparation of biodiversity strategies, plans and programmes
- Biodiversity inventories and assessments;
- Establish PAs and sustainable management of ecosystems;
- Develop impact assessment criteria, indicators and procedures;
- Capacity building in biodiversity assessment; education; training and awareness programmes.

Adapted from OECD DAC list of criteria.

TEXT BOX 20 CHECKLIST

Biodiversity Action Plans – preconditions for effective EC support

1) Political commitment
- What priority is given to biodiversity issues and how much political commitment and support is there?

2) Legal and policy framework
- How supportive is the underlying policy framework of trade, land tenure, resource access (see Chapter 2)?
- What are the incentive measures for conservation, sustainable use, and sharing of benefits from the use of biodiversity?
- What priority is given to biodiversity issues in national development plans (including poverty reduction strategies and NSSDs); are they informed by biodiversity action plans?
- How much coherence and compatibility is there between sectors?
- What legally binding conventions on biodiversity, and multilateral environment agreements is the country signatory to?
- What is the extent of stakeholder involvement in development of the Biodiversity Strategy or Action Plan?
- What are the policies, laws and contracts that allow access and benefit sharing for use of biodiversity components including genetic resources?
- What policies and laws are in place to implement the Biosafety Protocol?

3) Institutional capacity
- Ministry of Environment – what is its capacity to integrate with other development processes and policies?
- Roles and responsibilities – what is division of responsibilities between sectors and Ministries, and how effective are instruments for resolving conflicts?
- Macro-meso-micro links – what degree of conformity is there between national, regional and local level development needs and actions?
- Donor coordination – how well coordinated are the activities of different donors?

4) Financial issues
- What financial resources are available for improving integration of biodiversity into development plans: government funding; private sector investments; donor assistance.

5) Entry points
- Which instrument of EC assistance is most appropriate - contributions to central government, assistance to NGOs and Community-Based Organisations (CBOs), or assistance to private sector enterprises through the European Investment Bank?

Causes of biodiversity loss often lie in policies and activities such as fishing subsidies. In 1995 the world fishing fleet numbered about 3.8 million vessels. Twenty-five per cent of global fisheries are over-fished.

These constraints have resulted in Biodiversity Action Plans that are unrelated to, and not integrated with, other development priorities such as the campaign against poverty and the focus on food security. As a result, they receive little political support and are therefore not effective.

3.4 Guiding Principles – environmental sustainability

A set of Guiding Principles has been developed to address sustainable development that takes account of biodiversity[9], and should be considered during programming and project development. The key points are highlighted below.

[9] These problems were reviewed at five BDP regional workshops, and Guiding Principles were for-mulated on the basis of the lessons learned from case studies and the experience of nearly 100 workshop participants. These Guiding Principles have been elaborated in a companion volume to this report: *Guiding Principles for Biodiversity in Development: Lessons from field projects* (BDP, 2001).

TEXT BOX 21

Guiding Principles for biodiversity in development cooperation

Principle A: Adopt an ecosystem and multi-sectoral approach to development cooperation programmes (taking into account the impacts on adjacent and downstream areas)

Principle B: Promote fair and equitable sharing of costs and benefits from biodiversity conservation and sustainable use at and between local, national, regional and international levels.

Principle C: Encourage full stakeholder participation, including partnerships between civil society, government and private sector.

Principle D: Ensure that the institutional arrangements are effective, transparent, accountable, inclusive and responsive.

Principle E: Ensure that development cooperation projects and programmes are consistent with the wider policy framework, and/or changes are made for supportive policies and laws.

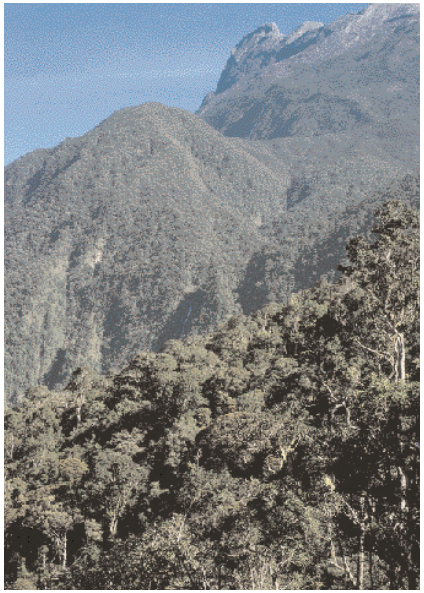
Principle F: Use/Provide accurate, appropriate, multi-disciplinary information, which is both accessible to, and understood by, all stakeholders.

Principle G: Development cooperation investments must be sensitive to, and complement, local/national structures, processes and capacities

a) Ecosystem approach

Development programmes should adopt a landscape perspective, taking careful note of land suitability. This requires a move away from the single species focus to a broader view of the interactions between species, between ecosystems, and with the non-living environment. This wider perspective must include potential effects on adjacent and 'downstream' ecosystems and communities, such as sedimentation and pollution. An ecosystem approach necessarily takes a long-term view, because effects may become apparent only over a long period.

The ecosystem approach moves away from a focus on single species, to be more holistic and multidisciplinary.



An ecosystem approach advocates a more holistic approach to development. It seeks to avoid the unsustainable use of landscapes, which require costly, and often lengthy, rehabilitation of soils and water regimes. It is multi-sectoral, and involves a wide range of stakeholders in the processes governing land use. A multidisciplinary input ensures that **multiple-use land management systems** are established, which satisfy the needs of as many stakeholders as possible and avoid unnecessary losses of biodiversity.

Ecosystems do not correspond with administrative boundaries, and many species habitually migrate across national boundaries.

Regulations on the release of plants, animals and micro-organisms into new areas should be implemented in order to monitor and control the impact of new introductions of modern varieties of crops and stock, including GMOs, and the **introduction of alien species**. Where there are no such

regulations, these should be developed and put into effect. The regulations should include effective measures to assess risk to human health, and both on-farm and wild biodiversity.

b) Biodiversity for pro-poor development

The costs and benefits from biodiversity use, must be shared equitably. This goes beyond the focus of the CBD, because it incorporates costs as well as benefits, and includes ecosystem and species levels of biodiversity, in addition to the genetic resources highlighted in the CBD.

TEXT BOX 22

Constraints to benefit sharing from biodiversity use, especially genetic resources

Providers need:
- better information/control of resources outside providers' jurisdiction;
- more information about values and market structures;
- stronger institutional, negotiating and contractual capacities;
- more adequate intellectual property right laws and systems of implementation the laws.

End users need:
- a reliable contact points/authorised institutions to grant access to biodiversity;
- accurate information on ownership and tenure, and legal certainty of access;
- clearer guidelines on obligations, corporate access and benefit sharing policies;
- distinctions to be made between different uses (commercial, scientific etc.).

Adapted from: Best practices for Access to Genetic Resources, Glowka *et al.*, 1998

Fair trade is important in supporting the livelihoods of the poor. Markets are generally not geared to small and unpredictable supplies of many different products of variable quality. Furthermore, communities who harvest goods that have a regional, national or international market value, or live in areas where products are harvested by other groups, often receive very low prices. As rural populations become increasingly incorporated into cash economies, problems of unfair trade often result in unsustainable and rapid elimination of resources. Finally, many ecosystem services that benefit people, such as water purification, are not 'traded' in any market and so are an undervalued benefit.

Destruction of biodiversity often leaves the poorest groups further deprived of important assets. And conversely, measures to protect biodiversity may result in losses to local communities, in the form of foregone benefits from land and biodiversity use. In the case of intellectual property rights (IPRs), there are detailed negotiations taking place on technology ownership, and control over patented goods. But little is being done to safeguard the IPRs of local and indigenous communities in relation to their knowledge about local biodiversity that may be of trade interest (see Text Boxes 14 and 22).

FAO estimates that about 1.5 billion farmers save and breed their own seed. Seeds selected from strong healthy crop varieties, may be inter-planted with other favoured varieties to encourage cross-breeding. Little is being done to safeguard the IPRs of local communities.

Partnerships with local communities are crucial for the success of most development activities, including conservation and sustainable use programmes.

At the national level, these market failures need to be addressed through policy reforms (see Section 2.3.1). At the international level, one measure to compensate developing country economies for stewardship of global goods is resource transfers from rich to poor nations, through international funding instruments (see Section 2.3.2).

c) Participation and governance

It is generally accepted that programmes and projects work better, and are more sustainable, if all stakeholders participate in their design and implementation. This is why EC development cooperation will build-on, and contribute to, country-driven poverty reduction strategies and NSSDs, and why capacity building for good governance is a priority issue for development cooperation investments.

Consensus should be sought between stakeholders, since reliance on a single group can undermine the success of an investment. Successful participation involves the full range of stakeholders, and takes account of local power relations, interests and understandings. As participation is not a neutral process, it is essential to establish mechanisms for conflict resolution and management.

All **aspects of good governance** are central to effective participation for poverty reduction and management of biodiversity. Decentralised decision-making permits co-management of natural resources, but strong local institutions, which are accountable to the electorate and supported by an accountable civil service, are needed. Developing this, and the institutional arrangements for negotiating solutions and resolving conflicts, are in themselves building blocks for democratic change. The policy framework must allow this if poor groups are to benefit from development cooperation.

TEXT BOX 23

Stakeholder participation

Many stakeholders may not dwell close to the resources they use, and so it is necessary to determine which stakeholders have a common interest, irrespective of where they live, and to determine: who will be the long-term beneficiaries and losers; and whose behaviour may have to be modified. In this process of analysis, it can help to distinguish three categories of stakeholders:

- **Primary stakeholders** – individuals, local small-scale groups, or institutions/companies who are the direct users of the resource, often referred to as a 'user group';
- **Secondary stakeholders** do not use the resource directly but still have an interest in, or are affected by, any planned activity relating to the resource;
- **Key stakeholders** who, either directly or indirectly, make decisions governing the management or use of components of biodiversity.

Women produce between 60 and 80 per cent of the food in most developing countries, yet their key role as food producers and providers is often poorly incorporated in participatory reviews.

d) Information

Programme and project development is hampered by a lack of information. Information from as many stakeholders as possible allows the values attributed to various biodiversity resources to be assessed. It may require developing new methods of gathering information, especially to integrate science-based approaches with traditional knowledge (Freese, 1997).

The CBD encourages improved information flow and communication on biodiversity in its call for the establishment of Clearing House Mechanisms (CHM). Through such units, *information is gathered and then redistributed in an efficient manner to those who can make use of it*. However the CHM will be effective only if information is provided in a form that can be understood easily, and if similar types of information are available to allow comparisons and exchange between CHM focal points.

As farming gets more complex and greater crop yields are required to feed more people on less land, farmers' local knowledge needs to be linked with information on new technologies.

Capacity for research and information gathering needs to be developed.

3.5 Capacity building

In order to put the Guiding Principles to good use during programming and project cycle management, a substantial amount of capacity-building will be required, both within EC delegations and in counterpart ministries, civil society groups and private sector companies.

The integration of environmental issues into poverty reduction strategies demands policy, legal and institutional reforms. This will require a programme of awareness-raising and training and the development of tools for environmental integration for officers in ministries of finance and central planning, companies trading internationally and civil society groups determining their own pathways to sustainable development. The sector guidelines in the EC *Environmental Integration Manual* (EC 2001) should be used both as a tool and training material to achieve this.

Chapter 4

Projects

This chapter focuses on the field-level thinking that is needed to address the direct causes of biodiversity loss in the context of sustainable development. It requires a supportive policy and legal framework as described in the preceding two chapters. The chapter is written primarily for administrative and technical officers, and project staff (including consultants and contractors) of EC-funded projects, along with their government, private sector and local community counterparts.

4.1 Land-use options: protection, sustainable use, conversion

The objectives of the CBD prioritise the balancing of conservation and sustainable use to provide equitable benefits. However, there is still much misunderstanding about the meaning of these terms.

Opinion is divided on whether **conservation** refers to the protection and the utilisation of natural resources. The World Conservation Strategy (1980) proposed that conservation should combine both protection and sustainable use, but the CBD, adopted a decade later, is ambiguous on the subject (Glowka *et al*, 1993): throughout the CBD the terms 'conservation and sustainable use' are dealt with separately, albeit placed side-by-side.

A distinction can be drawn between *in situ* (or on-farm) conservation and *ex situ* conservation (CBD Articles 8 and 9 respectively). *In situ* (or on-farm) conservation refers to the maintenance of viable populations of plants, animals and micro-organisms living in the habitats or surroundings in which they evolved their distinctive properties. *Ex situ* conservation refers to populations maintained outside the habitats in which they evolved (such as botanical gardens or gene banks). *Ex situ* conservation is an important supplement to *in situ* conservation, especially where wild or on-farm populations are severely threatened with extinction.

TEXT BOX 24

CBD definitions of conservation and sustainable use

Conservation is *'the conservation of ecosystems and habitats and the maintenance and recovery of viable populations of species'*, which can include habitat rehabilitation.

Sustainable use means *'the use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations.'*

Article 2 – CBD

Conserving coastal forests reduces run-off and so reduces damage to coral reefs and maintains fish stocks.

Sustainable (consumptive) use of wildlands is essential to maintain forests, but needs careful regulation and adaptive management.

Ex situ conservation is, however, generally expensive and usually dependent on substantial technical input, and often costly facilities.

It is not possible to define sustainable use, given the fact that it is context-specific and each site has unique conditions (IUCN SUI, 1999):
'Sustainable use is not determinate. There are a multitude of configurations of biological, social, and economic conditions at which sustainability of a use might be achieved. However, only certain combinations may work.'

In addition, consumptive use of biodiversity can be distinguished from non-consumptive use (Section 1.2.2), and low levels of subsistence use distinguished from higher levels of commercial use, when strong market forces can lead to more rapid loss of biodiversity. Taking commercial consumptive use as a starting point, a detailed study identified two types of sustainable use (Freese *et al*, 1996; Freese, 1997):

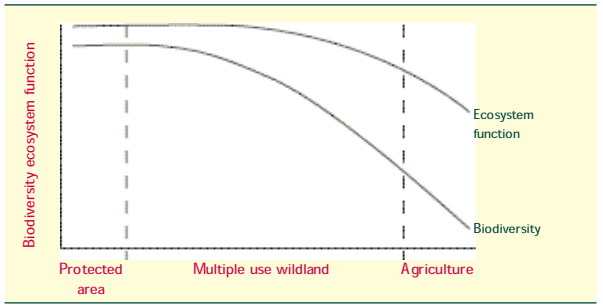
a) **off-take sustainability:** where the off-take of individuals or products from a population (the target species) is sustainable if conducted at a rate and in a manner that can be continued indefinitely. Off-take sustainability ensures levels of harvesting that will maintain target species in perpetuity but can lead to reversible declines in populations. Non-target species may become extinct, especially those species sensitive to human-induced habitat changes.
b) **ecosystem sustainability:** where the off-take from the target population(s) and associated management practices do not lead to permanent changes, particularly degradation, in species richness (including non-target species), ecosystem structure, or ecosystem processes. Ecosystem sustainability considers the needs of all species in an ecosystem, ensuring that both target and non-target species can be maintained in perpetuity.

In practice, it may be difficult to distinguish between these two types of activity except over long time horizons.

There is concern that in habitats with high species richness (e.g. tropical forests), and with species that have low tolerance to habitat change, then even minimal human impact can lead to species extinctions (Rice *et al*, 1999). Thus, sustainable use will lead to losses of vulnerable species, and ecologically sustainable off-take may be unattainable. A counter argument is that off-take sustainability maintains habitat, which is important for many species' survival. Areas where sustainable use is supporting livelihoods and maintaining habitats, even with some species losses, are still important.

As the intensity of consumptive use increases, wildland habitats begin to change in structure, composition and functions. Gradually, they are converted to anthropogenic habitats. In these areas, indigenous species are largely replaced with alien (often domesticated) species adapted to agricultural and pastoral conditions. Even where there are permanent species losses, however, ecosystem functions relating to soil fertility, water purification and oxygen or nutrient recycling usually remain intact, and continue to underpin human development in converted landscapes. Figure 8 gives a schematic representation of increasing biodiversity loss as the intensity of human consumptive use of wildlands increases; distinguishing between ecosystem service loss, and species/genetic losses (after Freese, 1997).

Figure 8– Scheme showing biodiversity declines with increasing human (consumptive) use of biodiversity



Source: Freese, 1997

4.2 Spectrum of choice

The gradual loss of biodiversity can be analysed using a set of species biodiversity indicators, that show the status of land units at different points along the spectrum (Table 6): from little-disturbed habitats with a full complement of species (protected lands), to agricultural landscapes with fewer species (converted lands). There is a gradual change along the continuum with blurred distinctions between land-use units, except where there have been recent major habitat changes (e.g. agricultural clearance). However, biodiversity indicators can still be used to assess the current status and hence options for the future land use.

Biodiversity status can change in either direction. For example, in tropical regions with high rainfall and poor soils, a woody bush quickly establishes in fields left fallow after two to three years cropping. If the area remains unfarmed, forest habitats can re-establish, thereby reversing the direction of

Integrated land use combines protection, consumptive use and agricultural development within a single landscape.

Table 6– Spectrum of land-use options

	Land use status			
Potential Land use	Protection of wildlands	Consumptive use of wildlands: Ecological sustainability	Consumptive use of wildlands: Off-take sustainability	Conversion to agri-culture/pasture
Biodiversity Indicators	• all species maintained • population cycles within natural limits • no alien/introduced species • ecosystem diversity maximum	• all species maintained • natural habitats main-tained • harvested species show cycles of decline and recovery • ecosystem services not compromised	• local extinctions of non-target species • natural habitats main-tained • harvested species show cycles of decline and recovery • ecosystem services not compromised	• widespread wild species extinctions • loss of natural habitats • pioneer and alien species dominate • ecosystem services at risk
Types of use	• subsistence harvest-ing • low impact methods • non-consumptive uses	Off-take does not exceed regeneration capacity of target species, and does not cause non-target species losses.	Stocks of harvestable species maintained in perpetuity, but other (non-target) species lost.	• unsustainable use of wildlands, and con-version to agricul-ture/ pasture/fallow; • intensive production systems relying on a few target species (crops, livestock, tim-ber, aqua-culture, etc.)
Forces for change:				
Intensity of human use →				
← Regeneration, recolonisation, rehabilitation				

change brought about by the earlier deforestation. In reality it is common to find a patchwork of land use units with varying biodiversity status reflecting a range of human use and processes of regeneration. Recovery can be accelerated through management actions such as rehabilitation, replanting and re-introductions. Global species losses, however clearly indicate that the 'pull' is towards converted habitats and biodiversity declines.

The integration of trees into agricultural systems can improve soil fertility, control water and wind erosion and recycle nutrients.

4.3 Rural development and food security

Rural development and food security is a priority sector for EC development cooperation (see section 2.1.1). In order to ensure effective and sustainable development in this sector, it is necessary to make full use of genetic, species and ecosystem biodiversity as natural capital.

Biodiversity is particularly relevant to food production and nutrition. Production can be considered in terms of the quantity of wild foods gathered and trapped, hunted or fished, as well as the range of crop and stock varieties bred and maintained to support livelihoods. Genetic biodiversity is also crucial in conferring resilience on crops and stock for farmers who cannot afford to buy pesticides, fertilisers and other inputs. As regards nutrition, biodiversity contributes variety and essential nutrients that may not be provided in dietary staples (see Text Box 4), and ecosystem services are a vital ingredient for all aspects of rural productivity (see Section 1.2.3).

Building on the spectrum of land-use options described above, and following the *Biodiversity Action Plan* (COM (2001) 162), the key biodiversity issues in rural development and food security will be considered under three categories:

- intensive systems of food production, in converted landscapes such as fields of crops, livestock pens, and fish ponds;
- collection of products from wildlands (including wetlands) and fallows which have not been domesticated;
- approaches to linking protection of biodiversity with rural development.

Natural woodlands protect pastoral rangelands, and provide shade for stock and crops.

4.3.1 Intensive production systems

Although traditional systems of crop and stock breeding provided a wide range of crop varieties and livestock/fish breeds, recent agricultural development has focused on a few high yield varieties (see Section 1.2.1). The resulting production systems encourage the loss of local varieties and undermine the resilience of global systems of food production to unpredictable shocks. For example, unstable markets for cash crops, unreliable agro-chemical supplies, new diseases and pests, harsh and changing climatic conditions, and declining soil fertility are all risks for global food production at worst, and a decline in food and income for the rural poor at best. Crop and stock gene pools demand thoughtful management to ensure that options for breeding to meet future needs remains open (see Text Box 25).

Use of land for commercial crops: monoculture of exotic species.

4.3.2 Livelihoods depending on non-domesticated species

Even in intensively farmed areas, people combine the use of cultivated or reared products with gathered/hunted/fished off-farm products. Some groups – particularly women, children and the poor – rely heavily on products from fallow thickets and wildlands. Such producers are particularly important in areas with low crop/stock potential.[10] It is vital that poor communities are not made poorer by the loss of biodiversity in these areas (see Text Box 26).

[10] See Biodiversity Brief 6.

TEXT BOX 25

Key biodiversity issues in managing domesticated crops and stock

i) Stocks of a broad range of useful/important domesticated plant and animal species, and their wild relatives need to be maintained, and policies and institutions need to support this. Such activities should be accompanied by the indigenous/local knowledge that is part of indigenous crop and stock development.

ii) Gene-bank collections are often unrepresentative of local priorities. More livestock and aquaculture species need to be added, as well as locally-important staple crops (such as roots and tubers), which are not well represented in international and national *ex situ* collections.

iii) The wealth of biodiversity cannot be safeguarded by *ex situ* conservation alone. The maintenance of genetic material from on-farm (or *in situ* populations of wild relatives of domesticated species) is important to allow continued evolution and adaptation to changing conditions.

iv) Mechanisms need to be established to ensure that rural communities have access to global genetic resources held in gene banks, and also to develop on-farm, community-based gene banks, as well as in situ programmes for wild populations.

v) The breeding and selection of new crops needs to take account of local growing conditions, and the needs and resources of poor farmers – in the bank, the field, the food store, and the kitchen. Moreover, use of indigenous knowledge to develop new crop and stock varieties should be 'paid for' under mutually agreed terms.

vi) Any proposed introductions of new varieties and/or GMOs should be preceded by careful risk assessment to examine the likely impacts on local domesticated species, on wild species and on human health. These assessments should then be followed by carefully controlled release programmes.

vii) In addition to benefits, there are numerous potential negative side-effects of agrochemical use, ranging from pollution and high debts to low yields and resistant pests. In response to over-use of agrochemicals, systems of organic farming and integrated pest management have been developed, the latter relying on biological control.[11] These need to be encouraged.

Source: Biodiversity Action Plan (EC 2001 / 162)

Fisheries are important to the food security of populations living in coastal areas, along river banks and in urban centres.

[11] See Biodiversity Brief 7.

TEXT BOX 26 CHECKLIST

Key biodiversity issues in sustainable use of wildland resources

i) Sustainable rural development depends on maintaining the integrity of non-cultivated lands that are sufficiently large to supply necessary goods and services: including wildlands and old-growth fallows, fish breeding grounds and nurseries (e.g. mangroves), watersheds etc.

ii) Sustainable use management should be developed to suit specific conditions. Government, local communities and private sector must agree on objectives, and monitor production and changes in the resource base (monitoring should make use of biodiversity indicators).

iii) Technical surveys and research are needed in order to understand what type, intensity and frequency of harvesting affects the resource base and, therefore, the adaptive management regimes required for sustainable use.

iv) Support from stakeholders for sustainable use is achieved only through careful economic analyses and use of participatory approaches to natural resource management. The focus should be on supporting poor communities. This in turn relies on a supportive national policy framework.

Source: EC Biodiversity Action Plan (EC (2001) 162)

TEXT BOX 27

Adaptive management

The basic elements of an adaptive management approach to sustainable use include:

i) assessing the resource base and developing models of resource use;
ii) supporting "internalisation" of the cost-benefit trade-offs within a management unit;
iii) ensuring maximum efficiency in converting biological capital into financial and other benefits;
iv) establishing decision-making processes and procedures that include a broad range of stakeholders and facilitate the establishment of co-management systems, with the support of key stakeholders for the management systems;
v) ensuring benefits reach people living with, and using, the resource;
vi) monitoring the effects of use on stocks, non-target species and ecosystem functions.

Developing systems for sustainable use of 'bushmeat' resources is an urgent priority in west and central Africa.

4.3.3 Biodiversity protection and development

There are 560 million ha of PAs in ACP and ALA countries (around 7.7 per cent of the land area), supplemented with 130 million ha of marine PAs worldwide, of which 35 per cent are in tropical areas (less than 1 per cent of the marine area).

PAs have been established for many reasons: to protect fragile ecosystems (especially watersheds), to set aside areas for recreation and hunting, and to protect a representative sample of a country's biological and cultural heritage. As social, economic and political circumstances have changed over time, so the management objectives for PAs have had to adapt. This has required a broader set of goals that take greater account of the needs of local communities and national economies. The current list of PA categories reflects this refocus, especially the inclusion of PAs managed mainly for the sustainable use of natural resources (see category VI in Text Box 28).

The potential benefits of PAs are wide ranging (see Text Box 29). All of these benefits need to be taken into account when looking at the contribution of PAs to development, particularly as the full benefits only emerge when the long-term and intangible values are included in economic valuations.

TEXT BOX 28

Definition of protected areas

Protected area means *a geographically defined area which is designated or regulated and managed to achieve specific conservation objectives* (CBD, 1992).

Protected area categories (IUCN, 1994):

I. Strict nature reserve/wilderness area managed for scientific purposes;
II. National park managed for ecosystem protection and recreation;
III. Natural monument/natural landmark mainly managed for the conservation of a specific natural phenomenon;
IV. Habitats/species management area mainly actively managed for conservation;
V. Protected landscape/seascape mainly managed for the conservation of a landscape/seascape;
VI. Managed Resource Protected Area: mainly managed for the sustainable use of natural resources

TEXT BOX 29

Benefits of protected areas

Goods
- access to natural resources, improved management and sustainable harvesting
- revenue from marketing of sustainably harvested goods
- reservoir of genetic material from ancestral stocks of domesticated species
- the maintenance of genetic materials in natural habitats, which can be used in medicine, plant and animal breeding, and for other potential uses
- conserve wetlands, which act as nurseries for fish, or marine PA networks that maintain fish stocks in adjacent areas

Services
- conservation of soil, watersheds and coastlines
- provision of clean water
- maintenance of biotic processes such as pollination which are important in supporting agricultural systems
- sequestration of carbon
- regulation of climate
- maintenance of buffers to natural disasters

Non-consumptive use
- education and research
- recreation and tourism, providing benefits for local economies

Others (non-use)
- preservation of cultural heritage, spiritual beliefs, sacred sites, cultural/traditional practices and traditional knowledge
- representative sample of indigenous plants animals and micro-organisms
- protection of scenic beauty and rare species
- maintenance of options for future use
- promotion of peace and international cooperation

The benefits of protected areas range from the production of NTFPs for local communities to climate regulation and water recycling for more distant populations

Managed agro-forestry plots can be biodiversity-rich, providing a range of farmed products in a resilient environment.

Recent research shows that habitat maintenance is better in clearly demarcated PAs which are staffed with an effective set of rangers and guards, and which offer incentives or compensation for local people (Bruner *et al* 2001). However, the difficulty of accurately evaluating the economics of PAs is compounded by the fact that benefits may accrue at national or international level, leaving local communities to carry the costs. These costs may include restricted access, crop damage from large mammals dwelling in the PAs, and even evictions from ancestral lands. These problems, plus the appearance that PAs are not 'being used' have led to low political support for parks and consequently management is correspondingly weak – the 'paper parks' syndrome.

In an effort to address these constraints, the main issues facing managers of PAs in ACP countries have recently been reviewed, and best practice guidelines drawn up (EC/IUCN 1999). These correspond closely with those summarised under Guiding Principles in the previous chapter.

One important approach is to ensure that PAs are managed as part of the overall landscape and not in isolation. PAs alone cannot maintain viable populations of certain species. Complementary actions are required outside PAs, especially the development of 'biodiversity-friendly' corridors. This allows migration, as well as some gene-flow between isolated PAs thereby reducing the potentially negative effects of in-breeding. Buffer zone management around PAs can help to improve the livelihoods of communities adjacent to the PA, as well as some of the shortcomings of PAs, as promoted through the UNESCO Man and the Biosphere Programme.

4.4 Tools for integrating biodiversity into development projects

The tools available to integrate biodiversity into development projects range from complex land use plans to discrete EIAs for specific projects.

4.4.1 Land-use planning

When drawing-up land use agreements, it is important to bear in mind that many conservation objectives may be achieved through sustainable use

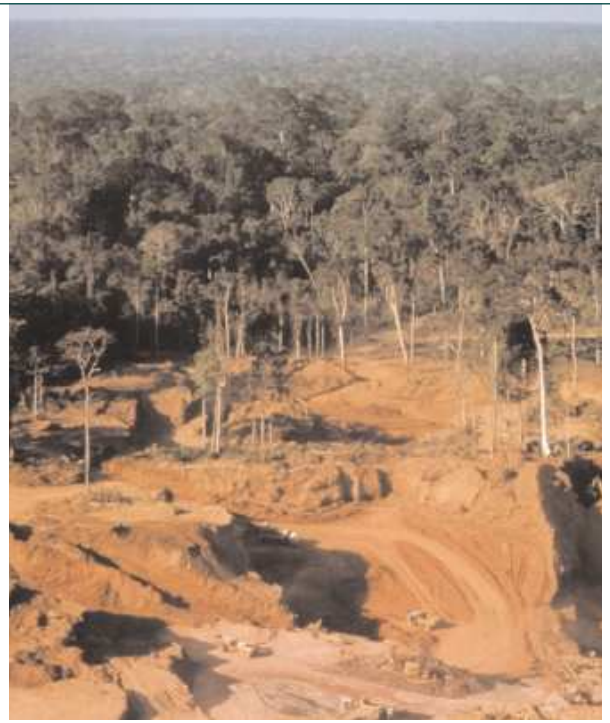
activities, such as maintaining habitats (and many species) in multiple-use buffer zones around PAs. Similarly, sustainable use objectives may rely on some conservation action, for example, protecting fish breeding grounds to sustain stocks for fishing in surrounding waters. Furthermore, improving production efficiency in converted lands (agricultural areas) can reduce pressure on wildland biodiversity, depending on resulting changes in demands for components of biodiversity.

Criteria need to be agreed for selecting land use activities appropriate for a particular land unit (see Table 7), and inevitably different criteria may support conflicting land-use options. For example, an area may have globally threatened species or habitats, but may also be highly suitable for agriculture. Under these circumstances, a framework needs to be set up for resolving conflicts and providing mitigation. This framework should take an ecoregional perspective and take account of social, economic and environmental effects as well as the political, institutional and legal context (Section 3.4).

Table 7 – Land use planning – examples of selection criteria

Selection criteria	Protection	Consumptive use	Conversion
Biodiversity	• globally/nationally threatened species/habitats • site of wild relatives of domestic plants and animals • stock maintenance for sustainable use zones • fragile ecosystems • area providing ecosystem services underpinning long-term productivity	• wildlands / natural habitats • harvestable species in abundance • moderate to low biodiversity value in global terms • low potential for livestock/ agriculture intensification • other areas in landscape fulfilling conservation functions	• low biodiversity value • anthropogenic habitats • high agricultural potential • stable environment for intensification of production systems • other areas in landscape fulfilling conservation/ functions
Other	• traditional reserved areas • weak market forces or poor market access • low human population density • effective government protected-area institutions • meets local needs/people recognise need to protect • high ecotourism potential • local people directly dependent on natural resources • little or no in-migration • historical/cultural relations with habitat (such as sacred sites)	• high potential for biodiversity-rich livelihoods (presence of marketable species) • land and biodiversity owned/accessible to stewards of the resource (including common property resources) • low to moderate human population density • access to markets • local management systems/ institutions are effective in controlling maintenance of and access to resources and manage conflict • sustainable use meets local needs/people recognise need for sustainable use • high pressure on particular resources/habitat • some livelihood dependence on natural resources	• high human population density • private lands • strong market forces for a few marketable goods • good communications/ infrastructure • little local interest in preserving wildlands • little out-migration • high pressure on resources/ degradation of habitat

Environmental Impact Assessments are required to take the environment – including biodiversity – into account in all development cooperation activities.



4.4.2 Environmental Impact Assessments – example of transport projects

Transport is one of the six priority areas for EC development cooperation, and accounts for substantial investments in ACP countries – €1.33 billion in 1990-95, with a further €2.25 billion allocated in 1995-2000. Most transport investments are in the form of discrete road infrastructure projects that should be subjected to EIA screening, whether the road is a new construction, rehabilitation or upgrading project. This screening should be carried out very early in the project development process (pre-feasibility and feasibility studies), and recommend whether a full EIA is required.

The key biodiversity issues to be addressed for transport infra-structure projects are set out in the checklist in Table 8. These same questions can be adapted for Strategic Environmental Assessments of national transport programmes, in combination with the checklists included in the preceding two chapters. Moreover, the same steps can be followed, with modified questions, for EIAs on non-transport investments.

In addition to these biodiversity criteria for EIA studies, additional questions have been established by the OECD/DAC, to assess whether a project contributes to achieving the objectives of the CDB (see Text Box 30).

TEXT BOX 30 CHECKLIST

OECD DAC checklist – to supplement the EIA checklist

- Development of incentive measures (regulations)
- Establish PAs and sustainable management of ecosystems
- Protect endangered or vulnerable species
- Capacity building to carry out EIA

Table 8– Key biodiversity issues in EIAs – road projects example CHECKLIST

EIA Procedural Stage	Biodiversity considerations
Screening Are there important biodiversity concerns that indicate the need for EIA?	Include biodiversity considerations in screening procedures. The need for EIA might be indicated if the proposed project affects: • designated or PAs, or protected species, • areas of cultural importance (e.g. sacred groves), • areas where biodiversity components support local livelihoods • watercourses, coastal zones, wetlands and river courses • large continuous areas of 'pristine' habitat, even if not protected.
Scoping Derive terms of reference (TORs) for the EIA	Ensure EIA takes account of potential impacts on biodiversity: include assessment of biodiversity in TORs. Consult widely and early with all stakeholders, especially people with cultural dependence on biodiversity in the affected area, and widely circulate the scoping report.
Focusing Refine the TOR on the basis of biodiversity values, which will be used in decision-making, and select suitably qualified (local) experts to carry out the work.	Select biodiversity components for more detailed study, for example, focus on: • indicators (e.g. of disturbance or pollution), • species valued for hunting, medicines, ecotourism, crop/livestock gene stocks • keystone species (on which others depend), • important ecosystem functions (e.g. flood attenuation caused by wetlands) • key breeding or feeding sites, especially for protected species, • migratory routes and stopover sites etc.
Impact Assessment Predict impacts: identify, describe and provide the data necessary to quantify the effects of proposal(s) on measures of biodiversity.	Specify (and quantify where possible) magnitude, duration and range of impacts, e.g. for: • areas of habitat to be lost (include breeding, feeding, refuge areas), • habitual routes to be severed (number and relative importance to maintenance of mobility in the landscape), • number of individuals likely to be killed, • proportion of population to be disturbed, • quality of remaining habitat for key species, • ecosystem functions lost or impaired etc. (e.g. hydrology of watersheds).
Impact significance Rank impacts, taking into account biodiversity values and the reversibility of impacts.	Consider: • magnitude, duration, timing and reversibility of impacts, and their predictability • effectiveness of mitigation measures, • post-development carrying capacity of remaining habitat, • viability of remaining populations, • 'utility' and sustainability of valued biodiversity components, • ability of affected habitats, populations or species to recover.
Impact Mitigation Most EIA law requires proponents to suggest measures to avoid, reduce or remedy adverse impacts.	Ensure mitigation is recommended for significant adverse impacts on biodiversity. Avoidance is always the best form of mitigation, and seeking ways to enhance biodiversity management for development is still better. To what extent will proposed mitigation measures reduce impacts? Have they been successful elsewhere? Mitigation for biodiversity may require land acquisition for compensation.
Impact Evaluation Are the impacts identified important or significant?	How important or significant are residual impacts on biodiversity?
Decision-making	Act upon the information and recommendations of the EIA report
Environmental Impact Statement (EIS)	Explain biodiversity impacts clearly, and disseminate baseline information widely. Provide clear maps, detailed practical advice concerning measures to protect biodiversity during construction or to mitigate for operational impacts. Provide a schedule for activities and a contingency plan in the event of mitigation failure.
Review and monitoring What really happened?	• Did impacts on biodiversity happen as predicted? • Were mitigation measures effective and implemented successfully? • What was the outcome for biodiversity?

4.5 EC Environmental Integration Manual

The recently completed EC *Environmental Integration Manual* (2001) details the steps in the EIA and SEA processes, and should be consulted for more information at policy, programme, and project levels. Sector guides on: agriculture, fisheries, forestry, transport, health and education are also available. The checklists presented in this chapter complement those offered on the EC Environmental Integration website.

As noted in the EC *Biodiversity Action Plan*, the EC has limited capacity to carry out EIAs and SEAs. Capacity building is needed for desk officers and those in EC delegations to be able to draw-up appropriate terms of reference for EIAs, and integrate environment issues more broadly into EC development cooperation. This capacity building could be combined with training of counterparts, project managers and consultants in-country, and may well rely on the establishment of an Environmental Help Desk in Brussels, which can be called on to provide technical support in reviewing EIA reports.

References and sources of further information

CGIAR	http://www.cgiar.org
CITES	http://www.cites.org
Community wildlife management	http://www.biodiv.net
Convention on Biological Diversity	http://www.biodiv.org
Coral Reef Degradation in the Indian Ocean	http://www.cordio.org
ECOFAC	http://www.ecofac.org
FAO Domestic Animal Diversity-Information System (DAD-IS)	http://dad.fao.org
FAOhttp://www.fao.org	
Financial resources, incentive measures, impact assessment, and economic valuation themes	http://economics.iucn.org
FISHBASE	http://www.fishbase.org/home.htm
Food First	http://www.foodfirst.org/
Forests for Life Campaign	http://www.panda.org/forests4life
General information on biodiversity	http://iucn.org/themes/biodiversity
Genetic biodiversity	http://www.rafi.org http://www.grain.org
Global Environment Facility	http://www.gefweb.org
IFPRI Vision 2020	http://www.ifpri.org
IIED	http://www.iied.org
International Association for Impact Assessment (IAIA)	http://www.iaia.org
IPGRI	http://www.ipgri/cgiar/org
IUCN economics unit	http://www.economics.iucn.org
IUCN	http://www.iucn.org
OECD (1997–2000) Reports on Trade and Environment	http://www.oecd.org
Research	http://www.idrc.ca
South Pacific Regional Environment Programme	http://www.sprep.org.ws
Strategic Environmental Assessment (SEAN)	http://www.seanplatform.org
TRAFFIC	http://www.traffic.org
TRIPS	http://www.wto.org
Tropical Forest Forum website	http://www.nri.org
UNESCO World Heritage Centre	http://www.unesco.org/whc
World Bank Biodiversity and Environmental Assessment Toolkit	http://www.worldbank.org/biodiversity
World Commission on Protected Areas (WCPA)	http://wcpa.iucn.org
World Resources Insitute	http://www.wri.org

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Appendix

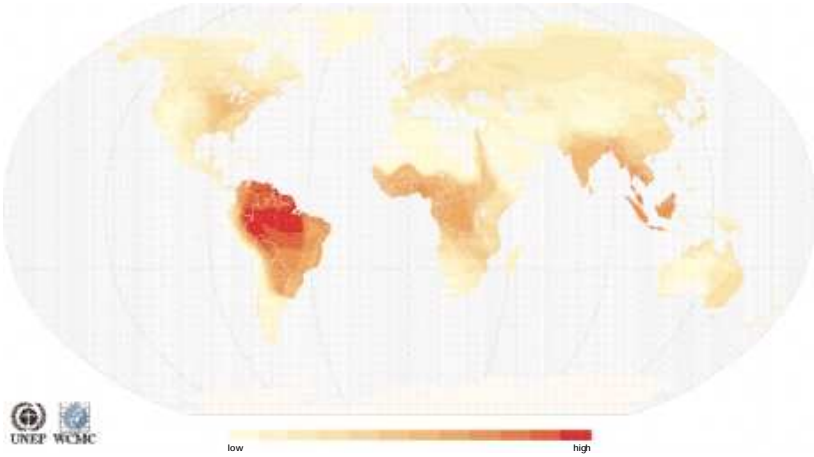
Appendix – Where is biodiversity?

Biodiversity is not evenly distributed around the world. The single most obvious pattern in the global distribution of species is the overall increase in species richness as latitude decreases toward the equator. To take an extreme comparison, only 41 flowering plants are found in the whole of Antarctica, while a single hectare of Latin American forest can contain 40 to 100 tree species (WCMC, 1992). There are exceptions to this rule, such as the *fynbos* vegetation of South Africa, which has great species richness at a relatively distant latitude from the equator.

Approximately 70 per cent of described species are found in the tropics and sub-tropics (Guruswamy, 1998). The prime example of this trend is tropical rain forests, which occupy only 7 per cent of the Earth's land area, yet are estimated to contain over half of the Earth's terrestrial species (Primack, 1993). Other notable tropical and subtropical habitats of high species richness include 'Mediterranean-like' heath systems, tropical dry forests, coral reefs and tropical lakes – the latter illustrated by the distribution of freshwater fishes (see Map 1).

This tarsier (*Tarsius syrichta*) is one of the smallest primates in the world; it is endemic to Bohol, Philippines.

Map 1 – Diversity of freshwater fishes



There are a number of reasons for this concentration of tropical biodiversity:

1) First, the tropics are older and have had a more stable climate throughout history than temperate regions. This has allowed species a greater period of time to adapt and specialise.

2) Second, tropical areas are characterised by warmer temperatures, higher precipitation and humidity, and more solar energy, which combine to favour the evolution of new arrays of species (Primack, 1993).

3) Third, scientific observations indicate that, in combination with climate and available energy, terrestrial species richness and density is strongly influenced by variation in topography, seasonality and elevation. Terrestrial species richness is often highest at lower elevations and lowest up mountains, along peninsulas and on islands. This range of influences, combined with variations in past land area, changes in vegetation and human impacts are reflected in the numbers of mammals and birds recorded in each region.

In terms of species richness in various developing countries, those with a high proportion of global biodiversity are referred to as being 'mega-diverse', and most of them are in Latin America (see Table 9). There are, however, several weaknesses in evaluating the global distribution of biodiversity on the basis of national species data. The species richness of a country is largely influenced by its size (most mega-diverse countries are larger than 500,000 km^2 in area), with a corresponding increase in diversity of available habitats. Consequently, smaller countries with a proportionately high concentration of species per unit area, such as Rwanda or Costa Rica, do not feature in the ranking.

Table 9– Developing countries rich in vertebrate and plant species (per cent of total world species)

Mammals		Birds[1]		Reptiles and Amphibians		Freshwater Fishes		Plants	
Mexico	491 (10.6%)	Colombia	1721 (17.3%)	Colombia	1277 (10.3%)	Brazil	3000 (30%)	Brazil	56215 (20.8%)
Peru	460 (9.9%)	Peru	1710 (17.2%)	Brazil	1072 (8.7%)	Colombia	1500 (15%)	Colombia	51220 (19.0%)
Indonesia	457 (9.9%)	Brazil	1635 (16.4%)	Mexico	1014 (8.2%)	Indonesia	1400 (14%)	China	32200 (11.9%)
Congo, D.R.	450 (9.7%)	Ecuador	1559 (15.7%)	Ecuador	806 (6.5%)	Venezuela	1270 (12.7%)	Indonesia	29375 (10.9%)
Brazil	417 (9.0%)	Indonesia	1531 (15.4%)	Indonesia	799 (6.5%)	Peru	855 (8.6%)	Mexico	26071 (9.7%)
Cameroon	409 (8.8%)	Venezuela	1296 (13.0%)	Peru	736 (6.0%)	India	748 (7.5%)	South Africa	23420 (8.7%)
China	400 (8.6%)	Bolivia	1275 (12.8%)	China	630 (5.1%)	Ecuador	706 (7.1%)	Venezuela	21073 (7.8%)
Colombia	359 (7.8%)	China	1244 (12.5%)	India	599 4.9%)	China	686 (6.9%)	Ecuador	19362 (7.2%)
Kenya	359 (7.8%)	India	1219 (12.3%)	Madagascar	542 (4.4%)	Thailand	600 (6%)	Bolivia	18316 (6.8%)
Uganda 338	(7.3%)	Congo, D.R.	1086 (10.9%)	Malaysia	539 (4.4%)	Mexico	506 (5.1%)	Peru	18245 (6.8%)

Source: WCMC database; data derived from published and unpublished sources, including country reports and regional checklists.
Notes: [1] total number of species recorded.

Evaluations at the national level also fail to take account of uniqueness of species, for example endemic species or sub-species that are restricted to a particular geographical area. For example, 200 of the 460 mammal species found in Peru also occur in neighbouring Ecuador (WCMC, 1992).

Centres of high endemism have arisen where populations have been isolated for long enough to evolve distinctive, species-specific characters that prevent or reduce out-breeding with other species/populations. Islands, mountain tops and lakes are all key examples of geographically isolated areas where locally endemic species often evolve, and this patterns of evolution can be appreciated from the fact that 20 per cent of bird species are restricted to 2 per cent of the world's surface.

Table 10– Preliminary estimates of total endemic species in developing regions*

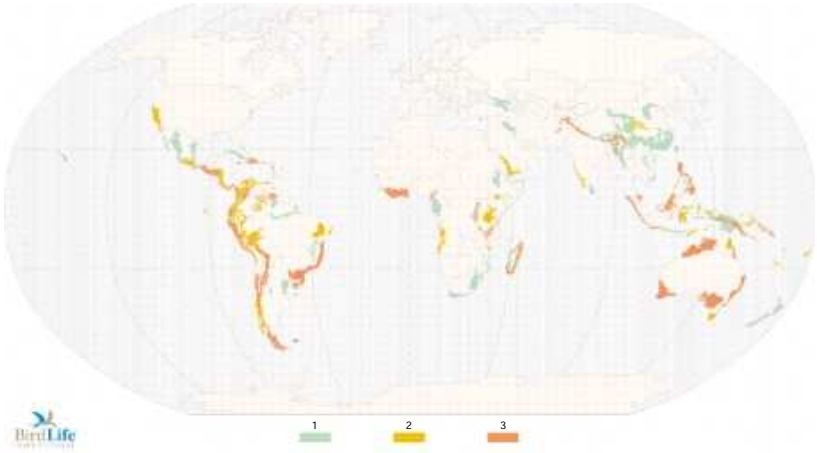
	Africa	Asia	Latin America	Caribbean	Pacific	Tacis-Nis
Mammals – endemic species	308	534	512	10	89	24
Mammals – all species[1]	1063	1333	1304	288	246	330
Birds	313	791	624	40	181	13
Reptiles and Amphibians	1211	1700	2845	229	245	2
Trees	715	1506	1496	267	206	3

Sources: WCMC Species Conservation Database; WCMC Threatened Trees Database; [1] Institute of Zoology (London) mammal database.
* Estimates are for aggregated single-country endemics. The estimate for trees refers only to threatened endemic species, as a comprehensive list of the nationally endemic tree species has yet to be compiled.

A preliminary regional examination of species known to have restricted ranges indicates that Asia has a substantially greater number of endemic bird species. Asia and Latin America have similar number of endemic mammals and trees, while Latin America has the lion's share of endemic amphibians and reptiles. Africa scores lower than the other two continents for all species groups, and would be even lower if the large island of Madagascar were excluded. Other important islands for endemic species are the Indonesian and Philippine archipelagos, which contributed substantially to the Asian total. Although the insular Pacific and Caribbean regions appear to have low numbers of endemic species, the land area of these two regions is relatively small and, proportionately, endemism is quite high.

Various global mapping exercises have been carried out to identify 'centres of endemism' – as shown on the following pages. The most systematic and complete global level assessment to date has involved bird species (undertaken by BirdLife International). Attempts to identify centres of plant diversity and areas high in aquatic species richness have also been completed, and these exercises have been expanded more recently to consider ecoregional approaches to conservation that identify distinctive regions of the world (Olson and Dinerstein, 1997).

Map 2– Endemic bird areas



More than one quarter (2,561) of the world's bird species, including 74% of the threatened birds, have a range restricted to less than 50,000 km^2. Virtually all these occur within the 218 Endemic Bird Areas (EBAs) defined by BirdLife International. The world's EBAs are shown on this map categorised 1, 2 or 3 according to increasing biodiversity importance (based on the number of restricted range species, whether shared between EBAs, taxonomic uniqueness, and EBA size).

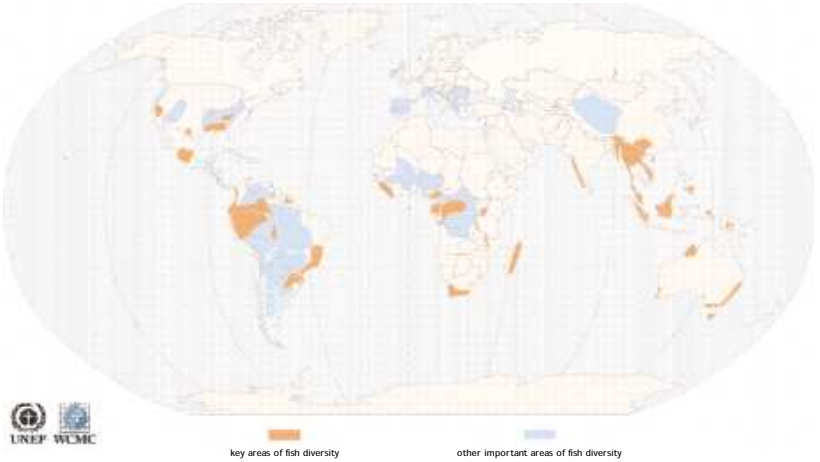
Source: data and analysis provided by BirdLife International (Slattersfield *et al*, 1998)

Map 3– Centres of plant diversity

This map shows the location of the sites and areas identified as important centres of plant diversity at regional and global level.

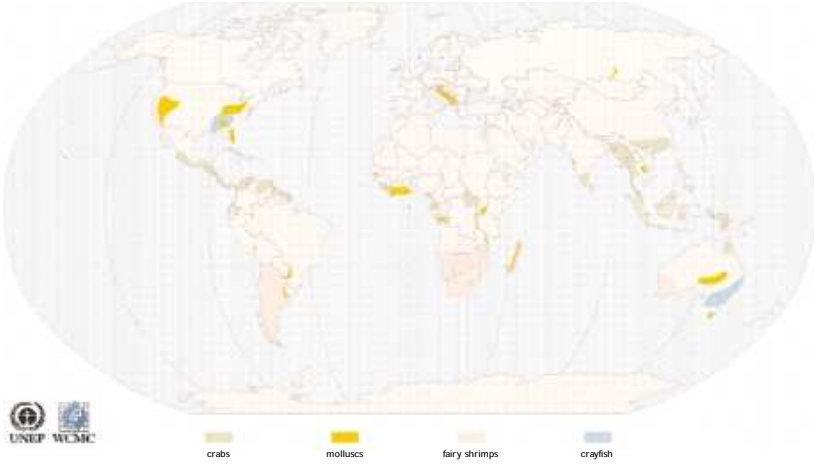
Source: WWF and IUCN (1994)

Map 4– Inland water fish diversity



Source: WCMC (1998), based on data provided in part by relevant IUCN/SSC specialist groups

Map 5– Inland water invertebrate diversity



Source: WCMC (1998), based on data provided in part by relevant IUCN/SSC specialist groups

Agricultural crops and their wild relatives have long been the focus of human development, and these too have distinct geographical distributions. Although they have been moved around the world to diversify agricultural production in recent times, the original populations, and ancestral stocks, are restricted to the regions in which they were developed / evolved. These localised populations have been important in supplying genetic material for developing varieties and breeds.

A representative sample of global biodiversity can only be maintained if all the distinctive regions of the world are considered, and account taken of the endemic (unique) species in each. If such a conservation strategy is to be effective, it will need to be integrated into national development programmes.

Map 6– Centres of crop origin

Vavilov centres and other significant areas associated with the presumed origins of the most globally important crop plants.

Sources: derived from Hawkes, 1991; Oldfield, 1984; and WCMC, 2000

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- Page 7: WWF-Canon/Meg Gawler
- Page 8: Top: WWF-Canon/Tom Moss; bottom: R. Faidutti/FAO
- Page 9: Dennis King
- Page 10: Top: Glyn Davies; bottom: IITA/CGIAR
- Page 11: WWF-Canon/John E. Newby
- Page 12: UNESCO
- Page 14: WWF-Canon/Martin Harvey
- Page 15: Top: R. Faidutti/FAO; middle: WWF/Martin Harvey
- Page 16: Top: WWF-Canon/Nigel Dickinson; middle: WWF-Canon/Patrick Dugan
- Page 17: Top: WWF-Canon/Elizabeth Kemf; bottom WWF-Canon/Nigel Dickinson
- Page 20: Top: WWF-Canon/Juan Pratginestos; bottom: FAO
- Page 21: WWF-Canon/Peter Tunley
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- Page 55: G.Tortoli/FAO
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- Page 60: WWF-Canon/Mark Edwards
- Page 72: WWF-Canon/Jurgen Freund
- Page 78: WWF-Canon/Kevin Schafer
- Page 80: Jim Thorsell/IUCN