Biodiversity

All species – as well as all individuals – have a finite life span and therefore changes in biodiversity are inevitable. Accelerated and enhanced reduction in diversity at gene, species and ecosystem level, however, is not only intrinsically undesirable but also a significant threat to human material welfare be-

cause it implies a reduced ability of ecosystems to provide key products and services (UNEP 1999a).

The total number of species on Earth is very large: around 1.7 million have been described but many more are believed to exist, with estimates ranging from 5 million to nearly 100 million. A figure of 12.5 million has been proposed as a reasonable working estimate (WCMC 1992). The most species-rich environments on Earth are moist tropical forests which extend over some 8 per cent of the world's land surface and probably hold more than 90 per cent of the world's species. Overall, the regions richest in biodiversity are Africa, Asia and the Pacific, and Latin America and the Caribbean.

The tropical, subtropical and temperate habitats of the region are exceptionally rich in biodiversity. The neotropical ecological zone contains 68 per cent of the world's tropical rain forests (FAO 1997b). The region contains 40 per cent of the plant and animal species of the planet, and is considered to have the highest floristic diversity in the world (Heywood 1995). The warm Amazonian valleys, the high, cold Andean mountains, the Brazilian Atlantic forest, and the dry forests of Meso-America are home to some of the world's richest ecosystems. Arid and semi-arid vegetation occurs in the mountainous areas running from southern Ecuador to Chile, in northern Colombia, and in Venezuela, Argentina and north-eastern Brazil. Brazil, Paraguay and Bolivia also share some of the world's most important continental wetlands, including 400 000 km^2 of marshlands (the *pantanal* and *chaco*) which are renowned for their diversity.

In recent years an important international debate has developed about 'biosecurity' and the possible negative impact of genetic modification of living organisms ('biotechnology') on human health and species diversity – especially the diversity of food and commercial non-food species. Latin America and the Caribbean are rich in native species, such as cocoa, corn, beans, tomatoes and potatoes, but they are also important exporters of exotic species such as Argentinian wheat and Chilean grapes. The debate addresses the establishment of warning mechanisms to avoid risks associated with the trade of genetically modified living organisms that could initiate a 'contamination' or genetic 'erosion' effect. The United States, Canada, Australia, Argentina, Chile and Uruguay object to these mechanisms if they are 'barriers' to international trade. Finally adopted in January 2000, the Cartagena Protocol on Biosecurity establishes warning, information and prior agreement mechanisms for the safe transfer, management and use of genetically modified living organisms.

Despite the possible risks involved in biotechnology, the main problem in biodiversity protection is how to avoid habitat destruction and the consequent extinction of species, many of which are not yet described by science. The expansion of agriculture into tropical and semi-arid regions, forest cutting, and the depletion of wetlands have reduced the populations of many species. Loss of habitat has been the greatest threat. Habitat conversion has been severe in the Central American forests, the *chaco* forest, the savannah ecosystems of the Brazilian *cerrado* – which houses the largest diversity of all savannah floras in the world – and the Mediterranean-type shrublands of the Pacific Coast (Dinerstein *et al.* 1995). Mexico hosts 51 per cent of all migratory bird species from its northern neighbours, and the loss of critical overwintering sites due to deforestation and other land use changes may threaten the survival of these populations (Robinson 1997; Greenberg 1990).

Levels of endemism for selected Caribbean countries (for selected taxa)

	Birds	Mammals	Amphibians and reptiles	Higher plants
Antigua and Barbuda		0	0	
Bahamas	3	4		
Barbados		0	0	
Cuba	22	15	43+91	3 475
Dominica		1	0	
Eastern Caribbean	38	11		68
Guadeloupe/Marie Galante		2	2	
Hispaniola (Haiti/ Dominican Rep.)	34	3	47	1 800
Jamaica	34	5	47	830
Martinique		0	0	
Montserrat		0	5	
Puerto Rico	26	1	42	234
St. Kitts, St. Eustatius and Nevis		0	1	
Sta. Lucia		0	2	
St Martin, Anguilla and St. Bartholemy			0	0
St. Vincent and the Grenadines		0	2	

Source: UNEP 1999b.

The Cartagena Protocol on Biosafety

The Protocol on Biosafety of the Convention on Biological Diversity (CBD) was adopted on 29 January 2000 in Montreal, Canada, after more than four years of intensive international negotiation. The agreement is known as the 'Cartagena Protocol' by decision of the extraordinary meeting of the parties to the CBD meeting at the Colombian port of that name at the beginning of 1999 when a first – unsuccessful – attempt was made to adopt the instrument.

The Cartagena Protocol establishes procedures for the safe movement, handling and utilization of genetically modified living organisms (GMOs) that may have an adverse effect on biodiversity, with emphasis on cross-border movements. It establishes a procedure to import GMOs by Advanced Informed Agreement (AIA) and incorporates the precautionary principle. Provisions are set forth for documentation, confidential and shared information, training, and financial resources, which pay special attention to the situation of developing countries and others without adequate national regulatory systems.

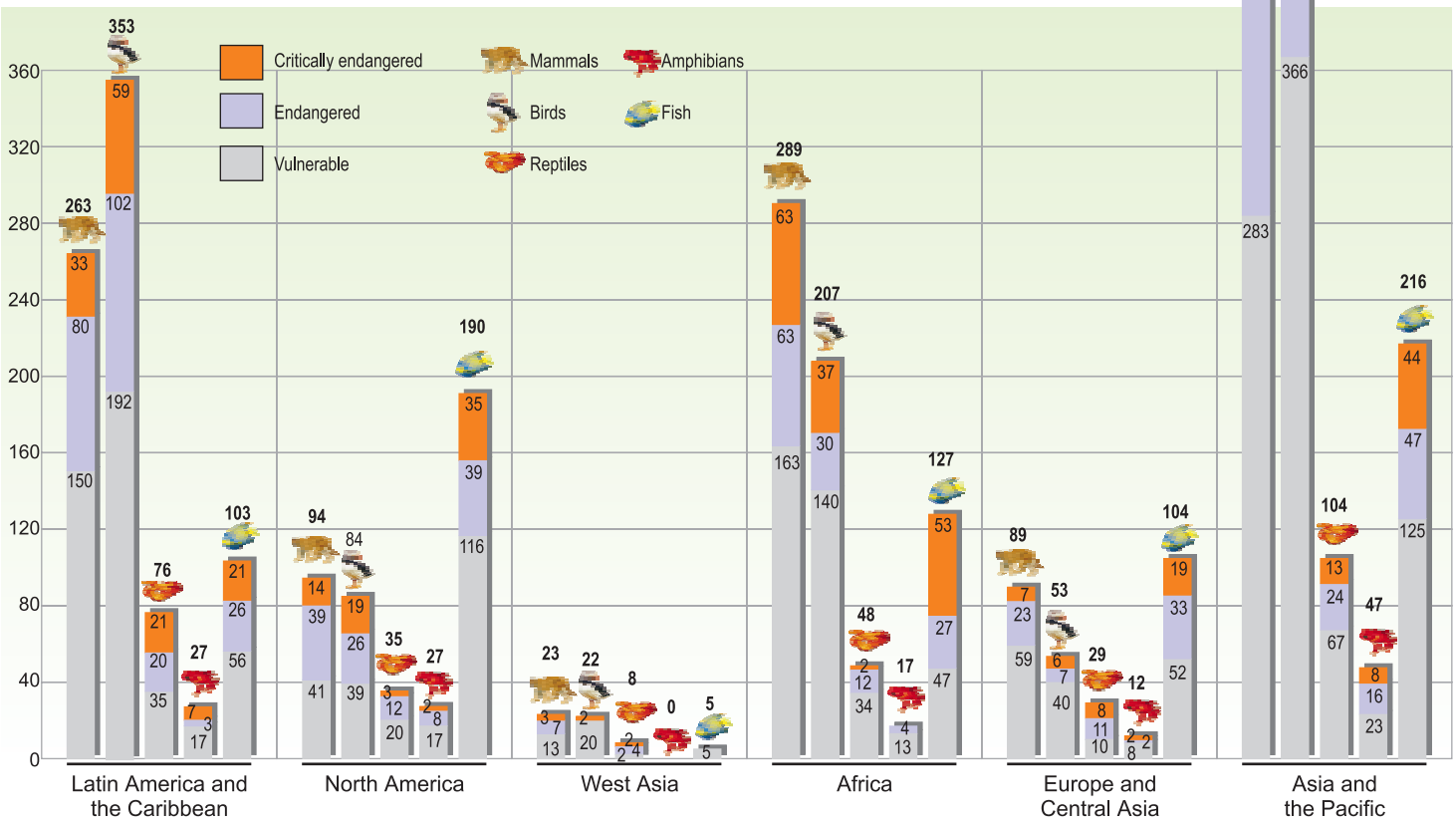
The Protocol was adopted by 133 delegations from governments, non-governmental organizations, industrial sectors and the international scientific community. The Third World Network, on behalf of most of the non-governmental organizations with delegates at the conference, applauded the agreement for putting environmental considerations before commercial interests. The Global Coalition for Industry stated that the Protocol would serve to protect biodiversity and share its benefits at a global scale.

Source: IISD 2000.

No systematic evaluation of habitat turnover and species depletion has been attempted, but those figures that are available suggest a significant impact: several hundred vertebrate species are now threatened with extinction (Baillie *et al.* 1996). The intensification of agricultural practices, replacement of natural forest with plantations, new technologies for cultivating dry lands (a major reservoir of biodiver-sity) and the modification of coastlines suggest that these trends may worsen in the near future.

Many of the region's animal species are now vulnerable, endangered or critically endangered.

Threatened animal species (number of species)



Source: WCMC/IUCN 1998

Overall, Latin America and the Caribbean rank second in the world in terms of threatened bird species (after Asia and the Pacific); third in terms of threatened mammals (after Asia and the Pacific and Africa); third in terms of threatened marine species (after Asia and the Pacific and North America); second place in terms of threatened reptiles (after Asia and the Pacific), and second in terms of threatened amphibian species (after Asia and the Pacific) (WCMC-IUCN 1998).

The biota of all countries are threatened. Brazil has the second-largest number of threatened bird species (103) in the world, and Peru and Colombia occupy fifth place with 64 species each (Baillie *et al.* 1996). Brazil also has 71 threatened mammal species (the fourth-highest in the world). More than 50 per cent of Argentinian mammals and birds are also threatened. Areas with large numbers of threatened birds tend also to have large numbers of threatened mammals, suggesting that the two groups may be susceptible to similar threats.

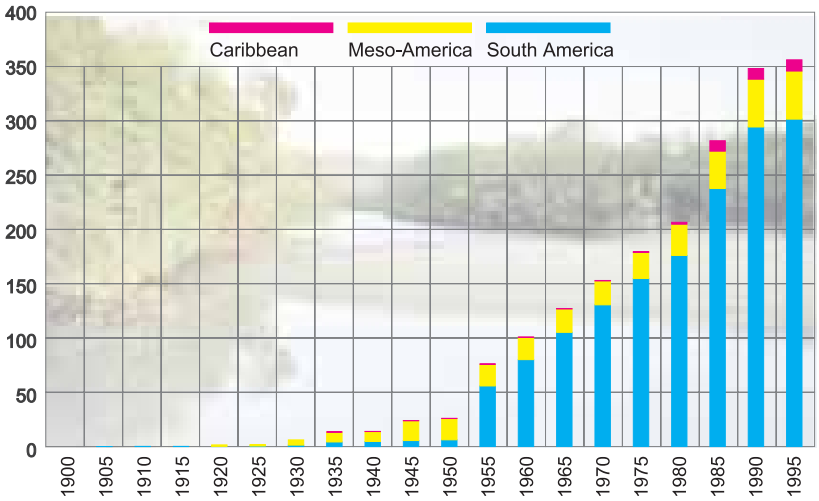
Ecosystems and their vegetation are similarly threatened. In central Chile, for example, it is estimated that 30 per cent of the *maulino* forest in the Cordillera de la Costa was replaced by pine plantations during 1978–87 (CODEFF 1987). In the Caribbean, environmental vulnerability is further accentuated by factors such as steep slopes and rapid topographic changes which fragment the ecosystems; the growing concentration of human populations and activities; and the high frequency and diversity of natural disasters.

The amount of land under some form of conservation and protection is continuing to rise, with some 6.6 per cent of the region's land under various categories of strict protection. However, many types of ecosystem are still under-represented or not represented in protected areas (Dinerstein *et al.* 1995). Furthermore, many protected areas, despite their declared legal status, are really only protected on paper, and lack any real means of preventing degradation. Central America is recognizing the social value of biodiversity for local communities as it re-evaluates its biodiversity and natural resources as the basis for the generation of new products and hence socio-economic development (CCAD and IUCN 1996).

Despite the growing support for biodiversity conservation, various governmental and institutional weaknesses – basically related to research and development – suggest that the current trends of declining biological diversity will continue unabated over the next decades.

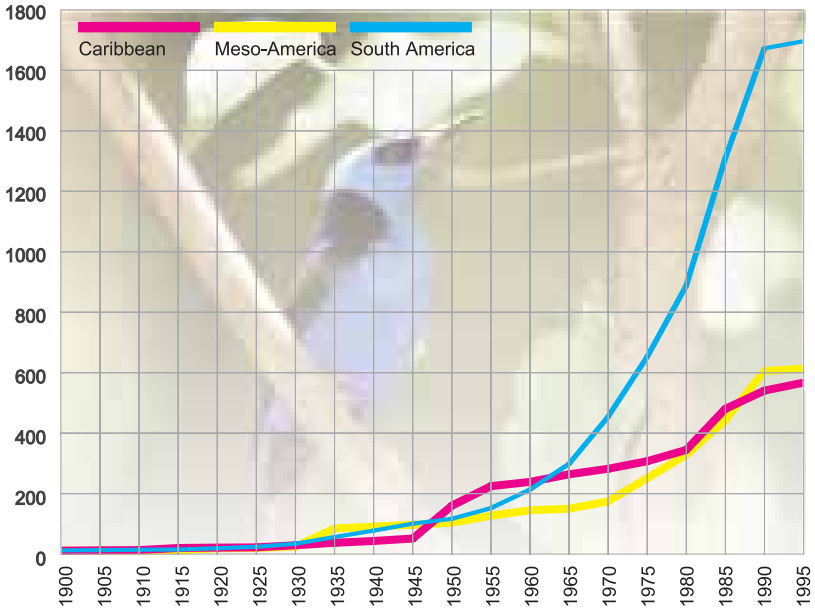
While the number and area of protected sites in Latin America continue to grow, many are protected only on paper and have no real resistance to degradation.

Size of protected areas, 1900-1995 (million hectares)



Source : World Conservation Monitoring Centre (WCMC), 1998: Protected Areas Database: http://www.wcmc.org.uk/protected_areas/data, downloaded January 31,2000.

Number of protected areas 1900-1995



Source : World Conservation Monitoring Centre (WCMC), 1998: Protected Areas Database: http://www.wcmc.org.uk/protected_areas/data, downloaded January 31,2000.

Chilean biodiversity in danger

In Chile, it is estimated that 35 per cent of the 684 terrestrial vertebrate species face conservation problems. The proportion increases to 51 per cent for mammals, to 58 per cent for reptiles, to 79 per cent for amphibians and to 100 per cent for fish.

In addition, one-third of all fern species in continental Chile (40 per cent of which are endemic to Chile) face significant threats. Six of these species have been declared to be endangered and six more are considered vulnerable. In the case of arboreal and shrub-like dicotyledons in continental Chile, although only 6 per cent of them suffer conservation problems, 11 species are considered endangered and 20 are classified as vulnerable – and most of them are endemic species. Out of a total of 167 cactaceous taxa analysed, 21 per cent of the species are endangered and 53 per cent are vulnerable.

Sources: Glade 1988; Hoffmann and Flores 1989; Simonetti et al. 1995; Marticorena et al. 1998; Rodríguez 1989.