Biodiversity and wetlands

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Keywords: Biodiversity, wetlands, conservation strategies

Abstract

The implications of the Biodiversity Convention of the UNCED Conference in Rio are discussed in terms of the obligations of participating states. The importance of biodiversity is outlined with special reference to wetland ecosystems. The values of wetlands and wetland biodiversity are discussed and a possible classification strategy for their conservation and wise use is suggested.

Introduction

Since the UNCED Conference in Rio de Janeiro in June 1992, where world leaders discussed Planet Earth and the influence and impact of mankind upon it, much has been written and said about the four main topics: Climate Change, Forest Principles, Sustainable Development and Biodiversity. At the Plenary Session in Rio on 14th June, a global partnership for sustainable development – known as Agenda 21 – was adopted. This was a consensus of agreement between participating nations to produce realistic targets to redress the balance between mankind and the natural environment within the twenty-first century. In other words there is a realization that the quality of the global environment is in serious decline.

Care must be taken that the euphoria born at the Rio conference is not allowed to degenerate into a series of platitudes in which words like ‘biodiversity’ and ‘sustainable development’ become political words of convenience rather than words of true meaning.

Definition of biodiversity

In order to be able to consider ‘Biodiversity and wetlands’, first it is necessary to have a clear idea of the meaning of biodiversity, its attributes and values. At the Convention it was defined thus:

‘Biological diversity means the variability among living organisms from all sources including inter alia, 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.’

Note, biodiversity does not just refer to the biological diversity of species and the protection of threatened species but covers the whole spectrum of the natural environment. A working definition might be:

‘The diversity of plants, animals and micro-organisms; their assemblies, habitats, ecosystems and natural areas, the mosaic of which constitute the landscape which gives richness to the natural environment.’

Both definitions bring out the significance of
scale, from strains of microbes to entire ecosystems and landscapes. The variability within species is equally as significant as the diversity of species within habitats. Assemblages of organisms which typify natural habitats and ecosystems are integral to the biological diversity of a region.

**Importance of biodiversity**

At the Rio conference, some 156 nations signed the Convention on Biological Diversity. Mongolia had the distinction of being the 30th country to ratify the convention, the statutory number required to make the convention international law. Alongside chapter 15 of Agenda 21, which addresses the need to improve the conservation of biological diversity and the sustainable use of biological resources, there is now a global forum for action.

Actions of human beings have degraded the natural environment and diminished biological diversity. Statistics suggest, for example, that half of all extant species may become extinct within the next 100 to 300 years (Wright *et al.* 1993). Generally, extinctions of taxa seem to be greater in an island environment than on a continent, probably because organisms have less area to hide or migrate on an island (WCMC 1992). It is pertinent to note that 66% of the continental extinctions are aquatic taxa. This highlights the exceptional sensitivity of the wetland and freshwater ecosystems to external pressures, for they behave as 'biogeographical islands'. The rate of habitat loss is even greater than species extinctions. In the USA some 54% of their original wetlands have been lost. The statistics for Europe are thought to be even greater whilst in New Zealand over 90% of their wetlands have been destroyed since the onset of European settlements (Dugan 1990). Data are less available for developing countries but a few examples may provide some indications of loss. In the Philippines around 67% of the mangrove forests have been lost over the last 60 years or so whilst in Senegal, 90% of the production from floodplains are expected to be lost by early next century (Dugan 1990). Scott and Poole (1989) found that of the 734 wetland sites studied in Asia, only 107 are not under threat.

At the other end of the scale, at the molecular dimension, there is the reduction of the total genetic resource due to animal and plant extinctions. Whereas extinctions of species is a natural process of evolution the rate of loss has dramatically increased over the last two-hundred years or so. The earth’s diversity is the pool from which individuals are created and evolution, through ‘survival of the fittest’ proceeds. If the total genetic resource declines, then the ability of taxa to adapt to changing conditions through genetic diversity declines accordingly and populations may not survive.

Why is Biodiversity so important? There is a range of reasons including precautionary, moral, indicative, aesthetic and economic arguments (HMSO 1994).

**Precautionary argument**

The precautionary argument accepts that our knowledge is insufficient to make definitive judgement on how much loss of biological diversity can be sustained without irretrievable damage. Until our knowledge is sufficient it is wisest to conserve biodiversity and use the natural environment on a sustainable basis. The argument can be used at a number of different levels. On the global scale, imagine Planet Earth to be one colossal living organism, a concept developed in the Gaia philosophy. The ecosystems: the forests, wetlands, prairies, uplands and oceans are the life of the planet which interact with land, air and water to sustain its natural health. The inter-dependence and successful functioning of ecosystems is critical to the planet as a whole. The photosynthetic activity and carbon fixation of living plants, for example, is crucial to the CO₂ balance in the atmosphere; a major gas in the global warming equation. In the wetland context, how much carbon is fixed globally in wetlands; what is their contribution to the CO₂ balance and how does wetland degradation affect the balance? Parallel arguments can be used for the effects of industrialization and pollution of the air, land and sea on natural habitats. In freshwater systems the effects of pollution can be very sinister as the source may be diffuse, many hundreds of kilo-