

WETLANDS AND THE BIODIVERSITY ISSUE

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A workshop on the Conservation and Sustainable Use of Floodplain Wetlands was organised by the British Deputy High Commission, British Council Division, Calcutta and the Asian Wetland Bureau, Kuala Lumpur in Calcutta in December 1993. Through discussions and interaction and presentation of case studies and papers, environmentalists from Britain, India, Bangladesh, Nepal and southeast Asia produced a statement of the problems affecting Indian floodplain wetlands and drew up action plans for their conservation and management in the states of West Bengal, Bihar and Assam. A paper presented by the British expert, Professor Patrick Denny, currently working in the Netherlands, is reproduced here.

An understanding of the meaning of biodiversity in the context of the Convention on Biodiversity, held at the United Nations Conference on Environment and Development (UNCED), is given in this paper. The values of biodiversity as a natural resource are also considered. Examples of the different types of values are given using wetland ecosystems wherever possible. An outline strategy for the conservation and wise use of wetlands is suggested here.

Since the UNCED Conference in Rio de Janeiro in June 1992 much has been written and said about biodiversity. 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' become political words of convenience rather than words of true meaning.

It is helpful 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 that 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. The definition brings out the significance of scale, from strains of microbes to entire ecosystems and landscapes.

Importance of Biodiversity

There is no doubt that the actions of mankind have degraded the natural environment and diminished biological diversity. Statistics suggest that half of all extant species may become extinct

within the next 100 to 300 years (Wright *et. al.*, 1993). The rate of habitat loss is even greater. In the Philippines, for example, around 67 per cent of the mangrove forests have been lost over the last 60 years (Dugan, 1990). Likewise, 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. 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. 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 to the balance of Nature. Until our knowledge is sufficient, it is wisest to conserve biodiversity and use natural resources on a sustainable basis. A more utilitarian argument is the commercial value of plants and animals. Breeders draw upon gene and gene combinations from the wild-type genetic pool for a particular quality of individual, be it disease resistance in rice or flavour of fish.

Whilst, probably, only a relatively small number of genetic resources will be of direct commercial benefit to mankind, the precautionary approach argues that the risk of losing valuable genes from the pool cannot be taken.

The moral argument supports the view that mankind is a steward of the natural environment,

who should look after and improve it; and hand it on to the next generation with pride. The indicative argument places a value on the ability of biodiversity to provide an indicator or barometer of the 'healthiness' of an environment. A change in biodiversity is often the first indicator that the environment is changing. Eutrophication of rivers and lakes, for example, is often identified by changes in plankton and invertebrate community composition. Aesthetic and cultural arguments are largely emotional, that is, the biodiversity of landscapes and natural ecosystems, and the species they support, can provide solace as well as a feeling of 'homeliness'.

Moral, aesthetic and cultural arguments have other dimensions which have to be taken into consideration; that is, the priority placed on these values compared with the immediate and real needs of the land for other purposes. This is particularly pertinent, but not confined, to the developing world, where national debts, poverty and population growth place enormous pressure on the natural environment. Agenda 21's philosophy of global partnership through the redistribution of technologies and wealth to areas of need should be able to help achieve a balance between the short-term need for non-sustainable utilisation and the long-term desire for conservation.

Economic arguments have been alluded to already. Biological diversity constitutes a capital asset with enormous potential for yielding sustainable benefits, but it is proving very difficult to quantify its value and give it a realistic price. Certain attributes can be allocated prices which reflect their commercial value, such as the value of a habitat as a tourist attraction. The functional values of an ecosystem are much more difficult to

price. Often the true and full functional value of an ecosystem, such as a wetland, is chronically underpriced as only a small proportion of all its functions is considered 'commercial'.

There is a plethora of values for biodiversity which defy any sensible pricing scheme. It is a sad reflection of our times that values have to be reduced to monetary terms. However, the monetary approach is likely to prevail and it is prudent for wetland socio-economists to attempt to devise a working model. For the model, it is essential to have a clear understanding of the values of wetlands.

Our knowledge of biodiversity, functioning and uses of wetlands is very elementary, and values attributed to wetlands can only be rough and ready approximations. However, the rates of loss of wetlands are so acute that one cannot await full, scientifically more accurate, evaluations.

Values of Wetlands

Values of wetlands have been outlined in a number of publications (Denny, 1985; Dugan, 1990; Claridge, 1991; Finlayson and Moser, 1991; Davies and Claridge, 1993; Aksomkoe, 1993). The value for each wetland is intimately tied up with the culture and needs of the people who exploit it, and its location. Some excellent local evaluations for the wetlands of south-east Asia have been undertaken by the Asian Wetland Bureau (Othman, 1990; Yahya, 1990; Said, 1990; Khan, 1990).

It may be helpful to consider values briefly in four categories, namely: global; functional; habitat and anthropogenic values (Denny, 1991).

Global values include those of widespread significance such as the contribution of wetlands

to the mosaic of ecosystems which maintain global diversity and their special value as an ecotone between dry land and the open water. There is a long list of functional values of wetlands. The more obvious ones include: the ability of wetlands to ameliorate the forces of floodwaters and their use in flood control management; wetlands for water supply and groundwater replenishment; the effects of wetlands on microclimates etc.

Habitat values are more conspicuous than most. Wetlands not only provide habitats for some of the rarest animals and plants but they provide a precise environment for a wide variety of other organisms. But the association between the habitat characteristics and the flora and fauna therein is often fragile.

Anthropogenic values specifically refer to the values of wetlands to mankind. They can be separated into extrinsic and intrinsic values. Extrinsic values are those mainly for governments and private organisations who exploit the wetlands for major commercial purposes. This may include rice schemes, tourism, water supply and fisheries. Intrinsic values are of direct value to the people who live around and in the wetlands, especially those whose whole lives and customs are intimately linked with the wetland functions. They rely upon the wetland for their everyday needs for food, water, building material and trade. To these people, the wetland is a priceless commodity.

The Way Forward

Wetlands are under particular threat through the destruction of ecosystems and loss of species. Indeed, the extinction of species in wetlands is

higher than for any other ecosystem due, probably, to their bio-geographical isolation in the larger continents and also their tendency to behave as biological islands. In order to conserve wetlands and their biodiversity, it is important for a nation to define its 'critical environmental capital' (*English Nature, 1992*). That is, those elements of the environment, for which loss would be critical on a global, national or local level. This is the 'Natural Capital Stock' of a national heritage which just cannot be traded.

A key element in conservation is the accurate determination of the carrying capacity of the habitat. As mankind is the main moderator of the natural resources, either directly or indirectly through his activities, then the size of the human population and the pressures its activities impose on each ecosystem must be assessed. In this way, an optimal population size for balance with its natural resources can be projected. If the carrying

capacity is exceeded, then the environment suffers accordingly, and discussions on moral, aesthetic and cultural values become largely academic.

The first step in an action plan for the conservation of wetlands and wetland biodiversity is to evaluate the total wetland resource of a nation. Then, it is important to develop management plans appropriate to the needs of each wetland. The carrying capacity of all compartments of the wetland, including fisheries, grazing, cropping, seasonal agriculture, tourism, wildlife etc., must be assessed for its sustainable use. Objectives and targets should be set to optimise the uses of the wetland for particular functions and a programme of survey and monitoring needs to be established to audit its management. If this procedure is followed, then wetland biodiversity can be conserved and a strategy for the wise use of wetlands can be formed.