

NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN - INDIA

WHY CONSERVE BIOLOGICAL DIVERSITY?

A Note for Executing Agencies¹

WHAT IS BIOLOGICAL DIVERSITY?

Before addressing the question of why we should take efforts to conserve *biological diversity* (referred to as biodiversity in short), it is important to have a clear understanding of what this term means. The best way to understand biodiversity is to look at it in a hierarchical manner, starting from the diversity contained in the genetic material of individual organisms and then going on to encompass the biological communities in which species are organised and on to the ecosystems in which they exist. To elaborate, biodiversity includes:

1. The full range of species on Earth, from unicellular organisms like bacteria, viruses and protozoans to all the multicellular organisms of fungi, plants and animals. Current estimates of this diversity range from 5 to 50 million, of which only about 1.7 million are known to humans. **It is worth remembering that the human species is only one out of these millions!** In India, the recorded diversity is about 130,000 species, though scientists agree that the actual (unrecorded) diversity would be much greater.
2. The genetic variation within these species, both among geographically separated populations and among individuals within single populations. To illustrate the case for geographically separated populations, let us take tigers in India. Tigers live in the mangrove forests of Sundarbans, the *terai* grasslands of Dudhwa, the dry and moist deciduous forests of Central India, the rainforests of Western Ghats and the north east and in many other habitats. All these tigers belong to the same sub-species. Each population of tiger has its unique set of adaptations developed as a result of their interactions with the local environment over many generations. It is vital to recognise the diversity of these adaptations which are only represented in local populations of the species which is fairly widespread in its distribution.
3. On a wider scale, the variations in the biological communities in which species live, the ecosystems in which these communities exist, and the interactions that take place amongst these various levels.

As a part of the National Biodiversity Strategy and Action Plan (NBSAP), for India, the definition includes both those living forms found in 'the wild', as also those that are domesticated, such as various crop varieties and breeds of livestock/poultry. The NBSAP also hopes to include and address issues related to the diversity of relationships and interactions that local people have with the natural environment, including cultural diversity.

All levels of biodiversity are required for the continued survival of species and natural communities and all are important for the well-being of humans. Genetic diversity is needed by any species to maintain reproductive vitality, resistance to disease and the ability to adapt to changing conditions. Species diversity represents the range of evolutionary and ecological adaptations of species to their environments, and provides the conditions for further such evolutionary changes. Community-level diversity represents the collective response of species to different environmental conditions.

The need for biodiversity conservation is being strongly felt because we are experiencing an unprecedented increase in the rate of extinctions being caused by human action. **Scientists estimate this rate to be anything between one**

¹ This note has been prepared by Ravi Chellam and Ashish Kothari, Member and Coordinator of TPCG, respectively, with inputs from other TPCG members.

an hour to one a day, though these estimates are fraught with uncertainties due to absence of adequate information. Extinction is a natural phenomenon, but what is different about current human-caused extinction is both its rate (several times greater than the pre-human natural rate), and the fact that it leaves a void in the natural system (whereas in natural processes one or more new species are likely to replace one going extinct).

A variety of human actions lead to such extinction: cutting of forests, overgrazing, draining of wetlands, conversion of mixed forests into single-species plantations, building on grasslands...all these actions lead to the loss of habitats that wild plants and animals depend on. The introduction of exotic species often drives local, indigenous species to extinction. Pollution, global warming and acid rain all alter the habitats in a negative manner and are rapidly depleting habitat quality. Various development activities are cutting the habitats into smaller and smaller disjointed patches resulting in habitat fragmentation. Populations are driven to extinction by over-hunting and exploitation. Monocultural systems of agricultural and dairy production have displaced hundreds, perhaps thousands of varieties of crops and breeds of livestock. Our increasing reliance on technology and the power it endows us to alter habitats over extensive areas in a very short period of time is also a problem. **It is crucial to bear in mind that extinction is forever and no technology can as yet bring back extinct species or other taxa.**

WHAT IS THE VALUE OF BIODIVERSITY?

The bottom line is: without biodiversity, humans would perish.

Unfortunately, standard economics and developmental planning has tended to ignore this simple fact. The costs of environmental damage and the depletion of natural resources has never been taken into account, to our own detriment. It is not easy to assign values to biodiversity especially in terms of monetary values as the role played by the various species are many, complex, and often hidden or insufficiently understood by humans. Nevertheless to provide a broad view of the possible benefits we stand to gain from biodiversity, a list of commonly accepted values follows.

Direct values are assigned to those products that are directly harvested and used by people. **Consumptive use value** is assigned to goods such as fuelwood and food from wild plants and animals, that are consumed locally and unlikely to appear in national and international markets. People leading low technology lifestyles are dependent on the land and water for a variety of goods to sustain themselves. If these rural people are unable to obtain these products, which is likely to happen due to environmental degradation, then their standard of living will drop dramatically and even their very survival will be threatened. The list of products obtained by the local people include fuelwood, fodder, vegetables, fruits and other plant-based food items, meat, medicines, cordage and building materials...the list is endless. In many communities, wild foods still account for over 40% of consumption. It has been estimated that about 80% of the world's population still relies principally on traditional medicines derived from plants and animals.

Productive use value is a direct value that is assigned to products that are harvested from the wild and sold in commercial markets, at both the national and international levels. The range of products obtained from the natural environment and then sold in the market place is enormous, and includes construction timber, fuelwood, fish and other marine products, medicinal plants, fibres, rattan, honey, bees wax, natural dyes, natural perfumes, plant gums and resins. Wild species are also periodically collected for use in scientific and medicinal research and agricultural breeding. These products are typically undervalued as it is the initial value at the point of origin which is used in environmental economics and not the final retail cost of the products. Even in modern societies a great number of the medicines used contain active ingredients derived from plants. Various ecosystems provide various products,

forests provide timber and a variety of other products. The grasslands provide fodder for livestock and the oceans, rivers and lakes produce, fish, shellfish and seaweed which are harvested for human use. Crop and livestock diversity provides stability and resilience to farmers and pastoralists, since it allows insurance against disease, natural disasters, and other unforeseen occurrences. Such diversity also provides for a diversity of human needs, both material and cultural. In short, various levels of biological diversity are critical components of the livelihood, survival, and cultural systems of tens of millions of people in India and abroad.

A considerably under-estimated value of biodiversity is the genetic base it provides to continuous improvements in agriculture, fisheries, medicine, industry, and other sectors. Examples abound of the millions of dollars of additional value that wild relatives of crops such as wheat, rice, and maize, or traditional cultivars of such crops, have provided. Or of the incalculable health and economic benefits derived from the use of medicinally important genetic traits. *Given that perhaps less than 10% of the plant and animal diversity that we know of, and an even smaller fraction of the micro-organisms that surround us, have been tested for their genetic and other properties, it is not surprising that considerable research all over the world is going into biodiversity products, in search of "miracle" cures for some of our deadliest diseases, or industrial and other products that could revolutionise human lives...much as rubber and quinine did once long long back.*

Indirect values are assigned to certain aspects of biological diversity, such as environmental processes and ecosystem services, that provide benefits to the human race without having to be harvested, depleted or destroyed during use. These are invariably never accounted for while making economic calculations. **Non-consumptive use values** refers to the variety of environmental services provided by the biological communities which are not consumed through use. Pollination, carbon fixing, protecting watersheds, protecting soils and waste disposal are some examples of the environmental services provided by biological communities. Natural environments and landscapes have been the inspiration for many works of art and literature. Traditional communities everywhere continue to find their closest cultural and spiritual links in nature. The peace and solitude offered by these environments have enabled even many 'modern' people to seek spiritual enlightenment and solace. Increasingly natural environments are also used for a variety of recreational activities such as hiking and wildlife watching. These activities are also the basis for a fairly large industry. Genuine ecotourism is increasingly proving to be a good earner for developing countries and there are many examples where revenue generated from ecotourism has served to protect critical habitats and populations of endangered species, apart from boosting the local economy.

The educational and scientific values of natural landscapes are enormous. As mentioned above, most of the complex natural world still remains to be explored and understood. The extinction of species and destruction of habitats will limit our efforts to explore nature and understand its implications for the human knowledge system. Many species serve as early warning systems of environmental quality. Lichens are a good indicator of air quality and molluscs of water quality. By careful monitoring we can take the required actions to prevent the pollution from endangering human life.

The option value of a species is its potential to provide an economic benefit to human society in the future. With the human society undergoing drastic change so are its aspirations. Previously untapped wild plants and animals often provide solutions for many of the problems faced by our society. These uses cover a wide spectrum of human activities but it is very difficult to give a monetary estimate to their value. Undoubtedly there is a vast potential waiting to be tapped which will cease to exist if species go extinct. Numerous surveys, especially in the United States of America have indicated that people value the existence of natural landscapes and some of the more spectacular species in particular. Most citizens are willing to pay for the ensuring the continued protection and survival of these landscapes and species and this constitutes **the existence value**.

Possibly the strongest arguments that can be given for the conservation of biodiversity are the **ethical** ones. Environmental ethics find a place in the value systems of most religions, philosophies and cultures. Broadly they appeal to have reverence for the living world, a respect for life and a sense of intrinsic value in nature. It is very important to inculcate in everyone respect for such an intrinsic value of biodiversity. This is a much more intuitive argument than the economic ones, especially because of the otherwise inadequate and lopsided evaluation of nature. The ethical arguments can be elaborated as follows :

1. **Each species has a right to exist.** Each species has value for its own sake, an intrinsic value unrelated to human needs.
2. **All species are inter-dependent.** Species interact in many complex ways in a natural community. Extinction of one species is likely to destabilise the entire community and cause the extinction of other species.
3. **Humans must live within the same ecological limitations as other species do.** Technology has enabled us to break free of environmental limitations imposed on us as a species, but perhaps only temporarily, as everyone the consequences of this violation of natural limits are hitting us. We need to recognise the need for a more sustainable lifestyle which will reduce our impacts on the environment.
4. **People must take responsibility for their actions.** Most people ignore the effects of their actions on the environment and on other species and fellow human beings. This is not acceptable because it is an unsustainable and inequitable lifestyle.
5. **People have responsibility to the future generations.** Ecological degradation including species extinctions deprive future generations of their right to inherit a wholesome earth to live in.
6. **Resources should not be wasted.** All efforts, including technological and policy initiatives, should be directed towards using natural resources in the most efficient manner possible. This will help minimize our demands of the natural ecosystems and our impacts. (not clear how this is an argument for biodiversity conservation...unless you are saying that its destruction is a "waste of resources"...there may also be an inherent contradiction here, as the very word "resources" is instrumentalist, i.e. related to the use of species for human beings).
7. **A respect for human life and human diversity is compatible with a respect for biological diversity.** It is important for all of us to appreciate the complexity and diversity of human culture as this will enable the appreciation of the diversity of the natural world and also to respect this diversity.
8. **Nature has spiritual and aesthetic values that transcend economic value.** Numerous writers, poets, artists and philosophers have been inspired by nature. A loss of biodiversity will reduce the ability of people to experience nature and to be inspired by it.
9. **Biological diversity is vital to study the mechanism of the origin and evolution of life.** It has not yet been conclusively proved as to how life originated and then evolved into its myriad forms, including humans themselves. If answers have to be found, intact ecosystems and biological communities are the key subjects of research. Any extinction will make this task more difficult to accomplish.

THE CONSERVATION IMPERATIVE

The statement of ethical principles of the emerging field of Conservation Biology are also important in this context.

- a. The diversity of organisms is good.
- b. The ongoing extinction of populations and species is bad.
- c. Ecological complexity is good.

- d. Evolution is good (and is dependent on the continued survival and interactions of the diversity or organisms).
- e. Biological diversity has intrinsic value.

The imperative of conserving biodiversity requires that:

1. Human actions be assessed from the point of view of their impact on biodiversity;
2. Research and monitoring to enable the above kind of assessment must be considerably stepped up;
3. Adequate human (including social, economic, technological, and political) investments to conserve biodiversity must be made;
4. Of the myriad "values" of biodiversity given above, the ones that encompass the ethical, ecological, and survival/livelihood dimensions are paramount, and all other values (commercial, industrial, aesthetic) only get priority after these.

If biodiversity has to be conserved it is really up to all of us. The most important adjustment we have to make is in our individual and collective lifestyles, in particular those of us who have privileged access to natural resources and to decision-making processes that determine the use of these resources. What decisions we take should be determined by what the American naturalist Aldo Leopold (1949) succinctly stated, "A thing is right when it tends to preserve the integrity, stability and beauty of the biotic community. It is wrong when it tends otherwise".

References

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