

THE IMPORTANCE OF BIODIVERSITY

Dr. Nitasha Malhotra

Associate Professor, Kamala Nehru College, University of Delhi

Introduction

Environmentalists might define biodiversity as the total of all plant and animal life of the planet, and the planet itself – the air, water and land that supports animal and plant life. This diversity of living creatures forms a support system which has been used by each civilization for its growth and development. The rich biodiversity has been instrumental in providing humanity with food security, health care and industrial goods that has led to high standard of living in the modern world. Ironically it has also produced the modern consumerist society which is adversely affecting the diversity of biological resources upon which it is based. The diversity of life on earth is so rich that if we use it sustainably we can go on developing new products for generations. For this reason, we must realize the importance of biodiversity as an important resource.

Biological variety can be observed at three levels –

- The genetic variability within a species
- The species variability within a community
- The organization of species in an area into distinctive plant and animal communities.

The genetic diversity: Every individual in a species differs widely from other individuals in its genetic makeup due to large number of combinations possible in the genes. This genetic variability is essential for healthy breeding population of a species. The reduction of genetic diversity will result in in-breeding in species. This leads to genetic anomalies and eventually extinction of that particular species. The variety of nature's bounty can be exploited if we breed domestic plant and animal varieties with their wild varieties to make them more productive and disease – resistant. Modern biotechnology also manipulates genes to develop better types of seeds, medicines and other industrial raw materials.

The species diversity: Every natural and man-made ecosystem is made up of a variety of animal and plant species. Some ecosystems such as tropical rainforests are very rich in the number of species as compared to other ecosystems such as the desert ecosystem. At present the scientists have been able to identify 1.8 million species on the Earth. However, this may only be a fraction of what really exists.

The ecosystem diversity: There are a large variety of different ecosystems on the Earth. Distinctive ecosystems include natural landscapes like forests, grasslands, deserts, mountains etc. as well as aquatic ecosystems like rivers, lakes and seas. Each of these also has man-modified areas such as farmlands, grazing lands, urban lands etc. Any ecosystem that is overused or misused loses its productivity and gets degraded.

Many people want to know “Why is biodiversity important?” Firstly, it is important because it represents the almost infinite variety of plant and animal life, and the variety of the types of Earth's ecosystems that support life as we know it. It enables humans to survive in what would otherwise result in adverse conditions. Biodiversity is the very stuff that supports the evolution and differentiation among the varying species. It's why cats are cats and horses are horses and humans are humans. And, further, it is responsible for the differences among groups within the larger species. Look at how many seemingly different types of humans there are or jungle cats or birds.

Water, wind, and sunlight generate much of the energy we use, and the action of the planet on various substances over the course of centuries create and provide things like coal, which is used to generate heat and more energy. Energy from wind, water, sunlight, and coal heats our homes and power all our appliances. Decaying animal matter has, over the centuries created the fossil fuels we use on a daily basis to power the vehicles that make transportation relatively easy and convenient.

Without biodiversity we would be (if we existed at all) a homogeneous population, with each of us having the same vulnerabilities. This would mean that in case of an epidemic, we would all be killed since there would be no biologic differences that would enable some of us to survive and adapt. Much of our modern medicine is based on combinations of biologically diverse substances isolated from various plants (which we, therefore, label medicinal). Even before the rise of modern medicine, ayurveda and unani systems of medicine used various plants to achieve various results. Without those plants, and the great variety of insects that pollinate and cross-pollinate them, humans would be much more vulnerable to disease.

The biodiversity contained in the ecosystem provides forest dwellers with all their daily needs- food, building material, fodder, medicines and a variety of other products. Biodiversity also provides us with lumber, granite, and marble – to name a few of the building materials much human habitation depends upon – we would largely be without shelter.

While humans are omnivorous, without biodiversity there would be virtually no variety in our diets. One reason to ask “why is biodiversity important?” is because biodiversity provides a literal treasure trove of foods, from things as common as wheat or corn to things as exotic as some of the seafood used in sushi. Further, not all the nutrients we need are in any particular food, so without a diverse base of foods to make combinations from our general health would suffer. Biodiversity sustains the bodies we live in, and affects the lives we lead, and the societies we form.

Many traditional societies have played an important role in preserving their biodiversity. They value biodiversity as a part of their livelihood as well as through cultural and religious sentiments. Traditional agricultural societies have been growing a great variety of crops which acts as an insurance against the failure of one crop. Modern agricultural practices on the other hand depend largely on monoculture with lot of importance given to cash crops for national and international markets. This has resulted in local food shortages, unemployment, landlessness and increased vulnerability to drought. Dependence on irrigation facilities, fertilizers and pesticides has also increased.

Besides all forms of life have a right to exist on the Earth. Apart from the economic importance of conserving biodiversity, there are several cultural, moral and ethical values which are associated with the sanctity of all forms of life. Biodiversity also makes irreplaceable contribution to our aesthetics, imagination and creativity. It forms an integral part of tourism in the world. People all over the world visit national parks, sanctuaries and resorts to recreate themselves. It not only helps them to de-stress but also helps them to feel one with nature.

Threats to Biodiversity

Biodiversity is a fragile thing, susceptible to all sorts of threats. Even as it supports all life on earth it is constantly facing threats and damage that is almost impossible for our multiple ecosystems to recover from. Threats to biodiversity come from many sources, most human but some natural. Largest among the threats to biodiversity looms human greed. Historically, humans have always taken what they needed from the earth itself and from its plant and animal species, with no regard as to whether the resources being consumed were finite or not. It has only been since the middle of the 1980s, as species started becoming extinct at a record rate, that threats to biodiversity became recognized as a major concern.

Deforestation has left acres of former forests bare and inhospitable to the animals and plants that depended on them for food and sustenance. Some bodies of water, such as the Aral Sea, have had their saline levels change so radically that they are uninhabitable by the marine life that used to be plentiful. These and other threats to biodiversity, again mostly caused by humans, have created situations where support for the human life of some regions is imperiled by the changes to the area. For example, when a body of water is no longer habitable, the fish become extinct or migrate elsewhere, contributing to hunger of the local land species that used to feed on them. Engineering projects – such as dams and irrigation channels which change the flow of water to a region, and can create either flood basins or deserts, depending on which project is placed in a region – are among the biggest man-made threats to biodiversity. They render vast amounts of land unusable for growing food, although – to be fair – an irrigation project is usually implemented to bring water to land that is more either arid or far more populous than the land used for the project.

Conservation of Biodiversity

The real problem we face, however, is the conservation of biodiversity. While everyone agrees that conserving natural resources is a good idea, there is no consensus on how to go about it. Every group, from governmental agencies to agro businesses to concerned individuals has their own idea of what conservation of biodiversity means, and what measures should be taken to achieve it. Further, each group has its own agenda to pursue, and may regard some factors of conservation of biodiversity as threats to those agendas.

Part of the problem is that conservation of biodiversity is quite costly. We are just beginning to develop the technologies necessary to preserve biodiversity hotspots, but trying to restore an area to its original state is not only costly, it is often impossible. Further, no one solution fits all hotspots. What is needed in, for example, the Aral Sea region is not necessarily what will work in the Everglades. In the first area, what is needed is reworking the irrigation

systems to restore proper salinity of the remaining water, and prevent further seepage due to the composition of the irrigation channels. In the second area, the restoration of the Everglades would require, among other things, reclamation and flooding of land currently owned privately or by agribusinesses requiring costly and time-consuming negotiations with each of the landowners in question, and, in the case of the agribusinesses, other areas would have to be found to grow their products, lest food shortages arise as a result of the land reclamation.

With so many groups and interests, and the high costs, it is clear that the conservation of biodiversity is a complicated matter. Yet, if it is not resolved during our lifetimes, the problems we leave our descendants will be even more complicated and harder to resolve.

Biodiversity as genetic species and as intact ecosystems can be best preserved *in-situ* by setting aside an adequate representation of wilderness as Protected Areas. These include national parks and wildlife sanctuaries which receive protection from governmental and international agencies. However, there are situations in which an endangered species is so close to extinction that unless alternate methods are instituted, the species may be rapidly driven to extinction. This strategy is known as *ex-situ* conservation. Botanical gardens and zoological parks are set up for multiplying species of plants and animals in artificially – managed conditions.

Most of the world's bio-rich nations are developing countries and the countries capable of exploiting biodiversity are the developed nations. In order to have access to these resources the developed countries have vested interest in making biodiversity a “common property resource” to be shared by all nations. Fortunately, India which is rich in biodiversity is also capable of making good use of it in biotechnology and genetic engineering. International agreements such as World Heritage Convention attempts to protect and support many hotspots of biodiversity in different parts of the world. Another treaty known as the Convention in the Trade of Endangered Species (CITES) intends to reduce the utilization of endangered plants and animals by controlling trade in their products. India is a signatory to both these agreements.

References

- Gaston, K.J. and Spicer J.I. (2004) *Biodiversity: An Introduction*, 2nd Edition, Blackwell.
- Groombridge, B. and Jenkins, M.D. (2002) *World Atlas of Biodiversity, Earth's living Resources in the 21st Century*, Berkeley: University of California Press.
- Hawkins, B.A. *et al.* (2003) “Energy, water and broad-scale geographic patterns of species richness”, *Ecology*, 84: 3105-3117.
- Mittelbach, G.G. *et. al.* (2001) “What is the observed relationship between species richness and productivity?”, *Ecology*, 82: 2381-2396.
- Purvis, A, and Hector, A. (2000) “Getting the measure of biodiversity”, *Nature*, 405: 212-219.
- Sala, O.E. *et al.* (2000) “Global biodiversity scenarios for the Year 2100”, *Science*, 287: 1770-1774.

