
UNIT 3 LOSS OF BIODIVERSITY

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3.0 INTRODUCTION

Biodiversity is the variety of living organisms on the earth. Biodiversity plays critical role in maintaining life on the earth and provides precious biological resources to humanity. Ironically, overexploitation and imprudent use by man are leading to loss of biodiversity on an alarming rate. As a result of biodiversity loss, productivity of most of the ecosystems of the world is declining and the supply of various goods and services provided by nature is getting hindered. The loss of biodiversity is perceived as potential threat to long term sustainability of life supporting system of the earth.

While Unit-2 of the present Block introduced you to the concept of biodiversity, the present Unit gives a comprehensive account of biodiversity loss. In fact, it is unprecedented rate of biodiversity loss that drew attention of the world community towards biodiversity. This unit highlights different human activities which are causing biodiversity loss. Knowledge of such activities will be helpful to formulate a development process that cares the precious biodiversity of the earth while fulfilling human needs.

3.1 OBJECTIVES

After reading this unit, you will be able to:

- describe the magnitude and pattern of biodiversity loss;

- identify the factors responsible for biodiversity loss; and
- explain the consequences of biodiversity loss.

3.2 BIODIVERSITY LOSS: AN OVERVIEW

As discussed in the previous unit of this, block biodiversity is the variety of living organisms on the earth. It includes diversity within species or between species and of ecosystems. Biodiversity plays critical role in maintaining life supporting system of the earth. We know now that globally, so far 1.75 million species have been identified against the estimates ranging from 3 to 100 million.

Biodiversity provides precious biological resources to humanity and these are vital to our economic and social development. But as a result of overexploitation and improper use by man, biodiversity of the earth is depleting on an alarming rate. Loss of biodiversity due to human activities occurred more rapidly in the past 50 years than at any time in human history. We are currently responsible for the sixth major extinction event in the history of the Earth.

The services provided by healthy, biodiverse ecosystems are the foundation for human well-being. As a result of biodiversity loss, productivity of most of the ecosystems of the world is declining. It has hampered the supply of various goods and services provided by nature. You already knew that as per a report of the Millennium Ecosystem Assessment, out of the 24 ecosystem services 15 are in decline. These include the provision of fresh water, marine fishery production, the number and quality of places of spiritual and religious value, the ability of the atmosphere to cleanse itself of pollutants, natural hazard regulation, pollination, and the capacity of agricultural ecosystems to provide pest control. These are the services of the nature which are critically important for our wellbeing and can not be supplied or reconstructed by human made devices.

Biodiversity loss is increasingly being recognized as a potential threat of global scale towards our long term survival and wellbeing on the earth. This calls for global and national actions for checking the current pattern of biodiversity loss. Biodiversity loss as a global issue gained importance at the 1992 Earth Summit in Rio de Janeiro, Brazil where world leaders agreed on a comprehensive strategy for “sustainable development”. One of the key agreements adopted at Rio was the ‘Convention on Biological Diversity’ (CBD), which was signed by vast majority of the world’s Governments showing commitments for maintaining earth’s biological diversity.

In order to quantify the magnitude of biodiversity loss and consequent changes in ecosystem services, the Millennium Ecosystem Assessment project was launched by UN in 2000. The International Union for Conservation of Nature and Natural Resources (IUCN) publishes and regularly updates a Red List which is a comprehensive inventory of plant and animal species that are threatened or facing the risk of extinction. We know till now that the Millennium Ecosystem Assessment, completed in 2005 by more than 1360 scientists working in 95 countries and they found that changes in biodiversity its due to human activities were occurring more rapidly in the past 50 years than at any time in human history.

Since the Stone Age, species loss has accelerated above the prior rate, driven by human activity. The exact rate is uncertain, but it has been estimated that species are now being lost at a rate approximately 100 to 10,000 times as fast as indicated by the fossil records. One of the major factors leading to this decline is that land is increasingly being transformed from wilderness into agricultural, grazing, mining and urban areas for human use. During the last century, significant decreases in biodiversity have been observed. Studies show that 30% of all natural species can be extinct by 2050. About one eighth of the known plant species are already threatened with extinction. Some estimates put the loss at up to 140,000 species per year (based on Species-area theory).

Declines in the numbers of animals such as tigers, lions, bears, elephants, pandas, whales, and various species of birds, have drawn world attention to the problem of species at risk. Species have been disappearing at 50-100 times the natural rate, and this is predicted to rise dramatically. Based on current trends, an estimated 34,000 plant and 5,200 animal species including one in eight of the world's bird species face extinction.

While the loss of individual species catches our attention, it is the fragmentation, degradation, and loss of forests, wetlands, coral reefs, and other ecosystems that poses the gravest threat to biological diversity. Forests are home to much of the known terrestrial biodiversity, but about 45 per cent of the Earth's original forests are gone, cleared mostly during the past century. Despite some regrowth, the world's total forests are still shrinking rapidly, particularly in the tropics. Up to 10 per cent of coral reefs among the richest ecosystems, have been destroyed, and one third of the remainder face collapse over the next 10 to 20 years. Coastal mangroves, a vital nursery habitat for countless species, are also vulnerable, with half already gone.

3.3 ASSESSMENT OF BIODIVERSITY LOSS

Convention on Biological Diversity, established a number of indicators for the assessment of biodiversity loss. Species population trend indices are valuable tools for monitoring and communicating biodiversity change at global, and regional National scales, or within bio-geographic units. They can also be applied to taxonomic groups (e.g., birds), habitat dependent species (e.g., waterfowl) or species with particular ecological characteristics (e.g., migratory species). Trends in abundance and distribution of selected species are indicators of ecosystem quality. Other indicators such as connectivity and fragmentation of ecosystems are also relevant in providing information about the quality of ecosystems. Following the indicators mentioned, Global Biodiversity Outlook 2 demonstrates a number of patterns of biodiversity loss. Some of them are described in the following paragraphs.

Deforestation, mainly through conversion of forests to agricultural land, continues at an alarmingly high rate. The loss of primary forest since 2000 has been estimated at 6 million hectares annually. Coastal and marine ecosystems have been heavily impacted by human activities, with degradation leading to a reduced coverage of kelp forests, sea grasses and corals. (in the Caribbean, average hard coral cover declined from about 50% to 10% in the last three decades. Some 35% of

mangroves have been lost in the last two decades in countries. Trends of some 3,000 wild populations of species show a consistent decline in average species abundance of about 40% between 1970 and 2000; inland water species declined by 50%, while marine and terrestrial species both declined by around 30%. Studies of amphibians, African mammals, birds in agricultural lands, British butterflies, Caribbean and Indo-Pacific corals, and commonly harvested fish species show declines in the majority of species assessed.

More species are becoming threatened with extinction. The status of bird species show a continuing deterioration across all biomes over the last two decades and preliminary findings for other major groups, such as amphibians and mammals, indicate that the situation is equally bad for these groups. Between 12% and 52% of species within well-studied higher taxa are threatened with extinction.

Forests and other natural habitats are increasingly fragmented, affecting their ability to maintain biodiversity and deliver ecosystem goods and services. Within the 292 large river systems assessed, for instance, only 12% of riverbasin area was unaffected by dambased impacts. The intensification of fishing has led to the decline in large high-value fishes, such as tuna, cod, sea bass and swordfish, which are high up in the food chain.

According to the report in the North Atlantic, the number of large fish has declined by two-thirds in the last 50 years. The threats to biodiversity are generally increasing. Humans contribute more reactive nitrogen to ecosystems globally than do all natural processes combined. The rate and risk of alien species introductions have increased significantly in the recent past, and will continue to rise as a result of increased travel, trade and tourism.

Overall, unsustainable consumption continues, as indicated by our growing global ecological footprint. The global demand for resources now exceeds the biological capacity of the Earth to renew these resources by some 20%.

On the positive side, the number and area of protected areas is increasing, although most eco-regions fall well short of the target to protect 10% of their surface. Marine ecosystems in particular are poorly represented, with approximately 0.6% of the ocean's surface area and about 1.4% of the coastal shelf areas protected.

3.4 LOSS OF AGROBIODIVERSITY

For thousands of years we have been developing a vast array of domesticated plants and animals important for food and several other human uses. This subset of biodiversity is popularly called as agrobiodiversity. It is defined as 'the subset of biodiversity that is directly relevant to agriculture' and includes crops and livestock species along with many other organisms such as soil fauna, weeds, pests and predators. Agrobiodiversity provides the foundation for food production for the huge world population and it cannot be substituted by any human made technology in long term.

From the human perspective, genetic diversity is of particular importance in cultivated and domesticated species. Numerous genetic varieties of relatively

small number of species are used in this way including a few dozen domesticated animals, a few hundred crop plants (if ornamental plants are excluded), and a few dozen major plantation timber species. Genetic variations are important for maintaining high yields, fitness, disease resistance and resilience to changing environmental conditions.

Unfortunately the rich treasure house of agrobiodiversity is shrinking as modern commercial agriculture focuses on relatively few crop varieties, which in turn is making the agriculture vulnerable to ecological risks. About 30% of breeds of the main farm animal species are currently at high risk of extinction. At present human well-being, particularly food security, depends on a small group of crops and domestic animals; failure of one individual crop can have far-reaching consequences. Loss of genetic diversity through the disappearance of locally adapted varieties and landraces of crops and livestock breeds is widely reported but difficult to quantify. It has been estimated that one third of the 6,500 recognized domesticated animal breeds are currently threatened with extinction.

Beyond cultivated systems, over-exploitation of wild harvested species, including several marine fish species, has led to decline of population size and distribution and as a consequence has contributed to the loss of genetic diversity. Selective trophy hunting of game and selective removal of valuable timber trees can change the genetic profile of the remaining populations. More generally, loss of genetic diversity is associated with the decline in population abundance and distribution that result from habitat destruction and fragmentation.

Detailed description about status, loss, conservation and various issues associated to agrobiodiversity is given in another block of this Course (Block 4 - Agrobiodiversity, Natural).

3.5 THE IUCN RED LIST OF THREATENED SPECIES

As discussed in the previous units about red list of threatened species we knew that the International Union for Conservation of Nature and Natural Resources (IUCN) has published the IUCN Red List of Threatened species. We have learned that the IUCN Red List is a catalogue of taxa that are facing the risk of extinction. Founded in 1948, the IUCN Red List is the world's most comprehensive inventory of plant and animal species that provide up to date information about the species that are threatened.

A series of Regional Red Lists are produced by countries or organizations, which assess the risk of extinction to species within a political management unit. The Red List also provides information to international agreements such as the Convention on Biological Diversity and the Convention on International Trade in Endangered species of Wild Flora and Fauna.

The IUCN Red List is set upon precise criteria to evaluate the extinction risk of thousands of species and subspecies. These criteria are relevant to all species and all regions of the world. The aim of IUCN red list is to convey the urgency of conservation issues to the public and policy makers, as well as help the international community to try to reduce species extinction.

Major species assessors include Bird Life International, the Institute of Zoology (the research division of the Zoological Society of London), the World Conservation Monitoring Centre, and many Specialist Groups within the IUCN Species Survival Commission (SSC). Collectively, assessments by these organizations and groups account for nearly half the species on the Red List.

The IUCN aims to have the category of every species reevaluated every 5 years if possible, or at least every ten years. This is done in a peer reviewed manner through IUCN Species Survival Commission (SSC) Specialist Groups, which are Red List Authorities responsible for a species, group of species or specific geographic area, or in the case of Bird Life International, an entire class (Aves).

According to the IUCN Red List of Threatened Species, between 12% and 52% of species within well studied higher taxa are threatened with extinction. Threatened species occur across all taxonomic groups and in all parts of the world. Over the past few hundred years, it is estimated that humans have increased species extinction rates by as much as 1,000 times the background rates typical over Earth's history.

On the basis of Red List data, a Red List Index can be calculated for different taxonomic groups or geographic regions to show trends in the proportion of species expected to remain extant in the near future without additional conservation interventions. The index is based on the number of species present in each Red List category, and on the number that change categories over time (i.e., between assessments), as a result of genuine improvement or deterioration in status. This index shows a continuing deterioration in the status of bird species, which have been completely assessed for the IUCN Red List four times over the last two decades, across all biomes.

The Red List Index is highly representative, being based on assessments of a high proportion of species in a taxonomic group across the world, but it shows a coarse level of resolution because of the width of the Red List categories. Some of the Red List criteria are based on absolute population size or range size, while others are based on rates of decline in these values or combinations of absolute size and rates of decline.

3.6 VARIOUS CATEGORIES OF IUCN RED LIST SPECIES

On the basis of information or data of abundance of different species, the IUCN Red Lists describes them in terms of the following categories:

Table 3.1: IUCN Red Lists Category

S.No.	Red List Category	Definition/Description
1.	Extinct	A taxon is Extinct when there is no reasonable doubt that the last individual has died.
2.	Extinct in Wild	A taxon is Extinct in Wild when exhaustive surveys have failed to record an individual.
3.	Critically Endangered	A taxon is Critically Endangered when it is facing an extremely high risk of extinction in the wild in the immediate future.
4.	Endangered	A taxon is Endangered when it is not Critically Endangered but is facing an extremely high risk of extinction in the wild in the near future.
5.	Vulnerable	A taxon is vulnerable when it is not Critically Endangered or Endangered but is facing high risk of extinction in the wild in the medium term future.
6.	Lower risk	A taxon is Lower risk when it has been evaluated and does not satisfy the criteria for Critically Endangered, Endangered, or Vulnerable.
7.	Data deficient	A taxon is data deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction.
8.	Not evaluated	A taxon is Not Evaluated when it has not yet been assessed.

Few examples of endangered animal and plant species of India, mentioned in the IUCN Red List are:

Table 3.2: Few examples of endangered animal and plant species of India

S.No.	Taxon	Examples
1.	Reptiles	Python, Tortoise, Sea turtle
2.	Birds	Great Indian Bustard, Pelican, Peacock, Spotted owl
3.	Carnivorous Mammals	Indian wolf, Red Panda, Tiger, Leopard, Indian lion, Red fox, Golden Cat
4.	Primates	Nilgiri langur, Capped monkey, Golden monkey
5.	Other Mammals	Black rhinoceros, Black buck
6.	Plants	Many species of orchids, Rhododendrons, Sarpagandha, Sandal wood tree, Pitcher plant

3.7 EXTINCTION OF THE SPECIES

The most serious aspect of the loss of biodiversity is the extinction of the species. Once a species is eliminated, the unique information contained in its DNA and

the special contribution of characters that it possesses is unlikely to be repeated again. Once species gone extinct, its chances for further evolution are lost.

A species is considered extinct when no member of the species remains alive any where in the world. If individuals of a species remains alive only in the human controlled conditions, the species is said be extinct in the wild. In both these situations, the species would be considered globally extinct. A species is considered to be ecological extinct, if it persists at such reduced numbers that its effects on the other species in its community are negligible.

Species become extinct through three types of extinction processes: natural extinction, mass extinction and anthropogenic extinction. Natural Extinction is the extinction of species slowly from the earth due to change in environmental conditions. Species have disappeared and new ones have evolved to take their place over the long geological history of the earth. Mass Extinction refers to the extinction of large number of species due to catastrophe like earthquake, falling meteors, volcano-eruption, advent of glacial age etc. For example, extinction of dinosaurs about 65 million years ago was triggered by similar catastrophic events. Anthropogenic Extinction refers to the disappearance of the species due to human activities. Species disappear chiefly due to habitat destruction, degradation and fragmentation or human induced introduction of exotic species. For example, extinction of bird species Dodo was largely due to human activities.

While loss of species has always occurred as a natural phenomenon, the pace of extinction has accelerated dramatically as a result of human activity. Ecosystems are being fragmented or eliminated, and innumerable species are in decline or already extinct. We are creating the greatest extinction crisis since the natural disaster that wiped out the dinosaurs 65 million years ago. These extinctions are irreversible and pose a threat to our own well-being since, we are dependent on biodiversity for food, medicines and other biological resources.

Check Your Progress 1

Note: a) Use the space given below for your answer.

b) Compare your answers with those given at the end of the unit.

1) What is the purpose of Red List of IUCN?

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2) Why is the extinction of species a serious issue?

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3.8 FACTORS LEADING TO BIODIVERSITY LOSS

There are a number of reasons or factors that are responsible for fast depleting biodiversity of the planet. Potential threats to species includes fragmentation of habitats, declines in size and quality of habitat, introduction of exotic species, uncontrolled exploitation or hunting of certain species, pollution and nutrient loading largely due to industrial development etc.

Fragmentation raises the extinction risk because isolated sub populations can go extinct one by one, without being repopulated. Stochastic declines in small sub populations make it more likely that they will go extinct and the situation is further worsen by the reduction of genetic variability in sub populations resulting from isolation. Species with already restricted ranges are particularly vulnerable to these threats.

For the terrestrial species, the declines in size and quality of habitat principally arise from conversion of forests and grasslands to agriculture, conversion of natural forests to monoculture plantations, and conversion of natural areas to urban settlement. These changes are largely induced by increasing demand for agricultural production, grazing of animals, wood cutting for fuel and timber, and accommodating increasing human population.

Invasive alien species can transform the structure and species composition of ecosystems by repressing or excluding native species because invasive species are often one of a whole suite of factors affecting particular sites or ecosystems. Introduction of exotic species by man also results in habitat degradation and thereby leading to loss of native species. Prominent examples are the spread of the Peruvian thorny tree *Prosopis juliflora* in the dry parts of northern India where it replaces native species such as *Acacia nilotica* (babool), and the spread of the South American flowering bush *Lantana camara* in the sub-Himalayan belt.

For aquatic and semi-aquatic species, the declines in habitat quality are due to diversion of ground and surface water, resulting in the drying up of streams and other water bodies, from siltation, and pollution from pesticides and other chemicals. Freshwater fish are also threatened by the introduction of exotic species which may be predators or competitors.

Deliberate overexploitation or hunting by human beings poses serious threat to a number of species. Black rhinos are disappearing from Africa, because their horns are in demand for the manufacture of ceremonial daggers for Middle Eastern puberty rites; elephants are threatened by the great economic value of ivory; spotted cats are at risk because their hides are in demand by furriers; and whales are rare because, among other things, they can be converted into pet food. Hunting of poaching of these animals have taken the population of these animals to the brink of extinction.

Global atmospheric changes, such as ozone layer depletion and climate change, also add to the stress which may cause biodiversity loss. A thinner ozone layer lets more ultraviolet-B radiation reach the Earth's surface where it damages living tissue. Global warming is already changing habitats and the distribution of species. Scientists warn that even a one-degree increase in the average global temperature, if it comes rapidly, will push many species over the brink.

It is clear from the above description that direct drivers for changing scenario of biodiversity are chiefly habitat alteration, land-use change, intensification of agriculture, species introduction, overexploitation, pollution, nutrient loading and climate change. These are further determined by a number of indirect drivers which include demographic, economic, socio-political pressure. For example increasing demographic or population pressure leading farmers to intensify their agriculture production by focusing on growing only few crop species. This has resulted in severe decline in agrobiodiversity of the world.

3.9 MAN WILDLIFE CONFLICT

Many species become endangered or extinct if their population size gets reduced below a particular threshold. Man wildlife conflict is a significant factor that is responsible for shrinking population size of some of the mammal species like tiger, elephant, bear, wild boar, porcupine, monkeys etc. Many times these animals enter in the agricultural areas, villages or human settlements and cause danger to human life and create a lot of damage to agriculture, livestock and property. In turn people kill these animals for the sake of their security. This creates conflicting situations between man and wild animal. Reports of man - animal conflicts and resultant casualties often appear in newspapers.

The main causes of human – wildlife conflicts are as follows:

- Destruction of habitats of wild animals compels them to move outside the forest and attack the fields and sometimes even humans.
- Conflict between man and animals arise when, man encroaches into the forest areas, because it is an issue of survival of both.
- When a wild animal gets injured or becomes weak, it develops a tendency to attack man. The female of many wild animals often attack humans, when they feel that their new borns are in danger. A tiger/tigress becomes man-eater, if she tastes human flesh once. In the process of tracing and killing such animal many innocent tiger may be killed.
- When there is the shortage of food for wild animals in wildlife sanctuaries and national parks, the animals move out of the sanctuaries and national parks in search of food and cause huge damage to the crop fields of surrounding areas. The farmers get revengeful and kill the wild animals.
- When there is the disruption in the migratory routes of wild animals due to development of human settlements, the migratory animals attack these settlements.
- Often the government does not pay sufficient compensation for the damage caused by the wild animals to the farmer's crop. The agonized farmers start killing the wild animals.

3.10 WHY BIODIVERSITY LOSS IS A CONCERN?

Human society completely depends on ecological system for some of the fundamental need of life including constant supply of oxygen, water and food. For proper functioning of ecosystems, biodiversity is critically important. The loss of biodiversity often reduces the productivity of ecosystems, thereby shrinking

nature's basket of goods and services, from which we constantly draw. The loss of biodiversity threatens our food supplies, opportunities for recreation and tourism, and sources of wood, medicines and energy. Loss of biodiversity destabilizes ecosystems, and weakens their ability to deal with natural disasters such as floods, droughts, and hurricanes, and with human caused stresses, such as pollution and climate change.

Biodiversity loss disrupts ecosystem functions, making ecosystems more vulnerable to shocks and disturbances, less resilient, and less able to supply humans with needed services. For example, wherever protective wetland habitats have been lost or degraded, the damage to coastal communities from floods and storms increased dramatically since the natural protection offered by these ecosystems against wave action, tidal surge, and water run-off from land is compromised. Recent natural disasters underline this reality.

The consequences of biodiversity loss and ecosystem disruption are often harshest for the rural poor, who depend most immediately upon local ecosystem services for their livelihoods and who are often the least able to access or afford substitutes when these become degraded. In daily life, rural households depend, to varying degrees, on farming, fishing, hunting and the harvest of wild products to help meet their subsistence and cash needs while complementing this environmental income with outside sources of earnings, such as wage labour. In fact, the Millennium Ecosystem Assessment has confirmed that biodiversity loss poses a significant barrier to meeting the needs of the world's poorest, as set out in the United Nations Millennium Development Goals. The loss of biodiversity is also increasingly recognized as a significant risk factor in business development and a threat to long term economic sustainability of a nation.

The reduction in biodiversity also hurts us in other ways. Our cultural identity is deeply rooted in our biological environment. History bears testimony that biodiversity has inspired musicians, painters, sculptors, writers and other artists all over the world. The biodiversity has directly or indirectly influenced and boosted creativity of people. Plants and animals are often used as symbols, preserved in flags, sculptures, and other images that define us and our societies. We draw inspiration just from looking at nature's beauty and power. Biodiversity is also a great source of knowledge. While exploring pattern of biodiversity across the globe, scientists indirectly discovered many secrets of nature including the process of evolution of life on the earth. Loss of biodiversity implies that these precious benefits to the humanity will also be lost.

Quite apart from nature's immediate usefulness to humankind, there are important additional reasons to care about the loss of biodiversity. An argument that is often cited is that every life form has an intrinsic right to exist. Species alive today are thousands to millions of years old and have each travelled unique evolutionary paths, never to be repeated, in order to reach their present form. It is unethical to drive other forms of life to extinction, and thereby deprive present and future generations of options for their survival and development. In fact we must recognize the right of future generations to inherit, as we have, a planet thriving with life, and that continues to afford opportunities to reap the economic, cultural and spiritual benefits of nature.

3.11 BIODIVERSITY LOSS: COMMON PERCEPTION VS. REALITY

Depleting status of biodiversity is one of the major global concerns calling for immediate attention from the world community. It is generally observed that public sympathy seems more easily aroused over the plight of furry, cuddly, or spectacular animals. On the basis of knowledge gained over last 2-3 decades, it can be said that biodiversity loss is much more extensive than this commonly held perception. The time has come to focus public attention on a number of more obscure and (to most people) unpleasant truths, such as the following:

- The primary cause of the decay of organic diversity is not direct human exploitation, but the habitat destruction that inevitably results from the expansion of human populations and human activities.
- Organisms have provided humanity with the very basis of civilization in the form of crops, domestic animals, a wide variety of industrial products, and many important medicines. Nonetheless, the most important anthropocentric reason for preserving diversity is the role that microorganisms, plants, and animals play in providing free ecosystem services, without which society in its present form could not persist.
- The loss of genetically distinct populations within species is, at the moment, at least as important a problem as the loss of entire species. Once a species is reduced to a remnant, its ability to benefit humanity ordinarily declines greatly, and its total extinction in the relatively near future becomes much more likely. By the time an organism is recognized as endangered, it is often too late to save it.
- Extrapolation of current trends, in the reduction of diversity implies a downfall for civilization within the next 100 years comparable to a nuclear winter.

Arresting the loss of diversity will be extremely difficult. The traditional “just set aside a preserve” approach is almost certain to be inadequate because of factors such as human population growth, pollution and climate change induced by human beings. A quasi-religious transformation leading to the appreciation of diversity for its own sake, apart from the obvious direct benefits to humanity, may be required to save other organisms and ourselves.

3.12 BIODIVERSITY LOSS AND MILLENNIUM DEVELOPMENT GOALS (MDGS)

The Millennium Development Goals were agreed upon at the United Nations Millennium Summit in 2000. Under each goal, specific targets for 2015 were established. The eight goals declared under MDG are: Eradicating extreme poverty and hunger; Achieving universal primary education; Promoting gender equality and empowering women; Reducing child mortality; Improving maternal health; Combating HIV/AIDS, malaria and other diseases; Ensuring environmental sustainability; and Developing a global partnership for development.

For achieving these goals the nations have to face a number of challenges. As per the Millennium Ecosystem Assessment, the current scenario of biodiversity loss poses a significant barrier to meeting the MDGs. Although policy-makers have generally focused narrowly on the contribution of biodiversity conservation and sustainable use to the achievement of Goal 7 (“Ensure environmental sustainability”), the wider role of ecosystem services in supporting livelihoods and human well-being reveals biodiversity to be the foundation for all development, and hence for meeting each of the Millennium Development Goals.

Studies of food security and nutrition, for instance, have shown the importance of agricultural biodiversity to the elimination of hunger and malnutrition. In terms of human health, biodiversity also has a recognized role in controlling vector-based diseases and providing the natural sources of many traditional medicines and modern pharmaceutical drugs.

The potential challenge in achieving MDGs lies in the fact that a number of the actions that could be implemented most quickly to promote economic growth and reduce hunger and poverty (e.g., intensification of agriculture or infrastructure developments) are harmful to biodiversity, at least in the short- to medium-term, and could undermine the sustainability of any development gains. Recognizing the trade-offs and synergies that exist between poverty alleviation and biodiversity conservation, sustainable use of biological resources becomes essential for achieving many of these goals.

Check Your Progress 2

Note: a) Use the space given below for your answer.

b) Compare your answers with those given at the end of the unit.

1) What are the major factors leading to biodiversity loss?

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2) How is human wellbeing affected by biodiversity loss?.

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3.13 LET US SUM UP

- Biodiversity of the earth is depleting on an alarming rate particularly in the last 50 years.
- As per a report of the Millennium Ecosystem Assessment, out of the 24 ecosystem services 15 are in decline.
- The IUCN Red List is the world's most comprehensive inventory of plant and animal species that provide up-to-date information about the species that are threatened.
- Potential threats to biodiversity include fragmentation of habitats, declines in size and quality of habitat, introduction of exotic species and uncontrolled exploitation or hunting of certain species.
- The loss of biodiversity threatens our food supplies, opportunities for recreation and tourism, and sources of wood, medicines and energy.
- The current scenario of biodiversity loss poses a significant barrier to meeting the Millennium Development Goals.

3.14 KEY WORDS

Ecosystem Services	: Various direct and indirect services provided by nature, e.g., producing food.
Agrobiodiversity	: Biodiversity that is relevant for agriculture.
Habitat	: Natural place of living of a species.
Exotic species	: Species that originated outside a particular region.
Species introduction	: Growing some new or exotic species in some area.
Extinction	: When no more members of a species remain alive on the planet.

3.15 REFERENCES AND SUGGESTED FURTHER READINGS

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- Millennium Ecosystem Assessment 2005. Ecosystems and Human Well-being: Synthesis. Island Press, Washington DC.
- O'Riordan, Tim and Stoll-Kleemann, Susanne 2002. Biodiversity, Sustainability and Human Communities: Protecting beyond the Protected. Cambridge University Press.
- Secretariat of the Convention on Biological Diversity (2006). Global Biodiversity Outlook 2. Montreal.
- Wilson, E.O. 1988. Biodiversity. National Academy Press. Washington, DC.

Relevant websites :

- <http://www.biodiversityhotspots.org> (Biodiversity Hotspots of the world)
- <http://www.cbd.int/abs/>(Conservation of Biodiversity)
- <http://wikipedia.org/wiki/biodiversity> [What is Biodiversity?]

3.16 KEY TO CHECK YOUR PROGRESS

Check Your Progress 1

- 1) Your answer must include the following points:
 - To enlist the species facing threat of extinction
 - To draw attention of world community for the conservation of these species
- 2) Your answer must include the following points:
 - Once species is lost, genetic information contained in DNA is lost
 - Loss is irreversible
 - Loss of species may result in loss of some ecosystem function

Check Your Progress 2

- 1) Your answer must include the following points:
 - Destruction, fragmentation and degradation of habitat
 - Introduction of exotic species
- 2) Your answer must include the following points:
 - Human wellbeing depends on ecosystem services
 - Loss of biodiversity results into disturbance in ecosystem functions
 - Direct and indirect benefits of biodiversity are lost

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