
UNIT 5 HUMAN IMPACTS ON BIODIVERSITY

Structure

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5.0 INTRODUCTION

Ecosystem is a self-sustaining landscape, in which all biotic and abiotic components play their own role. Any change in the demographics of the ecosystem, disturbs the ecological balance and further influence the growth and survival of biotic components. Over a period of time, rise in human population, unsustainable growth and over exploitation of natural resources has drastically impacted the genetic resources. Lack of education, economic conditions, social and cultural values are further leading to increase in population. Increased human population has direct impacts on the natural resources. The impact on biodiversity is evident at all three levels, i.e., genetic, species and ecosystem level. According to United Nations Global Assessment report over 1 million species of plants and animals are now threatened (IPBES, 2019). Decline in biodiversity is not just about loss of species, but decline in genetic variability, number and change in biological communities are also loss to the biodiversity. According to United Nations there is 20% decrease in species abundance of terrestrial habitats since 1900. Over 40% amphibian species and about one third of marine mammals are enlisted in the category of threatened species (IPBES, 2019). Ecosystems are deteriorating, biological species, native and wild species are declining at a fast rate, all this is impacting the biotic-abiotic interactions. Human activities have resulted in this loss, and the impact of this loss can be a serious threat to human civilization.

Major causes leading to extreme decline in the biodiversity, are associated with land use patterns, increase in global demand for food and energy production, environmental degradation due to increase anthropogenic sources, introduction of exotic species, pathogenic microbes and illegal hunting (Bálint et al., 2011; Semenchuk et al, 2022)

5.1 OBJECTIVES

After Completing this unit you will be able to:

- Describe human population growth and its impact on biodiversity;
- Explain habitat destruction, habitat fragmentation, habitat transformation, habitat degradation and over exploitation;

Describe impacts of invasive species and diseases on biodiversity.

5.2 HUMAN POPULATION GROWTH AND ITS IMPACT

Exponentially growing human population has drastic impacts on every aspect of environmental sustainability, and pose a great threat to biodiversity. The world is currently supporting 7.8 billion people with a population growth rate of 1.05%. So, about on an average there is global increase of 81 million people every year. Asia is the most populous continent having a population density of 104.1 inhabitants/km² (Roser et al., 2013). Although the size of population and growth rate fluctuates from region to region, but the impact of growing population on biodiversity can be seen globally. Japan and some parts of Europe have negative growth rate on the other hand countries like India, China, Bangladesh, Pakistan, Brazil, Philippines, Vietnam and Sri Lanka have continuously growing population. Various factors play role in the increasing population of these regions. Increase in population is attributed to lack of education, discrimination between male and female child, improved medical facilities, social, economic and religious causes. India is the second most populous country after China with a population over 1.3 billion. As per Government of India, the population density is 382 persons/km² (UN DESA, 2022). With the present growth rate, it is expected that by 2027 India will overtake China and will be represented as most populous country of the world. It is to be noted that India has 2.4% of surface area of the world but supports 17.7% of world population. So per capita availability of land is very less in the country (UN DESA, 2022). Also, India is a megadiversity nation, having various types of ecosystems, supporting different climatic conditions and habitats. Thus, species richness and diversity of species is significantly high in the Indian sub-continent and many species are endemic. With the constant increase in the population and limited resources there is a continuous threat to the biodiversity of the region. Increase in human population, demand for more natural resources for its sustenance and survival, thus add burden to the ecosystem, leading to extinction of species (Sinha et al., 2010). There are various ways through which increase population impact the biodiversity.

- **Injudicious use of resources**

To meet the demands of growing population, natural resources are being exploited at all levels. With increasing population demand of different resources also increase. More land is required for more housing, industries, food production and different aspects required for human sustenance. There is change in land use patterns to support the needs of growing population. This leads to habitat destruction or fragmentation. Hence, direct impacts of growing population on biodiversity loss are evident (Fuentes-Quezada et al., 2000). Overutilization of water resources to meet increased demand of population pose a threat to the aquatic ecosystems. The number of water ecosystems i.e., lakes and ponds are decreasing in many regions. Though, natural causes also play important role in depletion of water ecosystems but increased population and injudicious use is also a major cause. Exploitation of natural resources lead to the crunch of resources of lead to disruption of ecological balance and further affecting the biological diversity.

- **Demand for food and agriculture**

With the increase in population there is rise in demand for the production of more food to meet the need of growing population. Expansion in agriculture to produce more food, requires conversion of forest land to agricultural land, this promotes destruction and/or fragmentation of habitat. Also, the cultivation of crops is primarily aimed to provide the food to growing population, as a result of which agriculture is restricted to the cultivation of economically important species. This type of cultivation strategy has resulted in wiping off of many varieties of crops which were prevalent earlier. The advent of green revolution in 1960s and 1970s posed threat to both crop and wild biodiversity (Shiva, 1991). Intensification of agriculture primarily focuses on increasing the output and thus it aimed to cultivate only high yielding varieties of wheat or rice. It is believed that crop diversity is getting extinct at the rate of 1-2% per year and by now we have lost over 75% of genetic resources from the agricultural crops (FAO, 2019). Post green revolution plantation of most of the varieties of rice was restricted. Prior to green revolution, there were over 3000 species of rice but rice cultivation now is focused on growing very few varieties (Shiva, 1991; Li et al., 2014). There were more than 7000 varieties of apple in United states in the last century but 85% of those varieties are extinct today. Only 2 varieties account for over 50% production of apple in USA (Thrupp, 2000). Monoculture techniques to increase the productivity of commercially important varieties, result in extinction of various other native varieties. India is the land of various millets, but present cultivation patterns only focus on the production of wheat and rice in majority. This has resulted in decrease in growth and cultivation of millets and many of them are now not grown in any part of the country and this may lead to the extinction of these nutritionally important species (Sunderland et al., 2019).

- **Environmental degradation**

Increase in human population and rise in use of fossil fuels to meet growing energy demands results in addition of unwanted substances in the biosphere. Degradation of air, water and soil due to addition of contaminants released due to anthropogenic activities, alter the physico-chemical nature of different components of environment, threatening the survival of many species.

Deterioration of quality of air impacts the survival of various plants and microbes. Further, atmospheric deposition promotes settling of air pollutants on water bodies and land.

Discharge of industrial pollutants in the surface water bodies cause serious effects on the aquatic biodiversity. There had been many incidents when discharge of harmful pollutants has resulted in killing of large number of fishes. Increase in marine water pollution and dumping of plastic waste is posing a threat to many species of aquatic animals. Decline in number of dolphins as a result of biomagnification of pollutants in river ecosystem has been observed due to increased industrial discharge into the water body. Eutrophication of water bodies due to industrial effluents or run off from agricultural land impacts the local aquatic biodiversity. Increase in temperature of water due to thermal pollution further impacts the fish population in the water body. Concentration of various pollutants like, fluorides and heavy metals have increase drastically in ground and surface water of many parts of the world, resulting in change in microbial and plant life (Dudgeon et al., 2006; Vörösmarty et al., 2010; Munir et al., 2016; Williams-Subiza et al., 2021).

Contamination of land due to anthropogenic activities further impact the terrestrial biodiversity. Untreated effluent when discharged on the soil, increases the toxicity of soil thus, impacting the microbial biodiversity. Improper dumping of solid waste results on the land, results in percolation and translocation of pollutants to surrounding soil through leachate. This further impact the surrounding soil biota. Excessive use of agrochemicals like, pesticides and fertilizers on the agricultural land also has the detrimental impacts on soil quality. Decrease in population of earthworms due to excessive use of pesticides after green revolution is evident in many places, including India (Jeffery and Gardi, 2010; Wall et al., 2015).

5.3 HABITAT DESTRUCTION

Habitat conditions are most important factor for the biodiversity to exist, sustain and grow. Destruction of habit because of natural or anthropogenic cause can cause sharp decline in biodiversity. Elimination of natural habitat, effects the sustenance of species, by impacting their interdependence upon each other and by altering the regulation of ecosystem. Injudicious use of resources has accelerated the incidences related to habitat destruction.

There could be various causes of habitat destruction, both natural and anthropogenic.

Natural Causes of Habitat Destruction:

Natural disaster can pose threats to the habitat of various species. Rare species are most vulnerable to extinction because of natural disasters. Increase in frequencies of floods, cyclones, storms can lead to loss of habitat, thus triggering loss of biodiversity. Catastrophic floods in coastal biosphere reserves like Sundarbans, cause devastating impacts on the flora and fauna of the area. Incidences of floods and drought alters the soil characteristics, thus impacting the biodiversity further. Floods can increase salinity in the soil which in turn

can result in stunted growth of plants.

Forest fires are another major cause of habitat destruction. Wild fires can change the soil composition and many species might not flourish well the altered soil composition. Also, wild fires kill many wild animals and devastating impacts on the microbial population, thus disturb the ecological balance. Fires in forests of Australia and Amazon forest lead to the decline in biological diversity in these areas (Tilman et al., 1994; Parashar and Biswar, 2003; Marvier et al., 2004; Kelly et. al., 2020)

Anthropogenic Causes

Injudicious and ill planned human activities have played a great role in degrading and destructing the wildlife habitat. Human efforts to alter natural ecosystem also pose a threat to the habitats. As human population increased, need of resources surged and it resulted in exploitation of resources which had direct or indirect impact on the wildlife habitat. Improper land use activities to meet the demand of continuous increase in population and increase in need for urbanization results in conversion of forest land to commercial land (Laurance, 2010). Conversion of forest land to agricultural, commercial, industrial or urbanized land leads continuous decrease in forest cover. Major human activities causing serious loss to habitat includes:

- **Urbanization:** Increase in population and migration from rural to urban areas is leading to the increased demand of urbanized areas. Infrastructural development and increased demand of linking up different location with expressways lead to cutting down of forests and thus destructing the natural habitat.
- **Industrial Processes:** Economic development in developing countries is achieved through setting up of industrial units. Requirement of land and raw materials by industrial units, also lead to unsustainable cutting of trees.
- **Timber extraction:** With increasing population demand for natural resources including timber increases leading to large scale deforestation and thus, destruction of natural habitat. Illegal cutting of trees from different forest areas / protected areas because of lapse in the implementation of legal protocols accounts for unaccountable loss of forest cover.
- **Mining:** Extraction of mineral resources paves a way to economic development of the nation. Illegal mining leads to injudicious use of land for the extraction of mineral resources and hence, lead to large scale destruction of habitat. Mining degrades the quality of land due to release of toxic and acidic fumes/water from the mines. Thus, make the land not suitable for the vegetation growth.
- **Agriculture:** United Nations sustainable development goals focus to attain “Zero hunger”. Due to increasing population and lack of resources many countries are facing food shortage. In order to meet the demand of food and attain food security, expansion of agriculture is required, this leads to conversion of forest land to agricultural land, thus promoting loss of natural habitat for wildlife. Shifting agriculture, a practice being followed

in some communities, also require more land area.

- **Unsustainable development and Over Utilization of resources:** Economic development without considering ecological implications also pose a threat for both terrestrial and aquatic habitats.

Human interferences alter the natural habitat in a way to influence the abiotic factors of the area. Destruction in habitat through natural or anthropogenic causes is known to cause serious implications on the survival and existence of various species (Martínez et al., 2009; Hansen et al., 2012; Chase et al., 2020).

- No place to survive and spawn: Decrease in percentage of forest cover has significantly impacted the number of wild species. Endemic organisms which are presented with in a limited area are most impacted by the destruction of habitat. Tropical forest are most threatened habitats and large percentage of tropical forest gets removed every year. Biodiversity hotspots are located in tropical regions and support many endemic species. Most of these hotspots are located in countries with high population density resulting in the extensive habitat loss in those areas and thus impacting the number of species. For example, China's Giant Panda is now restricted only in the southwest region of the country, earlier this species was living in Sichuan as well but due to extensive deforestation in that area, the Giant Panda population from Sichuan area declines considerably (Li et al., 2013).
- Impact on Aquatic Ecosystems: Habitat destruction is faced by both terrestrial and aquatic habitats. Increase in soil erosion, over utilization of ground and surface water have significantly impacted the wetlands and rivers and thus the species surviving in these habitats are also facing the constant threat. The destruction of habitat with reference to the aquatic regions has resulted in the decline in coral reefs and mangroves, thus causing serious threat to the biodiversity (Wilinson and Salvat, 2012).
- Ecological Imbalance: Impact of wild habitat destruction is evident on human civilization as well. Destruction of habitat increase the area which are vulnerable to natural disasters. For example, chances of flood, drought, crop disease, contamination of air and water, vastly increases due to destruction of wild areas.
- Man-wildlife conflict: With decrease in forest cover, wild animals enter human infested areas. Infestation of wild animals in human inhabited areas often lead to conflict between man and wildlife in which human beings try to kill these animals. The number of endangered animals reduce significantly due to conflict between human being and animals (Distefano, 2005).

5.4 HABITAT FRAGMENTATION

Fragmentation of habitat is different from complete loss of habitat but has equally destructive impacts on biodiversity. Alteration of natural habitat in to small patches or emergence of discontinuities in an overall large area is known as Habitat Fragmentation. Fragmentation or discontinuities exists in biosphere

too due to geological process, changes in terrain, or change in other abiotic factors. This natural variation or emergence discontinuity in the habitat was a relatively slow process and have made species to adapt to these changes. But unprecedented increase in fragmentation rate due to human influences have made it difficult for the species to adapt and hence increase habitat patchiness due to anthropogenic reasons is serious threat to biodiversity (Martínez et al., 2009; Hansen et al., 2012; Chase et al., 2020). In simple words, habitat fragmentation is conversion of large habitats into smaller patches. Major causes of fragmentation of habitat includes:

- Agricultural Expansion
- Timber extraction
- Road/Railway networking and Sea links
- Construction of dams

Effects of habitat fragmentation results in decrease in the size of habitat this results in decrease in number of species and promote the risk of local extinction.

- **Reduced Size:** Size of habitat is major determinant of number of species. Demographic contribution in maintaining the population of species largely depend upon the environmental factors. Alterations in abiotic factors like climate, resources and other edaphic factors may have serious impacts on population restricted in small areas while can be corrected in large ecosystem.
- **Edge Effect:** The abiotic factors are different on the edges as compared to the interior of habitat. Habitat fragmentation exposes the interiors of habitat to the vulnerable exteriors. As a result of exposing the inner most core of the habitat to the external factors, fires also occur more often because of decrease in humidity and increase in wind currents. Habitat along the edge has different climatic conditions as compared to the interior habitats and thus, make them unfit for the survival of species living in interior habitat (Zhen-Min and Guang-Zhi, 2000)
- **Isolation of Patches:** Fragmentation can result in isolation of habitat in small patches of varied population density and community of organisms. These isolated patches can impact the movement and dispersal of species, reproduction among species, density of organisms. Competition among species and predation can also increase in the small isolated patches.
- **Decrease in genetic diversity:** Changes in genetic makeup of population leading to decrease in genetic diversity is known as genetic drift. In case of small population groups, the evolution due to natural selection is less often and there are more chances of genetic drift, thus leading to decrease in genetic diversity within species.
- **Alteration in animal behavior:** Fragmentation impacts the social interactions of different animals in isolated sub units. Due to reduced

availability of resources and increased edge effects, the predation and mating behavior of species gets altered in small fragments.

- **Impact on microbial population:** Microbes play significant role in maintaining the balance of the ecosystem. Diversity of microorganisms is also known to get altered as a result of habitat fragmentation. As the diversity of insects gets decreased because of fragmentation, the diversity of fungi which feed on these organisms also gets decreased. Edge effect and change in microclimatic conditions in the interior of habitat also impacted the amount of leaf litter available for the decomposers, thus impacting the diversity and population of microbes.

Fragmentation of habitat also poses the risk of extinction to species because of varied impacts they can cause in the biogeochemical pathways of ecosystem.

5.5 HABITAT TRANSFORMATION

Transformation of habitat to abiotically different habitat can happen because of natural as well as anthropogenic causes. It has been a matter of common observation when as a result of various natural factors or land use patterns, the habitat is being transformed in terms of abiotic factors. Major cause associated with habitat transformation include:

Climate Change

Climate change plays an important role in altering the abiotic conditions of the habitat. Increase in global mean temperature and change in rainfall patterns has resulted in expansion of deserts, decrease in fresh water ecosystem, alteration of microclimatic conditions in different regions has resulted in alteration of habitat conditions. Desertification of semi-arid areas has resulted in decrease in species population. Also, the alteration of fresh water habitat due to decreased rainfall has resulted in decline in aquatic population in many areas. Decrease in amount of ice in polar regions have resulted in change in microclimatic conditions thus posing a threat for the species in polar regions (Nunez et al., 2019).

Water use patterns

Increase in groundwater usage also alters the physicochemical conditions of soil and thus alters the habitat. Decrease in groundwater table increases the salinity in the soil and thus effects the growth of plants.

Human Interference in Ecosystem

To meet demands of human population, efforts are being made to alter the natural ecosystem. Building canals in a desert, spreading agriculture on grasslands, construction of roads and tunnels in hills and mountains, construction of dams on rivers, construction along various wetlands, transform the ecosystem. These activities change the abiotic components and thus biogeochemical cycles of the ecosystem also gets altered, this thus trigger change in biotic components of ecosystem and change the biological diversity of the ecosystem.

5.6 HABITAT DEGRADATION

Physicochemical conditions of soil, quality of water and air plays an important role in managing the biogeochemical parameters of the ecosystem. Human activities leading to addition of unwanted substances in the environment can lead to the degradation of habitat. Increase in industrialization, urbanization, unsustainable agricultural practices, mining, deforestation and activities which release contaminants in the surrounding areas, result in the habitat degradation. For example, surface run off from agricultural land using nitrogenous fertilizers can lead to increase in nitrates in the surrounding water bodies. This can result in increase in nutrients which can cause algal bloom leading to Eutrophication of water body. A eutrophied lake can turn to dead lake due to decrease in dissolved oxygen concentration. Similarly, coastal pollution can drastically affect the population of fishes near the coast line. Bioaccumulation of pollutants in different trophic levels of aquatic food chain pose serious threats to higher organisms.

Discharge of polluted wastewater in The Ganges, is leading to loss of biodiversity in the river course and in Sundarbans region as well. Also, littering of plastic, movement of cargos along with Ganga delta is posing threat to biodiversity in Sundarbans regions (Kamboj and Kamboj, 2019).

- Change in physico-chemical parameters: Human activities like irrigation, discharge of pollutants on soil and water, deposition of air pollutants leads to change in pH, salinity, elemental composition of soil and water. The change in pH of soil drastically impacts the soil microbial community further impacting the entire the ecosystem. Also, increase in salinity of soil reduces the growth of plants. This may not lead to immediate loss of biodiversity but it does impact the genetic diversity and eventually can lead to extinction of species. In aquatic ecosystems, addition of contaminants like nitrates can promote eutrophication, resulting in decrease in oxygen levels converting the lake into dead lake.
- Increase in toxicity: Addition of hazardous pollutants into soil or water increase the toxicity of the area and thus affect the growth of plants and thus the other trophic levels within the ecosystem. Discharge of pollutants into fresh and marine water bodies is harmful for the aquatic animals. Plastic pollution in marine system is known to threaten various species of fishes and other aquatic animals.
- Siltation: Increase in siltation of lakes, rivers and ponds as a result of land use patters near the fresh water bodies and/or construction of dams on the river ecosystem has resulted in decrease in carrying capacity of these fresh water bodies. Decrease in carrying capacity of these fresh water bodies has not only resulted in decrease in water quantity but have also altered the nutrient concentration in the ecosystem. As a result of which, there had been observable decrease in aquatic species in many such habitats.

5.7 OVER EXPLOITATION

Over exploitation of natural resources is another major reason for the extinction of biodiversity. Excessive usage of natural resources by mankind makes them less available for wildlife. Excessive usage of animal products promotes illegal trade and poaching of these animals. Skin of crocodiles, tusks of animals, skin of tiger are often used in various industries, due to lapse in the legal framework, illegal trade of these animal parts is very common. Hunting of threatened and endangered species for pleasure or trade is otherwise banned. Major implication of over utilization of resources are:

- **Resource crunch:** Increase in population and socio-economic needs results in excessive usage of naturally available resources like land, water, etc. by human beings creates a crunch of these resources for wildlife. Per capita availability of land for human population is decreasing with exponentially increase human population, as a result of which spreading of human civilization into wild areas becomes more evident. Thus, posing more threats of extinction of species due to habitat destruction, fragmentation, poaching, etc.
- **Poaching:** Illegal hunting of animals and their parts for trade and/or pleasure leads to the killing of threatened species. Hunting of threatened species is banned but illegal trade and lack of awareness regarding species under threat of extinction often lead to killing of these animals.
- **Ecological Imbalance:** Improper use of resources creates an imbalance within ecosystem. Extraction of timber from the forest decreases the number of producers and thus disturbs the function of ecosystem which further disrupts the growth and survival of other species, thus promoting extinction of species.

5.8 INVASIVE SPECIES

Invasive species are the alien/ non-native species which do not belong to the specific area but reaches there and establish their population and spreads exponentially. Invasive species is regarded as the second major cause of extinction of biodiversity after habitat loss. With increase in global trade, transport and communication chances of spreading of invasive species has increase many folds. United Nations Environmental Protection Agency mentions that in Fynbos biome of South Africa, 80% of threatened species are now endangered due to invasive species (Holmes and Cowling, 1997). Although, only a small percentage of organisms which have been transported become invasive, yet the impact caused by these species is tremendous. Global trade, migration, transport can introduce new species

in the ecosystem which can completely alter the functioning of ecosystem. The invasive species can impact the local population in the following ways:

- **Habitat modification:** Introduction of water hyacinth to wetlands has modified the wetland ecosystem and has impacted the aquatic species and migratory bird's population sprawling in and around the wetlands.

Introduction of invasive species and exponential spread of their population alter the abiotic (Villamagna and Murphy, 2010)

- **Competition:** Invasive species introduced in the ecosystem compete with the native species for the resources and nutrients available in the ecosystem. Example: Invasive Zebra mussels (*Dreissena polymorpha*) spread widely in the Great Lakes region after 1980s. They started competing with native mussels for space. So, in the process these exotic mussel species started killing native species. The native species soon were listed in the endangered category (Johnson and Padilla, 1996).
- **Prey-Predation Interaction:** Interaction among species of ecosystem can alter at all levels due to introduction of invasive species. The prey predator relationship can also alter at significant levels and the new exotic species could be predatory to the local/native species. Example: In Guam, an island in the Pacific Ocean, an exotic species of brown tree snake was introduced. Various birds of this island fell prey to this snake. Brown snake fed upon the eggs and young / adult birds and reptiles. This invasive species resulted in extinction of three quarter of local bird species. Introduction of this snake to other islands of Pacific Ocean also resulted in similar impacts (Rodda and Savidge, 2007).
- **Pathogenic diseases:** Some microorganisms can be also be introduced through the global trade or tourism. These microbes can be pathogenic in nature and may cause serious diseases to the native population and thus threaten their existence. In 1940s a disease named Chestnut blight wiped off chestnut trees in a significant number in eastern US. The outbreak of this disease was a result of exotic invasive pathogenic fungus. This resulted in the alteration of dominant species of the ecosystem. The species of moths which were dependent upon the chestnut trees also got eliminated from the ecosystem (Hepting, 1994).
- **Hybridization of species:** Invasive species can mate with closely related endemic species and promote hybridization. This can result in elimination of endemic species. Example: In many places around the world North American mallards (*Anas platyrhynchos*) have been introduced and they have mated with closely related duck species of those regions. This has resulted in the danger of extinction for endemic species in various regions. Many species of endemic ducks in Africa and New Zealand are facing the threat of extinction due to hybridization with exotic species (Champagnon et al., 2013).

Invasive species can change the structure and function of ecosystem. Invasive species can alter the biogeochemical cycles and mass energy transfer patterns within the ecosystem.

5.9 DISEASE

Disease is a part of normal physiological growth of organisms within ecosystem. Organisms living within stable ecosystem have generally adapted well to the common diseases occurring in the ecosystem, their immune response for the

common disease is well established. Bacteria, fungi and other microbes including pathogen are component of ecosystem. Introduction of any new pathogen, may spread the disease which can wipe off the species within a given habitat. Also, species richness protects ecosystem from any deadly disease and on one hand introduction or spread on new disease result in the loss of biodiversity; on the other hand, loss of biodiversity further increases the chances of occurrence of new diseases. These diseases can emerge through the introduction of invasive species, increase in temperature, decrease in biological diversity and increase in inter-species interaction. Increase in global trade, interaction between human and wildlife and habitat fragmentation promotes the incidences of disease occurrence in certain species.

- Alteration in genetic diversity: Spread of these in an area may completely remove a certain variety of organism and thus altering the other genetic diversity. Also, incidences of disease can result in modification of genetic diversity in order to support the adaptable population. Some of these diseases may also result in mutations at chromosomal levels thus again altering the genetic diversity within the given region.
- Impact on endangered and rare species: Rare species are the sensitive organisms, spread of an epidemic within the region may result in infecting and wiping off any of the rare species present in that area. Ebola killed more than 5000 of critically endangered Wester Gorillas in Republic of Congo. Similarly, anthrax killed more than 80 hippos in Uganda.
- Variations at genetic, species and ecosystem level are important for maintaining the ecological balance. Human interference in the ecological structure and function cause detrimental effects to the environment. Impacts of human activities on biodiversity can impact biodiversity at all levels. These changes can be instantaneous or delayed, reversible or irreversible and minor or major. The changes in biodiversity due to human interference can make the civilization devoid of benefits which can be availed from the variations in living organisms. Unsustainable development in different spheres of economic growth is one of the major drivers for the biodiversity loss. Efforts are required to be made to promote sustainable development which can aid in conservation of biodiversity at all levels (Roche et al., 2012)

Check Your Progress 1

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

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

1. Explain natural and anthropogenic causes of habitat destruction?

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2. What is habitat transformation? Describe its impact on biodiversity?

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5.10 LET US SUM UP

We can conclude this unit by saying that human activities have resulted in loss of biodiversity and the impact of this loss can be a serious threat to human civilization. Each species has its own importance in maintaining the balance of ecosystem and sustenance of biosphere. Loss of a single species impacts the entire biosphere and can lead to further extinctions. Major causes leading to extreme decline in the biodiversity, are associated with land use patterns, increase in global demand for food and energy production, environmental degradation due to increase anthropogenic sources, introduction of exotic species, pathogenic microbes and illegal hunting.

5.11 KEYWORDS

Drivers of Change : Any natural or human-induced factor that directly or indirectly causes a change in an ecosystem.

Direct driver and indirect Driver: A direct driver of change unequivocally influences ecosystem processes and can therefore be identified and measured to differing degrees of accuracy, an indirect driver of change operates by altering the level or rate of change of one or more direct drivers.

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5.13 ANSWER TO CHECK YOUR PROGRESS EXERCISE

Check Your Progress 1

1. Your answer must include the following points

- Habitat destruction (Refer section 5.3)

2. Your answer must include the following points

- Habitat Transformation (Refer section 5.7)