

## Chapter-16

### Biodiversity And Conservation

- **Biodiversity:** Biodiversity refers to the varieties of plants, animals and micro-organisms, the genes they contain and the ecosystems they form. It relates to the variability among living organisms on the earth, including the variability within and between the species and that within and between the ecosystems.
- **Species:** Groups of individual organisms having certain similarities in their physical characteristics are called species.
- **Genetic biodiversity:** Genetic biodiversity refers to the variation of genes within species.
- **Species diversity:** Species diversity refers to the variety of species. It relates to the number of species in a defined area. The diversity of species can be measured through its richness, abundance and types.
- **Ecosystem diversity:** The broad differences between ecosystem types and the diversity of habitats and ecological processes occurring within each ecosystem type constitute the ecosystem diversity.
- **Hotspots:** Some areas are richer in species than others. Areas rich in species diversity are called hotspots of diversity
- **Exotic species:** Species which are not the natural inhabitants of the local habitat but are introduced into the system, are called exotic species.
- **Sensitive species:** Pesticides and other pollutants such as hydrocarbons and toxic heavy metals destroy the weak species. These are called sensitive species.

- **Mega diversity centre:** There are some countries which are situated in the tropical region; they possess a large number of the world's species diversity. They are called mega diversity centres.
- **IUCN:** The International Union of Conservation of Nature and Natural Resources is an international organization which published information about species under the red list.
- **Endangered species:** Endangered species includes those species which are in danger of extinction. The IUCN publishes information about endangered species world-wide as the red list of threatened species.
- **Vulnerable species:** Vulnerable species includes the species which are likely to be in danger of extinction in near future if the factors threatening to their extinction continue. Survival of these species is not assured as their population has reduced greatly.
- **Rare species:** Rare species are those species whose population is very small in the world and they are confined to limited areas or thinly scattered over a wider area.

## IUCN

- The International Union for Conservation of Nature (IUCN; officially International Union for Conservation of Nature and Natural Resources) is an international organization working in the field of nature conservation and sustainable use of natural resources.
- It is involved in data gathering and analysis, research, field projects, advocacy, and education. IUCN's

### International Union for Conservation of Nature and Natural Resources (IUCN)

	
<b>Founded</b>	October 5, 1948; 71 years ago (as International Union for the Protection of Nature) Fontainebleau, France
<b>Type</b>	International organization
<b>Focus</b>	Nature conservation, biodiversity
<b>Location</b>	Gland, Switzerland
<b>Area served</b>	Worldwide
<b>Members</b>	1300
<b>Key people</b>	Grethel Aguilar (Director General a.i.) Zhang Xinsheng (President)
<b>Revenue</b>	CHF 114 million / US\$ 116 million (2013)
<b>Employees</b>	Over 900 (worldwide)
<b>Website</b>	<a href="http://IUCN.org">IUCN.org</a>

mission is to "influence, encourage and assist societies throughout the world to conserve nature and to ensure that any use of natural resources is equitable and ecologically sustainable".

## IUCN

Extinct (EX) - No known individuals remaining.

- Extinct in the wild (EW) - Known only to survive in captivity, or as a naturalized population outside its historic range.
- Critically endangered (CR) - Extremely high risk of extinction in the wild.
- Endangered (EN) - High risk of extinction in the wild.
- Vulnerable (VU) - High risk of endangerment in the wild.
- Near threatened (NT) - Likely to become endangered in the near future.
- Least concern (LC) - Lowest risk. Does not qualify for a more at-risk category. Widespread and abundant taxa are included in this category
- Data deficient (DD) - Not enough data to make an assessment of its risk of extinction.
- Not evaluated (NE) - Has not yet been evaluated against the criteria

### List of critically endangered species in India as per IUCN Red List 2019

#### Critically Endangered Mammals

1. Pygmy Hog

2. Andaman White-toothed Shrew
3. Jenkin's Andaman Spiny Shrew
4. Nicobar White-tailed Shrew
5. Kondana Rat
6. Large Rock Rat or Elvira Rat
7. Namdapha Flying Squirrel
8. Malabar Civet
9. Sumatran Rhinoceros
10. Javan Rhinoceros

#### Critically Endangered Reptiles

1. Gharial
2. Hawksbill Turtle
3. Leatherback Turtle
4. River Terrapin
5. Bengal Roof Turtle
6. Sispara day gecko

#### Critically Endangered Birds

1. Aythya baeri
2. Forest Owlet
3. Great Indian Bustard
4. Bengal Florican

5. Siberian Crane
6. Spoon-billed Sandpiper
7. Sociable Lapwing
8. Jerdon's Courser
9. White-backed Vulture
10. Red-headed Vulture
11. White-bellied Heron
12. Slender-billed Vulture
13. Indian Vulture
14. Pink-headed Duck
15. Himalayan Quail

### Critically Endangered Fishes

1. Pondicherry Shark
2. Ganges Shark
3. Knife-tooth Sawfish
4. Large-tooth Sawfish
5. Narrow-snout Sawfish

### Objectives of IUCN

The International Union for Conservation of Nature works to achieve the following goals:

1. To provide scientific data on the status of species and subspecies at a global level.

3. To address the factors of concern and spread awareness regarding the species and biodiversity extinction.
5. To plan a layout for the conservation of biodiversity.

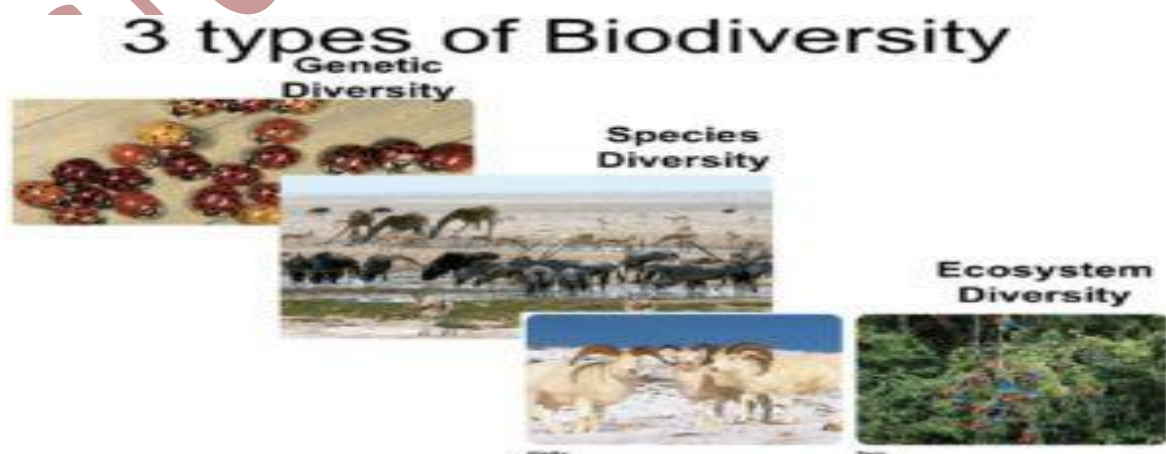
### Purpose of the IUCN Red List Data

The information cited in the IUCN Red List is used by various organizations in the following ways:

- International Agreements such as CITES, Ramsar Convention use the Red List data to make important decisions in sync with the status of nature as and when required.
- World Bank Group performance standard uses the IUCN Red List data to evaluate the risk of damage to biodiversity due to large-scale infrastructures and global projects.
- Zoos and National parks use this information to upgrade important policies like parks regulations from time to time.

### LEVELS OF BIODIVERSITY

- (i) Genetic diversity;
- (ii) Species diversity;
- (iii) Ecosystem diversity



### Genetic Diversity

Genetic biodiversity refers to the variation of genes within species. Groups of individual organisms having certain similarities in their physical characteristics are called species. Human beings genetically belong to the homo sapiens group and also differ in their characteristics such as height, colour, physical appearance, etc., considerably. This is due to genetic diversity. This genetic diversity is essential for a healthy breeding of population of species.

### Species Diversity

This refers to the variety of species. It relates to the number of species in a defined area.

The diversity of species can be measured through its richness, abundance and types. Some areas are more rich in species than others. Areas rich in species diversity are called hotspots of diversity (Figure 16.5).

### Ecosystem Diversity

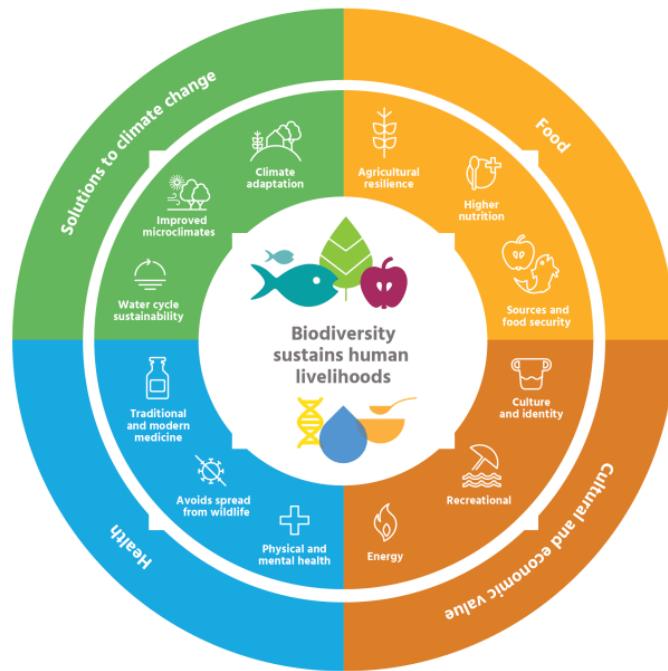
The broad differences between ecosystem types and the diversity of habitats and ecological processes occurring within each ecosystem type constitute the ecosystem diversity.

The 'boundaries' of communities (associations of species) and ecosystems are not very rigidly defined. Thus, the demarcation of ecosystem boundaries is difficult and complex.

## Importance of Biodiversity

1. Biodiversity has contributed in many ways to the development of human culture

In turn, human communities have played a major role in shaping the diversity of nature at the genetic, species and ecological levels. Biodiversity plays the following roles:



1. ecological, 2. economic 3. scientific.

2. Species of many kinds perform some function or the other in an ecosystem. Nothing in an ecosystem evolves and sustains without any reason.

3. That means, every organism, besides extracting its needs, also contributes something of useful to other organisms.

4. Species capture and store energy, produce and decompose organic materials, help to cycle water and nutrients throughout the ecosystem, fix atmospheric gases and help regulate the climate.

5. These functions are important for ecosystem function and human survival.

6. The more diverse an ecosystem, better are the chances for the species to survive through adversities and attacks, and consequently, is more productive.



7. the more the variety of species in an ecosystem, the more stable the ecosystem is likely to be.

### Economic Role of Biodiversity

1. 'crop diversity', which is also called agro-biodiversity
2. Biodiversity is seen as a reservoir of resources to be drawn upon for the manufacture of food, pharmaceutical, and cosmetic products.
3. This concept of biological resources is responsible for the deterioration of biodiversity.
4. At the same time, it is also the origin of new conflicts dealing with rules of division and appropriation of natural resources.
5. Some of the important economic commodities that biodiversity supplies to humankind are: food crops, livestock, forests, fish, medicinal resources, etc.

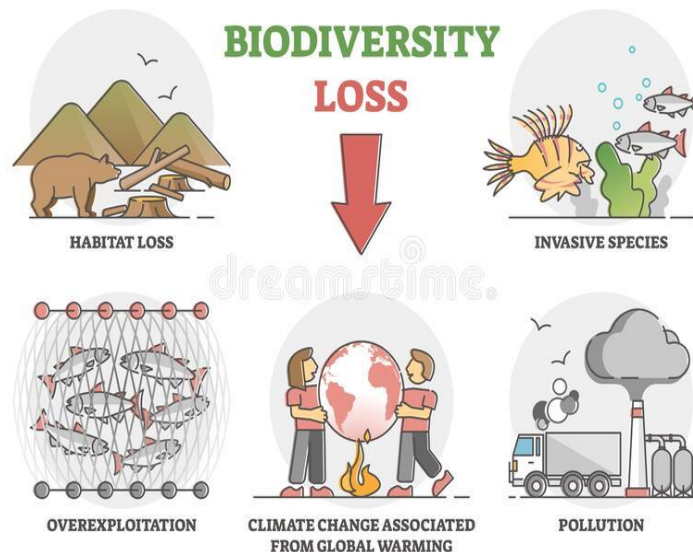
### Scientific Role of Biodiversity

1. Biodiversity is important because each species can give us some clue as to how life evolved and will continue to evolve.
2. Biodiversity also helps in understanding how life functions and the role of each species in sustaining ecosystems of which we are also a species.
3. This fact must be drawn upon every one of us so that we live and let other species also live their lives.
4. The level of biodiversity is a good indicator of the state of our relationships with other living species. In fact, the concept of biodiversity is an integral part of many human cultures

## LOSS OF BIODIVERSITY

Tropical regions which occupy only about one-fourth of the total area of the world, contain about three fourth of the world human population. Over-exploitation of resources and deforestation have become rampant to fulfill

the needs of large population. Tropical rainforests contain 50 per cent of the species on the earth. Destruction of natural vegetation have proved disastrous for the entire biosphere.



1. Natural calamities such as earthquakes, floods, volcanic eruptions, forest fires, droughts, etc. cause damage to the flora and fauna of the earth, bringing change the biodiversity of respective affected regions.

2. Pesticides and other pollutants such as hydrocarbons and toxic heavy metals destroy the weak and sensitive species.

3. Species which are not the natural inhabitants of the local habitat but are introduced into the system, are called exotic species

- There are many examples when a natural biotic community of the ecosystem suffered extensive damage because of the introduction of exotic species.
- During the last few decades, some animals like tigers, elephants, rhinoceros, crocodiles, minks and birds were hunted mercilessly by poachers for their horn, tusks, hides, etc

- It has resulted in the rendering of certain types of organisms as endangered category.
- The International Union of Conservation of Nature and Natural Resources (IUCN) has classified the threatened species of plants and animals into three categories for the purpose of their conservation.
- It includes those species which are in danger of extinction. The IUCN publishes information about endangered species world-wide as the Red List of threatened species.

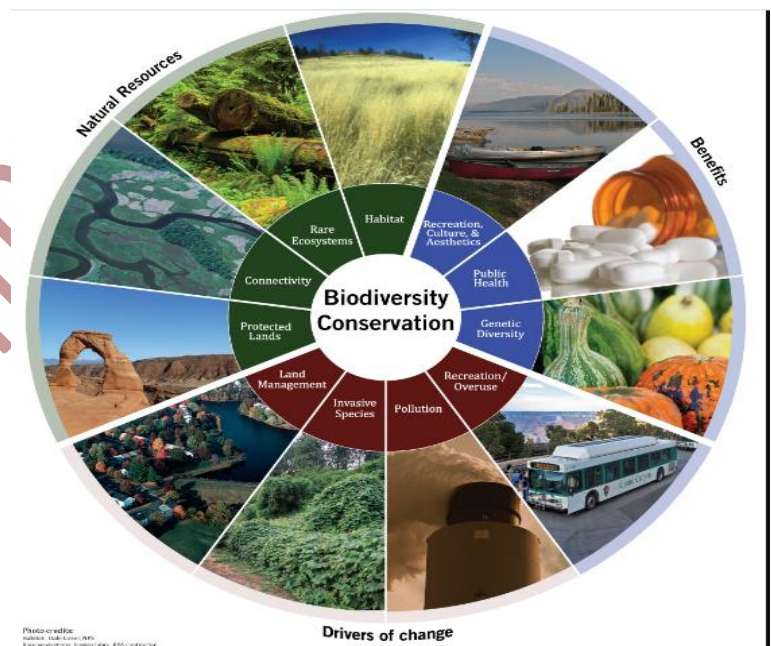
## CONSERVATION OF BIODIVERSITY

Biodiversity is important for human existence.

1. All forms of life are so closely interlinked that disturbance in one gives rise to imbalance in the others.

2. If species of plants and animals become endangered, they cause degradation in the environment, which may threaten human being's own existence.

3. There is an urgent need to educate people to adopt environmentfriendly practices and reorient their activities in such a way that our development is harmonious with other life forms and is sustainable.



4. There is an increasing consciousness of the fact that such conservation with sustainable use is possible only with the involvement and cooperation of local communities and individuals.

5. For this, the development of institutional structures at local levels is necessary. The critical problem is not merely the conservation of species nor the habitat but the continuation of process of conservation. The Government of India along with 155 other nations have signed the Convention of

**Biodiversity at the Earth Summit held at Rio de Janeiro, Brazil in June 1992.**

The world conservation strategy has suggested the following steps for biodiversity conservation:

- (i) Efforts should be made to preserve the species that are endangered.
- (ii) Prevention of extinction requires proper planning and management.
- (iii) Varieties of food crops, forage plants, timber trees, livestock, animals and their wild relatives should be preserved;
- (iv) Each country should identify habitats of wild relatives and ensure their protection.
- (v) Habitats where species feed, breed, rest and nurse their young should be safeguarded and protected.
- (vi) International trade in wild plants and animals be regulated.
- (vii) To protect, preserve and propagate the variety of species within natural boundaries, the Government of India passed the Wild

Life (Protection) Act, 1972, under which national parks and sanctuaries were established and biosphere reserves declared.

There are some countries which are situated in the tropical region; they possess a large number of the world's species diversity. They are called mega diversity centres. There are 12 such countries, namely



1. Mexico,
2. Columbia,
3. Ecuador,
4. Peru,
5. Brazil,
6. Democratic Republic of Congo,
7. Madagascar,
8. China,
9. India,
10. Malaysia,
11. Indonesia
12. Australia

- The International Union for the Conservation of Nature and Natural Resources (IUCN) has identified certain areas as biodiversity hotspots. Hotspots are defined according to their vegetation. Plants are important because these determine the primary productivity of an ecosystem.
- Most, but not all, of the hotspots, rely on species-rich ecosystems for food, firewood, cropland, and income from timber.
- In Madagascar, for example, about 85 percent of the plants and animals are found nowhere else in the world. Other hotspots in wealthy countries are facing different types of pressures. The islands of Hawaii have many unique plants and animals that are threatened by introduced species and land development.