diversity that has made India a "gene bank" for a number of food crops, forest trees, medical and aromatic plants and domesticated animal.

Forests are important bioreserves; most of the 1700 million hectares of tropical forests are located in poor countries. The forests surrounding Reo de Aneroid are part of vegetation which is rich in species of plants and animals that are endemic. There are about 53.5% of trees species found only in these forests and studies of birds, reptiles, primates and butter flies have revealed equally high or higher endemics.

2.2.3 INDIA AS A MEGA DIVERSITY NATION

India contains a great wealth of biodiversity in the forests, wet lands and marine areas. Hence biodiversity can be observed at all levels ie locally, nationally and globally . India, as a subcontinent representing a major part of South Asia is rich in flora and fauna and hence it is one of the world's "MEGADIVERSITY NATIONS" .
It is estimated that over 75000 species of animals and over 45000 species of plants are found in India.

Biogeographic regions of India: According to **wild life Institute of India**, the country has 10 distinct biogeographic zones or regions. They are:
1. Trans – Himalayan Zone
2. Himalayan Zone
3. Desert Zone
4. Semi – arid Zone
5. Western Ghats
6. Deccan Zone
7. Gangetic plain Zone
8. NE Indian Zone
9. Coastal Zone
10. Islands around the country

2.2.4 HOT SPOTS OF BIODIVERSITY

Areas which exhibit high species richness as well as high species endemism are termed as hot spots of biodiversity. Species which are restricted only to particular areas are known as endemic. India shows a good number of endemic species. About 62% of amphibians and 50% of lizards are endemic to India. Western Ghats are the site of maximum endemism. The term "Hot spots" was introduced by **Myers** (1988). There are 25 such hot spots of biodiversity on a global level out of which two are present in India, namely the Eastern Himalayas and Western Ghats. These hotspots covering less than 2% of the world's land area are found to have about 50% of the terrestrial biodiversity. According to Myers an area is designated as a hotspot when it contains at least 0.5% of the plant species as endemics.

a) Eastern Himalayas: They display an ultra-varies topography that fosters species diversity and endemism. Recent studies have shown that North East India along with its contiguous regions of Burma and Chinese provinces of Yunnan and Schezwan is an active center of organic evolution and is considered to be the cradle of flowering plants. Out of the world's recorded flora 30% are endemic to India of which 35000 are in the Himalayas.

b) Western Ghats: It extends along a 17000 km² strip of forests in Maharashtra, Karnataka, Tamilnadu and Kerala and has 40% of the total endemic plant species. The major centers of diversity are Agastyamalai Hills and Silent valley- the new Amambalam Reserve Basin .It is reported that only 6.8% of the original forests are existing today while the rest has been deforested or degraded, which raises a serious cause of alarm, because it means we have already lost a huge proportion of the biodiversity.

2.2.5 THREATS TO BIODIVERSITY

Extinction or elimination of a species is a natural process of evolution. In the geologic period the earth has experienced mass extinctions. During evolution, species have died out and have been replaced by others. However, the rate of loss of species in geologic past has been a slow process, keeping in view the vast span of time going back to 444 million years. The process of extinction has become particularly fast in the recent years of civilization. Edward O. Wilson prefers the acronym HIPPO, standing for habitat destruction, invasive species, pollution, human overpopulation, and over-harvesting
Following are the major causes and issues related to threats to biodiversity:

1. Habitat destruction: Habitat destruction has played a key role in extinctions, especially related to tropical forest destruction. Factors contributing to habitat loss are: overpopulation, deforestation, pollution (air pollution, water pollution, soil contamination) and global warming or climate change.
Habitat size and numbers of species are systematically related. Physically larger species and those living at lower latitudes or in forests or oceans are more sensitive to reduction in habitat area. Conversion to "trivial" standardized ecosystems (e.g., monoculture following deforestation) effectively destroys habitat for the more diverse species that preceded the conversion. In some countries lack of property rights or lax law/regulatory enforcement necessarily leads to biodiversity loss (degradation costs having to be supported by the community)

2. Poaching: Illegal trade of wildlife products by killing prohibited endangered animals i.e. poaching is another threat to wildlife. Despite international ban on trade in products from endangered species, smuggling of wildlife items like furs, hides, horns, tusks, live specimens and herbal products worth millions of dollars per year continues, the developing nations in Asia, Latin America and Africa are the richest source of biodiversity and have enormous wealth of wildlife. The rich countries in Europe and North America and some affluent countries in Asia like Japan, Taiwan and Hong Kong are the major importers of the wildlife products or wildlife itself. The trading of such wild life products is highly profit making for the poachers who just hunt these prohibited wild lives and smuggle it to other countries mediated through mafia. The worst part is that for every live animal that actually gets into the market about 50 additional animals are caught and killed

If you are fond of rare plants, fish or birds, please make sure that you are not going to the endangered species or wild-caught species. Doing so will help in checking further decline of these species. Also do not purchase fur coat, purse or bag, or items made of crocodile skin or python skin. You will certainly help in preserving biodiversity by doing so.

3. Man-Wildlife Conflicts: We have discussed about the need to preserve and protect wildlife. However, sometimes we come across conflicting situations when wildlife starts causing immense damage and danger to man and under such conditions it becomes very difficult for the forest department to pacify the affected villages and gain local support for wildlife conservation. Instances of man animal conflicts keep on coming to lime light from several states in our country.

In Sambalpur, Orissa 195 humans were killed in the last 5years by elephants. In retaliation the villagers killed 95 elephants in the border region of Kote-Chamarajanagar belt in Mysore have been reported recently. The man-elephant conflict in this region has arisen because of massive damage done by the elephants to the farmer's cotton and sugarcane crops. The agonized villagers electrocute the elephants and sometimes hide explosives in the sugarcane fields, which explode as the elephants intrude into their fields. In fact, more killings are done by locals than by poachers.

Causes of Man-animal conflicts:

Dwindling habitats of tigers, elephants, rhinos and bears due to shrinking forests cover are compelled to move outside the forests and attack the field or sometimes even humans. Human encroachment into the forest areas has rendered all forest living animals to trespass the borders of human civilizations. This is because the conflicts between man and the wildlife have increased since it is an issue of survival of both

3.1 Invasive Non-Native Species: Species that are non-native to a particular area can sometimes spread very quickly, for example the zebra mussel and Japanese knotweed have spread rapidly in Ireland in the past two decades. As a result, these species can destabilize an ecosystem by altering habitats affecting food webs.

3.2 Pollution/Litter: As you will remember from the Litter and Waste theme, pollution is always caused by humans. Pollution can have a huge impact, altering the balance within ecosystems, and is the cause of death for millions of animals and plants around the world every year.

3.3 Land Use Change/Increased Infrastructure Development: This is the alteration of natural areas by humans, for example, the clearing of huge areas of rainforest in South America for farming. In Ireland, upland open habitats, such as rough grassland, scrub and heath, have been changed by agriculture and afforestation.

3.4 Intensive Farming Practices: Extensive use and concentrations of chemical and/or biological pesticides and the removal of hedgerows are typical practices in modern-day intensive farming. Often large areas of land are planted with a single crop (monocultures) which greatly reduces the level of biodiversity in that area.

3.5 Climate Change: It is now widely accepted that the current global rate of change in climate is as a result of human activity. As global air or sea temperature changes, even by just 1 or 2 degrees, the habitats in which species live will also change and may even become uninhabitable to some species.

2.2.6 ENDANGERED AND ENDEMIC SPECIES

Endangered species A species whose numbers are reduced to the point. That means endangered species are in immediate danger of extinction.
The International Union Conservation of Nature (IUCN) classified the species of plants and animals as:
(a) Endangered species
(b) Threatened species: Species (including animals, plants, fungi, etc.) which are vulnerable to endangerment in the near future)
(c) Rare species : Among the important endangered animal species, Indian wild ass; the Kashmir stag, the Golden Langur etc .. are considered highly endangered. There are also
endangered bird species like Siberian crane; the great Indian Bustard; the florican etc..
The IUCN published the data on endangered species of both plants and animals of India. The data symbolizes the working signal for those species which are endangered and if not protected are likely to become extinct in near future
A species is said to be **extinct** when it is not seen in the wild for 50 years at a stretch e.g. Dodo, Passenger Pigeon.
A species is said to be **endangered** when its number has been reduced to a critical level or whose habitat, have been drastically reduced and if such species is not protected and conserved, it is in immediate danger of extinction.

Endangered species of India

The International Union for Conservation of Nature and Natural Resources(IUCN) publishes the **Red Data Book** which include the list of endangered species of plants and animals. The red data symbolizes the warning signal for those species which are endangered and if not protected are likely to become extinct in near future

The animals that are listed under the critically endangered category are as under:

1)MalabarLargeSpottedCivet
2)NamdaphaFlyingSquirrel
3)SalimAli'sFruitBat
4)SumatranRhinoceros

EndangeredSpeciesareasunder:
1)AsiaticLion
2)AsiaticBlackBear
3)DesertCat
4)GreatIndianRhinoceros
5)IndianElephant(or)AsianElephant

ThreatenedSpeciesareasunder:
1)IndianWildAss
2)Leopard

Endemic species of India

India has two biodiversity hot-spots and thus possesses a large number of endemic species.

The endemic species are those taxa whose distribution is confined to a restricted area due to their specific ecological niches and edaphic gradients. Therefore, the habitats of endemic species are far more vulnerable than other species. Endemic species once lost, it is a loss of biodiversity of these species forever.

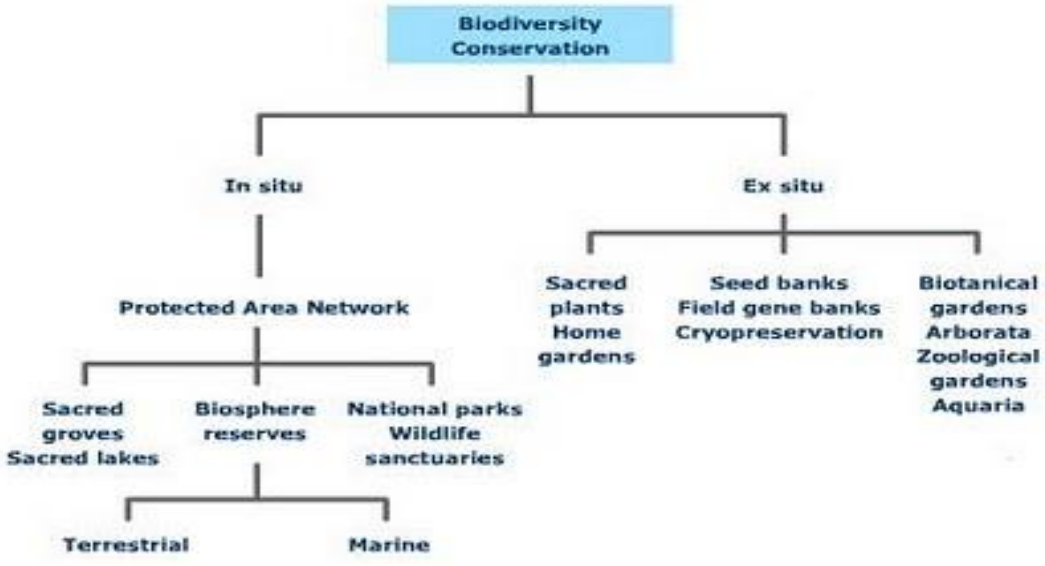
In India there are about 5725 endemic taxa of angiosperms (33.5% of Indian flora) which are located in 25 hot spots. The major hotspots in India which contain largest number of endemic plant species are the Southern Western Ghats and Eastern Himalayas with 1286 and 1808 endemic species respectively. There are about 1272 species of endemic angiosperms out of 3800 species occurring in Kerala (33.5% of Kerala flora) which represent 22.6% of Indian endemics. Seventy percent of the 1272 species of endemics have the major areas of distribution in Kerala with spill over in adjacent regions. On the basis of the study of the distributional range, about 102 endemic species occur exclusively in Kerala.

A large number out of a total of 81,000 of animals in our country is endemic. The Western Ghats are particularly rich in amphibians (frogs, toads etc) and reptiles (lizards, crocodiles etc) about 62% amphibians and 50% lizards are endemic to Western Ghats

.2.2.7 CONSERVATION OF BIODIVERSITY

In order to maintain and conserve biodiversity, the Ministry of Environment and Forests, government of India has already taken several steps to manage wildlife, the objectives of which are:

1. Maintenance of a number of species in protected areas such as National Parks, Sanctuaries..
2. To improve the biosphere reserves
3. Implement strict restrictions of export of rare plants and animals
4. Educate the public on these through the government agencies and NGO's.



A) In-situ conservation: The preservation of species **in its natural ecosystem** is called in-situ conservation. As a consequence, protected areas are being identified and maintained for natural conservation of species by individual countries. For the conservation and management of endangered species several projects have been established.
These are:

Tiger Projects: Corbett National Park which is 300 km from New Delhi is the oldest National Park of India having 1318.54 sq km. It was one of the nine Tiger Reserves created at the launch of the Project Tiger in 1973.

Gir Lion Projects: The Gir Forest of Gujarat where lions are found. This has an area of 1412 sq kms and declared as a National Park.

Elephant Projects: The objective was to ensure long-term survival of population of elephants (not come into operations). Project Elephant (PE), a centrally sponsored scheme, was launched in February 1992 to provide financial and technical support to major elephant bearing States in the country for protection of elephants and their habitats. The Project is being implemented in 13 States/UTs, viz..Andhra Pradesh, Arunachal Pradesh, Assam, Jharkhand, Karnataka, Kerala, Meghalaya, Nagaland, Orissa, Tamil Nadu, Uttaranchal, Uttar Pradesh and West Bengal.
There are about 7000 protected areas in the world which include a variety of National parks, Sanctuaries etc which vary in size (between 100 to 500 sq km), purpose (protection of one or more species and their habitats).. In India, there are 39 National Parks and 492 wildlife sanctuaries.

National Parks: These are protected areas exclusively for wild life. Human activities like hunting, Firewood collection, timber harvesting etc… are restricted in these areas to that wild plants and animals could grow in a protected environment

The following measures should be adopted for the conservation of biodiversity:
1. Over grazing in the forest and areas of vegetation should be controlled because it may Destroy the useful rare plants.
2. The habitat of plants and animals should be conserved.
3. The natural condition of ecosystem should be studied and researched in time and again, then Specific programs for conservation should be conducted.
4. Human activities should be done without destroying natural environment.
5. Illegal hunting and smuggling of animals and plants should be strictly avoided.
6. Effective laws and rules should be adopted for the conservation of rare animals and plants.
7. Industries are established from the raw materials. During the process of collecting raw materials, care should be taken not to destroy useful plants and habitats of animals.
8. Public awareness should be created about the importance of rare animals and plants, causes of rareness and measures for their preservation.

B) Ex-situ conservation: The conservation of elements of biodiversity out of the context of their natural habitats is referred to as ex-situ conservation. Zoos, botanical gardens and seed banks are all example of ex-situ conservation. In India we have the following important gene and seed bank facilities.

i) National Bureau of Plant Genetic Resources (NBPGR) is located in New Delhi. Here agricultural and horticultural crops are stored by **cryopreservation** of seeds, pollens etc. by using liquid nitrogen at a low temperature as low as -196^0C.

ii) National Bureau of Animal Genetic Resources (NBAGR) located at karnal, Haryana. It preserves the semen of domesticated bovine animals.