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Biodiversity and Conservation

- In our biosphere immense diversity (or heterogeneity) exists not only at the species level but at all levels of biological organisation ranging from macromolecules within cells to biomes.
- Biodiversity is the term popularized by the sociobiologist Edward Wilson to describe the combined diversity at all the levels of biological organisation.

The most important of them are–

(i) Genetic diversity:

- A single species might show high diversity at the genetic level over its distributional range.
- The genetic variation shown by the medicinal plant *Rauwolfia vomitoria* growing in different Himalayan ranges might be in terms of the potency and concentration of the active chemical (reserpine) that the plant produces. India has more than 50,000 genetically different strains of rice, and 1,000 varieties of mango.

(ii) Species diversity:

- The diversity at the species level. For example, the Western Ghats have a greater amphibian species diversity than the Eastern Ghats.

(iii) Ecological diversity:

- At the ecosystem level, India, for instance, with its deserts, rain forests, mangroves, coral reefs, wetlands, estuaries, and alpine meadows has a greater ecosystem diversity than a Scandinavian country like Norway.

Causes of biodiversity losses:

(i) Habitat loss and fragmentation:

(ii) Over-exploitation:

(iii) Alien species invasions:

(iv) Co-extinctions:

- When we conserve and protect the whole ecosystem, its biodiversity at all levels is protected - we save the entire forest to save the tiger.
- This approach is called in situ (on site) conservation.

- However, when there are situations where an animal or plant is endangered or threatened and needs urgent measures to save it from extinction, ex situ (off site) conservation is the desirable approach.

In situ conservation–

- Faced with the conflict between development and conservation, many nations find it unrealistic and economically not feasible to conserve all their biological wealth.
- Invariably, the number of species waiting to be saved from extinction far exceeds the conservation resources available.
- On a global basis, this problem has been addressed by eminent conservationists.
- They identified for maximum protection certain 'biodiversity hotspots' regions with very high levels of species richness and high degree of endemism (that is, species confined to that region and not found anywhere else).
- Initially 25 biodiversity hotspots were identified but subsequently nine more have been added to the list, bringing the total number of biodiversity hotspots in the world to 34.
- These hotspots are also regions of accelerated habitat loss.
- Three of these hotspots – Western Ghats and Sri Lanka, Indo-Burma and Himalaya – cover our country's exceptionally high biodiversity regions.
- Although all the biodiversity hotspots put together cover less than 2 percent of the earth's land area, the number of species they collectively harbour is extremely high and strict protection of these hotspots could reduce the ongoing mass extinctions by almost 30 per cent.
- In India, ecologically unique and biodiversity-rich regions are legally protected as biosphere reserves, national parks and sanctuaries.
- India now has 14 biosphere reserves, 90 national parks and 448 wildlife sanctuaries.
- India has also a history of religious and cultural traditions that emphasized protection of nature.
- In many cultures, tracts of forest were set aside, and all the trees and wildlife within were venerated and given total protection. Such sacred groves are found in Khasi and Jaintia Hills in Meghalaya, Aravalli Hills of Rajasthan, Western Ghat regions of Karnataka and Maharashtra and the Sarguja, Chanda and Bastar areas of Madhya Pradesh.
- In Meghalaya, the sacred groves are the last refuges for a large number of rare and threatened plants.

Ex situ Conservation–

- In this approach, threatened animals and plants are taken out from their natural habitat and placed in special setting where they can be protected and given special care.

- Zoological parks, botanical gardens and wildlife safari parks serve this purpose.
- There are many animals that have become extinct in the wild but continue to be maintained in zoological parks.
- In recent years ex situ conservation has advanced beyond keeping threatened species in enclosures.
- Now gametes of threatened species can be preserved in viable and fertile condition for long periods using cryopreservation techniques, eggs can be fertilized in vitro, and plants can be propagated using tissue culture methods.
- Seeds of different genetic strains of commercially important plants can be kept for long periods in seed banks.
- Biodiversity knows no political boundaries and its conservation is therefore a collective responsibility of all nations.
- The historic Convention on Biological Diversity ('The Earth Summit') held in Rio de Janeiro in 1992, called upon all nations to take appropriate measures for conservation of biodiversity and sustainable utilisation of its benefits.
- In a follow-up, the World Summit on Sustainable Development held in 2002 in Johannesburg, South Africa, 190 countries pledged their commitment to achieve by 2010, a significant reduction in the current rate of biodiversity loss at global, regional and local levels.