PROTECTION, UPLIFTMENT, AND MANAGEMENT OF BIODIVERSITY

MAMTA SHARMA* | ASSOCIATE PROFESSOR (ZOOLOGY), RAJ RISHI GOVERNMENT (AUTONOMOUS) COLLEGE, ALWAR, RAJASTHAN 301001, INDIA.

ABSTRACT:

-

KEYWORDS:

-

INTRODUCTION:

Biodiversity is something that surrounds us all. It is the variety of life on earth that relies on other organisms and the physical environment. Today, scientists study biodiversity and how organisms interact with their environment to gain an understanding of life evolves. The word biodiversity is derived from the phrase biological diversity. It refers to the variability among living organisms - within species, between species and within ecosystems. Scientists only started using the term at the start of the 20th century.

Biodiversity refers to the variety of living organisms in a particular habitat and Environment refers to an area and the conditions in which an organism lives and Conservation is the protection of biodiversity for sustainable utilization.Often the words 'environment', 'ecosystem' and 'surroundings' are used interchangeably; however, they are slightly different.

Ecosystem: An ecosystem (or ecological system) consists of all the organisms and the physical environment, including abiotic and biotic conditions with which they interact.

Surroundings: Surroundings refer to what surrounds a population.

TABLE -1: DIFFERENCE BETWEEN ENVIRONMENT AND ECOSYSTEM

Environment	Ecosystem
The surroundings where organisms live.	The community where the biotic and abiotic components interact with each other.
The environment changes as an organism moves from one place to another.	Dependent on essential life processes such as photosynthesis.
Just a place in time.	Provides interaction between the elements
Physical components.	Physical and biological components.
Can be macro or micro.	Can be aquatic or terrestrial.
It provides the condition to live.	It provides the relationship between components in which organisms live.

Biotic: Living elements of an ecosystem, such as plants and animals.

Abiotic: Non-living elements of an ecosystem, such as climate, temperature, water, and soil type.

There are different levels of biodiversity (species and ecosystem diversity). These are detailed below.

The Miscellany-Species Diversity:

Species biodiversity refers to the number of different species within an ecosystem as well as the relative abundance of each one of those species. There are two

types of species diversity: within a species and between species. **Intraspecies diversity** refers to diversity among individuals in the same species and **interspecies diversity** refers to diversity between different species.

Intra = within the same species

Inter = between different species

Ecosystem diversity

Our planet has many different ecosystems within it all of which have different species and habitats. For example, there are forests, mountains, deserts, etc. The variation and diversity among them are known as ecosystem biodiversity. An ecosystem consists of all the organisms and the physicalenvironment, including abiotic and biotic conditions with which they interact.

Interaction of ecosystems

All ecosystems are interconnected and this interaction can occur between organisms and themselves as well as between organisms and their environment. Biodiversity is also important because ecosystems interact with each other. Living organisms regulate:

Atmospheric composition

Until around 2.4 billion years ago, there was no oxygen in theatmosphere. The abundance of life on earth is due to a drastic increase in oxygen levels. The main reason for higher oxygen levels is the fact that plants use carbon dioxide from the atmosphere and then release oxygen.

Biogeochemical cycles

Biogeochemical cycles are the way in which elements are used and recycled in the biosphere.

Interspecies relationships

Some organisms provide a service to other organisms while others are negatively affected by other organisms.

Soil maintenance

Soil nutrient content is maintained by processes such as nitrogen fixation and vegetation cover help to prevent the erosion of soil.

Genetic diversity

Genetic diversity is the total variety of genes in a species and how they are expressed. Biodiversity maintains the stability of ecosystems. Each species is of value to the ecosystem and different species depend on each other. Every organism has a role to play. If one species disappears then the environment and food chains for all other species can change. Biodiversity is also important for humans who use ecosystems as resources for foods, medicines, and tourism.

Threats to biodiversity:

Most of the threats to biodiversity stem from human activity.

TABLE 2: THREATS TO BIODIVERSITY.

Threat	Reason
Farming and Agriculture	Results in habitat loss of a variety of species as the land is changed to accommodate for farming and agriculture.
Development	Residential and commercial developments threaten the species that interact with and live in the area being used.
Habitat Destruction	Habitat destruction = biodiversity destruction. This is because when the place that an organism lives is destroyed, it can no longer survive in that environment as it is not adapted to living and breeding in those conditions. This means that there are less species and therefore less biodiversity in the ecosystem. The main causes of this are human activities, deforestation, global warming, and overpopulation.
Climate change and natural disasters	Disasters such as tsunamis, earthquakes, landslides, avalanches etc can totally wipe out the biodiversity of a region. Climate change is causing an increase in these events.
Transportation	Building the infrastructure for transportation can separate populations leading to speciation and destroying habitats. Moreover, the pollution caused by transportation leads to climate change which is leading to the destruction of habitats.
Pollution	Untreated sewage, fertilisers and pesticides, industrial chemicals, soil erosion, waste, acid rain, and vehicle emissions all pollute the environment.
Hunting	Excessive hunting for meat and leather destroys biodiversity as it eliminates species from ecosystems.

Pesticide pollution another threat coming up

The challenge for producing more food for the ever-increasing population of the globe by proper management of crop posts and control of vector borne diseases necessitated the application of more pesticides. The pesticides are poisons of course, or they would not be useful in the control of insects, rodents, and other undesirable animals and plants. In other words, pesticide research is a continuous process for all of us striving for better living and better future. The historical development and projected future underscores identification and isolation of newer molecules and formulations. The economy of our country is related to the quality and quantity of its agricultural production. The more widely used of the modern synthetic insecticides are the

chlorinated hydrocarbons, organic phosphorous and carbamate groups of compounds. Although, there is considerable overlapping in toxicity between these groups, on average, the acute toxicity of the organic phosphorous groups is somewhat greater than that of the chlorinated hydrocarbon compounds. However, the chlorinated hydrocarbon compounds, due to their greater stability, are considerably more of a residue problem than are the other materials. It is therefore ironic that organochlorine compounds have possibly been the target of more emotional criticism as well as learned controversy than almost any other biological discovery. Some are notoriously persistent in the environment and so can be a real hazard to wildlife and many believe, a potential hazard to man. In addition, their use has led to the indiscriminate killing of beneficial as well as harmful insects and, increasingly, to the development of insect resistance. The latter reason, in itself, is sufficient justification for the current policy of using organochlorine compounds for specific purposes rather than as general all-purpose insecticides. This aspect of environmental contamination by the pesticides has been reported by Sharma .M in the year 2021 that organochlorine pesticides (OCPs) were found in the drinking water samples and milk samples from Bikaner city of Rajasthan, India, and it was found that mostly all samples have OCPs residues and many of them are statistically significant $P< .05$ and $P< .01$ (Sharma, M. 2021a).). In another report Mamta Sharma and her colleagues in the year 2023 and 2024 reported Organohalogens in the drinking water and the cattle milk fromAlwar, NCR of Delhi, India {Sharma et al., (2023)} & Sharma et al., (2024a). In this monitoring study, they reported the total amount of OCPs in cattle milk is 3.178 ppb and 1.398 ppb in water. This shows that how these xenobiotics have contaminated our Mother Nature and now faunal diversity is facing danger of existence and house sparrow is not staying away from this potential danger. It can be concluded that the magnitude of pollution is quantitatively enough to contaminate the food and environment and reaching out to all faunal diversity.It can be concluded that the magnitude of pollution is quantitatively enough to contaminate the food and environment and the pesticides reach the human body through various sources mainly by absorption form the gastrointestinal tract through contaminated food chain, are circulated in blood, stored milk and secreted during lactation resulting in sufficient neonatal intake. The battle against the harmful insects would be much less costly and more efficient, and the problem of contamination of the environment by toxic materials would be vastly reduced, if insect activities are controlled by natural means. The use of pest-specific predators; parasites or pathogens; sterilization of insects with the help of radiations; trapping insects using insect attractants like pheromones; use of juvenile hormones or hormone inhibitors may therefore be suggested as alternate ways of pest control {(Sharma, M. 1996; Sharma, M., & Bhatnagar, P. (1996a); Sharma, M., & Bhatnagar, P. (1996b); Sharma, M. & Bhatnagar, P. (2017); Sharma, M. (2018a); Sharma, M. (2018b); Sharma, M. (2018c); Sharma, M. (2019a); Sharma, M. (2019b); Sharma, M. (2021b); Sharma, M. (2021c) & Sharma, M. (2021d).}

Environment and Biodiversity Conservation:

Scientists have developed many ways to conserve biodiversity and stop its decline. Here are some of them.

Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act):

The Environment Protection and Biodiversity Conservation Act 1999 (the EPBC Act) commenced on the 16th of July 2000. It is a major piece of environmental legislation in Australia and provides the legal means to protect areas of national environmental significance.

The Wildlife and Countryside Act 1981:

This is the primary legislation, which protects animals, plants and habitats in the UK.

The act contains four parts, which cover:

Part 1: Wildlife

Part 2: Nature conservation, the countryside and National Parks.

Part 3: Public rights of way.

Part 4: Miscellaneous provisions of the act.

The IUCN - International Union for Conservation of Nature

The IUCN helps to identify species that should be prioritised for conservation. Its specific roles are to coordinate label data on biodiversity conservation to increase understanding and deploy nature-based solutions.

It categorises organisms as:

- extinct (EX)
- extinct in the wild (EW)
- critically endangered (CR)
- endangered (EN),
- vulnerable (VU)
- near threatened (NT)
- least concern (LC)

Specific characteristics that may identify a species as one that should be prioritised include:

- Flagship species
- Keystone species
- Endemic species
- High level of threat to habitat
- Dispersed population
- Evolutionary distinct species

The roles of the IUCN:

- Coordinating global data on biodiversity

conservation

- Increasing understanding of the importance of biodiversity
- Deploying nature-based solutions to global challenges in climate, food and sustainable
- development.

EDGE species (Evolutionary Distinct and Globally Endangered) - species threatened by extinction and diverged from other taxa long ago so they have greater genetic differences.

Endemic species - Species found within a single area, especially if the population is small.

Keystone species - Species whose survival is important for the survival of many other species.

Flagship species - A flagship species is a species from the plant or animal kingdom that is used to represent a certain environmental issue or cause. Eg. polar bears used to raise awareness of global warming.

Some environmental stewardship scheme examples include:

- Beetle banks (a strip planted within a crop field, that provides habitats for species that prey on pests).
- Buffer strips (reduce water pollution)
- Field margins (allow nesting).

So, Biodiversity conservation refers to the protection, upliftment, and management of biodiversity in order to derive sustainable benefits for present and future generations.

Biodiversity conservation has three main objectives:

i) To preserve the diversity of species.

ii) Sustainable utilization of species and ecosystem.

iii) To maintain life-supporting systems and essential ecological processes.

It can be conserved in the following ways:

- In-situ Conservation
- Ex-situ Conservation
- In-situ Conservation

In-situ conservation of biodiversity is the conservation of species within their natural habitat. In this method, the natural ecosystem is maintained and protected.

The in-situ conservation has several advantages. Following are the important advantages of in-situ conservation:

1. It is a cost-effective and convenient method of conserving biodiversity.
2. A large number of living organisms can be conserved simultaneously.
3. Since the organisms are in a natural ecosystem, they can evolve better and can easily adjust to

different environmental conditions.

Certain protected areas where in-situ conservation takes place include national parks, wildlife sanctuaries and biosphere reserves.

National Parks

These are small reserves maintained by the government. Its boundaries are well demarcated and human activities such as grazing, forestry, habitat and cultivation are prohibited. For eg., Kanha National Park, and Bandipur National Park.

Wildlife Sanctuaries

These are the regions where only wild animals are found. Human activities such as timber harvesting, cultivation, collection of woods and other forest products are allowed here as long as they do not interfere with the conservation project. Also, tourists visit these places for recreation.

Biosphere Reserves

Biosphere reserves are multi-purpose protected areas where the wildlife, traditional lifestyle of the inhabitants and domesticated plants and animals are protected. Tourist and research activities are permitted here.

Ex-situ Conservation

Ex-situ conservation of biodiversity involves the breeding and maintenance of endangered species in artificial ecosystems such as zoos, nurseries, botanical gardens, gene banks, etc. There is less competition for food, water and space among the organisms.

Ex-situ conservation has the following advantages:

1. The animals are provided with a longer time and breeding activity.
2. The species bred in captivity can be reintroduced in the wild.
3. Genetic techniques can be used for the preservation of endangered species.

Strategies for Biodiversity Conservation

Following are the important strategies for biodiversity conservation:

1. All the varieties of food, timber plants, livestock, microbes and agricultural animals should be conserved.
2. All the economically important organisms should be identified and conserved.
3. Unique ecosystems should be preserved first.
4. The resources should be utilized efficiently.
5. Poaching and hunting of wild animals should be prevented.
6. The reserves and protected areas should be developed carefully.
7. The levels of pollutants should be reduced in the environment.

8. Deforestation should be strictly prohibited.

9. Environmental laws should be followed strictly.

10. The useful and endangered species of plants and animals should be conserved in their nature as well as artificial habitats.

11. Public awareness should be created regarding biodiversity conservation and its importance.

It is believed that an area with higher species abundance has a more stable environment compared to an area with lower species abundance. The necessity of biodiversity could be claim by considering our degree of dependency on the environment and depend directly on various species of plants for our various needs. Similarly, depending on various species of animals and microbes for different reasons.

Biodiversity is being lost due to the loss of habitat, over-exploitation of resources, climatic changes, pollution, invasive exotic species, diseases, hunting, etc. Since it provides us with several economic and ethical benefits and adds aesthetic value, it is very important to conserve biodiversity.

Biodiversity can be conserved by:

i) Preventing the cutting of trees.

ii) Putting a ban on hunting of animals.

iii) Efficient utilisation of natural resources.

iv) Protected areas should be developed for animals where no human activities are allowed.

Biodiversity conservation is important because biodiversity provides certain services and resources that are essential for life on earth. Biodiversity also provides social benefits.

BIODIVERSITY AND ENVIRONMENT CONSERVATION MAP
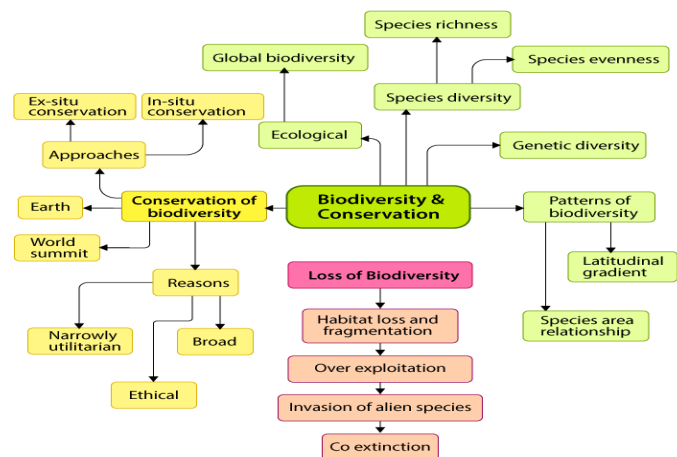
REFERENCES

1. Sharma, M. (2021 a). Pesticide Residues in Drinking Water and Cattle Milk. High Time to find an alternative to Chlorinated Hydrocarbons" in a journal of Innovative Research in Clinical and Medical Sciences (JIRCMS), Vol-5, Issue-1, 1-6.

2. Sharma, M., Mehra. M & Chhangani, A. K (2023). Organochlorine Pesticides in Drinking Water from Alwar, NCR of Delhi, India, Ajasra Vol. 12, Issue No. 4, December 2023

3. Sharma, M., Mehra. M & Chhangani, A. K (2024). Organochlorine Pesticides in the Cattle Milk from Alwar, NCR of Delhi, India International Journal of Engineering & Scientific Research Vol.12 Issue 01, January 2024 ,12-32.

4. Sharma. M. (1996). Transplacental movement of pesticides in women from Jaipur. Ph.D. thesis submitted to department of Zoology, University of Rajasthan, Jaipur, Rajasthan, India.

5. Sharma. M & Bhatnagar. P. (1996a). Effect of persistent Pesticide Pollutants on the Health of Women, & Neonates, research article for a book on Toxicology entitled "Health Hazards, Gender & Society" Edited by Indu Mathur & Sanjay Sharma by Rawat Publishers, Jaipur, India, 1996.

6. Sharma, M., & Bhatnagar, P. (1996b). Organochlorine pesticides and preterm labour in human beings. Current Science, Vol. 71, No. 8, pp. 628-631.

7. Sharma, M. & Bhatnagar, P. (2017). Pesticide burden in women from Jaipur in relation to ethnicity, religion and addiction habit. International Journal of Environmental Science and Development, Vol. 8, No. 3, 216-220.

8. Sharma, M. (2018a): Organochlorine Pesticides in Mothers Blood: Threat to Future Generations. ESSENCE Int. J. Env. Rehab. Conserv. IX (2): 143 — 153.

9. Sharma, M. (2018b). Presence of organochlorine pesticides in Breast Milk, Maternal Blood and Cord Blood (CB). An Alarming Situation.International Journal of Engineering, Science and Mathematics Vol. 7 Issue 10, October 2018.

10. Sharma, M. (2018c). Organochlorine Pesticides in Human Milk. A Follow Up Study. International Journal of Engineering, Science and Mathematics, Vol. 7 Issue 7, July 2018.

11. Sharma, M. (2019a). A preliminary report of organochlorine pesticides (OCPs) in the human milk samples of preterm and full-term cases.International Journal of Engineering & Scientific Research Vol. 7 Issue 7, July 2019.

12. Sharma, M. (2019b). Transplacental Movement of Organochlorine Pesticides: Future Generations are being Jeopardized. International Journal of Engineering, Science and Mathematics Vol. 6 Issue 8, December 2017.

13. Sharma, M. (2021b) Organochlorine Pesticides in Cord Blood: A Threat to the Safety of Prenates. Journal of Innovative Research in Clinical & Medical Sciences. Vol.4, (4), 6-16.

14. Sharma, M. (2021c) Organochlorine Pesticides in Human Placenta: A Threat for Prenates. Journal of Innovative Research in Clinical & Medical Sciences. Vol.05, (2) ,1-11.

15. Sharma, M. (2021d). Organochlorine Pesticides in Human Milk: A Source of toxicants for Neonates,

research article for a book on science and technology entitled "Emerging Trends in Science and Technology" Edited by Dr. M.K. Kumawat & Dr. N. Singh. IISN No-978-81-951982-2-1 by Bhumi Publishing, Nigave Khalasa, Kolhapur 416207, Maharashtra, India, 2021.