

TOPIC:*Ex situ* Conservation

SUBJECT: BOTANY

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NAME OF THE TEACHER: Dr. INDRANI TRIVEDI,

ASSISTANT PROFESSOR,

(Guest Faculty)

DEPARTMENT OF BOTANY

COLLEGE/UNIVERSITY: PATNA SCIENCE COLLEGE,

PATNA UNIVERSITY

EMAIL ID: indranitrivedi1987@gmail.com

Ex situ Conservation

Biodiversity is the richness of organisms. It mainly refers to the variety and variability of life existing on the planet Earth. The term biodiversity usually refers to the process of measuring the variation at the genetic, species, and ecosystem level. Biodiversity plays a vital role in boosting the ecosystem. The factors responsible for the cause of changes in biodiversity are:

- Increase in population
- Habitat loss
- Pollution
- Invasive species
- Over exploitation
- Change in the climatic conditions

We all need to conserve biodiversity, as it leads to the conservation of essential ecological diversity to preserve the continuity of food chains. Biodiversity can be conserved in two main ways, **in situ conservation** and **ex situ conservation**.

Ex situ conservation is off site conservation which includes conservation of samples genetic diversity(particularly endangered species) away from their field habitats. It is the chief mode or preservation of genetic resources which may include both cultivated and wild material.

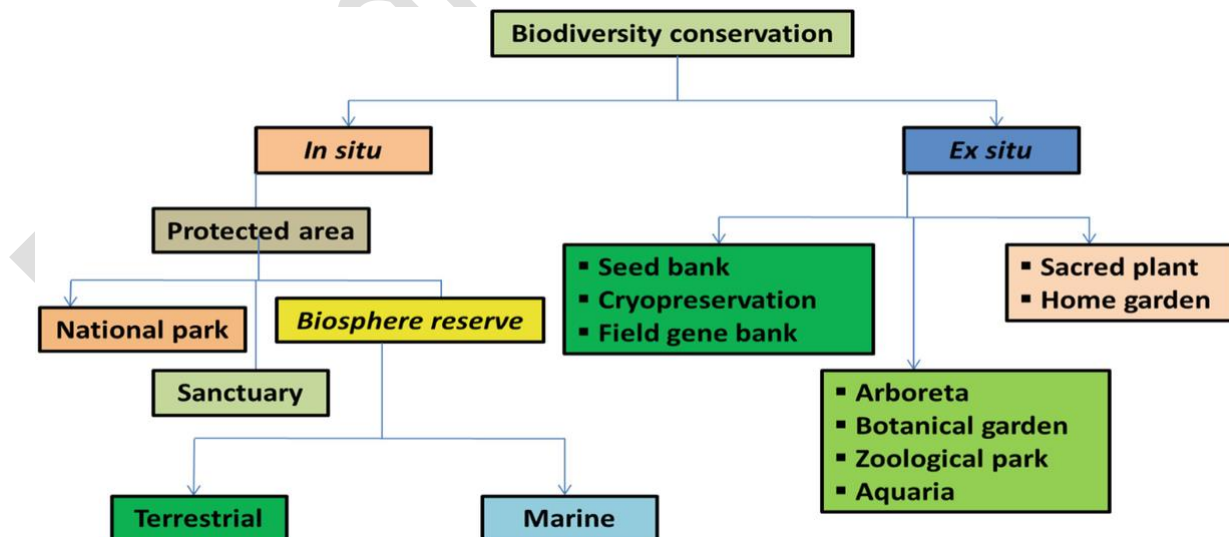


Figure: Biodiversity conservation methods

Ex situ Conservation strategies:

Ex situ conservation is the preservation of components of biological diversity outside their natural habitats. This involves conservation of genetic resources, as well as wild and cultivated species. The strategies include establishment of botanical gardens, zoos, conservation strands and gene, pollen, seed, seedling, tissue culture and DNA banks. This requires knowledge of the genetic structure of population sampling techniques, methods of regeneration and maintenance of varietal gene pools particularly in cross pollinated plants.

Seed gene bank:

A seed bank is the collection of seeds stored in a viable state. Here seeds are kept under controlled temperature and humidity for storage and this is efficient way to store the germplasm of plants at low temperature. Seeds preserved under controlled conditions (minus temperature) remain viable for long durations of time without substantial loss of vitality and without much genetic changes.

Gene bank:

It is not a new concept , but simply long term storage of seeds at sub freezing temperatures as gene bank. To preserve the diverse genetic resources, particularly of threatened species and those of seeds of which are not viable for longer periods, gene banking is one of the suitable methods for conservation.

Pollen and Spore bank:

Preservation of pollen and spores is of significant value for conservation of biodiversity of important flowering and spore bearing plants. Pollen banks are used to store pollen grains for a short as well as very long period of time in a viable conditions.

Cryopreservation:

This is the newest application of technology for preservation of cells, tissues, embryos, extracellular matrix, organs, or any other biological constructs by cooling to very low temperature.. This type of conservation is done at very low temperature (196°C) in liquid nitrogen. The metabolic activities of biological material are preserved under low temperature, which are later used for research purposes.

Tissue culture bank:

Cryopreservation of disease free meristems is very helpful. Long term culture of excised roots and shoots are maintained. Meristem culture is very popular in plant propagation as it's a virus and disease free method of multiplication.

Botanical gardens:

It is already in practice. There are more than 1500 botanical gardens. Botanical gardens are institutions holding documented collections of living plants for the purposes of scientific research, conservation, display and education. It is a place where flowers, fruits and vegetables are grown. The botanical gardens provide beauty and calm environment. Most of them have started keeping exotic plants for educational and research purposes.

Zoological Gardens:

There are more than 800 professionally managed zoos around the world with about 3000 species of mammals, birds, reptiles and amphibians. In various zoos wild animals are maintained in captivity and wild animals (rare, endangered species) are conserved. The oldest zoo, the Schonbrunn zoo which exists today also, was established in Vienna in 1759. Some zoos have undertaken captive breeding programmes.

Biodiversity conservation through biotechnology:

Biotechnology involves the use of all life forms for human welfare. Several biotechnological tools are now available to tackle various specific problems and to enhance the potentials of grass covers such as feeding value, propagation and persistence.

Additional germplasm library facilities:

- National facility for microbial type culture collection at Institute of Microbial Technology, Chandigarh.
- National facility on blue green algal collection at Indian Agricultural Research Institute.
- National facility for marine Cyanobacteria. This is at Bhartidasan University, Tiruchirapalli.
- National facility for plant tissue cultures repository at National Bureau of Plant Genetic Resources, New Delhi.
- National facility for laboratory animals at Central Drug Research Institute, Lucknow and National Institute of Nutrition, Hyderabad.
- National facility for Animal Tissue and Cell Culture, Pune.

Applications of ex situ conservation:

1. It is useful for declining population of species.
2. Endangered animals on the verge of extinction are successfully bred.
3. Threatened species are bred in captivity and then released in their natural habitats.
4. It is extremely useful for conducting research and scientific work on different species.
5. Germplasm conservation using cell, tissue and organ culture has been reported in 60 species including various crops. From the information available, conservation is possible in both monocot and dicot families.
6. In biotechnology laboratories, freeze preservation and storage of plant material can be of enormous value in maintenance of stock cultures and samples that await screening for future use.

7. Maintenance of material in an environment free of pest or pathogens.

References:

- <http://www.yourarticlelibrary.com/biodiversity/conservations-of-biodiversity-in-situ-conservation-and-ex-situ-conservation/30144>
- <https://espacepurlavie.ca/en/botanical-gardens-and-conservation>

Dr. Indrani Trivedi