

**MSC-2**

**Paper-XIII**

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## **Topic-1.**

### **Importance of in situ and ex situ conservation**

Nature with its rich resource has showered this planet with variety of living beings which is called as Biodiversity. Biological diversity' means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems. To manage such a huge number and types of Bio diversities it was essential to design a suitable platform with a common perspective, plan and motto. There was an urgent need to conserve the Biodiversity which was gradually replenishing. Conservation of biological diversity and sustainable use of its components came into the limelight in 1972 (United Nations Conference on Human Environment; Stockholm). In 1973, UNEP identified conservation of biodiversity as a priority area, hence there was need to get the legal mandate for conservation of world resources. There were negotiations for a legally binding instrument to address biological diversity and its loss to enhance fairness and equity in sharing of the benefits of biodiversity; this led to the opening of the Convention on Biological Diversity in 1992; Rio de Janeiro under the United Nations Conference on Environment and Development (UNCED)/ Earth Summit. The convention was inspired by the growing concern all over the world for sustainable development. The convention objectives were:

- Conservation of the biological diversity;
- Sustainable use of its components;
- A fair and equitable sharing of its benefits.

This was the first global comprehensive agreement that addressed all the aspects of biological diversity; genetic resources, species diversity and ecosystem diversity.

Edward Wilson coined this term for the first time. Conservation of biodiversity can be studied in different segments. They are:

**Genetic diversity Species diversity**

**Ecological/Ecosystem diversity**

This incorporates the preservation, maintenance, sustainable use (conservation), recovery and enhancement of the components of biological diversity.

**Sustainable development**

This refers to development that meets the needs of the current generation without compromising the ability of future generations to meet their needs; it simply refers to intra

and intergenerational equity. A balance between the environment, development and society results to sustainable development which ensures biodiversity conservation. This is only possible in the presence of good enforced and implemented policies/ conventions, environmental institutions and political stability among others conservation measures of biodiversity

**Types of Conservation:**

Conservation can broadly be divided into two types:

1. In-situ conservation
2. Ex-situ conservation

**1. In-situ conservation**

In-situ conservation is on site conservation or the conservation of genetic resources in natural populations of plant or animal species, such as forest genetic resources in natural populations of tree species. It is the process of protecting an endangered plant or animal species in its natural habitat, either by protecting or cleaning up the habitat itself, or by defending the species from predators. It is applied to conservation of agricultural biodiversity in agro forestry by farmers, especially those using unconventional farming practices. In-situ conservation is being done by declaring area as protected area. This also refers to conservation of ecosystems and natural habitats including maintenance and recovery of viable populations of species in their natural habitats.

In order to conserve Biodiversity as In situ conservation various measures have been undertaken. This constitutes:

- a) Development of Protected areas as National Park. Wild life sanctuaries and Biosphere reserve
- b) Sacred forests and reserves

INDIA has over 600 protected areas, which includes over 90 national parks, over 500 animal sanctuaries and 15 biosphere reserves.

**1. National Parks:**

A national park is an area which is strictly reserved for the betterment of the wildlife and where activities like forestry, grazing on cultivation are not permitted. In these parks, even private ownership rights are not allowed. Corbett National Park, Uttarakhand

**2. Wildlife Sanctuaries:**

**A sanctuary is a protected area which is reserved for the conservation of only animals  
Ghana Bird Sanctuary. Rajasthan**

**3. Biosphere Reserves:**

**It is a special category of protected areas where human population also forms a part of the system. Nanda Devi, Uttarakhand.**

**2. Ex-situ conservation**

**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 or species, and draws on a diverse body of techniques and facilities. Such strategies**

**include establishment of botanical gardens, zoos, conservation strands and gene, pollen seed, seedling, tissue culture and DNA banks. This also refers to conservation of components of biodiversity outside their natural habitats, e.g. zoos, museums, gene banks, botanic gardens/arboretums; Used for threatened and endangered species to avoid their extinction; also known as captive conservation. This also includes development of Tissue culture lab and Lab for cryoconservation of germplasm.**

**1. Seed gene bank:**

**These are cold storages where seeds are kept under controlled temperature and humidity for storage and this is easiest way to store the germ plasma of plants at low temperature.**

**2. Gene bank:**

**Genetic variability also is preserved by gene bank under normal growing conditions. These are cold storages where germ plam are kept under controlled temperature and humidity for storage; this is an important way of preserving the genetic resources.**

**3. Cryopreservation:**

**. This type of conservation is done at very low temperature (196°C) in liquid nitrogen.**

**4. Tissue culture bank:**

**Cryopreservation is a method where organelles, tissues, organs susceptible for damage are preserved by cooling at very low temperature. 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.**

**5. Long term captive breeding:**

**The method involves capture, maintenance and captive breeding on long term basis of individuals of the endangered species which have lost their habitat permanently or certain highly unfavorable conditions are present in their habitat.**

## **6.. Botanical gardens:**

**A botanical garden 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.**

## **7. Zoological Gardens:**

**In zoos wild animals are maintained in captivity and conservation of wild animals (rare, endangered species) takes place. In India, the 1st zoo came into existence at BARRACKPORE in 1800. In world there are about 800 zoos. Such zoos have about 3000 species of vertebrates. Some zoos have undertaken captive breeding programmes.**

### **Advantages of in-situ conservation and Ex –situ conservation**

**The flora and fauna live in natural habitats without human interference. In-situ conservation provides the required green cover and its associated benefits to our environment. It is less**

**expensive and easy to manage. Ex-situ conservation is useful for declining population of species. Endangered animals on the verge of extinction are successfully breded. Threatened species are breded in captivity and then released in the natural habitats. Ex-situ centers offer the possibilities of observing wild animals, which is otherwise not possible.. It is extremely useful for conducting research and scientific work on different species.**

## Topic-2

### Fiber yielding plant

flax (*Linum usitatissimum*)

1 Botanical Name: *Linum usitatissimum* L. Family: Linaceae

. This valuable fiber plant is much superior to cotton in quality, and provides a finer fabric. In India, it is grown in U.P., M.P., Bihar, Rajasthan and Maharashtra as an oilseed crop. Fibers of flax are obtained from its stem. Fibers are remarkable for their great tensile strength, length of staple, fineness and durability. They are used in the manufacture of linen cloth, canvas, carpets, threads, strong twine, cigarette paper, finest writing paper, etc.

2 Botanical name hemp (*Cannabis sativa*) Family: Cannabinaceae

It is an annual plant with grooved stem and palmately divided leaves. Plants are dioecious, and yield three products namely bast fibre from its stem, oil from its seeds, and narcotics (Bhaang, Charas and Ganja) from its leaves and flowers. The fibre is long, strong and durable but lacks flexibility and elasticity, and is used for the manufacture of ropes, twine, carpets, bags, nets, etc. Finer fibres are produced from male plants, while its female plants produce coarse fibres.

3 jute (*Corchorus* species) tossa jute (*C. olitorius*) white jute (*C. capsularis*) Botanical Name: *Corchorus capsularis*, *C. olitorius*.

Family: Tiliaceae.

It is a chief fibre-yielding annual shrub. Fibres are obtained from the stem of two species, i.e.,

*C. capsularis* and *C. olitorius*. It is a bast fibre, obtained from the secondary phloem by the process of retting. Jute is cultivated in West Bengal, Assam, Orissa, Bihar and U.P. Jute fibre is used in making carpets, coarse material, twine, gunny bags, paper and many similar articles. Jute forms the base of linoleum and wool carpet industry. High quality grease-proof paper is prepared from the fibres of jute sticks. It is used commonly in confectionery industry for wrapping greasy materials. Besides India, Bangladesh is also a chief jute-producing country of the world.

4. Cotton:

Botanical Names:

**Family: Malvaceae. Gossypium sp. (G. arboreum, G. barbadense, G. herbaceum and G. hirsutum).**

**It is the chief fibre plant which supplies more than 70% of the world consumption of fibres. Fibres occur on the seeds in the form of flattened, twisted and tubular hairs. Raw cotton consists of cellulose (94%), protein (1.3%), pectic substances (0.9% to 1.2%), water (0.6%),**

**sugar (0.3%) and some pigment traces. Chief use of the cotton is in the textile industry. Other uses include stuffing of pillows, cushions, and also in rubber tyre fabrics. Short fibres, called linters or fuzz, are used for superior acetates and viscose rayons, cellulose ethers and esters, and nitrocellulose lacquers.**

### Topic-3

#### Oil yielding plant

##### 1. Castor Seed or Castor Bean (Hindi – Arandi)

**Botanical Name:** *Ricinus communis* L. **Family:** Euphorbiaceae

1. These are the seeds of *Ricinus communis*, a member of family Euphorbiaceae.
2. Plant is a tall shrub with large rounded, partly lobed leaves and big terminal branches of flowers.
3. Seeds are oblong with crustaceous seed coat .
4. Oil obtained from seeds, called castor oil, is used as a purgative.
5. Castor oil is also used in making contraceptive jellies, washing powders and creams.
6. Because of a very low freezing point, castor oil ideally suits for the lubrication of aeroplane engines.
7. The oil is also used for transparent soaps, typewriter-inks, paints and varnishes.
8. It is also used for preparation of hair oils, hair fixers, hair lotions, lipsticks and aromatic perfumes.

##### 2. Yellow Sarson or Indian Colza (Hindi – Sarson)

**Botanical Name:** *Brassica campestris* var. *sarson* (Now *Brassica napus* L. var. *glauca* (Roxb.) Schulz.)

**Family:** Cruciferae or Brassicaceae.

1. It is the most common edible, oil-yielding plant.
2. Oil is obtained from the seeds.
3. Oil is widely used for cooking.
4. Oil is also used in lamps, in the manufacture of soap and rubber substitutes.
5. Oil cake is used as a cattle feed.

##### 3. Sesame or Gingelly Oil (Hindi – Til) **Botanical Name:** *Sesamum indicum* L. **Family:** Pedaliaceae

1. The seeds of this herb yield an edible oil used in confectionery and for making margarine, soaps, cosmetics, insecticides, perfumes and several medicines.
2. Seeds are used as topping the bread and rolls and in religious ceremonies by Hindus.



3. Oil cake is a good cattle feed.

4. India, China, Sudan, Myanmar, Pakistan and Mexico are the major sesame oil-producing countries. In India, it is grown in U.P., M.P., Rajasthan, Gujarat, Orissa, Maharashtra, Andhra Pradesh and Tamil Nadu.

#### 4. Eucalyptus Oil

Botanical Names: *Eucalyptus citridora* Hook., *E. globulus* Labill, *E. rostrata* Schlecht. Family: Myrtaceae

1. Essential oil obtained from the leaves of these and several other species of *Eucalyptus* is used in perfumery.
2. The oil is also a source of citronellal used for manufacture of citronellol and menthol.
3. The eucalyptus oil is also used in several germicides and disinfectants.
4. The oil from the leaves and terminal branchlets of *E. globulus* is used as mosquito repellent.
5. In cinema halls, eucalyptus oil is used as an ingredient of deodorizing and asepticizing compositions.
6. Oil is also used in curing bronchitis and asthma.

7 Extensive plantations of *E. citridora* has been undertaken during last few decades in U.P., Haryana, Punjab and Andhra Pradesh. *E. globulus* is cultivated mainly at hill stations of India. Large scale plantations of *E. rostrata* have recently been made in U.P., M.P. and Karnataka.

5. Peppermint (Hindi – Vilaiti Pudina) Botanical Name: *Mentha piperita* Family: Labiatae or Lamiaceae

1. The oil obtained from the leaves is widely used in perfumes and various types of soaps.
2. Medicinally the oil is used as carminative, stimulant and for treating nausea and vomiting.
3. Oil is also used widely in rheumatic pains, cough syrups, mouth washes and inhalations.
4. Several headache ointments are also prepared from peppermint.
5. It is widely cultivated in Punjab, Maharashtra and Kashmir.

## **Topic-4**

### **Botanical gardens in India**

**Botanical Survey of India is responsible to survey the plant resources of country, Some of the recognised Botanical gardens of India are listed below**

#### **1 Indian Botanic Garden, Kolkata**

**Acharya Jagadish Chandra Bose Indian Botanic Garden is the largest botanical gardens in India. The Indian Botanic Garden has enormous collections of orchids, bamboos, palms and The Great Banyan Tree.**

#### **2 Botanical Garden, Saharanpur**

**Botanical Garden of Saharanpur in Uttar Pradesh is also known as the Company Garden and one of the oldest existing gardens in India.**

#### **3. Lalbagh Botanical Garden, Bangalore**

**Lalbagh Botanical Garden is the most famous botanical garden in India, located in southern Bengaluru. Lalbagh Garden houses India's largest collection of tropical plants and main tourist attractions in Bangalore.**

#### **4. Government Botanical Gardens, Ooty**

**Government Botanical Gardens Udthagamandalam is home to thousand species of exotic and indigenous plants. The Gardens also host flower show and has a nurseries, public conservatory, an Italian garden and fountain terrace.**

#### **5, Tropical Botanic Garden, Trivandrum**

**Tropical Botanic Garden and Research Institute in Trivandrum was established by the Government of Kerala. The garden also engaged in garden planning and research.**

#### **6. Lloyd Botanic Garden, Darjeeling**

**Lloyd Botanic Garden or Darjeeling Botanical Garden preserves several species of rhododendron, bamboo and oak. Darjeeling Botanical Garden along with Himalayan Zoological Park are two major tourist attractions of Darjeeling.**

#### **7. Jawaharlal Nehru Botanical Garden, Gangtok**

**Jawaharlal Nehru Botanical Gardens in Gangtok is located close to Rumtek Monastery in Sikkim. The Botanical Garden host flower exhibition and home to rare species of Orchid and Rhododendron.**

#### **8. National Botanic Garden, Lucknow**

The National Botanic Garden inside the National Botanical Research Institute, situated in the heart of Lucknow. The institute is one of the first research institutes in plant sciences in India.

**9. Assam State Botanical Garden, Guwahati**

**Guwahati-zoo**

Assam State Zoo cum Botanical Garden is the largest garden of its kind in North East India. Guwahati Zoo and botanical garden is home to animals, birds and plants.

**10. Semmozhi Poonga Botanical Garden, Chennai**

Semmozhi Poonga Botanical Garden in Chennai was set up by horticulture department Tamil Nadu. The botanical garden is first in the city and houses exotic flora and rare plant species.

**11. Pilikula Botanical Garden, Mangalore**

Pilikula Botanical Garden of Mangalore is home to woody species of plants. Pilikula Nisargadhama park house endemic species of plants from the Western Ghats region.

**12. Reddy Botanical Garden, Hyderabad**

Kotla Vijayabhaskara Reddy Botanical Garden of Hyderabad is located near theHITEC City of Madhapur. The botanical garden is a eco tourist destination in Hyderabad and home to list of varieties of bamboo trees.

**13. Botanical Garden, Chandigarh**

Chandigarh Botanical Garden is located between Rock Garden and Sukhna Lake, in the foothills of Shivalik. The garden and nature park near the village Sarangpur is spread over 176 acres and established by the Chandigarh Administration.

**14. Waghai Botanical Garden, Saputara**

Waghai Botanical Garden is a thematic garden in Saputara and home to wide range of native and exotic plant samples. Waghai town near the hill station of Saputara is also home to breathtakingly beautiful Gira Waterfalls of Gujarat.

**15. Nehru Memorial Botanical Garden, Srinagar**

Jawaharlal Nehru Memorial Botanical Garden in Srinagar contains many types of plants. The garden is located near to Chashma Shahi Mughal garden and has a rare collection of Kashmiri tropical plants and vegetation.