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SAI RAM
ENGINEERING COLLEGE
INSTITUTE OF TECHNOLOGY
West Tambaram, Chennai - 44

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DIGITAL RESOURCES

YEAR
II

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ENVIRONMENTAL SCIENCE AND ENGINEERING

UNIT NO 1

ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY

**1.5 Conservation of biodiversity: In-situ and ex-situ
conservation of biodiversity.**

Field study of common plants, insects, birds;

**Field study of simple ecosystems – pond, river, hill
slopes, etc.**

SCIENCE & HUMANITIES





CONSERVATION OF BIODIVERSITY

Biodiversity is one of the important tools for sustainable development. The enormous value of biodiversity due to their commercial, medical, genetic, aesthetic and ecological importance emphasizes the need to conserve biodiversity.

Conservation

Conservation is defined as the management of biosphere so that it will yield the greatest sustainable benefit to the present generation while maintaining its potential to meet the needs of future generations.

Factors affecting biodiversity

1. Biodiversity is generally disturbed by human activities such as construction of dams in forest areas, release of industrial wastes, using pesticides and insecticides in the crop fields, urbanisation, etc.,
2. Poaching of wild animals, over exploitation of natural resources, degradation of habitats, affect biodiversity.
3. The marine ecosystems are also disturbed due to oil spills and discharge of effluents.
4. The climatic factors like global warming, ozone depletion, acid rain also affect biodiversity.

Advantages (or) Need of biodiversity conservation

1. It provides immediate benefits to the society such as recreation and tourism.
2. Drugs, herbs, food and other important raw materials can be derived from plants and animals.
3. It also preserves the genetic diversity of plants and animals.
4. Ensures the sustainable utilization of life supporting systems on earth.
5. It leads to conservation of essential ecological diversity and life supporting systems.
6. Since biodiversity loss results in ecological and environmental deterioration, it is essential to conserve biodiversity.

TYPES (OR) STRATEGY OF BIODIVERSITY CONSERVATION

There are two types of biodiversity conservation.

1. In - situ conservation (within habitat)
2. Ex - situ conservation (outside habitat)

In - situ conservation

In - situ conservation involves protection of fauna and flora within its natural habitat, where the species normally occurs is called in - situ conservation.

The natural habitats or ecosystems maintained under in-situ conservation are called “**protected areas**”.

Important In-situ conservation:

Biosphere reserves, National parks, wildlife sanctuaries, Gene sanctuary etc.,

Methods of In-situ conservation

Around 4% of the total geographical area of the country is used for in-situ conservation. The following methods are presently used for in-situ conservation. It is the best method for the long term protection of biodiversity.

In-Situ conservation	Numbers available
Biosphere reserves	7
National parks	80
Wild - life sanctuaries	420
Botanical gardens	120

1. Biosphere Reserves:

Biosphere reserves cover a large area, more than 5000 sq. km. It is used to protect species for a long time.

Some important Biosphere Reserves in India

Name of Biosphere	State
Nanda Devi	U.P
Nokrek	Meghalaya
Manas	Assam
Sunderbans	West Bengal
Gulf of Mannar	Tamil Nadu
Nilgiri	Karnataka, Kerala, Tamil Nadu
Great Nicobars and Similipal	Orissa

Role of biosphere reserves

1. It gives long - term survival to the evolving ecosystem.
2. It protects endangered species.
3. It protects the maximum number of species and communities.
4. It is also useful for educational and research purposes.
5. It remains and functions as an open system and changes in land use are not allowed.

Restriction: No tourism and explosive activities are permitted in the biosphere reserves.

2. National Park

A national park is an area dedicated for the conservation of wildlife along with its environment. It is usually a small reserve covering an area of about 100 to 500 sq. kms. Within the biosphere reserves, one or more national parks also exist.

Some important National parks in India

Name of National Park	State	Important Wildlife
Kaziranga	Assam	One horned Rhino
Gir National Park	Gujarat	Indian Lion
Bandipur	Karnataka	Elephant
Dachigam	J & KJ & K	Hangul
Corbett	U.P	Tiger
Kanha	M.P	Tiger
Periyar	Kerala	Tiger, Elephant
Dudwa	U.P	Tiger
Sariska	Rajasthan	Tiger
Ranthambore	Rajasthan	Tiger

Role of a national park

1. It is used for enjoyment through tourism, without affecting the environment.
2. It is used to protect, propagate and develop the wildlife.

Restrictions

1. Grazing of domestic animals inside the national park is prohibited.
2. All private rights and forestry activities are prohibited within a national park.

3. Wildlife Sanctuaries

A wildlife sanctuary is an area, which is reserved for the conservation of animals only. At present, there are 492 wildlife sanctuaries in our country.

Some Important Wildlife Sanctuaries in India

Name of Sanctuary	State	Major Wild Life
Hazaribagh Sanctuary	Bihar	Tiger, Leopard
Ghana Bird Sanctuary	Rajasthan	300 species of birds
Sultanpur Bird Sanctuary	Haryana	Migratory birds
Abohar Wildlife Sanctuary	Punjab	Black buck
Nal Sarovar Bird Sanctuary	Gujarat	Water birds
Mudumalai Wildlife Sanctuary	Tamil Nadu	Tiger, Elephant, Leopard
Vedanthangal Bird Sanctuary	Tamil Nadu	Water birds
Wild Ass Sanctuary	Gujarat	Wild ass, Wolf, Chinkara
Jaldapara Wildlife Sanctuary	W.Bengal	Rhinoceros, Elephant, Tiger

Role of wildlife Sanctuaries

- It protects animals only.
- It allows the operations such as harvesting of timber, collection of forest products, private ownership rights and forestry operations provided it does not affect the animals adversely.

Restrictions

Killing, hunting, shooting, or capturing of wildlife is prohibited except under the control of higher authority.

4. Gene Sanctuary

A gene sanctuary is an area, where the plants are conserved.

Example:

In Northern India, two gene sanctuaries are found available.

One gene sanctuary for citrus (Lemon family), and

One gene sanctuary for pitcher plants (an insect eating plant).

5. Other projects for conservation of animals

For the protection and conservation of certain animals, some special projects are framed in our country.

Example:

Project Tiger; Gir Lion project; Crocodile Breeding project; Project Elephant, etc.,

Advantages (or) merits of In-situ Conservation

1. It is a very cheap and convenient method.
2. The species gets adjusted to natural disasters like drought, floods, forest fires.

Disadvantages (or) Limitations of In-situ Conservation

1. A large surface area of the earth is required to preserve biodiversity.
2. Maintenance of the habitats is not proper, due to shortage of staff and pollution.

Ex-situ conservation

Ex-situ conservation involves protection of fauna and flora outside the natural habitats.

This type of conservation is mainly done for conservation of crop varieties and the wild relatives of crops.

Role of Ex-situ conservation

1. It involves maintenance and breeding of endangered plant and animal species under controlled conditions.
2. It identifies those species which are at more risk of extinction.
3. It prefers the species, which are more important to man in near future among the endangered species.

Important Ex-situ conservation

Botanical gardens, seed banks, microbial culture collections, tissue and cell cultures, museums, zoological gardens.

Methods of Ex-situ Conservation

The following important gene bank (or) Seed bank facilities are used in Ex-situ conservation.

1. National Bureau of Plant Genetic Resources (NBPGR):

It is located in New Delhi. It uses cryo preservation techniques to preserve agricultural and horticultural crops.

Cryopreservation technique:

It involves the preservation of seeds, pollen of some important agricultural and horticultural crops by using liquid nitrogen at a temperature as low as – 196°C. Varieties of rice, pearl millet, Brassica, turnip, radish, tomato, onion, carrot, chilli, tobacco, etc., have been preserved successfully in liquid nitrogen for several years.

2. National Bureau of Animal Genetic Resources (NBAGR):

It is located at Karnal, Haryana. It preserves the semen of domesticated bovine animals.

3. National Facility for Plant Tissue Culture Repository (NFPTCR):

It develops the facility for conservation of varieties of crop plants or trees by tissue culture. This facility has been created within the NBPGR.

Advantages (or) merits of Ex-situ Conservation

1. Survival of endangered species is increasing due to special care and attention.
2. In captive breeding, animals are assured food, water, shelter and also security and hence longer life span.
3. It is carried out in cases of endangered species, which do not have any chances of survival, in the world.

Disadvantages (or) Limitations of Ex-situ Conservation

1. It is an expensive method.
2. The freedom of wildlife is lost.
3. The animals cannot survive in a natural environment.
4. It can be adopted only for a few selected species.

Field study

Anyone working in biodiversity conservation or field ecology should understand and utilize the common-sense process of scientific inquiry: observing surroundings, framing questions, answering those questions through well-designed studies, and, in many cases, applying results to decision making. Field Studies for Biodiversity Conservation addresses that problem by offering a comprehensible, practical guide to using scientific inquiry in conservation work.

Field study of common plants, insects, birds:

Sacred Groves:

Sacred Groves comprise patches of forests or natural vegetation from a few trees to forests of several acres that are usually dedicated to local folk deities. These spaces are protected by local communities because of their religious beliefs and traditional rituals that run through several generations. The Sacred Groves are important repositories of floral and faunal diversity.

Rameshwaram Ornamental Spider or Rameshwaram Parachute Spider:

Its scientific name is **Poecilotheria hanumavilasumica**. It is found only in India. The species is semi-social, which means they live partly in groups. They are Arboreal and tend to live in hiding. It is a critically endangered species. The major threats causing the disappearance of this species are habitat alteration and degradation.

Vulture:

India has nine species of Vultures in the wild. Without Vultures, Equilibrium between populations of other scavenging species will be affected. Diclofenac is a non-steroid anti-inflammatory drug administered to reduce inflammation and to reduce pain for cattles. Vultures which were unable to break down the chemical diclofenac, suffer from kidney failure when they eat the carcass of animals which have been administered with the drug – Diclofenac. So the veterinary drug Diclofenac has been banned by Indian government. The Vulture Breeding and Conservation Centre had been established at Pinjore, Haryana in 2001 and Rani, Guwahati in 2005.

Field study of simple ecosystems – pond, river, hill slopes etc.,

Indian Crocodile:

The Indian Crocodile conservation project has pulled back the once threatened crocodilians from the brink of extinction and placed them on a good path of recovery. This project is emphasized to protect the remaining population of crocodilians in their natural habitat by creating sanctuaries. For better continuity of the project training imparted at project sites through Central Crocodile Breeding and Management Training Institute, Hyderabad.

Ganges Dolphin:

The River Dolphin is the National aquatic animal of India. It inhabits the Ganges – Brahmaputra – Meghna and Karnaphuli – Sangu river systems of Nepal, India and Bangladesh. In India, the Ganges River Dolphin is threatened by river water pollution and siltation, accidental entanglement in fishing nets and poaching for their oil. A stretch of the Ganges river between Sultanganj and Kahlgaon in Bihar has been declared a dolphin sanctuary and named Vikramshila Gangetic Dolphin Sanctuary.

Kashmir stag:

The Kashmir stag also known as Hangul which is a subspecies of Central Asian Red Deer. It is the state animal of Jammu & Kashmir. In Kashmir, It is found in Dachigam National Park at an elevation of 3035 meters. They were threatened due to habitat destruction, overgrazing by domestic livestock and poaching. The state of Jammu & Kashmir along with the IUCN and the WWF prepared a project for the protection of these animals. It became known as Project Hangul.

Video Links:

Biodiversity

https://www.youtube.com/watch?v=GK_vRtHJZu4

Biodiversity is collapsing worldwide. Here's why.

<https://www.youtube.com/watch?v=1cvMX82iwRM>

In-situ & Ex-situ Conservation Methods

<https://www.youtube.com/watch?v=RmiBj8jL7cc>

In-situ conservation

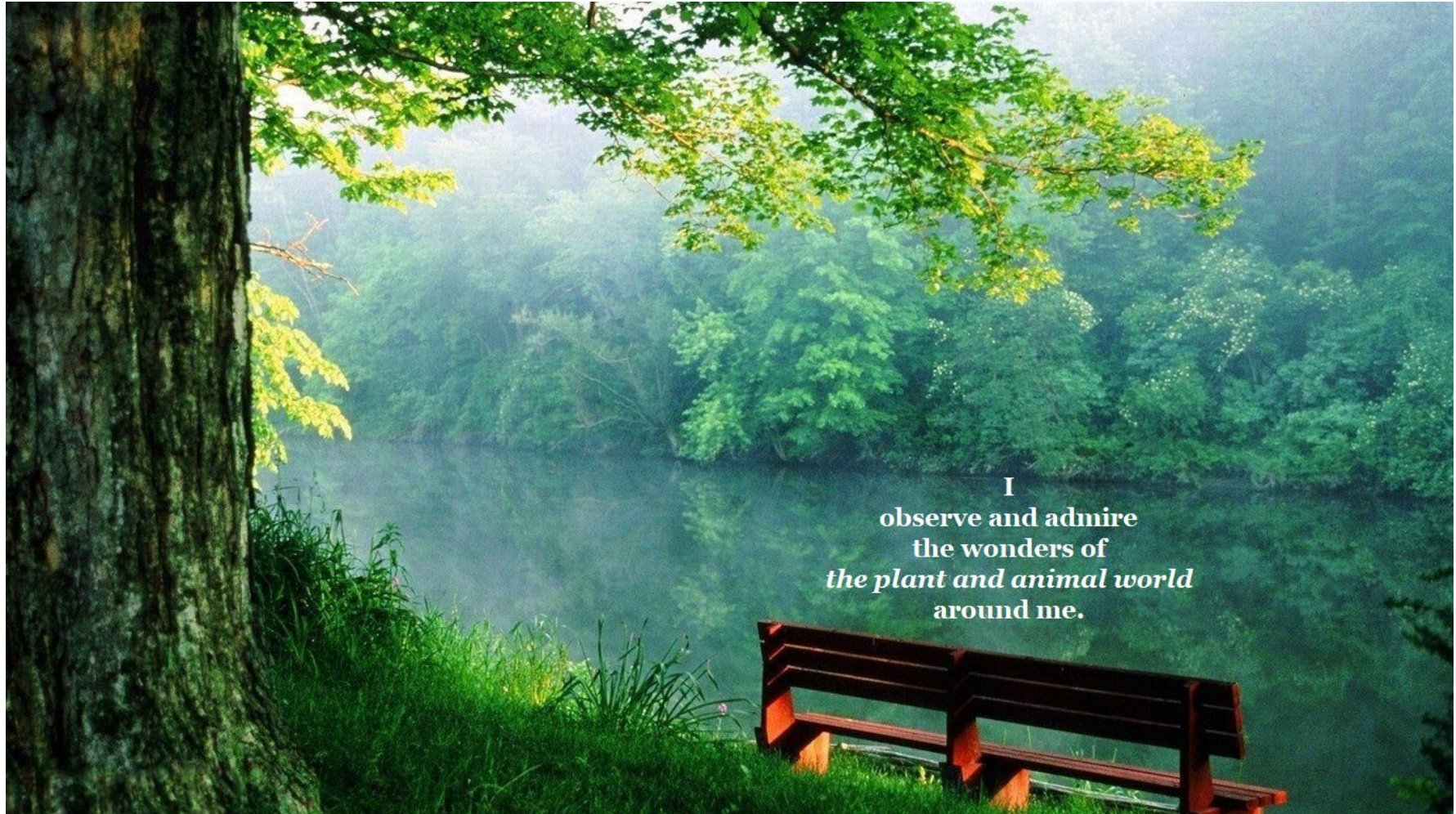
<https://www.youtube.com/watch?v=V2DXeCGRVxE>

Ex-situ conservation

<https://www.youtube.com/watch?v=T-vxIf6JAT4>

Difference between National Park, Wildlife Sanctuary and Biosphere Reserve

<https://www.youtube.com/watch?v=zpd-BzKIU9Y>



I
observe and admire
the wonders of
the plant and animal world
around me.