Threats to Biodiversity, Endemism, Threatened Categories

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INTRODUCTION

- Biological diversity is essential for preserving ecological processes, such as fixing and recycling of nutrients, soil formation, circulation and cleansing of air and water, global life support (plants absorb CO2, give out O2), maintaining the water balance within ecosystems, watershed protection, maintaining stream and river flows throughout the year, erosion control and local flood reduction.

- Food, clothing, housing, energy, medicines, are all resources that are directly or indirectly linked to the biological variety present in the biosphere.

CONSUMPTIVE USE

- The direct utilisation of timber, food, fuelwood, fodder by local communities.
- The biodiversity held in the ecosystem provides forest dwellers with all their daily needs, food, building material, fodder, medicines and a variety of other products.
- Fisherfolk are highly dependent on fish and know where and how to catch fish and other edible aquatic animals and plants.

MAN & WEB OF LIFE

- The Biodiversity of an area influences every aspect of the lives of people who inhabit it.
- It is linked with every service that nature provides us.
- That a natural forest maintains the water in the river after the monsoon.
- The wilderness is an outcome of a long evolutionary process.
- We are highly dependent on these living resources.

MARKETABLE GOODS

- The biotechnologist uses biorich areas to ‘prospect’ and develop better varieties of crops that are used in farming and plantation programs or to develop better livestock.
- To the pharmacist, biological diversity is the raw material from which new drugs can be identified from plant or animal products.
- To industrialists, biodiversity is a rich store-house from which to develop new products.
- For the agricultural scientist the biodiversity in the wild relatives of crop plants is the basis for developing better crops.

MARKETABLE GOODS

- Genetic diversity enables scientists and farmers to develop better crops and domestic animals through careful breeding. Originally this was done by selecting or pollinating crops artificially to get a more productive or disease resistant strain.
- Thus these wild species are the building blocks for the betterment of human life and their loss is a great economic loss to mankind.
- Preservation of biodiversity has now become essential for industrial growth and economic development.
- This is called ***biological prospecting***.

SOCIAL VALUES

- The consumptive and productive value of biodiversity is closely linked to social concerns in traditional communities.
- A great variety of crops have been cultivated in traditional agricultural systems and this permitted a wide range of produce.
- In recent years farmers have begun to receive economic incentives to grow cash crops for national or international markets, rather than to supply local needs.
- This has resulted in local food shortages, unemployment, landlessness and increased vulnerability to drought and floods.

DRUG PLANT SOURCE USE

- Atropine Belladonna Anticholinergic : reduces intestinal pain in diarrhoea .
- Bromelain Pineapple Controls tissue inflammation due to infection.
- Caffeine Tea, Coffee Stimulant of the central nervous system.
- Camphor Camphor tree Rebefacient: increases local blood supply.
- Cocaine Cocoa Analgesic and local anesthetic: reduces pain and prevents pain during surgery.
- Codeine Opium poppy Analgesic: reduces pain. Morphine Opium poppy Analgesic: controls pain.

DRUG PLANT SOURCE USE

- Colchicine Autumn crocus Anticancer agent.
- Digitoxin Common foxglove Cardiac stimulant used in heart diseases.
- Diosgenin Wild yams Source of female contraceptive: prevents pregnancy.
- L-Dopa Velvet bean Controls Parkinson’s Disease which leads to jerky movements of the hands
- Ergotamine Smut-of-rye or ergot Control of haemorrhage and migraine headaches.

DRUG PLANT SOURCE USE

- Glaziovine ocotea glaziovii Antidepressant: Elevates mood of depressed patients. Gossypol Cotton Male contraceptive.
- Indicine N-oxide heliotropium indicum Anticancer agent.
- Menthol Mint Rubefacient: increases local blood supply and reduces pain on local application.
- Monocrotaline Cotolaria sessiliflora Anticancer agent.
- Papain Papaya Dissolves excess protein and mucus, during digestion.
- Penicillin Penicillium fungi General antibiotic, skills bacteria and controls infection by various micro-organisms.

DRUG PLANT SOURCE USE

- Quinine Yellow cinochona Antimalarial.
- Reserpine Indian snakeroot Reduces high blood pressure. Scopolamine Thorn apple Sedative.
- Taxol Pacific yew Anticancer (ovarian).
- Vinblastine, Rosy periwinkle Anticancer agent: Controls cancer in children. vincristine (Vinca rosea) (Sadaphali)

From: 'The Diversity of Life'; Edward O. Wilson (Norton Paperback. In association with Havard University Press – 1993)

ETHICAL VALUES

- Ethical values related to biodiversity conservation are based on the importance of protecting all forms of life.
- All forms of life have the right to exist on earth. Man is only a small part of the Earth's great family of species.
- Indian civilization has over several generations preserved nature through local traditions. This has been an important part of the ancient philosophy of many of our cultures.
- We have in our country a large number of sacred groves or **'deorais'** preserved by tribal people in several States. These sacred groves around ancient sacred sites and temples act as gene banks of wild plants.

AESTHETIC VLAUE

- Knowledge and an appreciation of the presence of biodiversity for its own sake is another reason to preserve it.
- Biodiversity is a beautiful and wonderful aspect of nature. Sit in a forest and listen to the birds. Watch a spider weave its complex web. It is magnificent and fascinating.
- Symbols from wild species such as the lion of Hinduism, the elephant of Buddhism and deities such as Lord Ganesh, and the vehicles of several deities that are animals, have been venerated for thousands of years.
- The ‘Tulsi’ has been placed at our doorsteps for centuries.

MAJOR THREATS TO BIODIVERSITY

- The biodiversity in India i.e. Forests, Grasslands, Wetlands, Mountains, Deserts, Marine ecosystems, etc. face many pressures.
- One of the major causes of the biodiversity loss in India has been the depletion of vegetative cover in order to expand agriculture.
- Every species has its importance in its ecosystem as wild plant or animal and it can provide new genetic material for improvement.
- Economically important plants were over exploited to meet the demand of growing population throughout the globe and resulted in the drastic decline in the size of their populations. Some species have already become extinct and there are many facing danger of extinction.

MAJOR THREATS TO BIODIVERSITY

- Many factors both natural and man-made have been responsible for limiting the distribution of and causing them to become rare or even extinct.

- Major causes of biodiversity losses are **development pressure** (construction, forest based industries, hydel/irrigation projects, mining, oil drilling, pollution, resource extraction and road and transport), **encroachment** (agriculture, expansion of forest villages, fishery, habitat depletion, horticulture, monoculture, forestry, new settlements, shifting cultivation, etc.), **exploitation** (collections made by scientists/institutions, firewood, food, trading for money, poaching, smuggling of timber/forest produce, medicinal plants, etc.)

HABITAT LOSS

- High living standard and to accommodate an ever increasing human population, man has exploited and destroyed wildlife habitats.
- Loss, fragmentation or transformations of habitats have been mainly due to changes in land use such urbanization, industrialization, agricultural development, vegetation manipulation and shifting cultivation.
- Since habitat requirement of most of the species are quite narrow, with the loss of suitable habitats, populations are destroyed eventually leading to extinction of species.
- Extinction rates are based on the relation between habitat loss and species loss.

POACHING

- Poaching is an illegal exploitation of wild animals, which is unfortunately rampant in India even in the protected areas for precious animal products. Poaching of wildlife is done by the poachers for earning more money and by the tribals for their food.

- In India, for the conservation of endangered and threatened wild animals special projects are developed i.e. Tiger project, Gir Lion Project, Crocodile Breeding project, Rhinos Conservation Projects, Snow Leopard Projects, Project Elephant, etc.

- Plants also poached for their valuable products like essential oils, timber, tannins, resins, alkaloids, etc. As the plants forms first tropic level i.e. producers they play an important role in the ecosystem.

MAN & WILDLIFE CONFLICTS

- Everything was in control till man was with nature, but suddenly we are facing natural calamities, imbalances of natural cycles and seasons as soon as we tried to overcome the nature. This has been created man-wildlife conflicts.

- Wildlife plays an important role in the ecosystems. They are at higher trophic levels such as secondary and tertiary consumer level. If they killed for the short-term benefits like money, definitely destruction of the ecosystems will be taken place.

- People continuing the illegal activities like hunting, poaching, illegal trade, smuggling of forest produce, etc. This picture is due to the illiteracy about environment and ecology.

ENDANGERED & ENDEMIC FLORA

- Endangered species are those, which are in danger of extinction and whose survival is unlikely due to drastic change or reduction in the habitats and seemed to in immediate danger of extinction.
- The Botanical Survey of India in its publication **'Red Data Book'** has listed about **427** species of plants.
- This contributes to about **20%** of India's total higher plants flora. The available evidences, however, indicate that human activities are eroding the biological recourses and greatly reducing the biodiversity.
- All these species needs a **systematic management** attention.

ENDEMIC SPECIES

- Endemic species are the plants, which are limited in their distribution i.e. they are restricted to a small area and not found elsewhere in the world. This may due to

    1) Poor adaptability of a species

    2) presence of some ecological barrier (Mountains, seas, oceans, etc.)

    3) Young and not have enough time to spread.

- Endemism of Indian biodiversity is significant. About 4900 species of flowering plants are 33% of the recorded floras are endemic to the country.

ENDEMIC SPECIES

- These are concentrated in the floristically rich areas of North East India, the Western Ghats, North West Himalayas and the Andaman and Nicobar Islands.
- *Sequoia* (red wood), *Matasequoia* of N. America, *Ginkgo* of China, *Manglietia, Talauma* of SE Asia, *Degeneria* of Fiji islands are some examples of endemic species. Some Indian endemics are *Pteridium aquilinum* (Pteridaceae), *Solanum nigrum* (Solanaceae), *Podophyllum* spp. (Ranunculaceae), *Platanus* spp. (Platanaceae), *Senecio* spp. (Asteraceae), *Scirpus lacustris* and *S. tabernemontanii* (Cyperaceae), etc.

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THREATENED CATEGORIES

- Species are classified by the IUCN Red List into nine groups, set through criteria such as rate of decline, population size, area of geographic distribution, and degree of population and distribution fragmentation.

THREATENED CATEGORIES

- **Extinct** (EX) – No known individuals remaining.
- **Extinct in the Wild** (EW) – Known only to survive in captivity
- **Critically Endangered** (CR) – Extremely high risk of extinction
- **Endangered** (EN) – High risk of extinction in the wild.
- **Vulnerable** (VU) – High risk of endangerment in the wild.
- **Near Threatened** (NT) – Become endangered in the near future.
- **Least Concern** (LC) – Lowest risk.
- **Data Deficient** (DD) – Not enough data to make an assessment
- **Not Evaluated** (NE) – Has not yet been evaluated