SYLLABUS FOR THE BATCH FROM YEAR 2023 TO YEAR 2026

B.A. / B.Sc.

(12+3 SYSTEM OF EDUCATION)

Environmental Studies

(Compulsory Paper)

(Credit Based Grading System)

Examinations: 2023–26

GURU NANAK DEV UNIVERSITY AMRITSAR

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B.A./B.Sc. (Semester System) (12+3 System of Education) (CBGS) *(Batch 2023-26)*
(Faculty of Life Sciences)

INDEX

Sr. No.	Environmental Studies (Compulsory Paper)	Page No.
1.	Semester III	1-4

B.A./B.Sc. (12+3 System of Education) *(Semester–III) (CBGS) (Batch 2023-26)*
(Faculty of Life Sciences)

ESL-221 : Environmental Studies (Compulsory Paper)

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Time: 3 Hrs.

Max. Marks: 100

Exam Pattern: **End Semester Examination- 75 marks**
Project Report/Field Study- 25 marks [based on submitted report]
Total Marks- 100

Instructions for the Paper Setters:-75 marks
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Project Report / Internal Assessment:

Field work – 25 marks [Field work equal to 5 lecture hours]
The candidate will submit a hand written field work report showing photographs, sketches, observations, perspective of any topic related to Environment or Ecosystem. The exhaustive list for project report/area of study are given just for reference:

1. Visit to a local area to document environmental assets: River / Forest/ Grassland / Hill / Mountain / Water body / Pond / Lake / Solid Waste Disposal / Water Treatment Plant / Wastewater Treatment Facility etc.
2. Visit to a local polluted site – Urban / Rural / Industrial / Agricultural
3. Study of common plants, insects, birds
4. Study of tree in your areas with their botanical names and soil types
5. Study of birds and their nesting habits
6. Study of local pond in terms of wastewater inflow and water quality
7. Study of industrial units in your area. Name of industry, type of industry, Size (Large, Medium or small scale)
8. Study of common disease in the village and basic data from community health centre
9. Adopt any five young plants and photograph its growth
10. Analyze the Total dissolved solids of ground water samples in your area.
11. Study of Particulate Matter ($PM_{2.5}$ or PM_{10}) data from Sameer website. Download from Play store.
12. Perspective on any field on Environmental Studies with secondary data taken from Central Pollution Control Board, State Pollution Control Board, State Science & Technology Council etc.

SECTION-A

1. The multidisciplinary nature of environmental studies

Definition, scope and importance, Need for public awareness

2. Natural Resources: Renewable and non-renewable resources:

Natural resources and associated problems.

(a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

(b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

(c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

(d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

(e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.

(f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

SECTION-B

3. Ecosystems

- Concept of an ecosystem
- Structure and function of an ecosystem
- Producers, consumers and decomposers
- Energy flow in the ecosystem
- Ecological succession
- Food chains, food webs and ecological pyramids
- Introduction, types, characteristic features, structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

4. Biodiversity and its conservation

- Introduction – Definition: genetic, species and ecosystem diversity
- Biogeographical classification of India
- Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values
- Biodiversity at global, national and local levels
- India as a mega-diversity nation
- Hot-spots of biodiversity
- Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts
- Endangered and endemic species of India
- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

SECTION-C

5. Environnemental Pollution

Définition

- Causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear pollution
- Solid waste management: Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution
- Pollution case studies
- Disaster management: floods, earthquake, cyclone and landslides

6. Social Issues and the Environment

- From unsustainable to sustainable development
- Urban problems and related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rehabilitation of people; its problems and concerns. Case studies.
- Environmental ethics: Issues and possible solutions
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
- Wasteland reclamation
- Consumerism and waste products
- Environmental Protection Act, 1986
- Air (Prevention and Control of Pollution) Act, 1981
- Water (Prevention and control of Pollution) Act, 1974
- Wildlife Protection Act
- Forest Conservation Act
- Issues involved in enforcement of environmental legislation
- Public awareness

SECTION-D

7. Human Population and the Environment

- Population growth, variation among nations
- Population explosion – Family Welfare Programmes
- Environment and human health
- Human Rights
- Value Education
- HIV / AIDS
- Women and Child Welfare
- Role of Information Technology in Environment and Human Health
- Case Studies

Field Work

- Visit to a local area to document environmental assets river/forest/ grassland/ hill/ mountain
- Visit to a local polluted site – Urban / Rural / Industrial / Agricultural
- Study of common plants, insects, birds
- Study of simple ecosystems-pond, river, hill slopes, etc

Field work comprises of 5 hours of field work / visit/ assignment to be submitted by each candidate to the Teacher in-charge for evaluation latest by 1st week of before the commencement of theory exam.

ADVISORY FOR PUSHPA GUJRAL SCIENCE CITY, KAPURTHALA :

The Under Graduate students studying Environmental Studies (Compulsory Paper for All UG College Courses) may be taken to Pushpa Gujral Science City, Kapurthala in lieu of Field study report of 25 marks.
Although students will submit a hand written reports with pictures/ graphs/ tables related to biodiversity, ecology, health, biotechnology, energy, water etc. in about 10 pages to the teacher in-charge.
Above advisory is issued to promote scientific temperament in undergraduate classes and is optional. Further, the report will only be considered if there will be a minimum strength of 25 students along with deputed teacher by the college**.**

References:

1. Bharucha, E. 2005. Textbook of Environmental Studies, Universities Press, Hyderabad.
2. Down to Earth, Centre for Science and Environment, New Delhi.
3. Heywood, V.H. & Waston, R.T. 1995. Global Biodiversity Assessment, Cambridge House, Delhi.
4. Joseph, K. & Nagendran, R. 2004. Essentials of Environmental Studies, Pearson Education (Singapore) Pte. Ltd., Delhi.
5. Kaushik, A. & Kaushik, C.P. 2004. Perspective in Environmental Studies, New Age International (P) Ltd, New Delhi.
6. Rajagopalan, R. 2011. Environmental Studies from Crisis to Cure. Oxford University Press, New Delhi.
7. Sharma, J. P., Sharma. N.K. & Yadav, N.S. 2005. Comprehensive Environmental Studies, Laxmi Publications, New Delhi.
8. Sharma, P. D. 2009. Ecology and Environment, Rastogi Publications, Meerut.
9. State of India's Environment 2018 by Centre for Sciences and Environment, New Delhi
10. Subramanian, V. 2002. A Text Book in Environmental Sciences, Narosa Publishing House, New Delhi.

PROJECT FILE

OF E.V.S.

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[BSC (N-M) III]

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SUBMITTED

TO

Mrs. Mamdeep

Page No.
Date :

INDEX

S.No	Topics	Pg-No	Teacher's Signature
1.	Biodiversity	1-2	
2.	Value of the Biodiversity	3-10	
3.	Biodiversity at Local, Global, Nation level	11-17	
4.	India is a mega industry as Nation	18-21	
5.	Hotspots of Biodiversity in India	22-37	
6.	Causes of loss of Biodiversity	38-45	

WHAT IS BIODIVERSITY?

Biodiversity is all the different kinds of life you'll find in one area- the variety of animals, plants, fungi and even micro-organisms like bacteria that make up our natural world. Each of these species and organisms work together in ecosystem, like an intricate web, to maintain balance and support life. Biodiversity supports everything in nature that we need to survive food, clean water, medicines and shelter. But as humans put increasing pressure on the planet, using and consuming more resources than ever before we risk upsetting the balance of ecosystem and losing biodiversity WWF's 2022 living planet report found an average 69% decline in global population of mammals, fishes, birds, reptiles and the amphibians since 1970. The 2019 land-mark global assessment report by the intergovernment platform on

biodiversity and ecosystem Service reported 1 million animal and plant Species are now threatened with extinction- the highest number in human history.

Three quaters of the land- based environment and roughly 66% of the Ocean environment have been Significantly altered. More than a third of the World's land Surface and nearly 75% of freshwater resources are now devoted to Crop or livestock production. Climate change worsens the impact of other resources on nature and our well-being. Humans have overfished the Ocean, cleared forests, polluted our water Sources, and Created a Climate Crisis. These actions are impacting biodiversity around the World, from the most remote locales to our own backyards. Even the most important biodiversity hubs around the World are not immune from human pressure.

VALUES OF BIODIVERSITY

Biodiversity is commonly defined in terms of species of group of independent living organisms that can be produced of offspring. Marine mammals, fair-skinned deer, pine forests, fresh flowers and micron-sized bacteria that cannot be seen with the Naked eye are some of the examples of species that inhabit the earth.

Biodiversity has fundamental values which can be categorised into :-

1. Environment Values
2. Social Values.
3. Ecosystem Values.
4. Value of Consumptive use
5. Value of productive use
6. Economic Value
7. Moral and ethical Values
8. Aesthetic Values.

1. Environment Values :-

The Environment Value of biodiversity can be found by examining each ecosystem process and indentifying these ecosystem Service that result for instance, in Wetlands the Vegetation Captures water-Carried Sediment and the Soil organism break down a range of nutrients and pollutants washed into the area. These process provide the eco-System Service of purifying water. Wetlands also acts as Spawning and nursery grounds for Some fish and provide a refuge for animals in times of drought. Some ecosystem Services are easy to overlook Until the Underlying the process is impaired. for instance dry land Salinity has emerged as a problem following Sustained clearence of deep rooted perennial plants over wide areas. forests regulate the amount of Carbondioxide in the air by releasing Oxygen as photosynthesis and Control rainfall.

2. Social Values :-

The Social Values of biodiversity include aesthetic, recreational, cultural and spiritual values. To this can be added health benefits resulting from recreational and other activities. While traditional Societies which had a small population and are required less resources had preserved their biodiversity as a life supporting resources, modern man has rapidly depleted it even to the extent of leading to the irrecoverable loss due to extinction of Species. Thus apart from the local use an sale of products of biodiversity there is the Social aspect in which more and more resources are used by affluent Societies. The biodiversity has to a great extent have been preserved by traditional Societies that Valued it as a resource and appreciated that its depletion would be a great loss to their Society.

3. Ecosystem Services:-

These services also support human needs and activities such as intensely managed production eco-system. The production of oxygen by land based plants and marine alage. The maintainance of fresh quality by vegetation slowly run off, tapping sediment and removing nutrients and by soil Organisms breaking down pollutants. The production and maintance of fertile soil as a result of many interacting processes. The provision of food such as fish, pastures for cattle and sheep, timber, fire wood and harvest wildlife such as kangaroos and native cut flowers. The provision of native species and genes used in industry research and development, for instance in traditional breeding and biotechnology applications in aquiculture, forestry, horticulture, mariculture, pharmacy chemical production and bioremediations.

4. Economic Value :-

The economic potential of biodiversity is immense in terms of food, fodder, medicinal, ethical and the Social Values. Biodiversity forms the major resources for different industries, which govern the World economy. It is the source of food for all animals and humans. Many important chemical have their origin from the diverse flora and fauna used in various industries.

5. Consumptive use Value :-

This is related to natural products that are used directly for food, fodder, timber, fuel wood etc. Human use at least 40,000 Species of plants and animals on a daily bases. Many people around the World Still depend on the wild species for most of their needs like food, Shelter and clothing. The tribal people are Completely dependent on the forests for their daily need.

6. **Productive Use Value :-**

This is assigmmed to products that are Commercially harvested and marketed. Almost all the present date aquiculture Crops have originated fourm wild Varieties. The biotechnologists Continuously use the wild Species of plants for developing new, better yielding and disease resistant Varieties. Biodiversity represents the original stock from which new Varieties are being developed.

. **Ethical and Moral Values :-**

It is based on the principle of 'live and let others live'. Ethical Value related to biodiversity Conservation are based on the importance of protecting all fourms of life. All fourms of life have the right to exist on the earth. Man is only a Small part of the Earth's great family of Species. Don't plants and animals have

equal right to live and exist on our planet which is like an inhabitated Spaceship. Morality & Ethics teach us to preserve all forms of life and not to harm any Organism Unnecessarily.

8. Aesthetic Value :-

The beauty of our planet is because of biodiversity, which otherwise would have resemble other barren planets dotted around the Universe. Biological diversity adds to the quality of life and provides Some of the most beautiful aspects of our existence. Biodiversity is is responsible for the beauty of a landscape. People go far off places to enjoy the natural Surroundings and wildlife. This type of tourism is referred to as eco-tourism is referred to as eco-tourism, which has now become a major Source of Income in many Countries.

BIODIVERSITY AT GLOBAL, NATIONAL AND LOCAL LEVEL :-

1. Global Biodiversity :-

Global biodiversity refers to the total variety of life on Earth, including all species and ecosystem. The Earth's biodiversity is incredibly diverse, with millions of species, from microbes to plants and animals occupying different habitats and ecosystems. The global level is important to consider because it highlights the interconnectedness of different ecosystems and species of emphasizes the importance of maintaining the Earth's biodiversity for the functioning of ecosystem and provision of ecosystem services. International treaties and agreements have been established to promote the conservation and sustainable use of the biodiversity at the global level.

2. National Biodiversity :-

National biodiversity refers to the variety of life within a particular country or region. Each country has unique biodiversity, depending on its geographic location, climate and other factors. The conservation and sustainable use of biodiversity are essential at the national level because it contributes to the country's national capital and support the provision of ecosystem services. To promote the conservation of biodiversity, many countries have established national strategies, policies and legal frameworks. In India, for example, the national biodiversity act was passed in 2002, which provides for the conservation of biodiversity, sustainable use of its components and fair and equitable sharing of benefits arising out of the use of genetic resources.

3. Local Biodiversity :-

Local biodiversity refers to the variety of life within a particular local area, such as a park, forest, or wetland. Local biodiversity is important because it provides the essential ecosystem services and supports the well being of local ecosystem communities. Local conservation efforts include the establishment of protected areas, restorations of degraded habitats and sustainable use of natural resources. For example, community based conservation initiatives have been successful in promoting the conservation of biodiversity in many areas by involving areas local communities in conservation efforts.

There are several actions that can be taken at the global, national and local level to promotes the conservation and sustainable use of biodiversity.

Global level :-

(i) International Cooperation :-

International Cooperation is essential to conserve biodiversity at the global level. International treaties and agreements, such as the Convention on biological Diversity, promotes the conservation of bio-diversity and sustainable use of its components.

(ii) Promote Sustainable development :-

Promoting Sustainable development that balances economic, Social, and environmental goals can help reduce the negative impact of human activities on biodiversity.

(iii) Address climate change :-

Addressing climate change is Critical to the conservation of biodiversity. Reducing greenhouse gas emission promoting sustainable energy Sour

and adapting to the impacts of climate can help in conserve biodiversity.

National level:-

(i) Protecting areas:-

Establishing protected areas, such as national parks, wildlife sancturies and biosphere reserves, can help conserve biodiversity by providing habitats for wildlife and reducing human impacts on ecosystem.

(ii) Legislation and policies:-

Legislation and policies that promotes the conservation of biodiversity, such as the national Biodiversity act in India, can help protect biodiversity.

(iii) Sustainable use of resources:-

Promoting the sustainable use of natural resources, such as forest fisheries and water resources,

can help conserve biodiversity.

local level :-

(ii) Community - based Conservation :-

Community - based conservation initiatives involving local communities in conservation efforts, can be effective in promoting the conservation of biodiversity.

(iii) Restoration of degraded habitats :-

Restoring degrading habitats, such as wetlands and forests, can help conserve biodiversity and provide essential ecosystem service.

(iiii) Sustainable aquiculture and forestry :-

Promoting sustainable aquiculture and forestry practices, such as agro forestry and organic farming, can help conserve biodiversity.

INDIA AS A MEGA DIVERSITY NATION

India is considered as one of the mega diversity nations in the world due to its rich and diverse biodiversity, which is a result of its unique geographical location, varied climate zones, and varied topography. The country is home to an incredible variety of flora and fauna, which have evolved over millions of years in response to different environment conditions. In this essay, we will discuss India's status as a mega diversity Nation, highlighting its unique biodiversity and the importance of protecting it.

India's Geography and Biodiversity :-

India is located in the Northern hemisphere between 8°4' N and 37°6' N latitude and 68°7' E and 97°25' E longitude. The country has varied topography with the Himalayan

mountain range to the north, the Indo gangetic plains in the north and central parts of the country, and the western and eastern Ghats running along the western and eastern coasts. These different land forms, combined with India's varied climate zones, have resulted in a rich and diverse range of habitats, for tropical rains forests to alpine meadows, deserts and mangrove forest

India's flora and fauna:-

India's biodiversity is estimated to be around 7-8% of the world's total biodiversity. The country is home to over 91,000 species of animals including 1,300 bird species, 350 mammals species, and over 50,000 species of insects, including 15,000 flowering plants, 3,000 orchid species, and 1,700 fern species, meaning they are found only

in India and not found anywhere else in the world. Some of the notable endemic species include the Indian elephant, Indian rhinoceros, Bengal tiger, Asiatic lion, Nilgiri tahr, and the Kashmir Stag. The country is also home to over 1,500 species of orchids, many of which are endemic. India's marine biodiversity is also significant, with over 7,500 km of coastline and a rich variety of marine life. The country has over 2,000 fish species 1,200 coral species, and numerous species of turtles, dolphines and whales.

Conservation of India's Biodiversity:-

India is one of the world's mega diversity nations, and it is essential to protect its unique biodiversity India has taken several measures to Conserve its biodiversity. India has taken Serveral measures to Conserve its biodiversity.

BIODIVERSITY HOTSPOTS IN INDIA:-

Biodiversity is referred to as the diversity of plants and animals species in a specific habitat. The two main factors that make up biodiversity are species evenness and species richness. India is renowned for having a diverse ecosystem, and 23.39% of its land is covered in trees and forests with nearly 91,000 identified species and 45,500 documented plant species. four of the world's 36 biodiversity hotspots are located in India The Himalayas, Westerns Ghats, Indo-Burma areas and the Sundaland. Two of these, the Indo-Burma area and Sundaland are distributed throughout South asia and are not precisely contained with India's formal borders.

What are biodiversity hotspots?

The word 'hotspot' describes region

with a high priority for Conservation because of their abundant bio-diversity; high endemism and significant Vulnerability. Hotspots for biodiversity are places with a high Concentration of indegenious Species. In Case of marine hotspots, fish, Snails, lobsters and Coral reefs are all taken into account. Most of the hotspots are found in tropical and Subtropical areas Where high temperatures and humidity are typical all year round. With an elevation above Sea level and Ocean depth, animal diversity and ecosystem diversity change. Only 2.5 percent of the Earth's land Surface is taken up by the 36 hotspots that exist today, yet they are home to about 43 percent of the World's wide bird, mammals, reptile and amphibian Species, as well as more than half of its plant Species.

Criteria to be Satisfied for a biodiversity hotspot :-

A region must Satisfy two Strict requirements in order to be considered a biodiversity hotspot.

- Include at least 1,500 Vascular plant Species that are unique to the planet (known as "endemic Species")

Have lost the majority of their native vegetation by at least 70%. In other words, it must be threatened.

There are four biodiversity Hot Spots in India :-

1. Himalayas
2. Indo-Burma
3. Western Ghats.
4. Sundarlands.

HIMALAYAS :-

All the World's mountain peaks higher than 8000 meters, including Mt. Everest, are found within the himalayas hotspots, which span more than 3000 kilometers across northern pakistan, Nepal, Bhutan and the north west and northeastern States of India. It also has Several of the deepest river gorges in the World. The Himalayans Mountains range is nearly 7.5 million Square kilometers in Size and is divided into Eastern Himalayas, which includes parts of Nepal, Bhutan, the northeastern Indian States of West bengal, Sikkim Assam and Arunachal Pradesh, and the Western Himalaya, which includes parts of Kumaon-Gauhwal, northwest Kashmir, and northern pakistan. The Himalayan mountains are home to a Variety of ecosystems, includin

- Mixed Conifer and Conifer forests in the higher hills.
- Alpine meadows above the tree line, the tallest alluvial grasslands in the world.
- Subtropical broadleaf forest along the foothills.
- Temperate broadleaf forest in the mid hills.

Even at heights higher than 6000 meters vascular plants have been discovered. Numerous big bird and mammals populations include vultures, tigers, elephants, rhinos and wild water buffalo Can be found in the hotspot. The World wide hotspot regions were reviewed and revised in light Species distribution, threats and changes in threat Status and the Himalayans hotspot was delineated and identified as Seperate from the Indo - Burma hot-Spot.

Threats to Himalayan Biodiversity :-

- Promoting both outside immigration and internal migration and leading to an exponential increase in the human population in some of the locations with the greatest biodiversity.

- Due to spread legal and illegal logging especially on steep slopes, as well as the substantial removal of forests and meadows for farming, there has been serious erosion.

- During the summer, the area is frequently burned to make way for livestock, which provides an extra hazard to the forest because fires can occassionally go out to control.

- Rapid deforestation and habitat fragmentation were the result of conversion of forests and grass-lands for agriculture.

INDO - BURMA

The Indo - Burma hotspot is the largest of the world's 36 region of recognised hotspot, covering a total area of 2,373,000 km^2. The Indo - Burma hotspot formerly encompassed part of northeastern India, Bangladesh and Malaysia. However, Bangladesh, India and Malaysia are regarded as extra-limital to the hotspot for the purposes of the ecosystem profile because northeastern India is included in the himalaya n hot-Spot and the hotspot only barely extends into Bangladesh and Malaysia. The hotspot has an incredible geographic diversity, ranging from the tallest peak in Southeast Asia to Coast-lines along the Bay of Bengal, Andaman Sea, Gulf of Thailand and South China Sea. Along with several of Asia's greatest rivers and their lush floodplain and deltas, it also Compruises the

eastern extensions of Himalayas, remote massifs and Plateaus. Due to the diversity of its land forms and climate zones, the Indo Burma hotspot supports a wide range of habitats and as a result, a high level of Overall biodiversity. In the past 12 years, six new species of big mammals have been identified in this area :-

- Large - altered Muntjac
- Annamite Muntjac
- Grey - shanked Douc
- Annamite Striped Rabbit
- Leaf Dear
- Saola.

The majority of the edemic freshwater turtle species found in this hot-spot are in danger of going of extinct because of overfishing and habitat destruction. The Severely endangered White - eared Nigh- helon, Grey Crowned and Orange - necked partridge are amoung the 1300 birds species that exist.

Threats to Indo-Burma.

- The greatest threats to this hotspot's biodiversity are logging, over exploitation of natural resources, industrial agricultural trade and Consumption of wildlife, the building of Massive infrastructures including dams, highways and ports and Climate Change.

- In Indo-Burma, Commercial timber exploitation ranks second among the Causes of deforestation.

- The loss of habitat has had an effect on other land forms, including wetlands and freshwater floodplain Swamps.

- Large tracts of mangroves have been Contained within agricultural ponds, and many rivers have been dammed and altered.

- Mangroves, lagoons, marshes and other natural Wetland have undergone Sustaintial Conversation into Shrimp.

WESTERN GHATS :-

The Western Ghats sometimes referred to as Sahyadri Hills locally, are made up of the Malabar plains and a group of mountains that extend 30 to 50 kilometers inland and parallel to India's Western Coast. With just the 30 Km Palakad Gap in between they span, 1,600 km from the Southern most point of the nation to Gujrat in the north, Covering an area of over 1,60,000 Km^2. By Blocking the Southwestern monsoon winds, the Western Ghats Control the amount of rain that falls on peninsular India. Every year, a lot of rain falls on the Western Slopes of the mountains, with most of it falling during the Southern monsoon between June to September. Rainfall drops off as you move from South to north, while the eastern Slopes are drier.

Numerous rivers, including the three main eastward-flowing rivers on the peninsula, originate in these highlands. As a result, they serve as essential source of power, irrigation and drinking water. There are many different types of vegetation in the Western Ghats to the region's complicated geographically and varying rainfall patterns. They include scrub forests in low lying rain shadow regions and on the plains, deciduous and tropical rainforest upto a height of roughly 1,500 m and an exceptional mosaic of montane forests and rolling grasslands above that altitude.

Threats to Western Ghats:-

- The forests of the Western Ghats have been heavily fragmented and selectively cut across their whole range.

- For monoculture plantations of tea, coffee, rubber, oil palm, teak, eucalyptus and wattle as well as to make room for reservoirs, highways and railways, forests have been removed.
- More forests are lost due to encroachment into protected areas. One slopes that were once covered in forest, cattle and goat grazing inside and close to protected zones severely erodes them.
- The majority of the remaining the forest cover is made up of distributed secondary growth or wood plantation.
- Other concern include unrestrained tourism and forest fires.
- The conflict between human and wildlife has increased as a result of population growth in protected zones and other than woods.

SUNDALANDS :-

The Sundalands hotspot includes the western half of the Indo-Malayan archipelago, which is made up of about 17,000 equatorial islands Borneo and Sumatra are two of the largest islands in the World. Among all the Malaysia including Peninsular Malaysia and the East Malaysian States of Sarawak and Sabah in northern Borneo, Singapore at the Trip of the Malay Peninsula Brunei Darussalam, the western half of indonesia, including Kalimantan, are include In Sundalands. A small poution of Southern Island the provinces of Pattani, Yala and Narathiwat is also included the Indonesia poution of Borneo, Sumatra, Jara and Bali. India is in charge of the Nicobar Islands which are included. The 7,100 islands of philippiness Hotspots are direct to the northeast.

Page No. 31

Threats to Biodiversity in Sundaland

- The stunning flora and wildlife of the Sundaland Hotspot are being rapidly destroyed by Industrial forestry on these islands.
- Global traffic in animals, uses tigers, monkey and turtle species for food and medicines in other nations.
- Only in this area are Orangutans located and their population is rapidally declining.
- The Indonesian Islands of Java and Sumatra are also home to some of the final refuges for two Southeast Asian rhino species.
- Like many other tropical regions, the forests are being destroyed for Business.
- The production of pulp, oil palm and rubber are three of the most harmful factors.

CAUSES OF LOSS OF BIODIVESITY:-

1. Habitat loss and fragmentation:-

The Conversion of natural habitats into agricultural land, Urban areas and infrastructure development leads to the destruction and fragmentation of habitats, which is the primary Cause of biodiversity loss. As humans take over previously wild lands, it reduce the available Space for native Species to live, feed and reproduce, and also disrupt the Connections between the different ecosystems.

2. Climate change :-

Global Warming and the resulting chan in Climate patterns have altered th habitats, making its challenging fo organisms to perform their natura functions or adapt to new Condition Changes in temperature or rain patte for example, make it different for Cert plants to grow or Survive, which also af the Species that depend on them.

3. Overhunting :-

Overhunting of a species to meet high demand for meat or animal by products, for sport, or due to pest control is one of the main drivers of species extinction. Industrialised hunting does not take into account the effects of species deterioration on the rest of the ecosystem and quickly depletes populations.

4. Overfishing :-

Industrialised fishing has led to the depletion of highly-demanded species like tuna, whales and salmon to meet the world's demand. Unsustainable methods of fishing like bottom trawling, have also destroyed sea-floor habitat, which are important nursery areas for many species. This has had the knock-off effect of changing marine ecosystem structures by changing the increasing populations of predators at the expense of their prey.

7. Diseases:-

The Spread of infectious diseases, often facilitated by human activities, can devastate wildlife populations. Organism have developed natural defences against disease-inducing microbes native to their region. However, when human activity contaminates ecosystems with non-native microbes, indigeneous species are not equipped to combat them.

8. Genetic Pollution:-

The release of genetically modified organism or the hybridization of closely related species can lead to the loss of genetic diversity, which is crucial for species adaptability and resilience.

9. Ecosystem Simplification:-

The Conversion of complex, diverse ecosyste into simplified ones, such as monocult or urban areas, reproduce the number o niches available for species.

5. Invasive Species:-

As ecosystems have evolved to maintain a relative stabilities of species populations, non-native species introduced to new environments can outcompete native species for resources, prey on them or transmit diseases. When invasive species are in higher levels of the food chain, they can deplete populations of the prey they feed on. Conversely, when invasive species are in the middle or bottom of the food chain, the native species that feed on them may spike on population as they have an abundance of food.

6. Pollution:-

Air, Soil and water pollution can harm Species by degarding their habitats, physically harming them, or increasing their vulnerability to increase or predation Some popullants, such as pesticides and heavy metals, can be passed up the food chain, therefore contaminating many levels of the ecosystem.

7. Diseases:-

The Spread of infectious diseases, often facilitated by human activities, can devastate wildlife populations. Organisms have developed natural defenses against disease-inducing microbes native to their region. However, when human activity contaminates ecosystems with non-native microbes, indigeneous species are not equipped to combat them.

8. Genetic Pollution:-

The release of genetically modified organisms or the hybridization of closely related species can lead to the loss of genetic diversity, which is crucial for species adaptability and resilience.

9. Ecosystem Simplification:-

The Conversion of complex, diverse ecosystem into simplified ones, such as monocultu or Urban areas, reproduce the number of niches available for species.

es that can be used for the devel-
of new crops, medicines and
ultural expression.

d. biogeochemical cycles:-

sity loss can affect the cycling
rients, such as carbon, nitrogen
osphorus in ecosystems. This
lead to changes in ecosystem
ivity, water quality and green-
gas emissions.

d. risk of species extinction:-

of individual species can have
ng effects on other species
the same ecosystem,
to futher declines in bio-
and increasing the risk
ction for multiple species.

EFFECTS OF BIODIVERSITY LOSS ON THE ENVIRONMENT:-

1. **Loss of ecosystem Stabilities:-**

Biodiverse ecosystems are more stable and resilent to disruptions such as climate change, diseases outbreaks or invasive Speciess. Loss of biodiversity can reduce an ecosystem's ability to recover from these disturbances and increase the risk of ecosystem collapse.

2. **Decline in ecosystem Services:-**

Healthy, diverse ecosystem provide essential Services such as water and air purification, Soil formation pollination, Carbon Sequestration and climate regulation. Biodiversity loss can impare these Services, leading to a decline in environmental quality.

3. **Loss of Genetic resources:-**

Biodiversity is a reservoir of genetic

EFFECTS OF BIODIVERSITY LOSS ON THE ENVIRONMENT:-

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Biodiversity is a reservoir of genetic

resources that can be used for the development of new crops, medicines and for cultural expression.

4. Altered biogeochemical cycles :-

- Biodiversity loss can affect the cycling of nutrients, such as carbon, nitrogen and phosphorus in ecosystems. This can lead to changes in ecosystem productivity, water quality and greenhouse gas emissions.

5. Increased risk of species extinction :-

- The loss of individual species can have cascading effects on other species within the same ecosystem, leading to further declines in biodiversity and increasing the risk of extinction for multiple species.

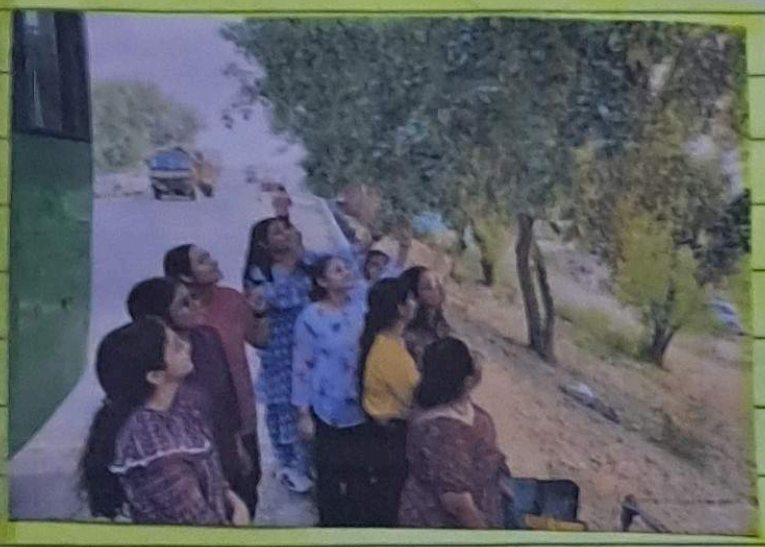
Page No.
Date

VISIT TO AMUSEMENT PARK LUDHIANA



Field trip to a park for Studing Various types of plants.

Page No.
Date



A Brief History of Trees.



Study of Gardening.

Date



View of a group of Students Stand in front of Satluj River.

Name = Anmolpreet Kaur

Class = BSc Non Medical

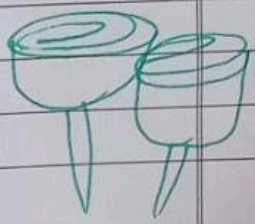
Sem - III

Roll No = 231902

Subject = E.V.S

Submitted To = Mandeep Kaur

Submitted By = Anmol Preet Kaur



Date
Page

Index

S.No	Topics	Page No	Signature
1.	Biodiversity	1 - 12	
2.	Level of Biodiversity	13 - 22	
3	Measurement of Biodiversity	23 - 33	
4.	Classification of Biodiversity in india.	34 - 40	

Biodiversity →

Biodiversity describe the richness and variety of life on earth. It is the most complex and important biodiversity, life would not sustain

The term biodiversity was coined in 1985. It is important in natural as well as artificial ecosystems. It deals with nature's variety the biosphere. It refers to variabilities ampunt plants, animals and microorganisms species.

Biodiversity includes the number of different organisms and their relative frequencies in an ecosystem. It also reflect the organization of organisms at different levels.

Biodiversity holds ecological and economic significance. It provides us with nourishment, housing, fuel, clothing and several other resources It also extracts monetary benefits through tourism Therefore it is very important to have a good knowledge of biodiversity for a sustainable livelihood.

Biodiversity



Date
Page

"Types Of Biodiversity"

There are the following three different types of biodiversity.

- Genetic Biodiversity
- Species Biodiversity
- Ecological Biodiversity

→ Genetic Biodiversity :- It is the diversity at the genetic level. A Single Species shows high diversity at the gentic level over its distrubutional range.

★ It enables a population to adopt to its enviroment.
★ India has more than 50000 genetically different Strains of rice and 1000 varieties of mango.
★ Genetic variation in the medicinal plant Rauwolfia vomitonia growing in different himalayan ranges might be due to its potency and Concentration of the active Chemical (reserpine) that the plant produces.

Date
Page 39

Genetic Diversity Examples

- Different breeds of dogs. Dogs are selectively bred to get the desired traits
- Different varieties of rose flower wheats etc
- There are most than 50,000 varieties of rice and more than a thousand varieties of mangoes found in India.
- Different Varieties of medicinal plant Rauvolfia vomitoria present in different Himalayan ranges differ in the amount of chemical reserpine produced by them.

Date
Page

Importance of Genetic Diversity

- Genetic diversity gives rise to different physical attributes to the individual and capacity to adapt to stress, diseases and unfavourable environment conditions.
- Environmental changes that are natural or due to human intervention, lead to the natural selection and survival of the fittest Hence due to genetic diversity the varieties that are susceptible die and one who can adapt to changes will survive.
- Genetic diversity is important for a healthy population by maintaining different varieties of genes that might be resistant to pests diseases or other conditions.
- New varieties of plants can be grown by cross breeding different genetic variants and produce plants with desirable traits like disease resistance increased tolerance to stress.
- Genetic diversity reduces the recurrence of undesired inherited traits.
- Genetic diversity ensures that at least there are some survivors of a species left.

Species Diversity.

Species diversity is defined as the number of different species present in an ecosystem and relative abundance of each of those species.

Diversity is greatest when all the species present are equally abundant in the area. There are two constituents of species diversity.

- Species richness : Number of different species present in an ecosystem. Tropical areas have greater species richness as the environment is conducive for a large number of species.
- Species evenness : Relative abundance of individuals of each of those species. If the number of individuals within a species is fairly constant across communities it is said to have a high evenness and if the number of individuals varies from species to species it is said to have low evenness high evenness leads to greater specific diversity.

Date
Page

Species Diversity

Example

- In a forest, there may have a large number of different species (high species richness) but have only a few members of each species (low species evenness)
- In a forest there may be only a few plant species (low species richness) but a large number of each species (high species evenness)

The species diversity varies in a different geographical location with tropics having highest and declines as we move towards poles The most species-rich environment are tropical rainforests coral reefs and ocean bottom zone.

Species richness increasing explored area.

Importance of Species Diversity

- More diverse ecosystem tend to be more productive E.g the ecosystem with a great variety of producer species will produce large biomass to support a greater variety of consumer species.
- Greater species richness and productivity makes an ecosystem more sustainable and stable.
- more diverse the ecosystem greater is ability to withstand environment stresses like drought or invasive infestations.
- Species richness makes an ecosystem able to respond to any catastrophe.
- In species-rich communities each species can use a different portion of resources available as per their requirement E.g plants with smaller roots can absorb water and minerals from shallow soil and plants with deper roots can tap deeper soil

Ecosystem Diversity :-

Ecosystem diversity is deals with the Study of different ecosystem in a certain location and their overall effect on humans and the environment as a whole It is one of the types of biodiversity along with Species diversity, genetic diversity and functional diversity.

Ecosystem diversity focuses on both terrestrial and aquatic ecosystem Also it includes the variation of a biological Community such as the number of levels of ecosystem diversity and different niches or habitat diversity and other ecological processes.

Ecosystem diversity has a great deal on both genetic and Species diversity thus it is Coined as the largest Scale of biodiversity

Grasslands, tundras, deserts rainforests terrestrial and marine ecosystems that are Some examples of ecosystem that are diverse and contribute a lot to creating a well-balanced environment.

Ecosystem Diversity Examples

Ecosystem diversity is valuable to the existence of humans and all living things on this planet. Human activities and other natural environment phenomena have a great deal on the impact being brought to the ecosystem biodiversity Thus it is a vital research subject of ecologists.

Some of the important things taken into account are the variation in niches trophic level and ecological interactions. As noted earlier, a macro-level of ecological diversity would be exemplified by variations in the ecosystems in oceans and seas which would not only be diverse in terms of ecosystems but also diverse in terms of species and genes.

In a diverse ecosystem, biotic and abiotic factors interact thus species living in a certain community should create a symbiotic relationship to keep the ecosystem healthy Ecosystem diversity boosts the availability of oxygen through photosynthesis among plant organisms living in a certain habitat.

Ecosystems are Divided Into three Classes:-

- Terrestrial Ecosystem
- Aquatic Ecosystem
- Wetland Ecosystem

⇒ Terrestrial Ecosystem:-

The includes land ecosystems, like forests grassland, desert areas and so on The types of ecosystems which are predominatly found on land are called the terrestrial ecosystem Terrestrial ecosystem cover approximately 140 to 150 million km^2 which is about 25 to 30 percent of total Surface area. An ecosystem can be as Small as an Oasis in a desert or as big as an ocean. The ecosystem are widely distributed on Surface around the geological zones. They include parts like. They include.

1. Forest
2. Grasslands
3. Tundra
4. Desert

Date
Page

2. Aquatic Ecosystem :-

This includes both fresh water ecosystems (like ponds, streams, lakes, rivers etc) and marine ecosystem (like oceans coral reefs, coastal shallows etc) habitat is part of an ecosystem The climate plants and animals are the identites of a habitat Ecosystem have two domain

1. Terrestrial or Land ecosystem
2. Aquatic or water ecosystem
   It include freshwater habitat like ponds, rivers, oceans streams wetlands swamp etc

⇒ Freshwater Aquatic Ecosystem

1 Lotic Ecosystem
2 Lentic Ecosystem
3 Wet Lands

⇒ Marine Aquatic Ecosystems

1. Ocean System
2. Coastal Ecosystem.

3. # Wet Land Ecosystem :-

This includes like estairies, mangrooves ecosystem A wetland is a land in which the land is covered by water, Salt fresh or Somewhere in between - either Seasonally or permanently. It functions as its own distinct ecosystem where soil is covered with water or can be present near ground throughout year. It supports other terrestrial and aquatic species. These areas can be found from Antratica. It is either Saltwater or freshwater

There are four main type of wetLands

1. Marsh
2. Swamp
3. Fen
4. Bogs

Date
Page

Ecosystem diversity is Measure in

1. Alpha diversity →

Alpha diversity is a measure of species diversity in a particular area or an ecosystem. Alpha diversity is expressed as the number of species present in the area of concern. Therefore, alpha diversity gives us species richness in that particular ecosystem. It is a small scale measure compared to beta and gamma diversity. Species richness is a valuable measure when compared to species diversity within different ecosystems. Species richness can be measured through a transect drawn within the ecosystem. The species we see along the ecosystem. The species we see along the transect is counted and the number of species is taken.

2. Beta Diversity :

Beta diversity is the term that refers to the change in species diversity between communities or ecosystem Hence, beta diversity allow the comparison of biodiversity between ecosystems In beta diversity, the number of species that are unique to each system is counted for example, if the beta diversity between ecosystem A and ecosystem B is 10, it tells us that there are a total of 10 species that are unique between two there are a total of ecosystems. Ecosystem A may have 8 unique species which are not seen in Ecosystem B, while ecosystem B has 2 unique species that are not seen in ecosystem A Therefore the beta diver between to two ecosystems is 10

Beta diversity increase when the interaction between adjacement communities is low. Humen land prevent the moven of species between two ecosystem. Beta diversity can be controlled by allowing th free movement of species among Communi

Date
Page

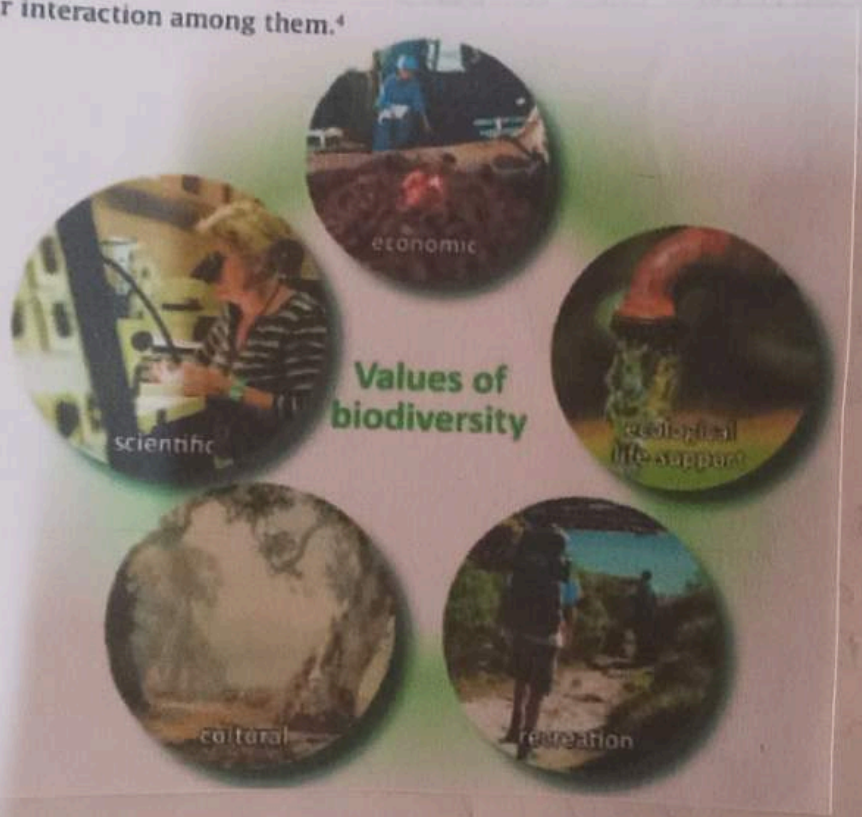
3. Gamma Diversity :-

Gamma diversity is the measure of overall biodiversity in a large geographic region. Total diversity depends on two things mean species diversity in an ecosystem and differentiation of species diversity is a type of geographic Scale species diversity

Compared to alpha and beta diversity gamma diversity is a very large scale measure. Total we can observe a decline in gamma diversity all over the wold. Mass extinction in places around the world is one of the main reasons for decreased gamma diversity

In the other words It refers to the habitat variety over the whole landscape or geographical area. In the example of the slope the species variety along the full range of the mountain slope is referred to as the gamma diversity of the landscape

or interaction among them.[4]



Date
Page

Importance of Biodiversity :-

Biodiversity and its maintenance are very important for sustaining life on Earth. A few of the reasons Explaining the importance of biodiversity are.....

→ Ecological Stability :- Every Species has a Specific role in an ecosysten. They Capture and store energy and also produce and decompose organic matter. The ecosystem Supports the Services without which humans Cannot Survive A diverse ecosystem is more produce and can withStand environmental Stress.

→ Ethical Importance :- All Species have a right to exist. Human should not Cause their voluntary extinction Biodiversity preserves different Cultures and Spiritual heritage. Therefore it is very important to Conserve biodiversity.

Economic Importance :-

Biodiversity is a reservoir of resources for the manufacture of food cosmetic products and pharmaceuticals.

Crops livestock, fishery and forests are a rich sources of food.

Wild plants such as Cinchona and Foxglove plant are used for medicinal purposes.

Wood, fibres, perfumes, lubricants, rubber resins, poison and cork are all derived from different plant species.

The national park and sanctuaries are a sources of tourism. They are a source of beauty and joy for many people.

→ Social Services :-

- Biodiversity provides us with opportunities for research and education
- Nature-based recreating opportunities such as walking and playing sports in parks and urban green spaces, play an important role in maintaining mental and physical health
- The aesthetic value of biodiversity has led to tourism and recreational activities. Thus cultural ecosystem service provides visitors with benefits as well as income opportunities for nature tourism. Service provides
- Animals plants and ecosystems have long inspired our art, culture and design they are increasingly inspiring science as well
- It is also significant in human culture traditions and values
- for Example in several Indian States tribal people have preserved a large number of sacred groves

→ Biological Services :-

Biodiversity provide us with drinking water oxygen to breathe food, medicine decomposition of waste and help our planet withStand natural disastere.

- Food

Much of our food exists because of the ecological services of pollinators. Fish provide billions of people with essential animal protein. A variety of different animals lyes are used in agriculture and food production

- Medicine.

Many medicines are derived or modelled upon compounds provided by the natural world. Aspirin was originally made from willow tree bark. The rosy periwinkle a flower that grows in madagascar provided a treatment for Hodgkins disease while a chemical from the saliva of leeches dissolves blood clots during surgery

- Drinking water.

Bidiversity sustains the water cycle and is sustained by biodiversity Transpiration provide 62 percent of annual renewable fresh water on our planet Groundwater is the major source of drinking water for many people.

Date Page 19

Global Species Diversity :-

It means total species present on the Earth

(i) According to IUCN (2004) the total number of plant and animals species is slightly more than 1.5 million.

(ii) For many taxonomic groups, species inventories are more complete in temperate than in tropical Contries.

(iii) A more conservative and Scientifically Sound estimate by Robert May places the global species diversity at about 7 million.

(iv) More than 70% of all the species recorded are animals, while plants comprise no more than 22% of the total.

(v) Among animals insect are most species rich taxonomic group making about 70% of the total. It means out of every 10 animals 7 are insects on the Earth

(vi) The number of fungal species in the world is more than the Combined total of the species of fishes amphibians reptites and mammals.

(vii) Biologists are not Sure about number of prokaryotic species because.

- Conventional taxonomic methods are not Suitable for identifying microbial species.
- Many species are not Cuttureable in the Lab.

Date
Page

Patterns of Biodiversity :

The patterns indicates that the Biodiversity is not uniform throughout the world because it is affeted by →

Latitudinal Gradients :-

The demonstrate the decrease in species diversity as we move away from the equator towards the poles.

(i) tropics harbour more species than temperature or polar areas. [latitudinal range of 23.5°N-23.5°S)

(ii) Example Colombia located near the Equator has around 1400 species of birds, while new york at 41°N has 105 Species and Greenland at 71°N has only 56 Species.

(iii) Studies indicate that the tropical areas have more biodiversity. for Example

(a) India with much of its land area in the tropical latitudes has more than 1200 species of birds.

(b) A tropical forest in equator has up to 10 times as many species of vascular plants as a forest of equal area in a temperate region like the midwest of USA.

(c) Tropical Amazonian rainforest in South America has the greater biodiversity on Earth It homes 4000 species of plants, 3000 of fishes, 1300 of birds 427 of mammals 427 of amphibians 378 of reptiles and of more than 125000 invertebrates.

Date
Page

Loss of Biodiversity :-

It is caused by the over population, unbanisation and industrialisation.

(i) The Colonisation of tropical Pacific island by human have led to the extinction of more than 2000 Species of native birds

(ii) The IUCN Red list (2004) documents the extinction of 784 species (including 338 vertebrates, 359 inveutebrates and 87 plants) in the last 500 years.

(iii) Some latest example of recent extinctions are Dodo (Mauritius), Quagga (Africa), Thylacine (Australia) Steller's Cow (Russia) and three ~~stat~~ - Species of tiger (Bali) (Javan) and (caspian).

(iv) The last twenty years alone the witnessed the disappearance of 27 species.

(v) The grim Scenario of extinctions is the fact that more than 15500 Species worldwide are facing the threat of extinction.

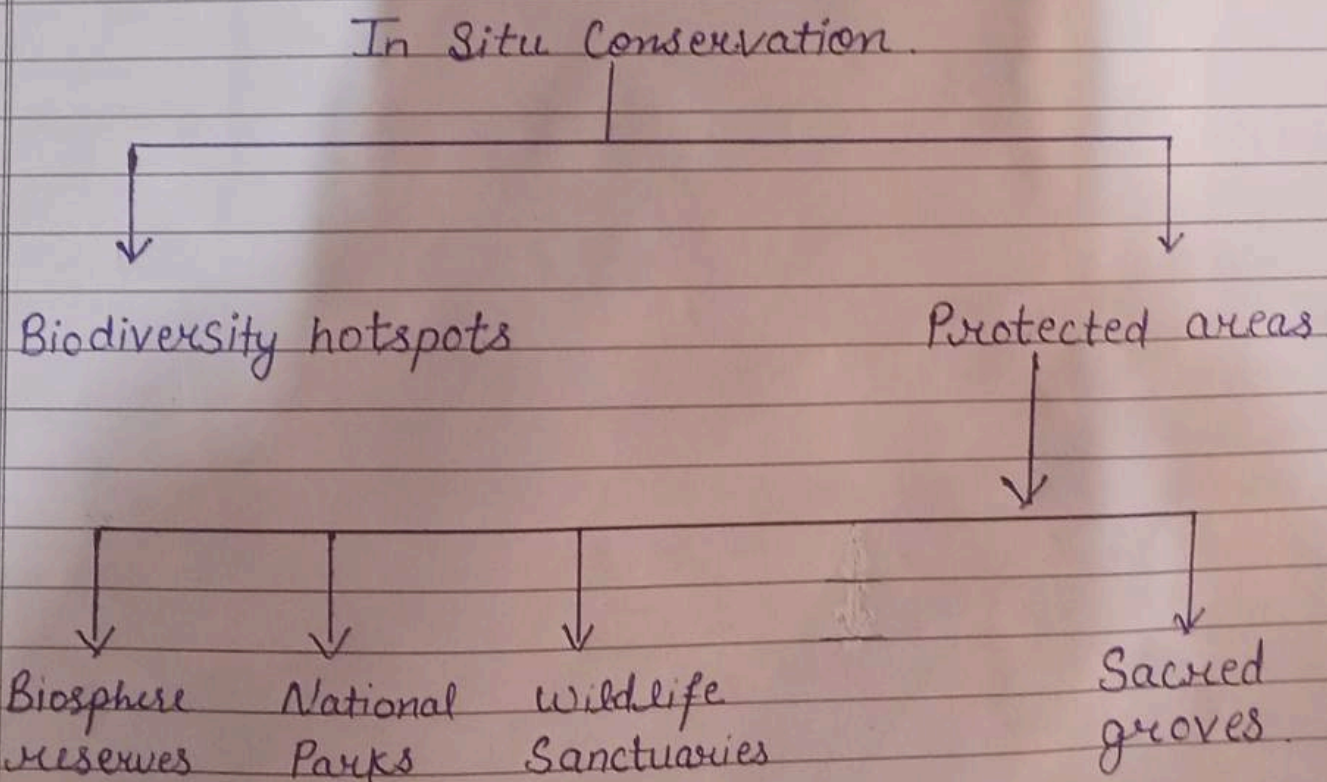
Biodiversity Conservation Methods

The two basic approches of biodiversity Conservation are....

1. In Situ Conservation
2. Ex Situ Conservation

In Situ Conservation →

It invalves protection of species in their natural habitat.

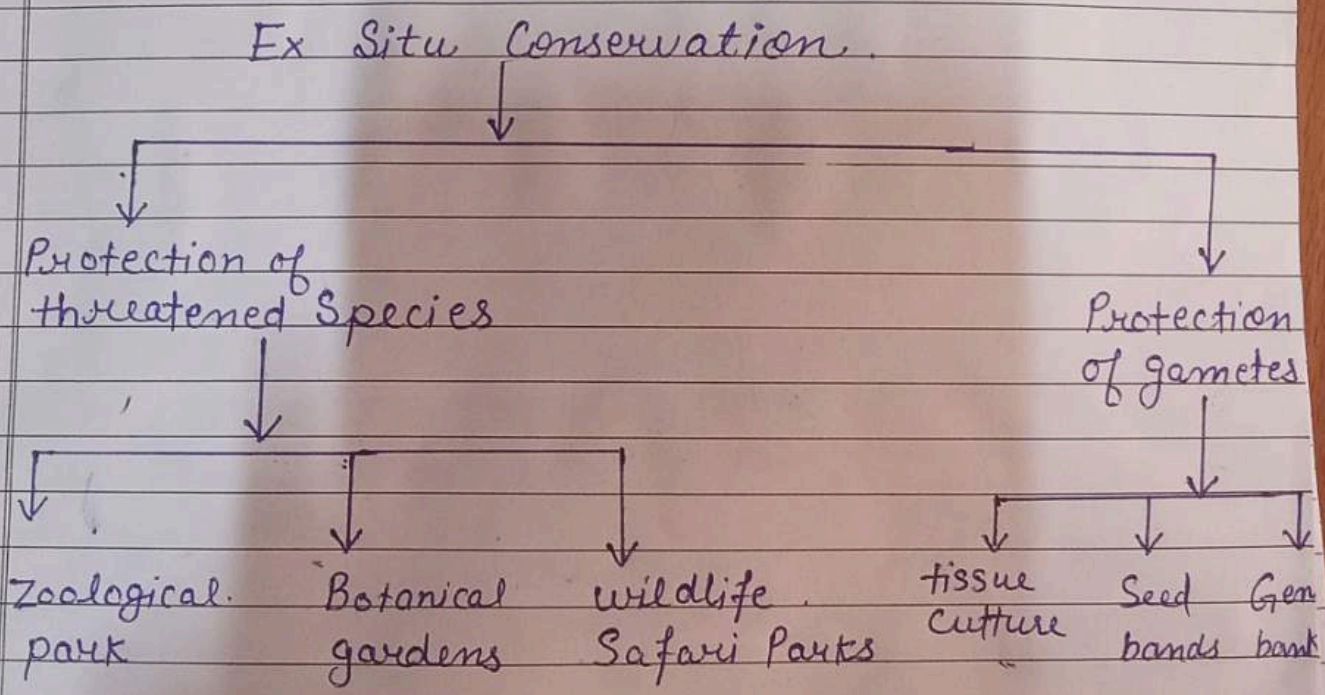


Ex Situ Conservation :-

In this methods, threatened animals and plants are taken out from their natural habitats and placed in Special Care units for their protection.

(i) Zoological parks, botonical gardens and wildlife Safari parks serve this purpase.

(ii) There are many animals that have became extinct in the wild, but Continue to be maintaned in Zoological park.



(iii) In vitro propogation of plants is Carried out by apply tissue cutture methods.

Date
Page

Biodiversity Hotspots :-

These are the regions with high levels of species richness and hight degree of endemism (i.e species confined to that region are not found anywhere else) Hotspots Cover less than 2% of the earth land area.

(i) The total number of biodiversity hotspots in the world are 34.

(ii) These hotspots are regions of accelerated habitat loss.

(iii) Three hotspots which Cover Indials biodiversity regions are western ghats and Shri Lanka, Indo-Buma and Himalaya.

Protected Area :-

These are ecologically unique and biodiversity rich region. These are legally protected as biosphere reserve, national parks and Sanctuaries.

(i) India has 14 biosphere revserve, 90 national parks and 448 wildlife Sanctuaries.

(ii) The first national park Setup in India was Jim Carbett National Park.

Conventions on Biodiversity

The Conservation of biodiversity is a Collective responsible of all the nations.

(i) Historic Convention on biological diversity. (The Earth Summit) was held in Rio de-Janeiro In 1992. It called upon all nations to take appropriated measures for Conservation of biodiversity and Sustainable untillisation of its benefits.

(ii) The waeld Summit On Sustainable development was held in Johamesburg South Africa in 2002, as a follow up in the Current rate of biodiversity loss at global regional and local levels by 2010.

3°

Threats to Biodiversity :-

Extinction of species is a process of loss of Biodiversity. Before the appearance of economic man' on this planet earth Species extinction was caused only due to natural process but now most of the extinction us due to anthropogenic process. world biodiversity loss by 27% b/w 1970-2005 population of terrestrial species declive by 27% b/w 1970-2005 Terrestrial and fresh water species suffer most in tropical region due to habitat loss as decline by 40%

Causes :-

> Primary cause of Biodiversity loss is habital loss due to industrict
> Envisnmental pollution which include air pallution water pollution due to chemical pastes, pesticides radioactive materials etc
> The natural resources are our exploited to meet growing rurel poverty intensiul technology globalization of economy.

Measurements of Biodiversity

A variety of objective measures have been developed in order to estimate biodiversity from field observations. This article discusses the most commonly used biodiversity indices. The basic idea of a biodiversity variability in space as in time that can be used to compare biological entities composed of diverse components It is important to distinguish 'richness' from diversity Diversity usually implies a measure of both species number and equitability. Three types of indices can be distinguished.

- Species richness indices
- Evenness indices
- Taxonomic indices

1. Species richness Indices :-

Species richness is a measure for the total number of the species in a community. However, complete inventories of all species present at a certain location is an almost unattainable goal in practical applications.

2. Evenness Indices :-

Eveness expressess how evenly the individes in a community are distributed among the different species.

3. Taxonomic Indices :-

These indices take into account the taxonomic Indices relation between differe organisms in a community. Taxonomic diversity for Example, reflects the average taxonomic distance between any two organisms chosen at random from a sample. The distanc can be seen as the length of the path connecting these two organisms along the branches of a phylogenetic trees.

Date
Page

Classification of Biodiversity In India

India is one of the most diverse nation in the world. It ranks ninth in terms of plant species richness. Two of the world 25 biodiversity hotspots are found in India It is the origin of important crop species Such as pigeon pea, eggplant, Cucumber Cotton and sesame. India is also a Centre of various domesticated species such as millets, cereals, legume, vegetable, medicinal and aromatic crops etc

India is equally diverse in its faunal wealth there are about 91000 animals species found here

However diversity is depleting at a drastic rate and various programmes on biodiversity Conservation are being launched to Conserve nature.

The role of Biodiversity in Maintaining Environment Balance.

Biodiversity boosts ecosystem productivity where each species, no matter how small, all have an important role to play. For Example, A larger number of plant species means variety of crop. Greater species diversity ensures natural sustainability for all life form.

- Maintaining balance of the ecosystem recycling and storage of nutrients combating pollution and stabilizing climate protecting water resources forming and protecting soil and maintaining ecobalance.
- Provision of biological resources Provision of medicies and pharmaceuticals, food for the human population and animals, ornamental plants, wood products, breedig stock and diversity of species ecosystems and genes.

Conclusion :-

Biodiversity is our life. If the Biodiversit got lost at this rate then in near future the Survival of human being will be threatened. So it is our moral duty to Conserve Biodiversity. as well as Enviornment Long term maintanance of Species and their management requires Co-operative effort across entire landscape. Biodiversity Should be deal with at Scale of habitats or ecosystem rathers than at Species level.

The management of biodiversity is a Complex matter that needs the involvement of many different partners ranging from govt organisation to private Companies NGO's Commission and Volunteers. This aside national and international Commulegislation and enforcement effer an essential from for promating and maintaining biodiversity.

NAME = Pawan YEAR = 2023 - 2024

SUBJECT = E.V.S CLASS = Bsc. N.M

SEM = 3rd ROLL NO. = 231910

(INDEX)

S. No.	Topic	Page No.	Remarks
1.	Biodiversity of India (Plants and Animals)	1. 1	
2.	Endemic Species of Animals.		
(i)	The Asiatic Lions:	1.	
(ii)	Kashmir Stag	2	
(iii)	Lion-Tailed Macaque	3	
(iv)	Nilgai	4	
(v)	Sangai Deer	5	
(vi)	Pygmy Hog	6	
3.	Endemic Species of Plants.	7	
(i)	Saparia Himalayan		
(ii)	Uvaria Lurida	8	
(iii)	Nepenthes Khasiana	9.	
(iv)	Brachystelma Tirmakurense	10	
(v)	Priyala - Buchanania of Latifolia	11	

(INDEX)

Sr. N.	Topic	Page No	Remarks
(vi)	Calamus Flagellum	12	
4.	Endangered Species	13.	
5.	Endangered Species of plants In India	14	
(i)	Amentotaxus assamica	14	
(ii)	Actinodaphne Lawsonii	15	
(iii)	Kingiodendron Pinnatum	16	
(iv)	Commiphora wightii	17	
6.	Endangered species of Animals In India	18	
(i)	Asiatic Cheetah	18	
(ii)	Bengal Fox	19	
(iii)	Indian Elephant	20	
(iv)	Marbled Cats	21.	
7.	Conservation of Biodiversity	22-23	
8.	Loss of Biodiversity and Biodiversity Conservation of Methods	24-26	
9.	In Situ Conservation	28-30	

(INDEX)

Sr No	Topic	Page No.	Remark
•	National park	28.	
•	Biodiversity Hotspot	29	
•	Gene Sanctuary	30	
•			
10.	Ex-Situ Conservation & Reason of Conservation of Bio diversity	30 - 31	
11.	Level of Biodiversity	32	
(i)	Ecosystem diversity	32.	
(ii)	Species diversity	33 - 34	
(iii)	Genetic diversity	35 - 36	
12.	Values of Biodiversity	37 - 42	
(i)	Environmental values.		
(ii)	Social values		
(iii)	Econonic Values		
(iv)	Economic services		
(v)	Value of consumptive use		
(vi)	Value of productive use		
(vii)	Moral and ethical value		
(viii)	Aesthetic Values.		

Biodiversity of INDIA

Endemic Species of Animals:

(1)



The Asiatic Lion

Biodiversity of INDIA {Plants And Animals}

Endemic Species :-> Endemic species are those that are found in just one region and nowhere else in the world. However, since endemic species are unique to a particular geographyical region, they are more vulnerable to extinction. As a result, special effort may be required to conserve them

Endemic Species of Animals :-

* The following is a list of the species that are unique to India and can only be found here :-

1. The Asiatic Lion :- The Asiatic Lion, commonly known as the Indian Lion, is endemic to only "the Gir forest National Park".

(2.)

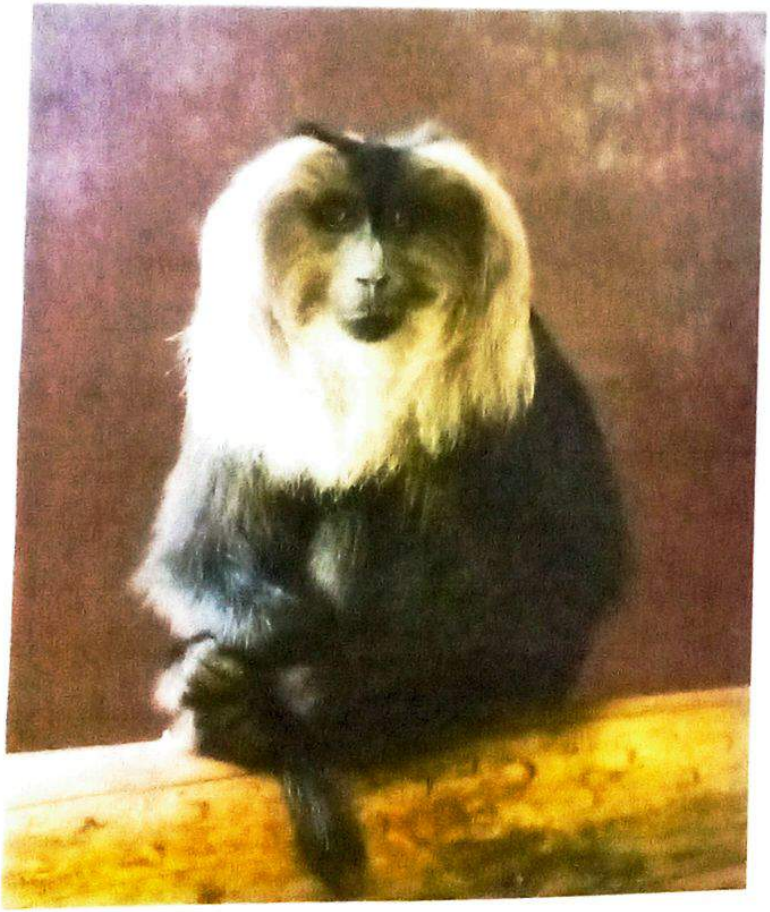


The Peaceful Stag

in Gujarat and the area immediately around it. These animals are considered to be on the verge of extinction. These are two of India's five big cats; the other are the Indian Leopard and Bengal Tiger. India is home to a total of five large cats.

2. Kashmir Stag :- Kashmir Stag is commonly known as Hangul; The Kashmir stag is a subspecies of central Asian red deer that is endemic to the region of Kashmir and its surrounding. These deer are found in the dense riverine forests of the high valleys and mountains in regions of Jammu and Kashmir and northern Himachal Pradesh. The Dachigam National Park in Kashmir serves as a significant habitat for the Hangul providing protection and preservation for this species. While their population is limited; a small group of Hangul has also been observed in the Overa-Aru wildlife Sanctuary in South Kashmir.

(3)



Lion-Tailed Macaque

5. **Lion tailed Macaque :-** The lion tailed Macaque is a rainforest dweller, often being found in the upper canopy of tropical moist evergreen or monsoon forests. It is diurnal, meaning it is active exclusively in daylight hours. When they is active, they will spend the day foraging and the other half will be spend resting or finding new areas to forage. An assessment in 2003 for ILTM reports 3000-3500 of these animals live scatted over several areas in Tamil nadu, Kerala, Karnataka. The lion-tailed macque ranked among the rarest and most threatened primates. Destruction of their habitat and their avoidance by Human proximity have led to the drastic decreases of their population.

From 1977 to 1980, public concern about the endanged status of lion-tailed macaque become the focal point to save Silent Valley, India's fiercest environment debate of the decade. From 1993 to 1996, 14 troops observed in Silent Valley National park, Kerala. Silent valley has the largest number of Lion-tailed macaque in South India.

(4)



Nilgai

4. Nilgai :- (Boselaphus tragocamelus), also called bluebuck, the largest Asian antelope. The nilgai is indigenous to the indian subcontinent, and Hindus accord it the same sacred status as cattle. Accordingly, the nilgai is the only one of the four Indian antelope that is still abundant. Nilgai is the Hindustani word for blue cow, which describes the blue-grey of adult bulls. The nilgai is categorised as of least concern by the International union for the conservation of Nature and Natural resource (IUCN). While it is common in India, the Nilgai occurs sparcely in Nepal and Pakistan. The In India the Nilgai is protected under Schedule III of the wildlife Protection Act of 1972. Major protected areas for the nilgai across India include Gir National Park, Bori Widlife sanctuary, Kanha National Park, Pachamarchi Biosphere Reserve, Panna Tiger Reserve, Pench Tiger Reserve, Satpura National Park (Madhya Pardesh); Todoba Andhari Reserve (Maharashtra); Kumbhalgarh Wildelife sanctuary, Sultanpur National Park in Gurgaon, Ranthambore National park and etc.

(5)



Sangai Deer

5. Sangai Deer :- Sangai is a medium sized deer, with uniquely distinctive antlers, with extremely long brow tine, which form the main beam. The forward protruding beam appears to come out from the eyebrow. This signifies its name, brow-antlered deer. The sexes are moderately dimorphic in body size and weight. Sangai was believed to be almost extinct by 1950, but six individual were spotted in 1953. and the state of Manipur has protected the species to increase the population to 204. Sangai faces threat from steadily degenerating habitat of phumdi as a result of continuous inundation and flooding caused due to artifical reservoir. Water quality of the reservoir is degrading due to pollution and stoppage of nutrient supply. There is also invasion of non-native plants like Paragrass. There has been decreases in area of phumdi from 31.60 km^2 in 1993 to 23.72 km^2 in 2010. Sangai also faces threats of diseases from the livestock. inbreeding depression and poaching

Endemic Species of Plants In India



Sapavia Himalayan

Endemic Species of Plants In India :-

1. Sapania Himalayan :- It is a rare and interesting root parasite plant on the roots of plants of grape family. and it is endemic to northeastern India. It is at the brink of extinction due to incessant human intervention in the natural forest environment and has been included in the endangered catategory. It was first reported from Arunachal Pradesh and is also distributed in Assam, Manipur, and Meghalaya. Sapania himalayana is an endoparasitic plant charater-ised by a greatly reduced vegetative body and gaint flowers. However, the mechanisms underlying its special life style and greatly altered plant form remainly known. To illustrate the evolution and adaptation of S. himalayana, we reported as de novo assembled genome and key insights into the molecular.

(2)



Uvaria Lurida

2. Uvaria Lurida :- It is a genus of flowering plants in the soursop family. Species are distributed over the old world tropics. It has climbing trees or shrubs. The flowers are borne singly or in a cluster. There are 6 petals in two whorls and many stamens. Uvaria lurida is a slimming small tree, with intense and vibrant red crimson and vinous flowers. It can be found in its natural habitat of south East Asia, from India to Queensland in Australia. Once it is established it requires very little in the way of care, being very resilient and tolerant to temperature and humidity. As a bonous, it a magnest of butterfly and humming birds, with its beautiful and unusual flowers that attract myriad of pollinators. Planting Uvaria lurida is easy, and it can be propagated from cutting. Plant it in well draining soil in sun or semi-shade and be sure to give it the water it needs regularly until it is established.

(3)



Nepenthes Khasiana

3. Nepenthes Khasiana :- It is a carnivorous plant endemic to the Khasi Hills of Meghalaya. It is critically endangered also. This is pitcher plant. This is believed to be the only species of pitcher plants found only in India. The species has a very localised distribution and is rare in the wild. But with new advancement in agro-technology and tissue culture, it is now being cultivated in campus of Nagaland University, Nagaland. These Pitcher Plants which are endemic to Meghalaya can be seen widely as decorative plants outside many houses of Nagaland. Isolated populations are known to occur in the Jarain area of the Jaintia Hills, the Baghmara area of the Garo Hills, adjacent to the Khasi Hills region of Meghalaya, in the upper Kharathong area, of Dima Hasao district Assam and in some parts of Nagaland.



4. Brachystelma Tumakurense :-

Brachystelma Tumakurense is a perennial herb. It has an unbranched, erect and delicate stem that grows up to a height of 1m (3 ft). The long and narrow leaves, which are curled such that they appear cylindrical are about 13 cm (5.1 in) long and are separated by internodalar spaces of 6 - 7cm (2.4 - 2.8 in).

Brachystelma Tumakurense is also known only from locality from where it was first described - Devarayanadurga in Karnataka's Tumakuru district. It is found growing among grasses in mixed forests. The species has a very localised distribution and is rare in the wild. But with new advancement in agro-technology and tissue culture, it is now being cultivated in campus of Nagaland University, Nagaland.

(5)



Priyala - Buchanania

5. Priyala - Buchanania Latifolia :-

Priyala, commonly known as Cudappa almond is one of most commonly used herb for the alleviation of inflammatory condition and allergic condition. The name Priyala means that it nourishes body. Priyala is found grown throughout India and is used in many diseases. It is also used in allergic diseases of skin.

Buchanania obovata is a small to medium sized understorey tree in woodlands native to northern Australia, in particular in Arnhem land in the Northern Territory Common names include green plum and wild mango. Buchanania latifolia belongs to the sapindales order, Anacardiaceae family and Anacardioideae subfamily. The fruit of this species is named Chironji nut. The leaves are spirally arranged, smooth, leathery elongated oblong and 5-26 cm long.

(6)



Calamus Flagellum

6. Calamus Flagellum :- Calamus Flagellum is a strong climber with stems in clusters forming The individual rattan stem form from a leafsheath up to 45 mm in diometer. Leaves are described as "ecirrate" produced from leafsheaths 6-7m long. Petioles are abouts, 10mm in didmeter. The flagellum is attached here (this is a whiplike climbing organ bearing reflexted strong claws on the lower side). The primary closely sheathing bract is tubular and fibrous at upper end. The rachillae are 100-250 mm long, each bearing 10-30 flower plants.

Endangered Species



Plants Animal

Endangered Species :-

A plant, animal or microorganism that is in immediate risk of Biological extinction is called endangered species or threatened species. In India, 480 plants species have be indentified as endangered species, 100 mammals and 150 birds are estimated to be endangered. India's biodiversity is threatened primarily due to:

1. Habitat destruction
2. Degradation and
3. Over exploitation of Resources.

The Red-data book contains a list of endangered species of plants and animals. It contains a list of species of that are endangered but might become extinct in the near future if not protect. Extinct species is no longer found in the world.

Endangered Species of Plants In INDIA

(i)



Amentotaxus Assamica

Endangered Species of Plants India India :-

1. Amentotaxus assamica :- This endangered plant species are present in Arunachal Pradesh including Twroo hills, Dafla hills, and Dilei valley. It is also found in the deciduous forest of Assam. It belongs to the coniferous tree group in india. This plant is also called as Assam catkin yew and is locally used construction. Amentataxus assamica is an endangered gymnosperm distributed in Eastern Himalayas, known for the its economic and ecological values. The species is also an important component in the high altitudes biodiversity facing risk of extinction. Amentotaxus is a genus of conifers (catkin-yews) comprising five species treated in either the Cephalotaxaceae, or in the Taxaceae when that family is considered in a broad sense.

(2)



Actinodaphne Lawsonii

2. Actinodaphne Lawsonii :- This endangered plant species which belongs to the Lauraceae family is present in the evergreen forest region of Kerala. It is found in the high elevation between 800 to 1400 meters. Its aromatic leaves have medicinal use. The plant population is decreasing because of habitat loss. It is endemic to the Western Ghats of southern India. It is threatened by habitat loss and fragmentation from forest clearance for agriculture. Mch of the species range is within protected areas. For this Actinodaphne Lawsonii Database on Rare, Endangered and threatened plant of Kerala is a red list complied by the Kerala Forest Research Institute (KFRI), Peechi, Kerala with information of from various institute and Scientists is clear that the Actinodaphne Lawsonii plant is presently threatened present in Kerala. It is also known from about six scattered locations in the western Ghats, within the Nilgiri Biosphere Reserve in Karnataka.

(3)



Kingiodendron Pinnatum

3. Kingiodendron Pinnatum :- This endangered plant species commonly called Malabar Mahogony is found in Kerala, Karnataka and TamilNadu. This evergreen tree, which grows up to 30 meters tall, is best known for its wood. It grows at elevation up to 1000 meters. The balsom obtained from its trunk is used as a medicine To treat gonorrhea as well as catesrhal condition of respiratory and genito-urinary tracts. It is an endangered plant of fabaceae family. fabaceae, the third - largest family of about 730 generations of angiosperms and more than 19400 species worldwide includes plants commonly called legumes. The scientific and medical development of the kingeodendron pinnatum has not yet been established although it is traditionally used by regional tribes. In this current study research has been conducted to find the therapeutic properties of kingiodendron pinnatum and its applications.



4. Commiphora wightii :-> This rare shrub is commonly called guggul which blooms between september to January month. It grows up to a height of 3-3.5 meter. It is present only in Gujarat, Madhya Pradesh, Maharashtra, and Rajasthan. This shrub is used to treat arthritis uninary disoder, rheumatism, obesity, piles, high cholesterol, and skin diseases. Invasive non-native species have led to a decrease in numbers of this species. Because of its use in traditional medicine, C. wightii has been overharvested, and has became so scared in its two habitats in India - Gujrat and Rajasthan - that the World Conservation Union has enlisted it in its efforts are in place to address this situation. India's National Medicinal Plants Board launched a project in kutch District to cultivate 500 to 800 hectares of guggal while a grass-roots conservation moment, led by IUCN associated Vineet Soni, has been started to educate guggal growers.

Endangered Species of Animals In India

(1)



Asiatic cheetah

Endangered Species of Animals In India :-

1. **Asiatic cheetah :-** The Asiatic cheetah has been listed as critically endangered on the IUCN Red List since 1996 following the Iranian Revolution of 1979, wildlife conservation was interrupted for several years. Manoeuvres with armed vehicles were carried in steppes, and local people hunted cheetahs and prey species unchecked. The gazelle population declined in many areas, and cheetah retreated to remote mountainous habitate. Reduced gazelle numbers, persecution, land-us change, habitat degradation and fragmentation and desertification contributed to decline of the cheetah population The cheetah is affected by loss of prey as a result of antelope hunting and overgrazing from introduced livestock. Its prey was pushed out as harder entered game reserves with their herds.

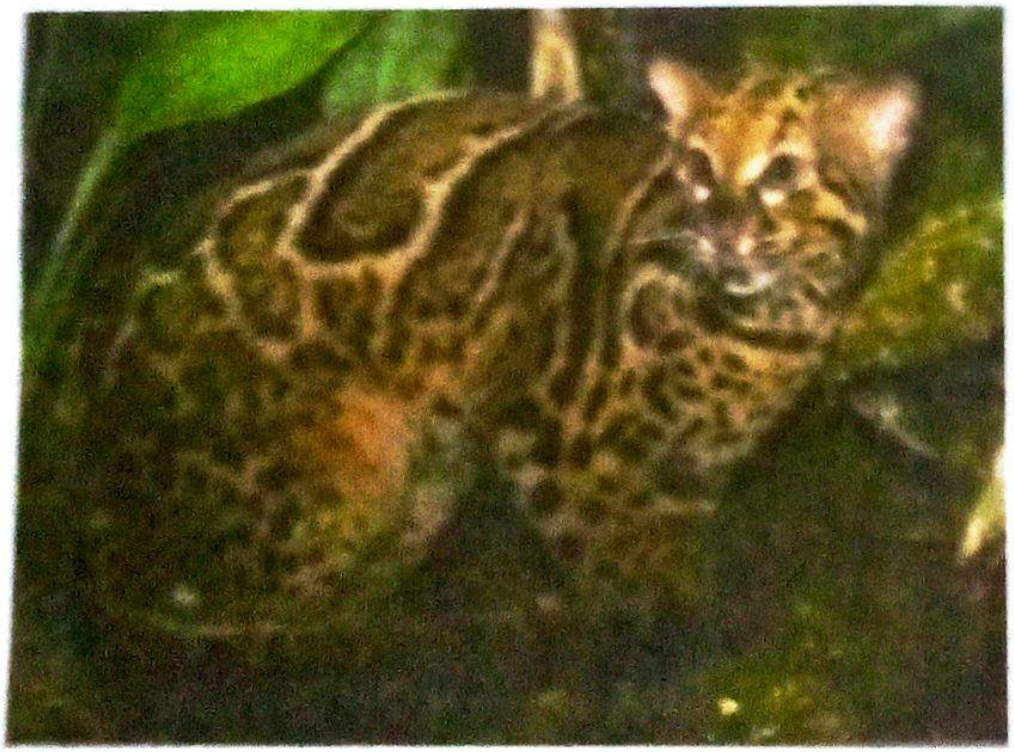
(2)



Bengal Fox

2. Bengal Fox :- The Bengal fox, also known as the Indian fox, is a ~~fox~~ endemic to the Indian subscontinent from the Himalayan foothills and Tesai of Nepal through southeren India; and from southern and eastern Pakistan to eastern India and southeastern Bangladesh. While the Bengal fox is common, it usually occurs at low densities across its range, and populations may experience significant fluctuation due to prey abundance and disease, ~~to~~ Any human disruption can be tolerated, but with the increase of human population and the increase growth of grasslands for aquicultural and industrial use, the habitat of the Bengal fox is continually being reduced. The combination of above causes, combined with disease and/or natural mortality could potentialy cause localized extirpation. Lack of habitat protection is perhaps the greatest threat to the Bengal fox. For example, in southern India; less than 2% of potential Indian fox habitat is covered under the exitting protected area network of states of Karnataka and AP.

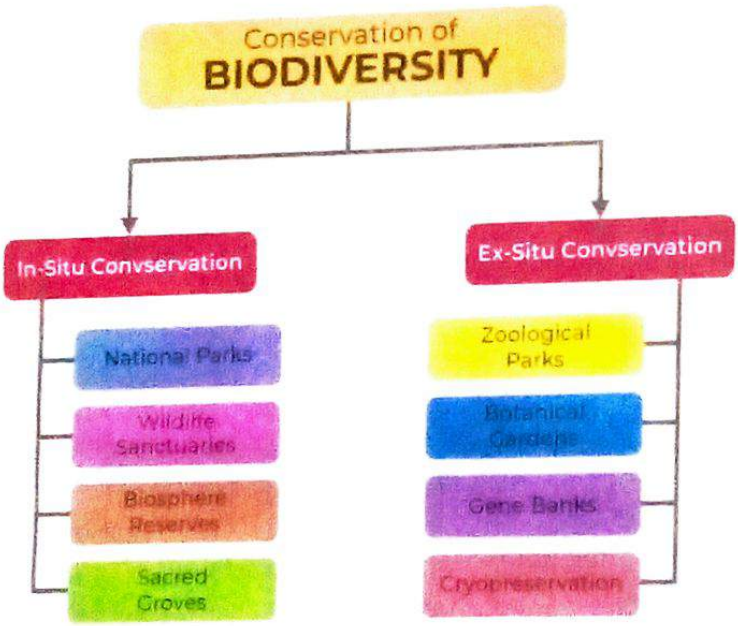
3. Indian Elephant :- The Indian elephant is one of three extant recognised subspecies of the Asian elephant and native to mainland Asia. Since 1986, the Asian elephant has been listed as Endangered on the IUCN Red List as the wild population has declined by at least 50% Since the 1930s to 1940s, i.e, three elephants generations. The Asian elephant is threatened by Habitat loss, degradation and fragmentation. The pre-eminent threats to Asian elephants today are habitat loss, degradation and fragmentation, which are driven by an expanding human population, and lead in turn to increasing conflicts between Humans and elephants when elephants eat our temple crops. Loss of significant loss extents of elephant range and suitable habitat of continues, their free movement is impeded by reservoirs hydroelectric projects and associated canals, irrigation dams, numerous pockets of cultivation and planatation highways, railways lines, mining and industrial development. Elephant conservation in northern West Bengal has been set back due to high-level of human-elephant conflict and elephant mortality owing to railways etc.



Marbled Cat

4. Marbled Cats :→ The marbled cats enlarged canines blotched coat pattern and broad feet resemble those of the larger clouded leopard. It has a short, broad face, rounded ears, and an extremely long, bushy tail. The coat is thick and soft, with well developed woolly underfur. The background colour can vary from dark gray-brown to yellowish grey to red-brown. The flanks and back are strikingly marked with large, irregular, dark-edged blotches, while the legs and underparts are patterned with black spots. Found from sea level up to elevations reaching 3000 meters, the marbled cats' distribution lies throughout northern India, Nepal, Sikkim, Assam, and south through Myanmar, Laos, Thailand. Although the Marbled Cat is believed to be rare, there is little information available to indicate its current status. Threats to the marbled cat include habitat destruction and habitat loss. The marbled cat seems sensitive to, and intolerant of human disturbance. The marbled cat is classified as Near Threatened (NT) by the International Union for Conservation of Nature (IUCN) and Protect under appendix I of the convention of (CITES).

Conservation of Biodiversity



Conservation of Biodiversity

The conservation of Biodiversity is the practice of protecting the natural environment and its various plant and animal species. This is done through various methods such as the protection of natural areas, the promotion of sustainable practices, and the restoration of degraded ecosystem. The conservation of biodiversity is important because it helps to maintain the natural balance of the environment, and its also provides a variety of economic and social benefits.

Biodiversity is the variety of life on earth, and is one of the planet's most important environment resource. The conservation of biodiversity is the practice of protecting the natural environment of protect the many species. This can be done through the establishment of protected areas.

Such as national parks and nature reserves, and by encouraging responsible land-use practices.

The conservation of Biodiversity important for a number of reasons. First, it is necessary to maintain the ecosystems that provide us with essential servies, such as clean air and water. Second; many of the world's medicinal plants come from biodiversity hotspot, and so it is is important to protect these regions in order to ensure that we continue to have access to new drugs. Third, diversity is important for tourism, and many people visit parks and reserve to see the amazing array of plants and animals that exist there. Finally it is simple morally wrong to destroy species just for the sake of it, when we have no need to do so. There are a number of ways that we can help to conserve biodiversity. First we can reduce our consumption, especially of resource that are derived from endangered species. Second, we can support the establishment of protection areas.

Loss of Biodiversity



Loss of Biodiversity

=> Loss of Biodiversity is the decrease in variety of life forms on Earth This can be caused by many factors including human activity, climate change, and natural disasters. The loss of Biodiversity can have a negative impact on the environment and human population. The number of factors like pollution, erosion, evolution, urbanization, industrialization and depeletion lead to loss of very harmful to the ecosystem as it indicates either loss of species, or redution of species in a natural habitat, or both of them on a global level. Loss of Biodiversity has a poor impact on the ecosystem. Loss of biodiversity dirctly impact the ecosystem and food chains in it. It affects agriculture and weakness the resistance to natural disasters like floods, drought etc.

Visit To Amusement Park, Ludhiana



Field trip to a park for studing various types of plants.

CLASSMATE
Date
Page



Studing the seeds and vehation (multi isolate divergent) in palm variety.

Visit to a garden within the park.





Near the Satluj River.

CLASSMATE
Date
Page 42

Conclusion :-

Biodiversity may be defined as the variability with which life presents on the earth. It is difficult for life to sustain on the earth is referred to as biological diversity. They are interconnected as well as create an impact on each other. Biodiversity includes a wide range of plants, animals, and microorganism In Laymans terms, and wide range of life forms found in a given geographic area. It refers to the various plant, animals and microorganism species. as well as the genetic mutation they encompass and the ecosystems they form. Biodiversity help to create and preserve cultural and religious values.