Biodiversity Succession

Unit -III

Subject Name
Environmental science

Mr. Supranshu Mishra
Assistant Professor
Civil Department

Course Details
Semester –III/IV

Faculty Introduction

Mr. Supranshu Mishra

M. Tech

Assistant Professor

Department of Civil Engineering

Evaluation Scheme

Sl. No.	Subject Codes	Subject Name	Periods			Evaluation Schemes				End Semester		Total	Credit
			L	T	P	CT	TA	TOTAL	PS	TE	PE		
WEEKS COMPULSORY INDUCTION PROGRAM													
1	AAS0303	Statistics and Probability	3	1	0	30	20	50		100		150	4
2	ACSE0306	Discrete Structures	3	0	0	30	20	50		100		150	3
3	ACSE0305	Computer Organization & Architecture	3	0	0	30	20	50		100		150	3
4	ACSE0302	Object Oriented Techniques using Java	3	0	0	30	20	50		100		150	3
5	ACSE0301	Data Structures	3	1	0	30	20	50		100		150	4
6	ACSAI0301	Introduction to Artificial Intelligence	3	0	0	30	20	50		100		150	3
7	ACSE0352	Object Oriented Techniques using Java Lab	0	0	2				25		25	50	1
8	ACSE0351	Data Structures Lab	0	0	2				25		25	50	1
9	ACSAI0351	Introduction to Artificial Intelligence Lab	0	0	2				25		25	50	1
10	ACSE0359	Internship Assessment-I	0	0	2				50			50	1
11	ANC0301 / ANC0302	Cyber Security * / Environmental Science *(Non Credit)	2	0	0	30	20	50		50		100	0
12		MOOCs (For B.Tech. Hons. Degree)											
		GRAND TOTAL										**1100**	**24**

Syllabus

- **UNIT-I (Basic Principle of ecology)**
- Definition, Scope and basic principles of ecology and environment. **Ecosystem:** Basic concepts, components of ecosystem.
- Food chains and food webs. Ecological pyramids, Energy flow in ecological systems, Characteristics of different ecosystems.
- **Biogeochemical Cycles**: Importance, gaseous and sedimentary cycles. Carbon, Nitrogen, Phosphorus and Sulphur Cycles.
- Basic concepts of sustainable development, SDGs, Ecosystem services, UN Decade for Eco restoration.

Syllabus

- **UNIT-II (Natural Resources and Associated Problems)**
- Natural resources and associated problems.
- **Forest resources:** Use and over-exploitation, deforestation. Timber extraction, mining, dams and their effects on forest and tribal people.
- **Mineral resources:** Use and exploitation, environmental effects of extracting and using mineral resources.
- **Food resources:** World food problems, changes caused by agriculture and over-grazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.
- **Land resources:** Land as a resource, land degradation, man induced landslides. Equitable use of resources for sustainable lifestyles.
- **Non Renewable Energy Resources:** Fossil fuels and their reserves, Nuclear energy, types, uses and effects,
- **Renewable Energy Resources:** hydropower, Solar energy, geothermal, tidal and wind energy, Biomass energy, biogas and its advantages.

Syllabus

- **UNIT-III (Biodiversity Succession)**
- Biodiversity and their importance, Threats to biodiversity, major causes, extinction's, vulnerability of species to extinction, IUCN threat categories, Red data book.
- Strategies for biodiversity conservation, principles of biodiversity conservation in-situ and ex-situ conservation strategies , Mega diversity zones and Hot spots, concepts, distribution and importance.
- **Succession:** Concepts of succession, Types of Succession. Trends in succession. Climax and stability.

Syllabus

- **UNIT-IV (Pollution and Solid Waste Management)**
- **Air pollution:** sources of air pollution, Primary and secondary air pollutants. Origin and effects of SO_X, NO_X, CO_X, CFC's, Hydrocarbon,, control of air pollution.
- **Water pollution:** sources and types of water pollution, Effects of water pollution, Eutrophication,
- **Soil pollution:** Causes of soil pollution, Effects of soil pollution
- **Noise Pollution:** Major sources of and effects of noise pollution on health,
- **Radioactive and thermal pollution:** sources and their effects on surrounding environment.
- Solid waste disposal and its effects on surrounding environment
- Climate change, global warming, acid rain, ozone layer depletion,

Syllabus

- **UNIT-V (Role of Community and Environmental Protection Acts)**
- Role of community, women and NGOs in environmental protection, Bioindicators and their role, Natural hazards, Chemical accidents and disasters risk management,
- Environmental Impact Assessment (EIA)
- **Salient features of following Acts:**
  - a. Environmental Protection Act, 1986, Wildlife (Protection) Act, 1972.
  - b. Water (Prevention and control of pollution) Act, 1974.
  - c. Air (Prevention and control of pollution) Act, 1981. Forest (Conservation) Act, 1980.
  - d. Wetlands (Conservation and Management) Rules, 2017;
  - e. Chemical safety and Disaster Management law.
  - f. District Environmental Action Plan. Climate action plans.

Applications for Emerging Technology

- Environmental engineering is the application of science and engineering principles to improve the environment (air, water, and/or land resources), to provide healthful water, air, and land for human habitation and for other organisms, and to remediate polluted sites.

Course Objectives(CO1)

- **To help the students in realizing the inter-relationship between man and environment and help the students in acquiring basic knowledge about environment.**
- To develop the sense of awareness among the students about environment and its various problems.
- To create positive attitude about environment among the student.
- To develop proper skill required for the fulfillment of the aims of environmental education and educational evaluations
- To develop the capability of using skills to fulfill the required aims, to realize and solve environmental problems through social, political, cultural and educational processes

Course Outcome

CO 1	Understand the basic principles of ecology and environment. Ecosystem: Basic concepts, components of ecosystem, food chains and food webs. Ecological pyramids	K1,K2
CO 2	Understand the different types of natural recourses like food, forest, Minerals and energy and their conservation	K1.K2
CO 3	Understand the importance of biodiversity, Threats of biodiversity and different methods of biodiversity conservation.	K1,K2
CO 4	Understand the different types of pollution, pollutants, their sources, effects and their control methods.	K1,K2,K3
CO 5	Understand the basic concepts of sustainable development, Environmental Impact Assessment (EIA) and different acts related to environment	K1,K2,K3

Program Outcome (PO's)

1. Engineering Knowledge,
2. Problem Analysis
3. Design/development of solutions,
4. Conduct investigations of complex Problems,
5. Modern tool usage,
6. The engineer and society,
7. Environment and sustainability,
8. Ethics,
9. Individual and team work,
10. Communication,
11. Project management and finance,
12. Life-long learning

Topic mapping with CO

Topic	Topic outcome	CO Map	Extend of mapping
Environment and its segment	Students understand the meaning of environment	CO1	1
Segment of atmosphere Multidisciplinary nature of EVS Scope and importance of evs	.Students understand different segment of atmosphere Students understand the basic knowledge of basic science Students understand the scope of environmental SC.	CO1	1
Food chain and food web	Students understand the definition and types of food chain	CO1	2
Ecological pyramid	Students understand the graphical representation of food chain	CO1	1
Ecosystem and its types	Students understand the interaction between the biotic and abiotic Components .along its types	CO1	1
Components of ecosystem	Students understand the living and non living components	CO1	1
Function of ecosystem	Students understand the functions of ecosystems.	CO1	2
Forest recourses	Students understand the functions and value of forest	CO1	1
Deforestation	Students understand the ill effect and causes of deforestation	CO1	1
Mining and transportation activity.	Students understand the ill effects of mining and	CO1	1

CO-PO Mapping

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	2	2	1	1	-	2	3	2	2	2	-	2
CO2	2	2	1	1	-	2	3	2	2	2	-	2
CO3	2	2	1	1	-	2	3	2	2	2	-	2
CO4	2	2	1	1	-	2	3	2	2	2	-	2
CO5	2	2	1	1	-	2	3	2	2	2	-	2
Mean	**2**	**2**	**1**	**-**	**-**	**1**	**3**	**2**	**2**	**2**	**-**	**2**

CO-PO and PSO Mapping (CO2..)

	PSO1	PSO2	PSO3
CO1	1	1	1
CO2	1	1	1
CO3	1	1	1
CO4	1	1	1
CO5	1	1	1
Average	1	1	1

Program Specific Outcome (PSO's)

Not applicable

COs and PSOs Mapping

Not applicable

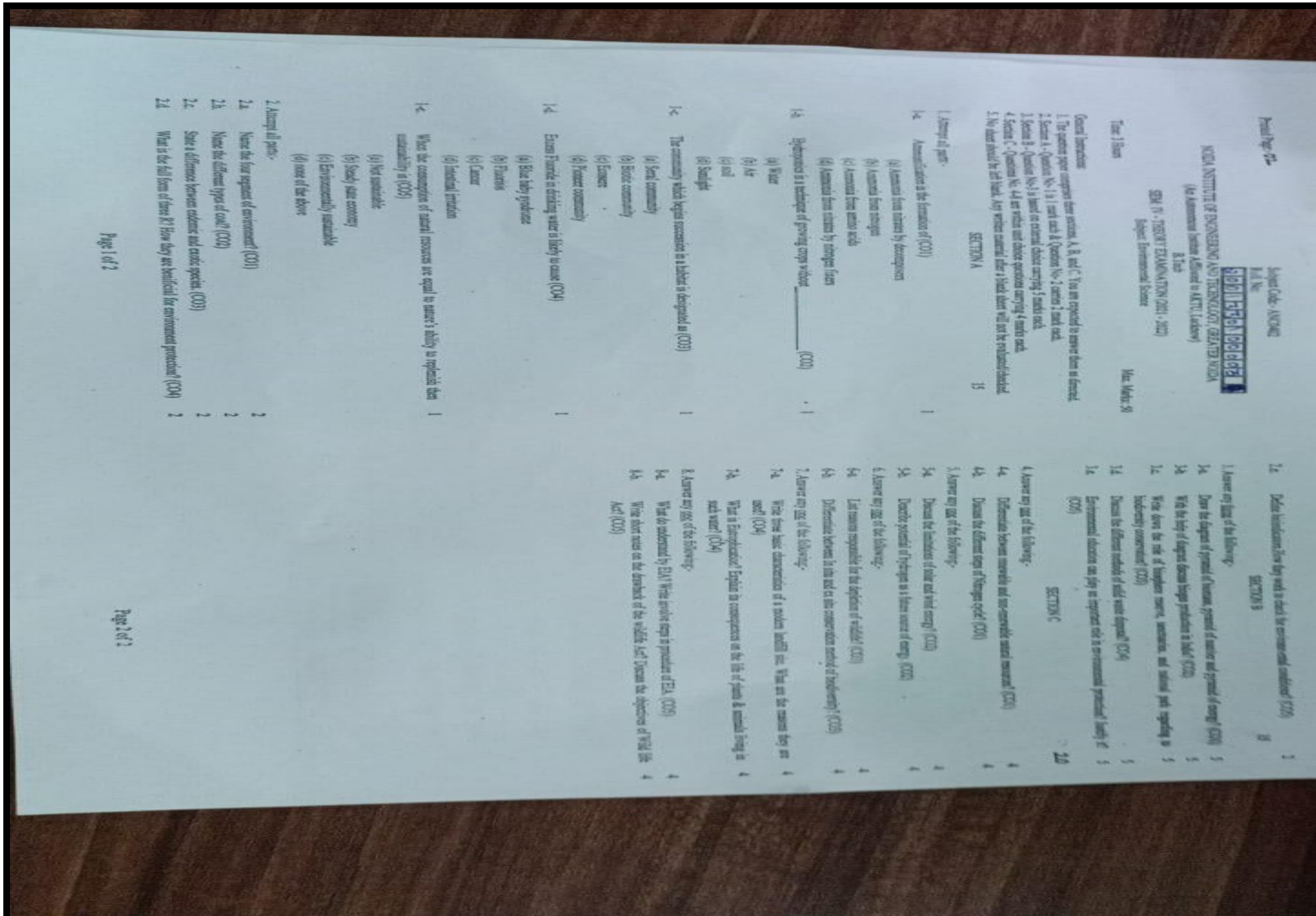
Program Educational Objectives (PEOs)

Not applicable

Result Analysis

Not Available (first time included)

End Semester Question Paper Templates



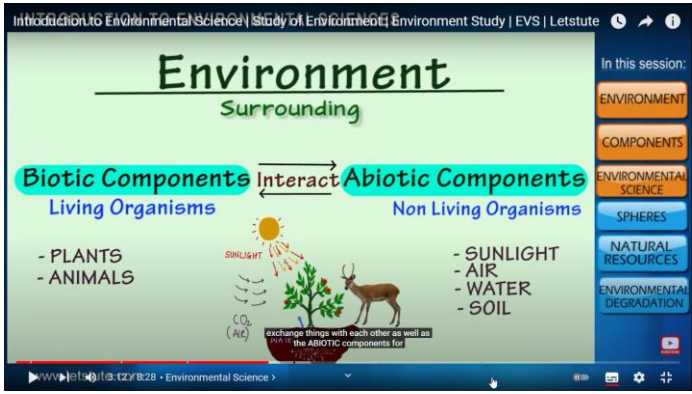
Pre requisite/Recap

- General knowledge of Environment and its spheres
- Brief introduction of flora and fauna
- Threats to biodiversity
- Natural resources and its effect on biosphere.

Brief Introduction about the Subject

- Environmental studies are the study of human interaction with the environment and in the interests of solving complex problems.
- Environment includes which we are directly or indirectly dependent for our survival, whether it is living component like animals, plants or non living component like soil, air and water.
- The biologist Jacob Van Uerkal (1864-1944) introduced the term ‘environment’

- Video: https://www.youtube.com/watch?v=7G3eXI_DPn8



Syllabus

Unit: III

- **UNIT-III (Biodiversity Succession)**
- Biodiversity and their importance, Threats to biodiversity, major causes, extinction's, vulnerability of species to extinction, IUCN threat categories, Red data book.
- Strategies for biodiversity conservation, principles of biodiversity conservation in-situ and ex-situ conservation strategies,Mega diversity zones and Hot spots, concepts, distribution and importance.
- **Succession:** Concepts of succession, Types of Succession. Trends in succession. Climax and stability.

Content

- Biodiversity and their importance,
- Threats to biodiversity,
- Major causes, extinction's,
- Vulnerability of species to extinction,
- IUCN threat categories, Red data book.
- Strategies for biodiversity conservation,
- Principles of biodiversity conservation in-situ and ex-situ conservation strategies,
- Mega diversity zones and Hot spots, concepts, distribution and importance.
- **Succession:** Concepts of succession, Types of Succession. Trends in succession.
- Climax and stability.

Course Objective(CO3)

Course objective of

- **CO 3 – To Understand the importance of biodiversity, Threats of biodiversity and different methods of biodiversity conservation (K1,K2)**

Course Outcome(CO3)

- CO 1 ---Understand the basic principles of ecology and environment. Ecosystem: Basic concepts, components of ecosystem, food chains and food webs. Ecological pyramidsK1,K2

- CO 2--Understand the different types of natural recourses like food, forest, Minerals and energy and their conservation K1.K2
- **CO 3 --Understand the importance of biodiversity, Threats of biodiversity and different methods of biodiversity conservationK1,K2**
- CO 4--Understand the different types of pollution, pollutants, their sources, effects and their control methods.K1,K2,K3
- CO 5--Understand the basic concepts of sustainable development, Environmental Impact Assessment (EIA) and different acts related to environmentK1,K2,K3

Topic wise mapping(CO3)

No	Topic	Topic outcome- Students will be able to	CO mapping	Extend of mapping
1	• Definition of biodiversity • Types of biodiversity	Meaning of biodiversity,alpha,beta and gamma biodiversity	CO3	1
2	Measurement of biodiversity Value of biodiversity	beta and gamma and alpha biodiversity	CO3	1
3	Causes to the loss of biodiversity	Different sources and causes which are responsible to the loss of biodiversity	CO3	2
4	Hot spot Conservation of biodiversity	Definition and criteria for the selection for hot spot	CO3	1

Topic wise mapping(CO3)

No	Topic	Topic outcome- Students will be able to	CO mapping	Extend of mapping
5	Ex situ method of conservation of biodiversity	Importance of forest reserve, national parks for the conservation of biodiversity	CO3	1
6	In situ method of biodiversity	Seed bank, Gene bank, tissue culture etc	CO3	1
7	Definition of succession Types of ecological succession	Meaning of succession. Types and importance of succession	CO3	2
8	Process of ecological succession	Process of succession	CO3	1

Biodiversity(CO3..)

Biodiversity

- It refers to the variety of living species on Earth, including plants, animals, bacteria, and fungi.
- While Earth's biodiversity is so rich that many species have yet to be discovered, many species are being threatened with extinction due to human activities, putting the Earth's magnificent biodiversity at risk.

Biodiversity

- It is a term used to describe the enormous variety of life on Earth.
- It can be used more specifically to refer to all of the species in one region or ecosystem.
- Biodiversity refers to every living thing, including plants, bacteria, animals, and humans.
- **Biodiversity**, also called **biological diversity**, the variety of life found in a place on Earth or, often, the total variety of life on Earth.
- A common measure of this variety, called species richness, is the count of species in an area.

- https://en.wikipedia.org/wiki/Biodiversity

Biodiversity(CO3..)

- Coined by Norman Myers, the term “Biodiversity hotspots” can be defined as the regions which are known for their high species richness and endemism

Bio = Life

Diversity = Variation

Biodiversity is the variety of life on earth and the essential interdependence of all living things.

Biodiversity is defined as

“the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.”

Biodiversity(CO3..)

- Coined by Norman Myers, the term “Biodiversity hotspots” can be defined as the regions which are known for their high species richness and endemism

Bio = Life

Diversity = Variation

Biodiversity is the variety of life on earth and the essential interdependence of all living things.

Biodiversity is defined as “the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.”

Types of biodiversity(CO3..)

Biodiversity is a measure of variation at the different level

Ggenetic, Species, and Ecosystem level.

Genetic biodiversity(CO3..)

Types of Biodiversity

- There are the following three different types of biodiversity:
- Genetic Biodiversity
- Species Biodiversity
- Ecological Biodiversity
- **Genetic diversity** is all the different genes contained in all individual plants, **animals**, fungi, and microorganisms.
- It occurs within a species as well as between species

Species biodiversity(CO3)

- **Species diversity** refers to the variety of different types of species found in a particular area. It is the biodiversity at the most basic level.
- It includes all the species ranging from plants to different microorganisms.
- No two individuals of the same species are exactly similar. For example, humans show a lot of diversity among themselves

Ecological biodiversity(CO3..)

- **Ecosystem biodiversity** is a collection of living and non-living organisms and their interaction with each other.
- Ecological biodiversity refers to the variations in the plant and animal species living together and connected by food chains and food webs.
- It is the diversity observed among the different ecosystems in a region.
- Diversity in different ecosystems like deserts, rainforests, mangroves, etc., include ecological diversity.

Biodiversity at Global Level(CO3..)

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 ecosystem.
- 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 productive and can withstand environmental stress.

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 source 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 parks and sanctuaries are a source of tourism. They are a source of beauty and joy for many people.

Biodiversity at Global Level(CO3..)

Ethical Importance

- All the species have a right to exist.
- Humans should not cause their voluntary extinction.
- Biodiversity preserves different cultures and spiritual heritage.
- Therefore, it is very important to conserve biodiversity.

Biodiversity at Global Level(CO3..)

Biodiversity at National Level(CO3..)

Indian Diversity

- Bacteria – 850
- Fungi – 23,000
- Algae – 2500
- Reptiles – 428
- Birds – 1228
- The numbers will increase if a thorough Survey is done again.

Biodiversity at national level(CO3..)

- Biodiversity refers to the totality of genes, species and -------- of a region.
- Within a community diversity is called----------
- Western Ghats and ------- in India are among 25 hot spots of Biodiversity
- Define the term biodiversity. Explain the different types of biodiversity
- What are the measurements of biodiversity?
- Write short note on Hot spots of Biodiversity.

Biodiversity Hotspots (CO3..)

Biodiversity Hotspots

- 2 Main Qualifying Criteria

According to Conservation International, a region must fulfill the following two criteria to qualify as a hotspot:

1.The region should have at least 1500 species of vascular plants i.e., it should have a high degree of endemism.

2.It must contain 30% (or less) of its original habitat, i.e. it must be threatened.

Biodiversity Hotspot,

there are major four biodiversity hotspots in India:

1.The Himalayas

2.Indo-Burma Region

3.The Western Ghats

4.Sundar land

Biodiversity Hotspots (CO3..)

The Himalayas

- It is considered the highest in the world, the Himalayas (overall) comprises North-East India, Bhutan, Central and Eastern parts of Nepal.
- This region (NE Himalayas) holds a record of having 163 endangered species which includes the Wild Asian Water Buffalo, One-horned Rhino; and as many as 10,000 plant species, of which 3160 are endemic.
- This mountain range covers nearly 750,000 km^2.

Indo – Burma Region

- The Indo-Burma Region is stretched over a distance of 2,373,000 km^2.
- In the last 12 years, 6 large mammal species have been discovered in this region: the Large-antlered Muntjac, the Annamite Muntjac, the Grey-shanked Douc, the Annamite Striped Rabbit, the Leaf Deer, and the Saola.
- This hotspot is also known for the endemic freshwater turtle species, most of which are threatened with extinction, due to over-harvesting and extensive habitat loss.
- There are also 1,300 different bird species, including the threatened White-eared Night-heron, the Grey-crowned Crocias, and the Orange-necked Partridge.

Biodiversity Hotspots (CO3..)

The Western Ghats

- The Western Ghats are present along the western edge of peninsular India and covers most of the deciduous forests and rain forests.
- As per UNESCO, it is home to at least 325 globally threatened flora, fauna, bird, amphibian, reptile and fish species. Originally, the vegetation in this region was spread over 190,000 km^2 but has been now reduced to 43,000 km^2.
- The region is also known for the globally threatened flora and fauna represented by 229 plant species, 31 mammal species, 15 bird species, 43 amphibian species, 5 reptile species and 1 fish species.
- UNESCO mentions that “Of the total 325 globally threatened species in the Western Ghats, 129 are classified as Vulnerable, 145 as Endangered and 51 as Critically Endangered.”
- Knowing in detail about the Western Ghats will be helpful for the aspirants for the Geography preparation.

Biodiversity Hotspots (CO3..)

Sundarland

- The Sundarland hotspot lies in South-East Asia and covers Singapore, Thailand, Indonesia, Brunei, and Malaysia.
- In the year 2013, the Sundarland was declared as a World Biosphere Reserve by the United Nations.
- This region is famous for its rich terrestrial and marine ecosystem.
- Sundarland is one of the biologically richest hotspots in the world which comprises 25,000 species of vascular plants, of which 15,000 are found only in this region.

Threats to Biodiversity(CO3)

H.I.P.P.O.

- There are many threats to biodiversity today.
  The biggest ones can be remembered by using the acronym H.I.P.P.O.:
- **H**abitat Loss,
- **I**nvasive Species,
- **P**ollution,
- Human **P**opulation,
- **O**verharvesting.

Threats to Biodiversity(CO3)

Threats to biodiversity

-**Habitat destruction** - Important to protect habitat in order to protect biodiversity within it. Huge pressure from the World's rapidly increasing population.

- **Global climate change** - Change in a biotic elements of ecosystems leading to biotic change.

- **Habitat fragmentation** – From human activity. Reduces ability of habitat to support species.

- **Pollution** - Introduction of pollutants such as nutrient overloading with nitrate fertilizer as well as more immediately harmful chemicals.

- **Over-exploitation** - This includes the illegal wildlife trade as well as overfishing, logging of tropical hardwoods etc.

- **Alien species** - Introduced by humans to regions where there are no natural predators.

- **Disease** - Reduction in habitat causing high population densities, encourages spread of diseases.

Threats to Biodiversity(CO3)

Some of the main threats to biodiversity are:

1. Human Activities and Loss of Habitat,
2. Deforestation,
3. Desertification,
4. Marine Environment,
5. Increasing Wildlife Trade and
6. Climate Change.

Human Activities and Loss of Habitat:

- This occurs when a particular area is converted from usable to unusable habitat.
- Industrial activities, agriculture, aquaculture, mining, deforestation, and water extraction are all central causes of habitat loss.
- This includes deforestation for wood for cooking food.
- Habitat fragmentation, the loss of large units of habitat, is also a serious threat to biodiversity.
- Human activities are causing a loss of biological diversity among animals and plants globally estimated at 50 to 100 times the average rate of species loss in the absence of human activities.

Two most popular species in rich biomes are tropical forests and coral reefs.

- Tropical forests are under threat largely from conversion to other land-uses, while coral reefs are experiencing increasing levels of over exploitation and pollution.

Threats to Biodiversity(CO3)

Biodiversity loss can result from a number of activities, including:

(a) Habitat conversion and destruction;
(b) Over-exploitation of species;
(c) Disconnected patches of original vegetation; and
(d) Air and water pollution.

Deforestation:

- Forest ecosystems contain as much as 80 percent of the world's terrestrial biodiversity and provide wood fiber and biomass energy as well as critical components of the global cycles of water, energy and nutrient.
- Forest ecosystems are being cleared and degraded in many parts of the world.
- Forest ecosystems contain about three times the amount of carbon currently present in the atmosphere and about one-third of this carbon is stored above ground in trees and other vegetation and two-third is stored in the soil.
- When forests are cleared or burned, much of this carbon is released into the atmosphere. According to current estimates, tropical deforestation and burning account for about one quarter of carbon emissions into the atmosphere from human activities.

Threats to Biodiversity(CO3)

Desertification:

- Desertification and deforestation are the main causes of biodiversity loss. Both processes are decisively influenced by the extension of agriculture.
- The direct cost of deforestation is reflected in the loss of valuable plants and animal species.
- Desertification process is the result of poor land management which can be aggravated by climatic variations.
- Converting wild lands to agriculture often involves ploughing the soils which leads in temperate regions to an average decline in soil organic matter between 25 and 40 per cent over twenty five years.
- Decreasing soil organic matter is always a clear indication of soil degradation, and often is accompanied by reductions in water infiltration, fertility, and ability to retain fertilizers.
  Ploughing also exposes soils to wind and water erosion, resulting in large-scale pollution of freshwater resources.

Threats to Biodiversity(CO3)

Marine Environment:

- Oceans play a vital role in the global environment. Covering 70 per cent of the earth's surface, they influence global climate, food production and economic activities.
- Despite these roles, coastal and marine environment are being rapidly degraded in many parts of the globe.
- In coastal areas, where human activities are concentrated, pollution, over-exploitation of resources, development of critical habitats such as wetlands, and mangroves, and water-flow from poor land-use practices have led to drastic reductions in near shore fisheries production and aquatic biodiversity.

Increasing Wildlife Trade:

- According to Nick Barnes, "Trade is another cause of biodiversity depletion that gives rise to conflict between North and South."
- Global trade in wildlife is estimated to be over US $ 20 billion annually.
- Global trade includes at least 40,000 primates, ivory from at least 90,000 African elephants, 1 million orchids, 4 million live birds, 10 million reptile skins, 15 million furs and over 350 million tropical fish.

Threats to Biodiversity(CO3)

Climate Change:

- As climate warms, species will migrate towards higher latitudes and altitudes in both hemisphere.
- The increase in the amount of CO_2 in the air affects the physiological functioning of plant and species composition.
- Moreover, aquatic ecosystems, particularly coral reefs, mangrove swamps, and coastal wetlands, are vulnerable to changes in climate.

Important Definitions(CO3)

Define

(1) Threatened species

(2) Extinct species

(3) Endemic species

(4) Endangered species

1. **Threatened species** are any species (including animals, plants, fungi, etc.) which can be endangered in the near future. Species that are threatened are characterized by the population of that species.

2. **Extinct species** is a particular animal or plant species that can no longer be available as a wild, the species has died out.

3. **Endemic species** are those species of plants and animals which are found exclusively in a particular area.

4. **An Endangered (EN)** species are those species which are less in number and can be extinct in near future.

ENDANGERED & ENDEMIC SPECIES OF INDIA:

- ENDANGERED & ENDEMIC SPECIES OF INDIA:
- Species are classified into various types:
- *Extinct species* → No longer found in the world
- *Endangered species* → A species is said to be endangered when its no has been reduced to a critical level. Unless it is protected it is in danger of extinction.
- *Vulnerable species* → when its population is facing continuous decline due to habitat loss.
- *Rare species* → when it is localized within restricted area.
- ENDANGERED SPECIES OF INDIA:
- A species is said to be endangered when its no has been reduced to a critical level. Unless it is protected it is in danger of extinction
-

Important Endangered Species(CO3)

- Important Endangered Species**:**
- Reptiles → Tortoise, green sea turtle, gharial, python
- Birds → Peacock, Siberian white crane, pelican, Indian Bustard
- Mammals → Indian wolf, red fox, tiger, Indian lion, golden cat, desert cat. Primates → lion tailed monkey, capped monkey, golden monkey
- Plants → medicinal plants, sandal wood tree

- ***No of threatened species of India:***
- Plants 250
- Birds 70
- Mammals 86
- Reptiles 25
- Amphibians 3
- Fishes 3
- Mollusks 2, Insects -50

ENDEMIC SPECIES(CO3)

- **ENDEMIC SPECIES:**
  - The species, which are found only in a particular region are known as endemic species.
  - 62% of endemic species are found in Himalayas and Western Ghats
- ***Fauna:***
  - Animals present in a particular region or period is Fauna.
  - 62% amphibians & 50% lizards are endemic to Western Ghats.
  - (ex) Monitor lizards, reticulated python, Indian salamander, viviparous toad.
- ***Flora:***
  - Plants present in a particular region or period is Flora
  - (ex) Sapria himalayana, ovaria lurida, pteridophyta, angiosperms etc

The IUCN Red List(CO3)

The IUCN Red List

- It is Founded in 1964, the IUCN Red List also known as the Red Data List evaluates the biological species in the world which are at the risk of extinction.
- IUCN aims to focus on the conservation of the world's species to reduce species extinction.
- More than 77,300 species have been assessed on the IUCN Red List.

The IUCN Red List can be divided into the following 9 categories:

1.Extinct (EX) – No known individuals remaining.
2.Extinct in the wild (EW) – Known only to survive in captivity, or as a naturalized population outside its historic range.
3.Critically endangered (CR) – Extremely high risk of extinction in the wild.
4.Endangered (EN) – High risk of extinction in the wild.
5.Vulnerable (VU) – High risk of endangerment in the wild.
6.Near threatened (NT) – Likely to become endangered shortly.
7.Least concern (LC) – Lowest risk. Does not qualify for a more at-risk category. Widespread and abundant taxa are included in this category.
8.Data deficient (DD) – Not enough data to assess its risk of extinction.
9.Not evaluated (NE) – Has not yet been evaluated against the criteria

Conservation of biodiversity(CO3)

- **Types of Conservation of biodiversity *:***
  - In-situ conservation (within habitat)
  - Ex-situ conservation (outside habitat)
- **IN-SITU CONSERVATION:**
- Involves protection of fauna & flora within its natural habitat

Biosphere Reserves:

- Biosphere Reserve (BR) is an international designation by UNESCO for representative parts of natural and cultural landscapes extending over large area of terrestrial or coastal/marine ecosystems or a combination thereof.
- BRs are designated to deal with one of the most important questions of reconciling the conservation of biodiversity, the quest for economic and social development and maintenance of associated cultural values.
- BRs are thus special environments for both people and the nature and are living examples of how human beings and nature can co-exist while respecting each others' needs.
  - Covers area of more than 5000 sq. km.
  - Protect species for long time

Conservation of biodiversity(CO3)

1	Nilgiri Biosphere Reserve	Tamil Nadu, Kerala and Karnataka	2000
2	Gulf of Mannar Biosphere Reserve	Tamil Nadu	2001
3	Sundarbans Biosphere Reserve	West Bengal	2001
4	Nanda Devi Biosphere Reserve	Uttarakhand	2004
5	Nokrek Biosphere Reserve	Meghalaya	2009
6	Pachmarhi Biosphere Reserve	Madhya Pradesh	2009
7	Simlipal Biosphere Reserve	Odisha	2009
8	Great Nicobar Biosphere Reserve	Andaman & Nicobar Islands	2013
9	Achanakmar-Amarkantak Biosphere Reserve	Chhattisgarh, Madhya Pradesh	2012
10	Agasthyamalai Biosphere Reserve	Kerala and Tamil Nadu	2016
11	Khangchendzonga National Park	Sikkim	2018
12	Panna Biosphere Reserve	Madhya Pradesh	2020

Conservation of biodiversity(CO3)

- **Role of Biosphere reserves:**
  - Protects endangered species
  - Site of recreation & tourism
  - Useful for education & research purpose
  - Gives long term survival
- **Restriction:**
- No tourism & explosives are permitted.

Conservation of biodiversity(CO3)

National Park:

- National park is an area which is strictly reserved for the betterment of the wildlife and biodiversity, and where activities like developmental, forestry, poaching, hunting and grazing on cultivation are not permitted.
- The government can declare an area as a national park with adequate ecological, geo-morphological and natural significance.
- In these parks, even private ownership rights are not allowed.
- Their boundaries are well marked and circumscribed. They are usually small reserves spreading in an area of 100 sq. km. to 500 sq. km.

Conserve Plants

- **Examples:**
- Citrus sanctuary – North India
- Pitcher plant -North India
- https://www.careerpower.in/national-parks-india.html

Conservation of biodiversity(CO3)

- **Wildlife Sanctuaries:**
- A **Wildlife Sanctuary** is a protected area of importance for flora, fauna, or features of geological or other interest, which is reserved and managed for conservation and to provide opportunities for study or research.
- The Wild Life (Protection) Act, 1972 provides for the establishment of Protected Areas in India
  - Conserve animals & Birds only
- (Examples)
- Mudumalai wildlife sanctuary –TN
- Vedanthangal Lake Bird sanctuary- TN
- Sultanpur Bird sanctuary - Haryana
- Ghana Bird sanctuary - Rajasthan
- Wild Ass sanctuary -Gujarat
-
- ***Role of wildlife Sanctuaries:*** Protects animals only Harvesting of timber, Collection of forest products

https://en.wikipedia.org/wiki/List_of_wildlife_sanctuaries_of_India

Conservation of biodiversity(CO3)

- **Other Projects for conservation of animals:**
- Examples:
- Gir Lion Project, Crocodile Breeding Project, Project Elephant, Project Tiger etc.
-
- **Merits of In-situ conservation:**
- Very cheap & convenient method
- Species adjust to floods, drought, forest fires etc.
- **Demerits**
- Large area is needed, Maintenance is not proper due to pollution and lack of staff

Ex situ conservation of Biodiversity(CO3)

Definiton

- Ex-situ conservation literally means, "off-site conservation".
- It is the process of protecting an endangered species of plant or animal by removing part of the population from a threatened habitat and placing it in a new location, which may be a wild area or within the care of humans.
- While ex-situ conservation comprises some of the oldest and best known conservation methods, it also involves newer, sometimes controversial laboratory methods.
- Such strategies include establishment of
- Botanical gardens,
- Zoos,
- Conservation strands and gene,
- Pollen seed,
- Seedling, tissue culture and DNA banks.

Merit and demerit of Ex situ conservation(CO3)

- **Merits**
- Survival / life span of species increase by special care Species are assured for food, water, shelter etc Endangered species are preserved
-

Demerits:

- Expensive method Freedom of wildlife is lost
- Animal cant survive in natural environment

Ex situ conservation of Biodiversity (CO3)

Difference between "In-situ Conservation" and "Ex-situ Conservation":

In situ Conservation:

- It is conservation of endangered species in their natural habitats.
- The endangered species are protected from predators.
- The depleting resources are augmented.
- The population recovers in natural environment.

Ex situ Conservation:

- It is conservation of endangered species outside their natural habitats.
- The endangered species are protected from all adverse factors.
- They are kept under human supervision and provided all the essentials.
- Offspring produced in captive breeding are released in natural habitat for acclimatization.
- https://www.hindawi.com/journals/isrn/2013/985037/

Megadiversity Zones (CO3)

- The term **megadiverse country** refers to any one of a group of nations that harbor the majority of Earth's species and high numbers of endemic species.
- Conservation International identified 17 megadiverse countries in 1998.
- Many of them are located in, or partially in, tropical or subtropical regions.
- Brazil, China, Colombia, Costa Rica, India, Indonesia, Kenya, Mexico, Peru, the Philippines, South Africa and Venezuela etc.
- **India is one of the 12 mega biodiversity countries in the world.**

Hot spots in India

- The Himalayas,
- The Western Ghats,
- The Indo-Burma region
- The Sundaland.
- The Sundarbans and
- The Terrai-Duar Savannah grasslands

Megadiversity Zones (CO3)

Biosphere Reserves in India

There are 18 biosphere reserves in India:

- Cold Desert, Himachal Pradesh
- Nanda Devi, Uttrakhand
- Khangchendzonga, Sikkim
- Dehang-Debang, Arunachal Pradesh
- Manas, Assam
- Dibru-Saikhowa, Assam
- Nokrek, Meghalaya
- Panna, Madhya Pradesh
- Pachmarhi, Madhya Pradesh
- Achanakmar-Amarkantak, Madhya Pradesh-Chhattisgarh
- **Kachchh, Gujarat (Largest Area)**

Megadiversity Zones (CO3)

- Sundarban, West Bengal
- Seshachalam, Andhra Pradesh
- Agasthyamala, Karnataka-Tamil Nadu-Kerala
- **Nilgiri, Tamil Nadu-Kerala (First to be Included)**
- Gulf of Mannar, Tamil Nadu
- Great Nicobar, Andaman & Nicobar Island

National Parks:

- There are 106 existing national parks in India covering an area of 43,716 km2, which is 1.33% of the geographical area of the country (National Wildlife Database Dec. 2020).
- In addition to the above 75 National Parks covering an area of 16,608 km2 are proposed in the Protected Area Network Report (Rodgers & Panwar, 1988).
- https://en.wikipedia.org/wiki/List_of_national_parks_of_India

Megadiversity Zones (CO3)

Wildlife Sanctuaries:

A **Wildlife Sanctuary** is a protected area of importance for flora, fauna, or features of geological or other interest, which is reserved and managed for conservation and to provide opportunities for study or research.

The Wild Life (Protection) Act, 1972 provides for the establishment of Protected Areas in India

Conserve animals & Birds only

(Examples)

Mudumalai wildlife sanctuary –TN

Vedanthangal Lake Bird sanctuary- TN

Sultanpur Bird sanctuary - Haryana

Ghana Bird sanctuary - Rajasthan

Wild Ass sanctuary -Gujarat

Role of wildlife Sanctuaries: Protects animals only Harvesting of timber, Collection of forest products

https://en.wikipedia.org/wiki/List_of_wildlife_sanctuaries_of_India

Megadiversity Zones (CO3)

Biogeographic zones

India has been devided into **ten recognizable biogeographic zones** as follows:

- Trans-Himalayan Region
- Himalayan Zone
- Indian Desert Zone
- Semi Arid Region
- Western Ghats
- Deccan Plateau
- Gangetic Plain
- North East Region
- Coastal Region
- Andaman and Nicobar Islands

https://www.gktoday.in/topic/biogeographic-regions-of-india/

Value of biodiversity(CO3)

Value of biodiversity:

Some of the major values of biodiversity are as follows:

1. **Environmental Value**
2. **Social Value**
3. **Ecosystem Services**
4. **Economic Value**
5. **Consumptive use value**
6. **Productive Use Value**
7. **Ethical and Moral Value**
8. **Aesthetic Value.**

Direct values

- These are those ways by which we can directly use biodiversity for our benefit.
- For example we can use plants as food of for deriving medicines in the laboratory.
- Economic value and recreational value comes under this category.

Direct values are further classified into:

Consumptive use Value:

- Consumptive use value is the value put on the products of nature which are consumed directly without passing through a market.
- **For example,** if we use firewood by cutting down a tree or consume an animal after hunting it.

Productive use value:

- Productive use value is the value put on the products of nature which are consumed after passing through a market.
- **For example,** if we buy fish from the market then it will have productive use value.

Value of biodiversity(CO3)

Indirect values or Non-Consumptive value

- These are those ways by which we don't physically use a plant or animal, but by virtue of its existence it provides services that keep the ecosystem healthy.

Indirect values would include

- **Ethical or moral value,**
- **Existence value,**
- **Ecological value,**
- **Aesthetic value,**
- **Cultural or spiritual value,**
- **Option value and**
- **Scientific or educational value**
- **Social values**
- Social value of biodiversity lies in the more and more use of resources by affluent societies.
- Apart from traditional agricultural systems, in recent years, farmers have begun to receive economic incentives to grow each crop for national or international markets rather than to supply local needs.
- This has resulted in local food shortages, unemployment, landlessness and increased tendency to drought and floods.

Value of biodiversity(CO3)

Ethical and Moral value

- Every species has its moral right to exist on earth. Every human culture, religion and society has its own ethical values.
- There are several cultural, moral and ethical values, which are associated with the conservation of biodiversity.
- We have in our country a large number of sacred grooves or deolis preserved by tribal people in several States.
- These sacred groves around ancient sacred sites and temples act as gene banks for wild plants.

Economical value

Biodiversity has economic value because it is a source of important products. Some of these products are :

- • **Food supplies:** Agriculture, the very basis of human survival, depends on plants and animals.
- • **Source of medicines:** A large number of medicines are obtained from plants and animals. Cinchonas, Belladonna are important medicinal plants. Snake venom is used in making medicines.
- • **Source of raw materials for industries.**
  • It supports the economy of a country.

Value of biodiversity(CO3)

Aesthetic value

- Nature contributes immensely to the beauty of the world.
- Can you imagine a world without trees, grass, flowers, birds or animals?
- Thus, biodiversity has immense aesthetic value for us.

Ecological value

- Every species plays a unique role in the ecosystem.
- Through this role its maintains the ecological balance.
- The ecological services maintain ecological balance and the ecosystem.

Some of these services are:

- **Waste Management:** Nature has a unique way of managing wastes. The waste of one organism becomes food for another organism. So, wastes don't accumulate.
- **For example**, forests absorb greenhouse gases like carbon dioxide during photosynthesis.
- This helps to reduce global warming.
- Forests also contribute to precipitation due to transpiration.
- Many other plants and animals help to keep forests healthy.
- So, the entire biodiversity contributes towards maintaining climate stability.

Value of biodiversity(CO3)

Scientific value or Educational value

- Biodiversity is of great scientific value.
- Many species of plants and animals are the subjects of our research.
- We use many species for research and in turn get a lot of knowledge from their study.
- Through research on plants, insects and animals we find better ways of making medicines, hybrid plants, engineering designs and many other things that are of immense value to human beings.
- **For example,** the design of Velcro is developed from cockle-burrs which cling fast to clothing as we walk in the woods.

Value of biodiversity(CO3)

Cultural and Spiritual value

- Many cultures of human beings are closely related to many species of plants and animals.
- For example, Hindus Identify owls as the transport of Goddess Lakshmi. Many religions identify themselves with such plants and animals which renders to them a cultural or spiritual value.

Option value

- There are many plants and animals which have not yet been discovered or even if they have been discovered we do not know if they can be of any use to us.
- This untapped potential is referred to as option value.
- For example, there might be a plant or animal which we can use in the future to find a cure for corner.
- If we destroy biodiversity then we lose this chance of finding a cure for cancer. Thus biodiversity has great potential of being useful to us in the future.

Ecological succession(CO3)

Ecological succession

“Ecological succession is a series of changes that occur in an ecological community over time.”

- It is the process of change in the species structure of an ecological community over time.
- The time scale can be decades (for example, after a wildfire), or even millions of years after a mass extinction.
- **The "engine" of succession**, the cause of ecosystem change, is the impact of established organisms upon their own environments.
- A consequence of living is the sometimes subtle and sometimes overt alteration of one's own environment.

Two different types of succession

- Primary succession
- Secondary succession

Ecological succession(CO3)

The complete process of a primary autotrophic ecological succession involves the following sequential steps, which follow one another:

1. Nudation:

- The process of succession begins with the formation of a bare area or nudation by several reasons, such as oceanic eruption, landslide, flooding, erosion, deposition, fire, disease, or other catastrophic agency.
- New lifeless bare areas are also created by man, for example, walls, stone quarrying, burning, digging, flooding large land areas under reservoirs, etc.

2. Invasion:

- The invasion is the arrival of the reproductive bodies or propagules of various organisms and their settlement in the new or bare area.
- Hants are the first invaders (pioneers) in any area because the animals depend on them for food.

The invasion includes the following three steps:

- **Dispersal or migration**
- **Ecesis**
- **Aggregation**

Ecological succession(CO3)

Dispersal or migration:

- The seeds, spores or other propagules of the species reach the bare area through the agency of air, water or animals.
- The process starting from the time a propagule leaves the parent plant to the time it arrives the bare area is called migration.

Ecesis:

- This is the successful establishment of migrated plant species into the new area.
- It includes germination of seeds or propagules, growth of seedlings and starting of reproduction by adult plants only a few immigrant propagules are capable of doing this under primitive hard conditions, and thus most of them disappear.

Aggregation:

- This final stage of invasion, the successful immigrant individuals of a species increase their number by reproduction and aggregate in a large population in the area and in consequence individuals of the species come close to each other.

Ecological succession(CO3)

3. Competition and reaction:

- As the numbers of individuals of a species increase due to multiplication and all aggregate at the limited place, the competition for space and nutrition is started among them (intraspecific competition).
- They also compete with individuals of other species that may enter the area (interspecific competition).

4. Stabilization or climax:

- Eventually a stage is reached when the final terminal community becomes more or less stabilized for a longer period of time and it can maintain itself in the equilibrium or steady state with the climate of that area.
- Theoretically at least, this last serai stage is mature, self-maintaining, self reproducing through development stages and relatively permanent.
- The vegetation is tolerant of the environmental conditions it imposed upon itself.

- https://www.vedantu.com/biology/ecological-succession
- https://www.biotecharticles.com/Biology-Article/Ecological-Succession-Stages-and-Processes-750.html
- https://www.yourarticlelibrary.com/environment/4-sequential-steps-involves-in-the-process-of-a-primary-autotrophic-ecological-succession/3789

Ecological succession(CO3)

Mechanism of Ecological Succession

The entire process of primary succession is accomplished through a series of progressive steps followed one after another. The different sequential steps may be outlined as below:

(1) Nudation:

It is a process of formation of a bare area without any form of life for the arrival of new species. The causes of nudation may be:

(a) Topographic:

The existing community may fade away due to soil erosion, landslide, volcanic activity, etc.

(b) Climatic:

The existing community may be demolished due to storm, fire, frost, drought.

(c) Biotic:

The community may also be destroyed by anthropogenic activities like the destruction of the forest, the destruction of grassland, etc.

Ecological succession(CO3)

(2) Invasion:

The successful establishment of a species in a vacant area is called invasion. This process of establishment is completed in three successive steps:

(a) Migration (dispersal):

The seeds, spores of the species are carried to the unadorned area by the agents like air, water, etc.

(b) Establishment:

The process of the successful establishment (germination and growth) of the species in the new area as a result of adjustment with the prevailing conditions is known as ecesis.

(c) Aggregation:

After ecesis, the individuals of species increase their number by reproduction and thus, are aggregated in a particular area.

Ecological succession(CO3)

(3) Competition and Coaction:

As the species aggregate within a restricted space, there happens competition for space and nutrition. Secondly, the life process of one individual is affected by the surrounding species in various ways which are known as coaction.

(4) Reaction:

The species present in an environment constantly interact with it by causing its modification. The mechanism of the modification of the environment through the influence of living organisms on it is known as a reaction. Hence, the existing community may be replaced by another community.

(5) Stabilization (Climax):

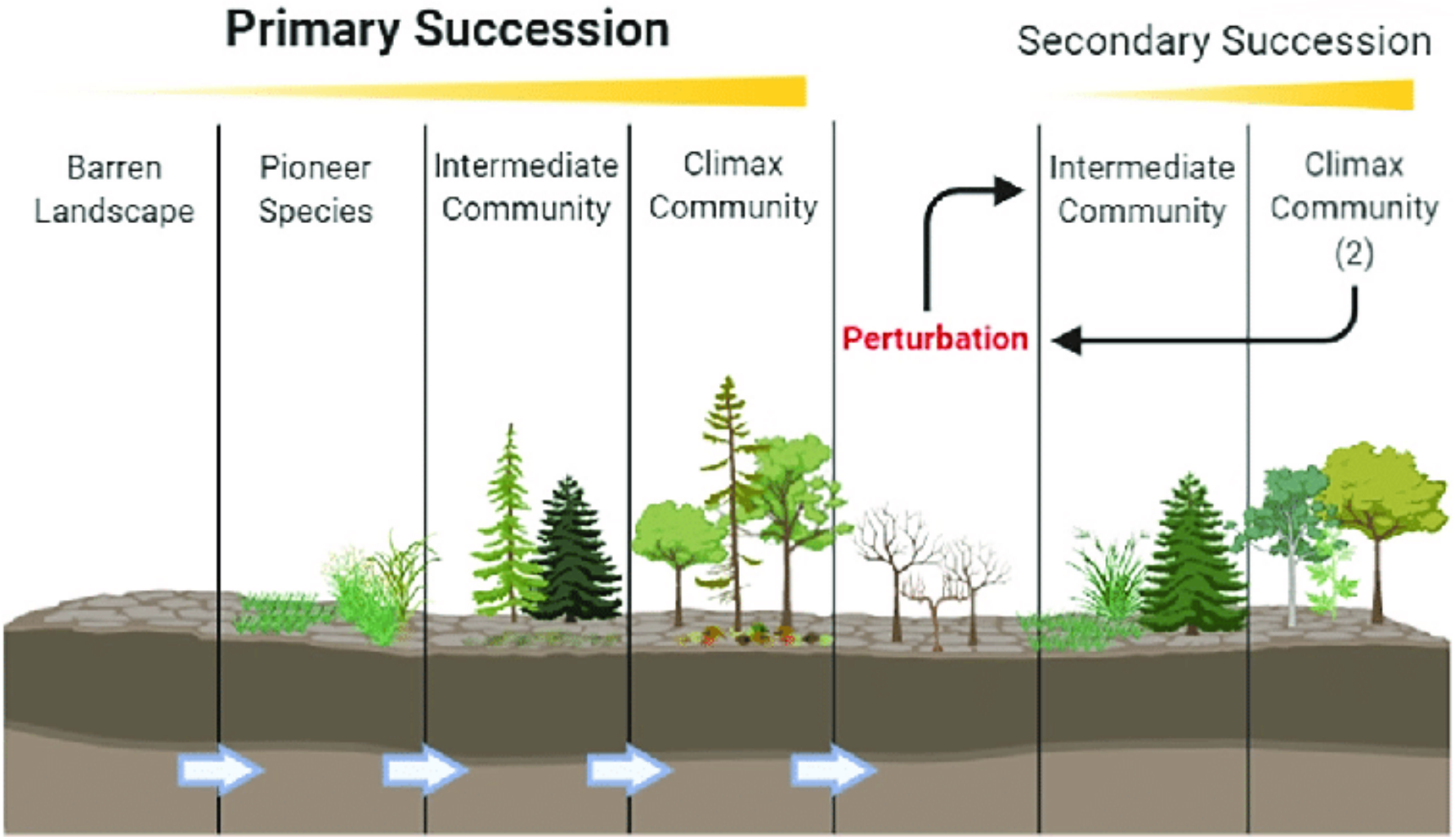
At last, a final or terminal community is established which can maintain equilibrium. This community is known as the climax community.

Ecological succession(CO3)

Primary Succession

- Primary succession is the succession that starts in lifeless areas such as the regions devoid of soil or the areas where the soil is unable to sustain life.
- When the planet was first formed there was no soil on earth.
- The earth was only made up of rocks.
- These rocks were broken down by microorganisms and eroded to form soil.
- The soil then becomes the foundation of plant life.
- These plants help in the survival of different animals and progress from primary succession to the climax community.
- If this primary ecosystem is destroyed, secondary succession takes place.

Ecological succession(CO3)



Ecological succession(CO3)

Secondary succession

- It occurs when the primary ecosystem gets destroyed
- eg., a climax community gets destroyed by fire.
- It gets recolonized after the destruction.
- This is known as secondary ecological succession. Small plants emerge first, followed by larger plants.
- The tall trees block the sunlight and change the structure of the organisms below the canopy.
- Finally, the climax community arrives.

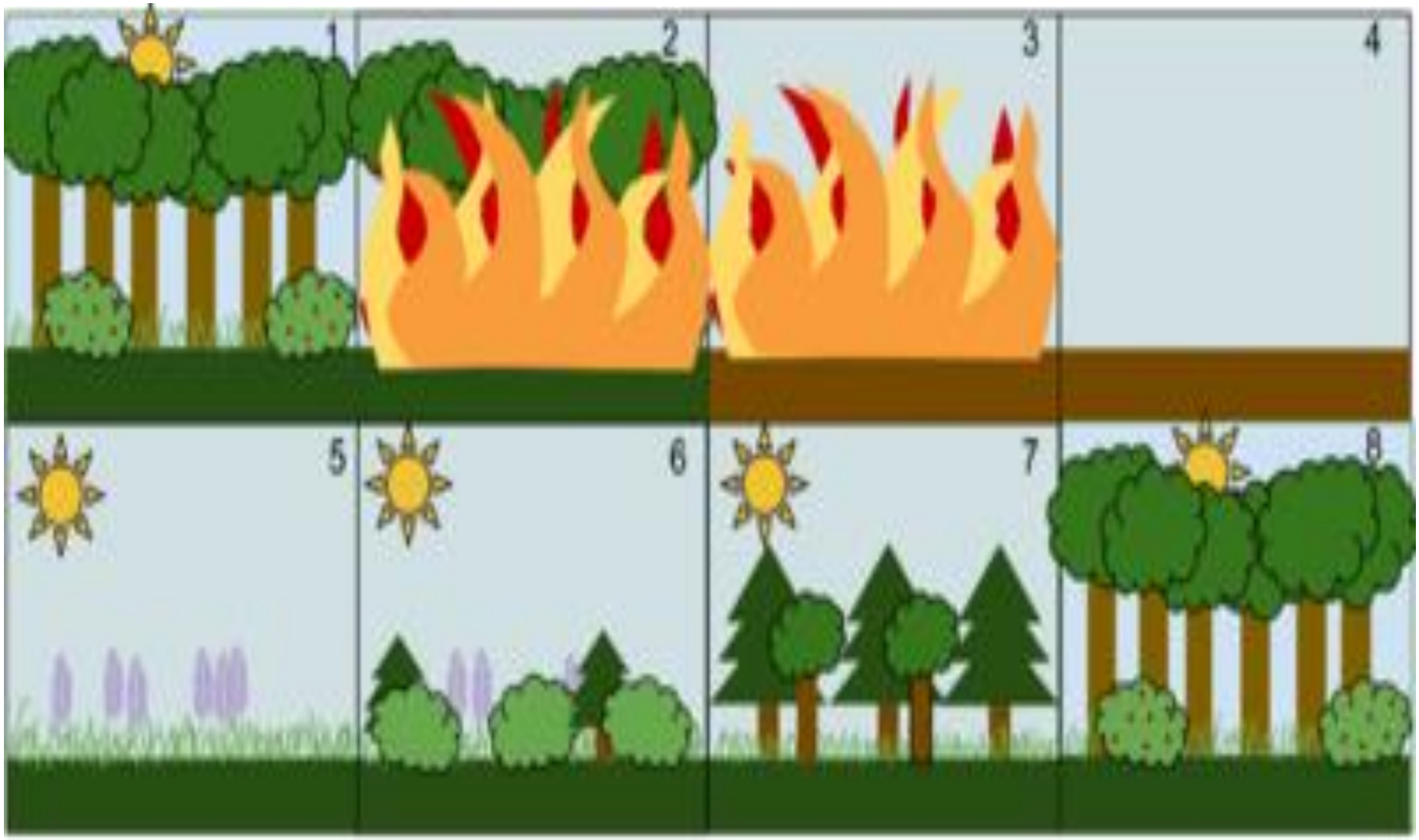
Ecological succession(CO3)

Secondary succession

- It is one of the two types ecological succession of a plant's life.
- **Secondary succession** is a process started by an event (e.g. forest fire, harvesting, hurricane, etc.) that reduces an already established ecosystem (e.g. a forest or a wheat field) to a smaller population of species.
- **Secondary succession** occurs on pre-existing soil whereas primary succession usually occurs in a place lacking soil.
- Many factors can affect secondary succession, such as trophic interaction, initial composition, and competition-colonization trade-offs.
- The factors that control the increase in abundance of a species during succession may be determined mainly by
- Seed production and dispersal,
- Micro climate;
- Landscape structure (habitat patch size and distance to outside seed sources);
- Bulk density,
- pH, and
- Soil texture (sand and clay).

Ecological succession(CO3)

Secondary succession



Ecological succession(CO3)

- *A seral community is an intermediate stage of ecological succession advancing towards the climax community."*
- A seral community is replaced by the subsequent community.
- It consists of simple food web and food chains.
- It exhibits a very low degree of diversity.
- The individuals are less in number and the nutrients are also less.
- https://en.wikipedia.org/wiki/Ecological_succession
- https://www.britannica.com/science/ecological-succession

Climax and stability(CO3)

- A *climax community* refers to a stable ecosystem in its final stage of ecological succession.
- *Succession* is when one community of plants and animals replaces another in an ecosystem.
- In a *climax community,* the plants and animals are in balance with each other and their environment. It remains this way unless destroyed or disrupted, as by a fire.
- **Climax**, in ecology, the final stage of biotic succession attainable by a plant community in an area under the environmental conditions present at a particular time.
- **For example,** cleared forests in the eastern United States progress from fields to old fields with colonizing trees and shrubs to forests of these early colonists and finally to climax communities of longer-lived tree species.

Climax and stability(CO3)

Climax community

Unity :-

- Climax is a unit. All the species are not taken as an organized unit.
- Life or growth forms of plants indicate the climate type.
- In other words, climax is a unit, which acts as the index of climate of an area.

Stability :-

- The form of climax community is more or less stable with the climate.
- This climax community can not replaced through competition.
- In other words, according to the Clements in a particular climate area there may be develop climax community only with a few characteristic dominant species.

Origin and Phylogenetic Relations :-

- Climax community is treated as an equivalent to an organism, like which it takes birth, grows and develops and become mature.
- Clements designated it a Super-organism.
- In any climatic region, the developmental stages of the climax community have their own characteristics, which reflect the type of climate.
- Climax communities undergo changes with the changes of time and climate.

Climax and stability(CO3)

CHARACTERISTICS Of A CLIMAX COMMUNITY :-

- The vegetation is tolerant of environmental conditions.
- The vegetation of the climax community will have high ecological amplitude.
- They show rich diversity in species composition and a well drained spatial structure.
- The community possesses a complex food chain system.
- Individuals in the climax stage are replaced by others of the same kind. Thus the species composition maintains equilibrium.
- The ecosystem will be balanced and self-sustainable.
- There is equilibrium between gross primary production and total respiration.
- The energy used from the sunlight and energy released after decomposition will be balanced.
- The uptake of nutrients from the soil and the release of nutrients back to the soil by decomposition will be balanced.
- It is an index of the climate of the area. The life or growth forms indicate the climatic type.

Types of Seres(CO3)

- **Types of Seres**
- Hydrosere
- Succession in aquatic habitat.
- Xerosere
- Succession in dry habitat

Types of Seres(CO3)

- Lithosere
- Succession on a bare rock surface.
- Psammosere
- Succession initiating on sandy areas.
- Halo sere
- Succession starting in saline soil or water.
- Senile
- Succession of microorganism on dead matter.
- Eosere
- Development of vegetation in an era.

Daily Quiz(CO3)

Q.1.What features make a community stable?

Q.2. What is the reason behind the vast diversity in Indian ecology?

Q.3. Mention one application of pollen bank. How are pollen stored in a bank?

Q.4. Name an artificial ecosystem with high productivity.

Q.5. In the IUCN Red List (2004), what does 'Red' represent?

Q.6. How can the prevailing rate of species extinction be declined by 30% solely through protection of biodiversity hotspots?

Q.7.---------is the illegal killing of wildlife for sale in the international trade market.

Q.8.Name various methods of In-situ conservation.

Q.9.What is Gene Bank

Q10.What do you understand by biodiversity conservation

Weekly Assignment(CO3)

1.Define Biodiversity?

2.Define genetic and species diversity?

3.What do you understand by flora and fauna?

4. Define the term biodiversity. Explain the different types of biodiversity

5.. What are the measurements of biodiversity.

6.. Discuss the different factors which are responsible to the loss of biodiversity.

7 What do you understand by biodiversity conservation or management? What are the methods of biodiversity conservation

8.What is Biodiversity? Why has it become important recently?

9. List the important attributes of a stable community?

10.. What do you mean by biodiversity? What are the different types of Biodiversity?

11. Why is it necessary to conserve biodiversity?

12. What are the different approaches for biodiversity conservation in India?

Faculty Video Links, Youtube & NPTEL Video Links and Online Courses Details

- Self Made Video Link:

- Youtube/other Video Links
- https://www.youtube.com/watch?v=GK_vRtHJZu4, https://www.youtube.com/watch?v=b6Ua_zWDH6U, https://www.youtube.com/watch?v=7tgNamjTRkk, https://www.youtube.com/watch?v=ErATB1aMiSU, https://www.khanacademy.org/science/high-school-biology/hs-ecology/hs-human-impact-on-ecosystems/v/conservation-and-the-race-to-save-biodiversity

MCQ s(CO3)

- 1.Which of the following communities is more vulnerable to invasion by outside animals and plants?
- A)Mangroves B)Tropical evergreen forests C)Temperate forests D)Oceanic island communities
- Answer---D
- 2.Which part of the world has a high density of organism ?
- A)Greenland B)Savannahs C)Deciduous forests
- D)Tropical rain forest
- Answer---- D
- 3.The community which begins succession in a habitat is designated as
- A)Seral community
- B)Biotic community
- C)Pioneer community
- D)Ecosere
- Answer-----C

MCQ s(CO3)

- 4.Which of the following is not a colonizer ?
- A)Blue-green algae B)Viruses C)Lichens D)Mosses Answer---B
- 5.A succession exhibiting changes in the communities at a place is described as
- A)Biotic succession B)Physiographic succession C)Climatic succession D)Geographic succession
- Ans--D
- 6.The nature of a climax community depends upon
- A)Water factor
- B)Temperature
- C)Soil fertility
- D)Climate
- Answer C

MCQ s(CO3)

- 7.The earliest settlers on barren lands generally are
- A)Diatoms B)Ferns C)Mosses D)Lichens
- Answer--C
- 8.The last community in a succession is called
- A)Ecosystem B)Climax community C)Ecotone D)Seral community
- Answer--B
- 9.Plant succession taking place in sandy area is called
- A)Halosere B)Psammosere C) XerosereD) Hydrosere
- Answer---B
- 10The physiographic factor responsible for the initiation of succession to
- A)Erosion
- B)c)Fire
- C)Hail
- D)Wind
- Answer D

Glossary Questions(CO2)

- The earliest settlers on barren lands generally are …….

A)Diatoms B)Ferns C)**Mosses** D)Lichens

- A succession exhibiting changes in the communities at a place is described as ……..

A)Biotic succession B)Physiographic succession C)Climatic succession **D)Geographic succession**

- ……. part of the world has a high density of organism ?

A)Greenland B)Savannahs C)Deciduous forests **D)Tropical rain forest**

- 3.The community which begins succession in a habitat is designated as

A)Seral community B)Biotic community **C)Pioneer community** D)Ecosere

- ..... is a structural change in a community and its nonliving environment over time that alters the ecosystem?

A)Mutation B)Adaptation C)Natural selection D)Succession

Glossary Questions(CO2)

- ..... are least likely to be present during primary succession?

A)Lichen B)Trees C)Moss D)Grass

- Ecosystems recover from disturbances in unique ways. A landscape ecologist observes in area right after a volcanic eruption. There is lava and dust across the landscape, and all vegetation has been removed. This ecosystem experiencing .....?

A)Secondary succession B)Primary succession C)None of these D)Climax succession

- After an event such as a fire or a tree fall in a forest, early successional species are the first to reappear. Which is an example of early successional species?

A)Bears B)Shrubs C)Gorillas D)Grasses

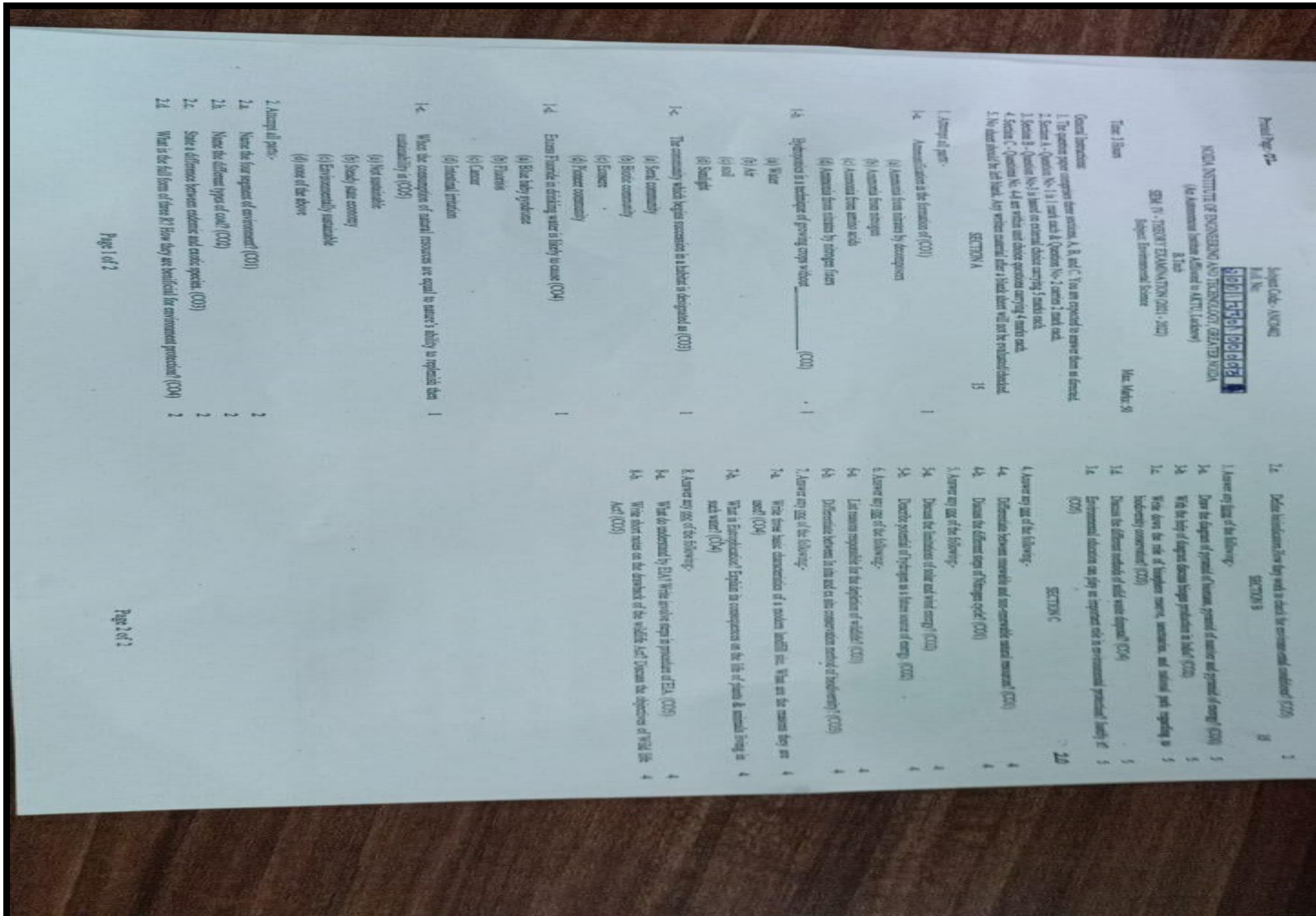
- A glacier has just receded across the landscape. As the glacier retreated, it completely decimated all standing vegetation. The landscape recovers quickly because there are plenty of seeds left in the seed bank. This an example of .....?

A)Primary succession B)Secondary succession C)Tertiary succession D)Quaternary succession

- .....is the process by which ecosystems change gradually overtime?

A)Ecological succession B)Climax community C)Greenhouse effect D)Pre-existing disturbance

Old Question Papers



Printed Page: 02

Subject Code:- ANC0402

Roll No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: IV - THEORY EXAMINATION (2021 - 2022)

Subject: Environmental Science

Time: 3 Hours | Max. Marks: 50

General Instructions:

1. The question paper comprises three sections, A, B, and C. You are expected to answer them as directed.
2. Section A - Question No- 1 is 1 mark each & Question No- 2 carries 2 mark each.
3. Section B - Question No-3 is based on external choice carrying 5 marks each.
4. Section C - Questions No. 4-8 are within unit choice questions carrying 4 marks each.
5. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION A — 15

1. Attempt all parts:-

1-a. Ammonification is the formation of (CO1) — 1
- (a) Ammonia from nitrates by decomposers
- (b) Ammonia from nitrogen
- (c) Ammonia from amino acids
- (d) Ammonia from nitrates by nitrogen fixers

1-b. Hydroponics is a technique of growing crops without__________ (CO2) — 1
- (a) Water
- (b) Air
- (c) soil
- (d) Sunlight

1-c. The community which begins succession in a habitat is designated as (CO3) — 1
- (a) Seral community
- (b) Biotic community
- (c) Ecosere
- (d) Pioneer community

1-d. Excess Fluoride in drinking water is likely to cause (CO4) — 1
- (a) Blue baby syndrome
- (b) Fluorise
- (c) Cancer
- (d) Intestinal irritation

1-e. When the consumption of natural resources are equal to nature's ability to replenish then sustainability is (CO5) — 1
- (a) Not sustainable
- (b) Steady state economy
- (c) Environmentally sustainable
- (d) none of the above

2. Attempt all parts:-

2.a. Name the four segment of environment? (CO1) — 2

2.b. Name the different types of coal? (CO2) — 2

2.c. State a difference between endemic and exotic species. (CO3) — 2

2.d. What is the full form of three R? How they are benificial for environment protection? (CO4) — 2

Page 1 of 2

2.e. Define bioindicators. How they work to check the environmental conditions? (CO5) — 2

SECTION B — 15

3. Answer any three of the following:-

3-a. Draw the diagram of pyramid of biomass, pyramid of number and pyramid of energy? (CO1) — 5

3-b. With the help of diagram discuss biogas production in India? (CO2) — 5

3-c. Write down the role of biosphere reserve, sanctuaries, and national park regarding to biodiversity conservation? (CO3) — 5

3-d. Discuss the different methods of solid waste disposal? (CO4) — 5

3-e. Environmental education can play an important role in environmental protection? Justify it? (CO5) — 5

SECTION C — 20

4. Answer any one of the following:-

4-a. Differentiate between renewable and non-renewable natural resources? (CO1) — 4

4-b. Discuss the different steps of Nitrogen cycle? (CO1) — 4

5. Answer any one of the following:-

5-a. Discuss the limitations of solar and wind energy? (CO2) — 4

5-b. Describe potential of hydrogen as a future source of energy. (CO2) — 4

6. Answer any one of the following:-

6-a. List reasons responsible for the depletion of wildlife? (CO3) — 4

6-b. Differentiate between In situ and ex situ conservation method of biodiversity? (CO3) — 4

7. Answer any one of the following:-

7-a. Write three basic characteristics of a modern landfill site. What are the reasons they are used? (CO4) — 4

7-b. What is Eutrophication? Explain its consequences on the life of plants & animals living in such water? (CO4) — 4

8. Answer any one of the following:-

8-a. What do understand by EIA? Write involve steps in procedure of EIA. (CO5) — 4

8-b. Write short notes on the drawback of the wildlife Act? Discuss the objectives of Wild life Act? (CO5) — 4

Page 2 of 2

Expected Questions for University Exam(CO3)

1) Why is there a need to conserve biodiversity?
2) Name and explain any two ways that are responsible for the loss of biodiverse
3) What is the difference between in-situ & ex-situ conservation
4) “Amazonian rain forest in south America has the greatest bio-diversity on earth”. Justify the statement
5) What do you mean by species diversity? Name two measures of species diversity statement with the help of an example?
6) What are sacred grooves? What is their role in conservation? What do you mean by IPR. What are the drawbacks of IPR?
7) What is Biodiversity? Why has it become important recently?
8) List the important attributes of a stable community?
9) 1.There are many animals that have become extinct in the wild but continue to be maintained in zoological parks.**2.**White Bengal tigers are protected in special settings in zoological parks. Tiger reserves are maintained in Western Ghats. How do these two approaches differ from each other? Mention the advantages of each one.

Recap of Unit 3(CO3)

- . ***Definition:*** *The variety and variability among all groups of living organisms and the ecosystem in which they occur.*
- Levels/Classification of Biodiversity:
- **Genetic diversity** → Diversity within the species is genetic diversity.(ex) teak wood varieties, Indian, Burma, malasian
- **Species diversity**→ diversity between different species. (ex) plant species = apple, mango, grapes, animal species = lion, tiger, elephant etc.
- **Community/Ecosystem diversity** → Diversity at the ecological or habitat level is ecosystem diversity. Ex. River ecosystem.

Recap of Unit 3(CO3)

- ***Process of Ecological Succession***
- Nutation
- Invasion → Migration, Establishment Competition
- Reaction Stabilization
- The progressive replacement of one community by another till the development of stable community in a particular area is ecological succession.
- **Stages of ecological succession:**
- Pioneer community → first group of organism in an area Seral stage → various developmental stages of community
- ***Types of ecological succession:***
- *Primary succession* → involves gradual establishment of biotic communities on a lifeless ground Heydrich / Hydrosere → establishment starts in watery area like pond and lake
- Xerarch / Xerosere → establishment starts in a dry area like desert and rock

Reference Books

.1. Sodhi G.S. 2005, Fundamentals of Environmental Chemistry: Narosa Publishing House, New Delhi.
2. Dash, M.C. (1994).Fundamentals of Ecology, Tata McGraw Hill, New Delhi.

3. Sharma P. D. (1996). Environmental Biology, Rastogi Publications, Meerut.
4. Verma P.S. and V.K. Agarwal. (1985). Principles of Ecology. S. Chand and Company (Pub.), New Delhi.
5. Principles of Environmental Sciences and Engineering -P. Venugoplan Rao, Prenitice Hall of India.
6. Environmental Science and Engineering Meenakshi, Prentice Hall India

Thank You