Assignment on Ecosystems

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1. Introduction to Ecosystem

The term ecosystem was first introduced by A.G. Tansley in 1935.

An ecosystem is a functional unit of nature where living organisms (plants, animals, microbes) interact with each other and with their physical environment (soil,

water, air, sunlight).

It involves the flow of energy and cycling of nutrients.

Ecosystems can be as large as a forest or as small as a pond.

📌 Diagram Needed: Simple block diagram of ecosystem → showing "Abiotic factors → Producers → Consumers → Decomposers".

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2. Structure of an Ecosystem

The structure of an ecosystem can be studied under two components:

(A) Biotic Components (Living)

1. Producers (Autotrophs):

Plants, algae, and some bacteria.

Use sunlight to prepare food through photosynthesis.

Example: Phytoplankton in aquatic ecosystems, green plants in terrestrial ecosystems.

2. Consumers (Heterotrophs):

Depend on producers for food.

Classified as:

Primary consumers (Herbivores):
Cows, deer, zooplankton.

Secondary consumers (Carnivores):
Frogs, small fishes, fox.

Tertiary consumers (Top carnivores): Lion, tiger, shark.

3. Decomposers (Saprotrophs):

Fungi and bacteria.

Break down dead organic matter and recycle nutrients back to the soil.

(B) Abiotic Components (Non-living)

Physical factors: Sunlight, temperature, rainfall, soil, wind.

Chemical factors: pH, nutrients

(nitrogen, phosphorus, carbon), gases (oxygen, carbon dioxide).

These determine the type and productivity of ecosystems.

📌 Diagram Needed: Two-column chart → Biotic vs Abiotic components.

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3. Food Chain

A food chain is the linear sequence of organisms where energy flows

from producers → herbivores → carnivores → decomposers.

Example (Grassland food chain):
Grass → Grasshopper → Frog → Snake → Eagle.

Energy decreases at each step (10% energy law by Lindeman).

📌 Diagram Needed: Flow diagram of a food chain.

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4. Food Web

A food web is a complex network of interconnected food chains.

It shows how different organisms are related through multiple feeding relationships.

Example: In a pond ecosystem → algae → small fish → big fish → bird; but small fish may also be eaten by snakes.

Food webs make ecosystems more stable.

📌 Diagram Needed: Web-like

diagram of food chains connected.

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5. Types of Ecosystem

(A) Aquatic Ecosystems

1. Lentic (Standing water):

Examples: Lakes, ponds, reservoirs.

Characteristics: Water is relatively still, supports phytoplankton, rooted plants, zooplankton, fishes.

2. Lotic (Flowing water):

Examples: Rivers, streams.

Characteristics: Continuous flow of water, more oxygen supply, organisms adapted to currents (fish like trout).

📌 Diagram Needed: Sketch of pond ecosystem (lentic) & river ecosystem (lotic).

(B) Terrestrial Ecosystems

1. Forest ecosystem: High biodiversity, tall trees, rich soil nutrients.

2. Grassland ecosystem: Dominated by grasses, herbivores like deer, carnivores like lions.

3. Desert ecosystem: Extreme temperatures, low rainfall, xerophyte plants, reptiles.

4. Tundra ecosystem: Cold regions, mosses, lichens, animals like polar bears, reindeer.

📌 Diagram Needed: World map showing different terrestrial ecosystems.

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6. Biogeochemical Cycles

Ecosystems depend on nutrient cycling (biogeochemical cycles).

(A) Water Cycle

Process: Evaporation → Condensation → Precipitation → Runoff → Infiltration → Groundwater flow.

Maintains global water balance.

📌 Diagram Needed: Water cycle with arrows showing stages.

(B) Carbon Cycle

Carbon is exchanged between atmosphere, living organisms, oceans, and soil.

Main processes: Photosynthesis, respiration, combustion, decomposition.

Important for climate regulation.

📌 Diagram Needed: Carbon cycle (plants, animals, atmosphere, fossil fuels).

(C) Nitrogen Cycle

Nitrogen is essential for proteins and DNA.

Steps: Nitrogen fixation (by bacteria) → Nitrification → Assimilation → Ammonification → Denitrification.

Example: Rhizobium bacteria fix nitrogen in root nodules of legumes.

📌 Diagram Needed: Nitrogen cycle with bacteria names.

(D) Sulphur Cycle

Sulphur is required for amino acids and proteins.

Sources: Volcanoes, fossil fuel combustion, decaying matter.

Sulphur circulates between atmosphere, soil, and organisms.

📌 Diagram Needed: Sulphur cycle (atmosphere, soil, plants, animals, decomposers).

(E) Phosphorus Cycle

Phosphorus is essential for ATP, DNA, and bones.

Unlike other cycles, it does not involve the atmosphere.

Phosphorus comes from rock weathering, enters soil, taken up by plants, passed to animals, returned via decomposition.

📌 Diagram Needed: Phosphorus cycle (rocks → soil → plants → animals → decomposers).

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7. Conclusion

Ecosystems are the foundation of life on Earth.

They maintain a balance through energy flow and nutrient cycling.

Human activities like deforestation, pollution, and overuse of resources are disturbing

ecosystems.

To ensure sustainability, we must conserve ecosystems and promote biodiversity.