OUR ENVIRONMENT

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» Our surroundings composed of living things, non-living things and physical conditions to maintain the balance of Earth are our 'environment'.

ECOSYSTEM

» Structural and functional unit of BIOSPHERE.

- **Natural**
  - **Aquatic**
    - ponds
    - lakes
    - estuaries
  - **Terrestrial**
    - forests
    - grasslands

  etc.
- **Artificial**
  - aquarium
  - botanical gardens
  - parks
  - crop fields

  etc.

Components of an Ecosystem

- **Biotic**
  - living
  - **Producers**
    - autotrophs
    - green plants and blue-green algae
    - convert solar energy to chemical energy
    - initiators of food chain
  - **Consumers**
    - dependent on producers (heterotrophs)
    1. Herbivores
    2. Carnivores
    3. Omnivores
  - **Decomposers**
    - bacteria, fungi
    - Help in:
      - recycling materials
      - cleaning waste
      - creating space for growth of new organisms
- **Abiotic**
  - non-living
  - Eg - sunlight
    - water
    - soil
    - wind etc.

Physical factors affecting Ecosystem

(the abiotic components)

Wind
- helps in pollination
- seed dispersal
- redistributes top soil

Light
- photosynthesis

Gases
- O_2, N_2, CO_2

Temperature
- high temp.
- causes rain
- affects growth of plants, animals

Water

FOOD CHAIN

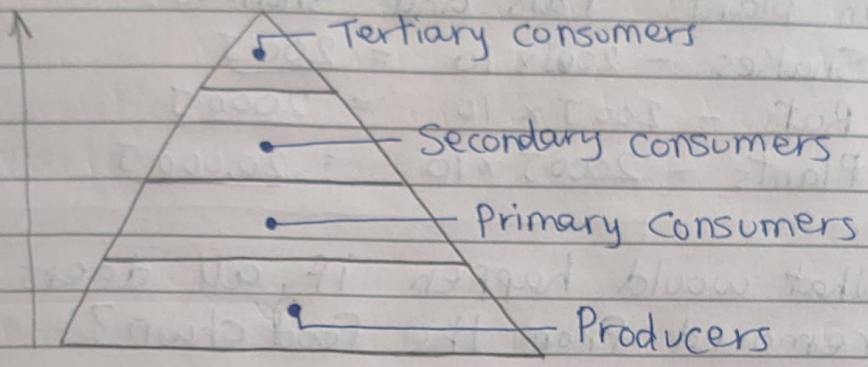
» Linear network of living organisms for the transfer of energy

Examples:

Forest	Grassland	Pond
Trees	Grass	Phytoplankton
↓	↓	↓
Deer	Grasshoper	Scorpion
↓	↓	↓
Lion	Frog	Fish
	↓	↓
	Snake	Crane
	↓	
	Vultures	

Food web - A series of branching lines and the interconnection of different food chains at various trophic levels.

Trophic Levels



Significance of food chain

1. Transfer of energy from one level to another
2. Feeding relation and interaction between organism and ecosystem
3. Movement of toxic substances and problems associated with biological magnification.

Energy flow

- Unidirectional, no back/reverse flow
- Energy accumulated by producers flows to different trophic levels.

10% Law - Lindeman (1942)

Example			
	Plants	— 1,00,000 J	90% loss
	↓ Rats	— 10,000	
	↓ Snakes	— 1000 J	90% loss
	↓ Hawk	— 100 J	90% loss

Q If hawk has 20 J energy, find the energy in plants, rats and snakes.

» Snakes - 200 J x 10 = 200 J
Rats - 200 J x 10 = 2000 J
Plants - 2000 J x 10 = 20,000 J

Q What would happen if all deers are removed from the food chain?

» No. of lions would decrease and plants will increase

BIOGOGICAL MAGNIFICATION

» Progressive increase in the concentration of toxicants in organisms at each successive trophic level.

» Fertilizers and Pesticides on crops
↓
Soil and water gets washed away
↓
Toxins enter food chain
↓
They cannot be digested and are non-biodegradable
↓
Their concentration increases at each trophic level
↓
Maximum accumulation in human body
(Example - Bird flu infected humans more than birds)

OZONE DEPLETION

Ozone = O_3 (triatomic) [deadly poisonous, present in upper layer of atmosphere]

Formation

UV radiations act on O_2 and break the molecule into free oxygen (O) [nascent oxygen] which is very reactive and combines with diatomic oxygen molecules (O_2) to form ozone (O_3).

$$O_2 \xrightarrow{UV} O + O$$
$$O + O_2 \longrightarrow O_3$$

Depletion (began in 1980)

Caused due to synthetic chemicals like CFCs used in refrigerators and fire extinguishers.

Chlorofluorocarbons (CFCs) are very stable
↓
Thus, do not degrade easily and rise up in the atmosphere
↓
UV radiations breakdown CFC molecules and release Chlorine atom
↓
This chlorine reacts with ozone and disassociates it into oxygen

$$Cl_2 + O_3 \longrightarrow ClO + O_2$$

» United Nations Environment Programme (UNEP) succeeded in forming an agreement to freeze CFC production in 1986.

WASTE MANAGEMENT

Types of Wastes

Biodegradable	Non-biodegradable
» Substances which dispose off naturally by fungi, bacteria	» Cannot be converted into harmless simpler forms by the action of microorganisms.
» Bacteria or fungi secrete enzymes which causes them to break down into simpler forms.	» Toxic, harmful and accumulates in the environment
» Example: • Manure / Compost	» Example: • radioactive waves • insectides. • plastics • heavy metals (Pb, Al, etc.)
» Effects: 1. Foul smell 2. Reduction of crop yield 3. Flies breeding 4. Spread of germs 5. Water pollution 6. Reduced soil fertility	» Effects: 1. Life-threatening diseases 2. Pollute water, harm aquatic plants, animals 3. Block the transfer of energy and minerals in ecosystem.

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Waste Disposal

I. **Recycling** — Form new products

II. **Composting** — Garbage like kitchen waste is buried in pits

III. **Incineration** — Burning substances (eg - hospital waste) at high temperature to form ash

IV. **Landfills** — Solid waste is dumped in low lying areas

V. **Sewage Treatment** — Waste is carried to sewage treatment plants (STPs)

↓

Filtered

↓

Settled down

↓

Decomposed

↓

Cleaned

↓

Released into water bodies