Module 3 QB

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1) Define Environment. Explain its scope.

Ans) Environmental studies deals with every issue that affects an organism.

It is an applied science that seeks with practical answers to make human civilization sustainable on the earth's finite resources.

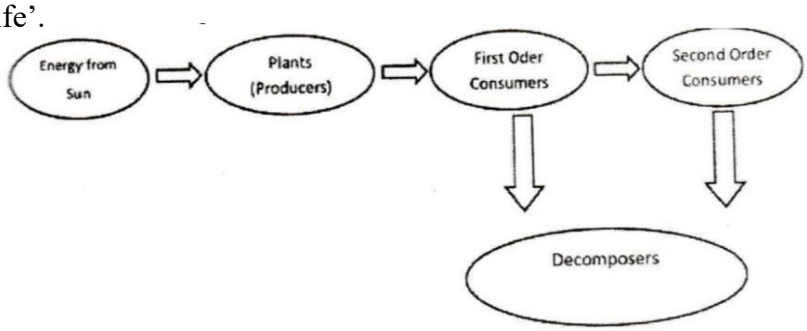
Scope:

- Our surroundings include natural landscapes such as a forest, a river, a mountain, a desert, or a combination of these elements.
- Most of us live in landscapes that have been heavily modified by human beings, in villages, towns or cities.
- But even who live in cities get our food supply from surrounding villages.
- These in turn are dependent on natural landscapes such as forests, grasslands, rivers, seashores, for resources such as water for agriculture, fuel wood, fodder and fish.
- Thus our daily lives are linked with our surroundings.
- All people are using water to drink and for other day-to-day activities.
- They use air to breath, use resources for food, depends on the community of living plants and animals which form a web of life, of which we are also a part.
- Our dependence on nature is so great that we cannot continue to live without protecting the earth's environmental resources.
- Thus most traditions refer to our environment as 'Mother Nature'.
- This has led to many cultural practices that helped traditional societies protect and preserve their natural resources.

2) Explain how the energy cycle in ecosystem works.

Ans)

- The energy cycle is based on the flow of energy through the ecosystem.
- Energy from sunlight is converted by plants themselves into growing new plant material which includes leaves, flowers, fruit, branches, trunks and roots of plants.
- Since plants can grow by converting the sun's energy directly into their tissues, they are known as producers in the ecosystem.
- The plants are used by herbivorous animals as food, which gives them energy.
- A large part of this energy is used up for day to day functions of these animals such as breathing, digesting food, supporting growth of tissues, maintaining blood flow and body temperature.
- Energy is also used for activities such as looking for food, finding shelter, breeding and bringing up young ones.
- The carnivores in turn depend on herbivorous animals on which they feed.
- Thus the different plant and animal species are linked to one another through food chains.
- Each food chain has three or four links.
- Each plant or animal can be linked to several other plants or animals through many different linkages and these inter-linked chains can be depicted as a complex food web.
- This is thus called the 'web of life'.



3) Explain how the carbon cycle in ecosystem works.

Ans)

- The carbon, which occurs in organic compounds, is included in both the abiotic and biotic parts of the ecosystem.
- Carbon is a building block of both plant and animal tissues.
- In the atmosphere, carbon occurs as carbon dioxide (CO_2).
- In the presence of sunlight, plants take up carbon dioxide from the atmosphere through their leaves.
- The plants combine carbon dioxide with water, which is absorbed by their roots from the soil.
- In the presence of sunlight, they are able to form carbohydrates that contain carbon.
- This process is known as photosynthesis.
- Oxygen is released at this stage.
- All of mankind thus depends on the oxygen generated through this cycle.
- Both plants and animals release carbon dioxide during respiration.
- They also return fixed carbon to the soil in the waste they exerted.
- When plants and animals die they return their carbon to the soil.
- These processes complete the carbon cycle.

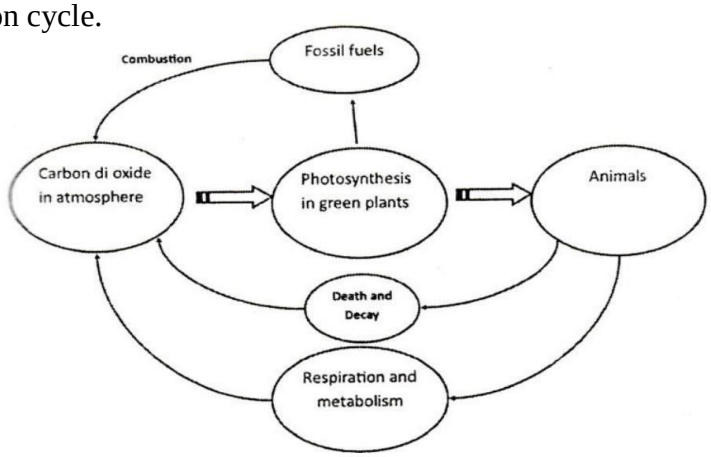


Fig: Carbon Cycle

4) Explain how the oxygen cycle in ecosystem works.

Ans)

- Oxygen is taken up by plants and animals from the air during respiration.
- The plants return oxygen to the atmosphere during photosynthesis.
- This links the Oxygen Cycle to the Carbon Cycle.
- Deforestation is likely to gradually reduce the oxygen levels in our atmosphere.
- Thus plant life plays an important role in our lives which we frequently do not appreciate.
- This is an important reason to participate in afforestation programs.

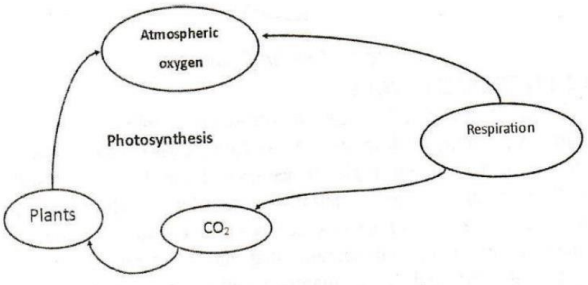


Fig: Oxygen Cycle

5) Explain how the nitrogen cycle in ecosystem works.

Ans)

- Carnivorous animals feed on herbivorous animals that live on plants.
- When animals defecate, this waste material is broken down by worms and insects mostly beetles and ants.
- These small ‘soil animals’ break the waste material into smaller bits on which microscopic bacteria and fungi can act.

- This material is thus broken down further into nutrients that plants can absorb and use for their growth.
- Thus nutrients are recycled back from animals to plants.
- Similarly, the bodies of dead animals are also broken down into nutrients that are used by the plants for their growth.
- Thus the nitrogen cycle on which life is dependent is completed.
- Nitrogen fixing bacteria and fungi in soil gives this important element to plants, which absorb it as nitrates.
- The nitrates are a part of the plant's metabolism, which help in forming new plant proteins. This is used by animals that feed on the plants.
- The nitrogen is then transferred to carnivorous animals when they feed on the herbivores.
- Thus our own lives are closely interlinked to soil animals, fungi and even bacteria in the soil.
- When we think of food webs, we usually think of the large mammals and other large forms of life.
- But we need to understand that it is the unseen small animals, plants and microscopic forms of life that are of great value for the functioning of the ecosystem.

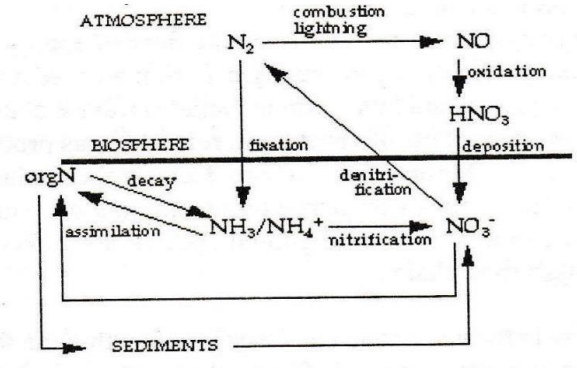


Fig: Nitrogen Cycle

6) Explain how the water cycle in ecosystem works.

Ans)

- When it rains, the water runs along the ground and flows into rivers or falls directly into the sea.
- A part of the rainwater that falls on land percolates into the ground.
- This is stored underground throughout the rest of the year.
- Water is drawn up from the ground by plants along with the nutrients from the soil.
- The water is transpired from the leaves as water vapour and returned to the atmosphere.
- As it is lighter than air, water vapour rises and forms clouds.
- Winds blow the clouds for long distances and when the clouds rise higher, the vapour condenses and changes into droplets, which fall on the land as rain.
- Though this is an endless cycle on which life depends, man's activities are making drastic changes in the atmosphere through pollution which is altering rainfall patterns.
- Measures must be taken to reduce the water pollution and protect water bodies.

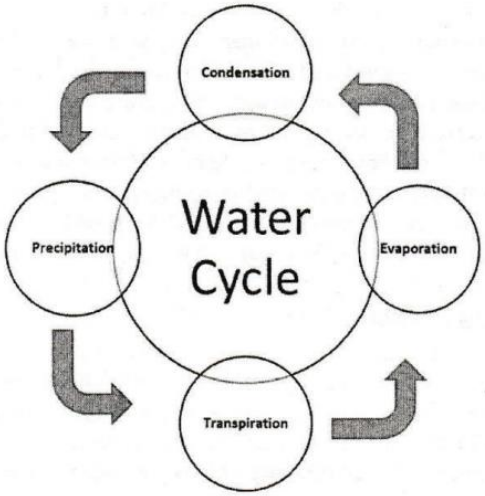


Fig: Water Cycle

7) Explain the importance of Environment for Public Awareness.

Ans)

Importance:

- Environment is not a single subject.
- It is an integration of several subjects that include both Science and Social Studies.
- In a world natural resources are limited.
- Water, air, soil, minerals, oil, the products are get from forests, grasslands, oceans and from agriculture and livestock, are all a part of our life support systems.
- Without them, life itself would be impossible.
- The earth cannot be expected to sustain the expanding level of utilization of resources.
- Added to this, is misuse of resources.
- Wasting or polluting large amounts of nature's clean water, creating more and more material like plastic that discard after a single use and wasting colossal amounts of food, which is discarded as garbage is polluting the environment.
- Air pollution leads to respiratory diseases, water pollution to gastro-intestinal diseases, and many pollutants are known to cause cancer.
- Improving this situation will only happen if each of us begins to take actions in our daily lives that will help preserve our environmental resources.
- Cannot expect Governments alone to manage the safeguarding of the environment, nor expect other people to prevent environmental damage.

Public Awareness:

- As the earth's natural resources are diminishing gradually and environment is being increasingly degraded by human activities, it is evident that something needs to be done to save environment.
- Along with government support, even we need to save the environment.
- To prevent ill-effects on our environment by our actions is economically more viable than cleaning up the environment once it is damaged.
- Individually play a major role in environment management.
- Reduce wasting natural resources and act as watchdogs that inform the Government about sources that lead to pollution and degradation of our environment.
- This can only be made possible through mass public awareness.
- Mass media such as newspapers, radio, television, strongly influence public opinion.
- However, someone has to bring this about.

Institutions in Environment:

- There have been several Government and Nongovernment organizations that have led to environmental protection in our country.
- They have led to a growing interest in environmental protection and conservation of nature and natural resources.
- Public awareness is thus a critical need to further environmental protection.
- A few well-known organizations include government organizations such as the BSI and ZSI, and NGOs such as BNHS, WWF-I, etc.

People in Environment:

- There are several internationally known environmental thinkers.
- Among those, the ones who have made landmarks Charles Darwin, Ralph Emerson, Aldo Leopald, EO Wilson and few others.
- Each of these thinkers looked at the environment from a completely different perspective.

8) List the structure and function aspects of Ecosystem.

Ans)

Structural aspects:

Components that make up the structural aspects of an ecosystem include:

1) Inorganic aspects – C, N, CO_2, H_2O.
2) Organic compounds – Protein, Carbohydrates, Lipids – link abiotic to biotic aspects.
3) Climatic regimes – Temperature, Moisture, Light & Topography.
4) Producers – Plants.
5) Macro consumers – Phagotrophs – Large animals.
6) Micro consumers – Saprotrophs, absorbers fungi.

Functional aspects:

1) Energy cycles.
2) Food chains.
3) Diversity - inter linkages between organisms.
4) Nutrient cycles - biogeochemical cycles.
5) Evolution.

9) What is food chain, food web and ecological pyramid?

Ans)

The transfer of energy from source in plants through a series of organisms by eating and being eaten constitutes a food chain.

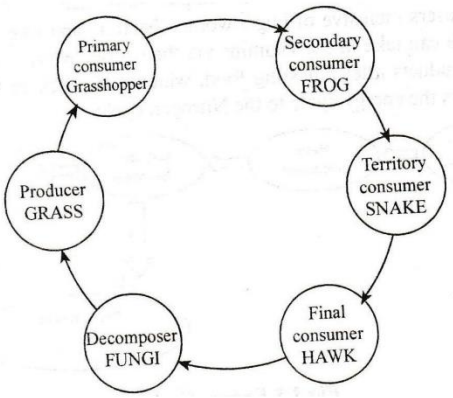


Fig: Food Chain

These food chain are not isolated sequences, but are interconnected with each other. This interlocking pattern is called as food web.

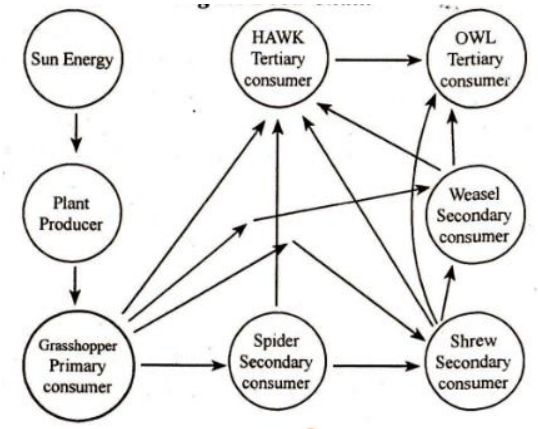


Fig 3.7 Food Web

Each step of the food web is called a trophic level. These trophic level together form the ecological pyramid.

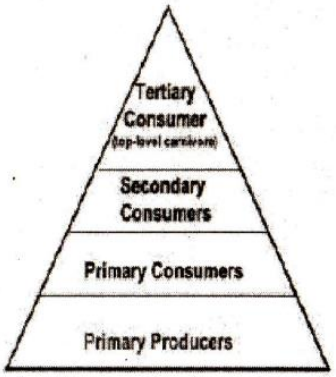


Fig 3.7 Energy Pyramid

10) Write a short note on

i) Forest Ecosystem

Ans)

- Forests are formed by a community of plants which includes trees, shrubs, climbers and ground cover.
- Natural vegetation looks vastly different from a group of planted trees, which are in orderly rows.
- The most 'natural' undisturbed forests are located mainly in our National Parks and Wildlife Sanctuaries.

The non-living or abiotic aspects of the forest:

- Forests on mountains and hills differ from those along river valleys.
- Vegetation is specific to the amount of rainfall and the local temperature which varies according to latitude and altitude.

The living or the biotic aspects of the forest:

- The plants and animals form communities that are specific to each forest type.
- For instance, coniferous trees occur in the Himalayas.
- Mangrove trees occur in river deltas.
- Thorn trees grow in arid areas.
- The snow leopard lives in the Himalayas.
- The leopard and tiger live in the forests of the rest of India.
- Wild sheep and goats live high up in the Himalayas.
- Many of the birds of the Himalayan forests are different from the rest of India.
- Evergreen forests of the Western Ghats and North East India are very rich in plant and animal species.

ii) Desert Ecosystem

Ans)

- Desert and semi arid lands are highly specialized and sensitive ecosystems that are easily destroyed by human activities.
- They are located in Western India and the Deccan Plateau.
- There are also cold deserts such as in Ladakh, which are located in the high plateaus of the Himalayas.
- The most typical desert landscape that is seen in Rajasthan is in the Thar Desert.
- In some areas it may rain only once every few years.
- The rare animals include the Indian wolf, desert cat and desert fox.
- Some of the commoner birds include partridges, quails and sand grouse.

iii) Aquatic Ecosystem

Ans)

- The aquatic ecosystems constitute the marine environments of the seas and the fresh water systems in lakes, rivers, ponds and wetlands.

- These ecosystems provide human beings with a wealth of natural resources.
- The aquatic ecosystems are classified into freshwater, brackish and marine ecosystems, which are based on the salinity levels.

The freshwater ecosystems:

- They have running water such as in streams and rivers.
- Ponds, tanks and lakes are ecosystems where water does not flow.
- They have shallow water with aquatic vegetation, which forms an ideal habitat for fish, crustacean and water birds.

Marine ecosystems:

- They are highly saline.

Brackish water ecosystems:

- They have less saline water.
- They are present in river deltas covered by mangrove forests.
- They are among the world's most productive ecosystems in terms of biomass production.
- The largest mangrove swamps are in the Sundarbans in the delta of the Ganges.

11) Explain the types of Grasslands.

Ans)

1) The Himalayan-pasture belt:

- It extends upto the snowline.
- They have a large variety of grasses and herbs.
- There are also a large number of medicinal plants.

2) The Terai:

- This consists of patches of tall grasslands interspersed.
- They include marshes in low-lying depressions.
- This ecosystem extends as a belt south of the Himalayan foothills.

3) The Semi-arid plains:

- This is located in Western India.
- Central India and the Deccan are covered by grass land tracts with patches of thorn forests.
- They are covered with seasonal grasses and herbs on which its fauna is dependent.

4) The Shola grasslands:

- It consists of patches on hillslopes along with the Shola forests on the western Ghats, Nilgiri and Annamalai ranges.
- This forms a patchwork of grassland on the slopes and forest habitats along the streams and low lying areas.