

# ASSIGNMENT 1

Unit-1 Environmental Studies and Ecosystem.

Q.1

Define:

- 1) Environmental Science : The systematic and scientific study of our environment and our role in it. This branch includes the knowledge of pure science and to some extent social science.
- 2) Environmental Studies : The branch of study concerned with environmental issues. It has a ~~broad~~ broader coverage than environment science and includes the social science aspects of the environment.
- 3) Environment : All the living and non-living (Biotic and abiotic) factors affecting an organism and ultimately determining its form and survival.

Q.2

List out and discuss multidisciplinary nature of environment.

- Multidisciplinary refers to the combination of more than one discipline or topic of study. It defines multi-sectoral and multi-dimensional research in a variety of disciplines.  
example: ~~geography, climatology, humanities, science and mathematics.~~

It includes the following factors :

- i) Life-Science : It includes, botany, zoology, microbiology, genetics, biochemistry, biotechnology

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help in understanding the biotic components and their interactions. It is a field of science that focuses on the study of living creatures.

- ii) Physical Science: The physical and chemical structure of the biotic components, energy transfer and flow are understood with the help of basic concept of physics, chemistry, atmosphere science and oceanography.
- iii) Modelling: Mathematics, statics and computer science serve effective tools in environmental modelling and management. It is the study of quantitative data collection, analysis, interpretation and presentation.
- iv) Management & Awareness: Economics, sociology and mass communication provides the input for dealing with socio economic aspects associated with various developmental activities.
- v) Technology: Combination with environmental, civil and chemical engineering form the basis for various technologies dealing with the control of environmental pollution, waste treatment and development of cleaner technologies that are important for protection of environment.

Q.3 Mention the scope of studying environmental studies in brief.

→ Scope of the environmental studies found a large no. of areas and aspects broadly listed below:

- i) Natural resources - their conservation and management
- ii) Ecology and biodiversity
- iii) Environmental pollution and control
- iv) Social issues in relation to development and environment.
- v) Human population and environment.

~ The study creates awareness among the people to know about various renewable and non-renewable resources of the region.

~ It provides the knowledge about ecological systems and cause and effect relationship.

~ It enables one to evaluate alternative responses to environmental issues before deciding an alternative course of action.

~ The study exposes the problems of over population, health, hygiene, etc and the role of arts, science and technology in eliminating the evils of society.

~ The study enables theoretical knowledge into practice and the multiple uses of environment.

~ The study tries to identify and develop appropriate and indigenous eco-friendly skills and technologies to various environmental issues.

Q.4

write a brief note on concept of sustainability and suit sustainable development.

→

The concept of sustainable development aims to encourage the use of products and sources in a manner that reduces the impact on the environment and optimizes the resources in order to satisfy the human needs.

~

"Development that ~~meets~~ needs the needs of the present world without compromising the ability of future generations to meet their own needs."

~

Five guiding principle:

- living within environmental limits
- Ensuring a strong, healthy and just society
- Achieving a sustainable economy.
- Promoting good governance
- Utilizing ICT as a social responsibility.

~

There are three main pillars, which are:

- Economic Sustainability

It seeks to promote those activities through which long-term economic growth can be achieved without having a negative impact on the environmental, social and cultural aspects of the community.

- Social Sustainability.

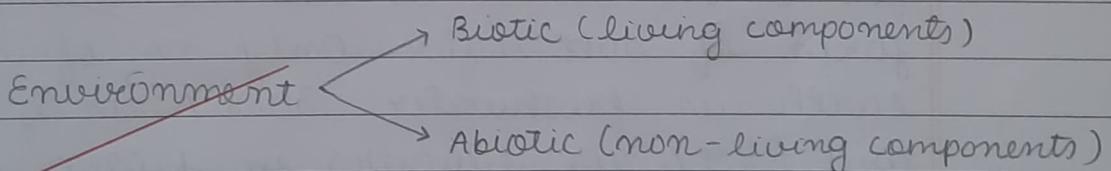
It is a form of social responsibility that significantly takes place when a community's stable and unstable components need a revival.

of depleted resources. It combines with the physical environment and focuses on the needs of community and puts special emphasis on providing the right infrastructure to support weaker section.

### > Cultural Sustainability

The need for cultural sustainability arises from the growing awareness of the importance of ~~cult~~ cultural rights and the preservation of cultural ~~heights~~ heritage.

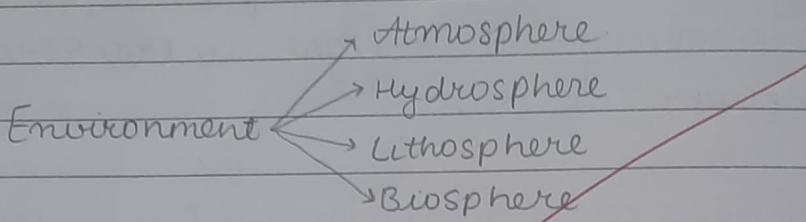
- Q.5 Classify the elements / components of environment.  
 Explain each of them in brief.  
 -4 Environment can be divided in to two major components.



- > Biotic: They are living organisms in the ecosystem. These are obtained from the biosphere and are capable of reproduction.  
 eg: animals, birds, plants, fungi etc.
- > Abiotic: They are non-living physical and chemical elements in the ecosystem. These are obtained from the lithosphere, atmosphere and hydrosphere.  
 eg: water, air, soil, sunlight and ~~make~~ minerals.

~4

Environment can also be classified into various physical component.



- > Atmosphere: The region surrounding the earth. It is mixture of gaseous layer enveloping the earth.
- > Hydrosphere: It comprises of all forms of water bodies on earth including marine (oceans, seas), freshwater (rivers, lakes, ponds, streams) and ground water resources etc. It covers 71.1% of earth's surface. 97% of water found on earth is in the oceans in the form of salt water. Only 3% of water on earth is freshwater. 30.8% is ground water and 68.9% is glaciers in frozen forms. 0.3% in rivers, reservoirs and lakes.
- > Lithosphere: The solid outer section of earth which includes earth's crust as well as the underlying cool, dense and fairly rigid upper part of the upper mantle. The main component is earth's tectonic plates.
- > Biosphere: The region on earth where life exists. The ecosystems that support life could be in soil, air, water or land.

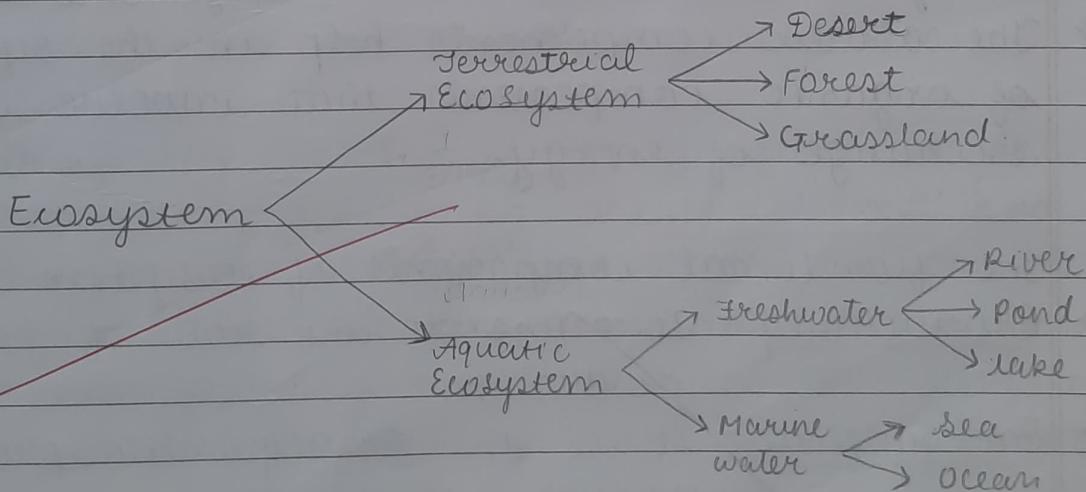
Q.6 Define Ecosystem. Describe it in brief and give its types.

→ "The interaction and interrelationship between the living community ~~exist~~ in relation to each other and the non-living community is referred as an ecosystem."

→ An ecosystem is a structural and functional unit of biosphere. It is made up of living and non-living beings and their physical environment.

→ A natural ecosystem is defined as a network of interactions among the organisms and between organisms and their environment.

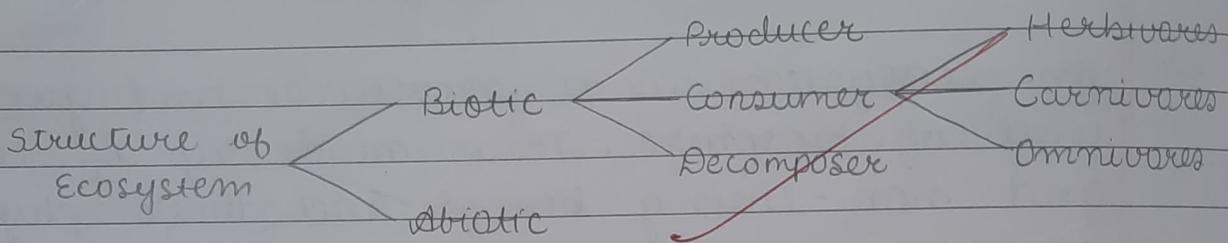
Nutrient cycles and energy flows keep these living and non-living components once connected in an ecosystem.



Q.7  
→

Explain structure and function of Ecosystem.

Structure: It is characterized by the organisation of biotic and abiotic components. The biotic and abiotic components are interrelated in an ecosystem.



~ Functions of Ecosystem :-

- It regulates the essential ecological processes, supports life systems and renders stability.
- It is also responsible for the cycling of nutrients between biotic and abiotic components.
- It maintains a balance among the various trophic levels in the ecosystem.
- It cycles the minerals through the biosphere.
- The abiotic components help in the synthesis of organic components that involve the exchange of energy.

~ The functional components of ecosystem are:-

- Productivity - It refers to the rate of biomass production.
- Energy flow - It is the sequential process through which energy flows from one trophic level to another.
- Decomposition - It is the process of breakdown of dead organic material. The top soil is the major site for decomposition.

➤ Nutrient Cycling - In ecosystem nutrients are consumed and recycled back in various forms for the utilization by various organisms.

Q.8 Explain energy flow in ecosystem.

The chemical energy of food is the main source of energy required by all living organisms. Energy flow is unidirectional in nature. This energy flow is based on two different laws of thermodynamics.

~ First law of thermodynamics , states that energy can neither be created nor destroyed, it can only change from one form to another.

~ Second law of thermodynamics , states that energy ~~cons~~ conversion is never 100% as heat is lost to the environment or utilized by organism in metabolic activities

~ During the ~~process~~ of energy flow in the ecosystem, plants being the producers and absorb sunlight. This energy ~~is~~ is stored in various ~~type~~ organic products in the plants and passed on to the primary consumers in the food chain where the herbivores consume the plants as food.

~ Then conversion of chemical energy stored in plant product the kinetic energy occurs,

degradation of energy will occur through its conversion into heat.

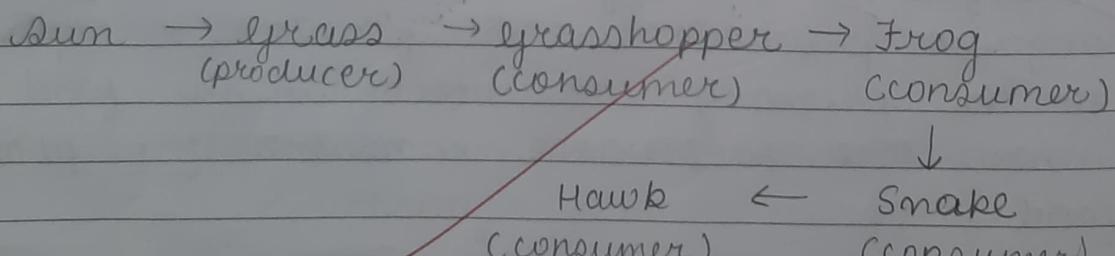
~ Then followed by the secondary consumer, herbivores are ingested by carnivores of the first order further degradation will occur.

~ Finally, when tertiary consumers (omnivores) consume the carnivores, energy will again be degraded. Thus, the energy flow is unidirectional in nature.

~ Moreover, in a food chain, the energy flow follows the 10 percent law. According to this law, only 10 percent of energy is transferred from one trophic level to the other; rest is lost into the atmosphere.

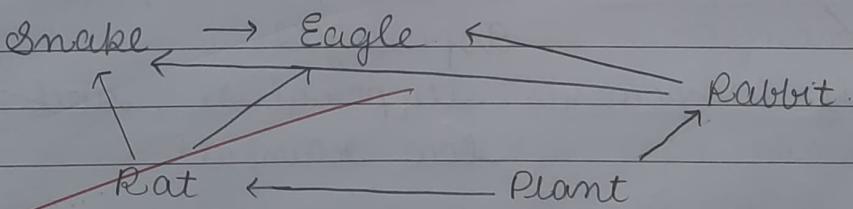
Q.9  
→ Brief on : Food chain , Food web.

Flow of energy in an ecosystem is one way process (unidirectional). The sequence of organism through which the energy flows, it is known as Food Chain.



There are basically three different types of food chains in the ecosystem, namely -

- Grazing food chain (GFC) - Here the plants are the producers and the energy flows from the producers to the herbivores, then to carnivores and so on.
  - Detritus food chain (DFC) - Here the dead organic matter occupies the lowermost level of the food chain, followed by the decomposers and so on.
  - Parasitic food chain (PFC) - Here the large organisms either the producer or the consumer is exploited and therefore the food passes to the smaller organism.
- ~4 Food web: A network of food chains which <sup>are</sup> interconnected at various trophic levels, so as to form a number of feeding connections amongst different organisms of a biotic community. It is also known as consumer-resource system.



- ~4 A food web is similar to a food chain but the food chain. Occasionally, a single organism is consumed by many predators or it consumes several other organisms. Due to this, many trophic levels get interconnected. The food chain

fails to showcase the flow of energy in the right way. But the food web is able to show the proper representation of energy flow, as it displays the interactions between different organisms.

Q.10

Enlist types of ecosystems. Explain each them in brief.

→

There are mainly two types of ecosystem, namely -

i) Terrestrial Ecosystem

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is land-based community of organisms and the interactions of biotic and abiotic components in a given area.

~

There are three sub-parts of this ecosystem:

> Desert Ecosystem.

The desert ecosystem is the driest terrestrial ecosystem in the world, therefore it has less biodiversity. The plants in this desert ecosystem are usually short-lived in nature.

Here thorny shrubs are mostly scattered around.

Biotic Components: rabbit, camel, thorny bushes, Asparagus.

Abiotic Components: Temperature, soil, sunlight, etc rainfall.

> Forest Ecosystem.

An ecosystem of forests and resources.

Forests are renewable natural resources.

Biotic Components: trees, animal, plants, etc.

Abiotic Components: inorganic & organic components present in the soil along with temperature, rainfall, light, etc

## ➤ Grassland Ecosystem.

Grasslands are area dominated by grasses. They occupy about 20% of the land on the earth surface. Grasslands occur in both tropical and temperate regions where rainfall is not enough to support the growth of trees.

Biotic components: grasses, animals.

Abiotic components: nutrients, hydrogen, oxygen, nitrogen, sulphur & phosphorus.

## ii) Aquatic Ecosystem.

- A group of interacting organisms which are dependent on one another and their water environment for nutrients and shelter.
- There are mainly two sub-parts of this ecosystem:
  - Freshwater ecosystem.

It is any naturally occurring liquid or frozen water containing low concentrations of dissolved salts and other total dissolved solids.

There are further three sub-parts:

### » River

A river ecosystem is a dynamic system that is influenced by a variety of physical and biological factors. The food chain in a river ecosystem begins with primary producers, such as algae and aquatic plants, which are consumed by primary consumers, such as zooplankton and aquatic insects.

### » Pond

A pond ecosystem is a freshwater ecosystem that can either be temporary or permanent. It consists of

a wide variety of aquatic plants and animal interacting with each other and the surrounding aquatic conditions.

Biotic Component: Algae, fish, frog, plants

Abiotic component: water, sunlight, pH, O<sub>2</sub>, temperature

## » Lake

A lake is a body of standing water that is generally large enough in area and depth, regardless of its hydrology, ecology or other ~~processes~~ and it also includes biotic as well as abiotic, physical and chemical interactions.

Biotic component: Bacteria, invertebrates, fish

Abiotic component: light, temperature, wind, chemistry

## » Marine water Ecosystem

They are aquatic environments with ~~help~~ high levels of dissolved salt, such as those found in or near the ocean.

There are further two sub-parts are:

» Sea

» Ocean

Diagrams