FAQ's

What is ecosystem?

An **ecosystem** is a community of living organisms in conjunction with the nonliving components of their environment (things like air, water and mineral soil), interacting as a system. These biotic and abiotic components are regarded as linked together through nutrient cycles and energy flows. As ecosystems are defined by the network of interactions among organisms, and between organisms and their environment, they can be of any size but usually encompass specific, limited spaces. (although some scientists say that the entire planet is an ecosystem)
Ecosystems are controlled both by external and internal factors. External factors such as climate, the parent material that forms the soil, and topography control the overall structure of an ecosystem and the way things work within it, but are not themselves influenced by the ecosystem. Other external factors include time and potential biota.

Discuss the structure of the ecosystem.

The two major aspects of an ecosystem are the structure and function.

By structure we mean:

(i) The composition of biological community including species, numbers, biomass, life history and distribution in space etc.,

(ii) The quantity and distribution of the non-living materials, such as nutrients, water etc., and

(iii) The range, or gradient of conditions of existence, such as temperature, light etc.

Structure of an Ecosystem:

An ecosystem has two major components: namely abiotic and biotic.

Abiotic (non-living) component includes:

(i) The amount of inorganic substances as P, S, C, N, H, etc. involved in material cycles. The amount of these inorganic substances, present at any given time in an ecosystem, is designated as the standing state or standing quality,

(ii) Amount and distribution of inorganic chemicals, such as chlorophylls etc., and of organic materials, as proteins, carbohydrates, lipids etc., present either in the biomass or in the environment i.e. biochemical structure that link the biotic and abiotic components of the ecosystem,

(iii) The climate of the given region. The Biotic (living) component is indeed the trophic structure of any ecosystem, where living organisms are distinguished on the basis of their nutritional relationships. Biotech components of an ecosystem have two sub components: namely autotrophic and heterotrophic.

(i) Autotrophic component:

In which fixation of light energy, use of simple inorganic substances and build up of complex substances predominate. The component is constituted mainly by green plants, including photosynthetic bacteria. To some lesser extent, chemosynthetic microbes also contribute to the build-up of organic matter. Members of the autotrophic component are known as producers.

(ii) Heterotrophic component:

In which utilisation, rearrangement and decomposition of complex materials predominate. The organisms involved are known as consumers, as they consume the matter built up by the producers (autotrophs). The consumers are further categorized as: macro and micro consumers.

(a) Macro consumers:

These are the consumers, which in an order as they occur in a food chain are, herbivores, carnivores (or omnivores). Herbivores are also known as primary consumers. Secondary and tertiary consumers, if present, are carnivores or omnivores. They all are phagotrophs which include chiefly animals that ingest other organic and particulate organic matter.

(b) Micro consumers:

These are popularly known as decomposers. They are saprotrophs (osmotrophs) and include chiefly bacteria, actinomycetes and fungi. They breakdown complex compounds of dead or living protoplasm absorb some of the decomposition or breakdown products and release inorganic nutrients in environment, making them available again to autotrophs.

The biotic component of any ecosystem may be thought of as the functional kingdom of nature, since they are based on the type of nutrition and the energy source used. The trophic structure of an ecosystem is one kind of producer consumer arrangement, where each "food" level is known as trophic level.

The amount of living material in different trophic levels or in a component population is known as the standing crop, a term applicable to both, plants as well as animals. The standing crop may be expressed in terms of (i) number of organisms per unit area, or (ii) biomass i.e. organism mass in unit area, which can be measured as living weight, dry weight, ash-free dry weight or carbon weight, or calories or any other convenient unit suitable for comparative purposes.

What is ecological pyramid?

An ecological pyramid (also trophic pyramid, eltonian

pyramid, energy pyramid, or sometimes food pyramid) is a graphical representation designed to show the biomass or bio productivity at each trophic level in a given ecosystem.

What are the types of ecological pyramids? Discuss in detail.

Biomass is the amount of living or organic matter present in an organism. *Biomass pyramids* show how much biomass is present in the organisms at each trophic level, while *productivity pyramids* show the production or turnover in biomass.

Energy pyramids begin with producers on the bottom (such as plants) and proceed through the various trophic levels (such as herbivores that eat plants, then carnivores that eat herbivores, then carnivores that eat those carnivores, and so on). The highest level is the top of the food chain.

An *energy pyramid of biomass* shows the relationship between biomass and trophic level by quantifying the biomass present at each trophic level of an energy community at a particular time. It is a graphical representation of biomass (total amount of living or organic matter in an ecosystem) present in unit area in different tropic levels. Typical units are grams per meter^2, or calories per meter^2. The pyramid of biomass may be "inverted". For example, in a pond ecosystem, the standing crop of phytoplankton, the major producers, at any given point will be lower than the mass of the heterotrophs, such as fish and insects. This is explained as the phytoplankton reproduce very quickly, but have much shorter individual lives.

One problem with biomass pyramids is that they can make a trophic level appear to contain more energy than it actually does. For example, all birds have beaks and skeletons, which despite having mass are not eaten by the next trophic level.

There is also pyramid of numbers which represent the number of organisms in each trophic level. They may be upright (e.g. Grassland ecosystem), inverted (parasitic ecosystem) or dumbbell shaped (forest ecosystem).

An 'ecological pyramid of productivity' is often more useful, showing the production or turnover of biomass at each trophic level. Instead of showing a single snapshot in time, productivity pyramids show the flow of energy through the food chain. Typical units are grams per meter^2 per year or calories per meter^2 per year. As with the others, this graph shows producers at the bottom and higher trophic levels on top.

The advantages of the *pyramid of productivity* as a representation:

- It takes account of the rate of production over a period of time.
- Two species of comparable biomass may have very different life spans. Thus a direct comparison of their total biomasses is misleading, but their productivity is directly comparable.
- The relative energy chain within an ecosystem can be compared using pyramids of energy; also different ecosystems can be compared.
- There are no inverted pyramids.
- The input of solar energy can be added.

The disadvantages of the *pyramid of productivity* as a representation:

- The rate of biomass production of an organism is required, which involves measuring growth and reproduction through time.
- There is still the difficulty of assigning the organisms to a specific trophic level. As well as the organisms in the food chains there is the problem of assigning the decomposers and detritivores to a particular trophic level.