

Module 1

Ecology and Biodiversity

1.2 Definition & types of an Ecosystem

Structure (or) components of an Eco system

Energy flow in the ecosystem

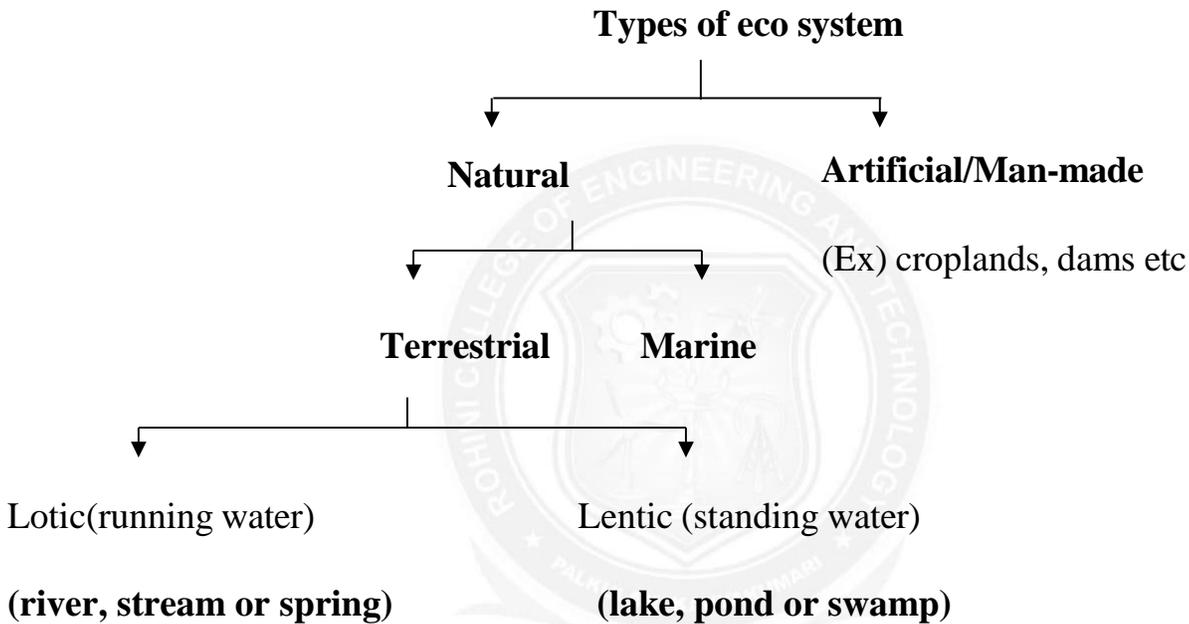
Ecological pyramids



1.2 DEFINITION & TYPES OF AN ECO SYSTEM

Definition:

A group of organisms interacting among themselves and with environment is known as eco system. An ecosystem consists of the biological community and the physical and chemical factors that make up its non-living or abiotic environment.



STRUCTURE (OR) COMPONENTS OF AN ECO SYSTEM

The structure of an ecosystem is the description of the organisms and physical features of environment including the amount and distribution of nutrients in the ecosystem.

From the structure point of view, all ecosystems consist of the following basic components:

1) Abiotic components

Abiotic components of an ecosystem include basic inorganic elements and compounds. Non-living components of an eco-system

(Ex) Climate, soil, water

2) Biotic components

The biotic components include all living organisms present in the environmental system. Living components of an eco-system.

(Ex) Plants and Animals

1) Producers (Autotrophs)

Producers can prepare their food themselves through photo synthesis.

(Ex) All green plants, trees

2) Consumers (Heterotrophs)

Consumers cannot, prepare their food but they directly (or) indirectly depends on producers.

a) Primary consumer

* It is called herbivores (or) plant eaters.

* Directly depends on plants for their food.

* (ex) rat, goat, cow

b) Secondary consumer

* It is called primary carnivores (or) meat eaters

* Depends on primary consumer for its food need.

* (ex) Tigers, lions

c) Tertiary consumer

* It is called Secondary Carnivores (or) meat eaters.

* Depends on Secondary consumer.

* (ex) Tigers, lions

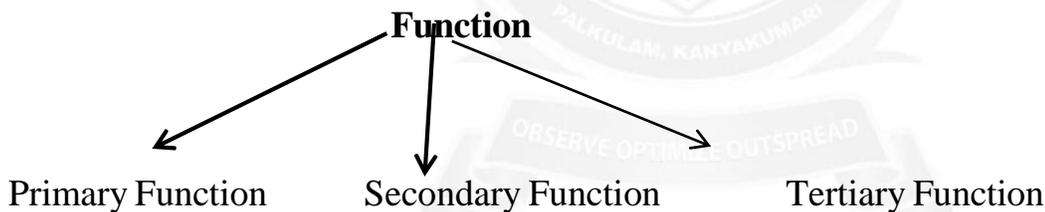
3) Decomposer:

Decomposers are used to decompose the body of dead organisms, plants, animals into simple compounds.

(Ex) Microorganisms like bacteria, fungi

(Ex) Grass → Rat → cat → Tiger →

Functions of an ecosystem



ENERGY FLOW IN THE ECOSYSTEM

FOOD CHAIN

Definition :

The sequence of eating & being eaten in an ecosystem is food chain (or) transfer of food energy from the plants through a series of organisms is called food chain.

The inter-relationship between plants and animals and between animals and animals in the sphere of energy production and consumption results in a definite pattern of several stages of eating and being eaten up — this is referred to as the food chain.

1. Food Chain in a Pond:

Phytoplankton → Zooplankton → Small fish → large fish → Man

2. Food Chain in a forest:

Plants → Deer → Tigers/Lions

Types of Food Chain:

Grazing Food Chain → starts with green plants & goes to decomposer food chain

Detritus food chain → starts with dead organic matter & goes to decomposer food chain.

Tropic Levels:

The various steps through which food energy passes in an ecosystem is called as tropic level.

T1 → T2 → T3 → T4 → T5

T1= Producers, T2= Primary consumers, T3= Secondary consumers, T4= Tertiary consumers, T5=decomposers

In Photosynthesis process, the energy stored in the plants. During this process light energy is converted into chemical energy and it is passed through the consumer. Energy is transferred from one tropic level into other tropic levels.

FOOD WEB

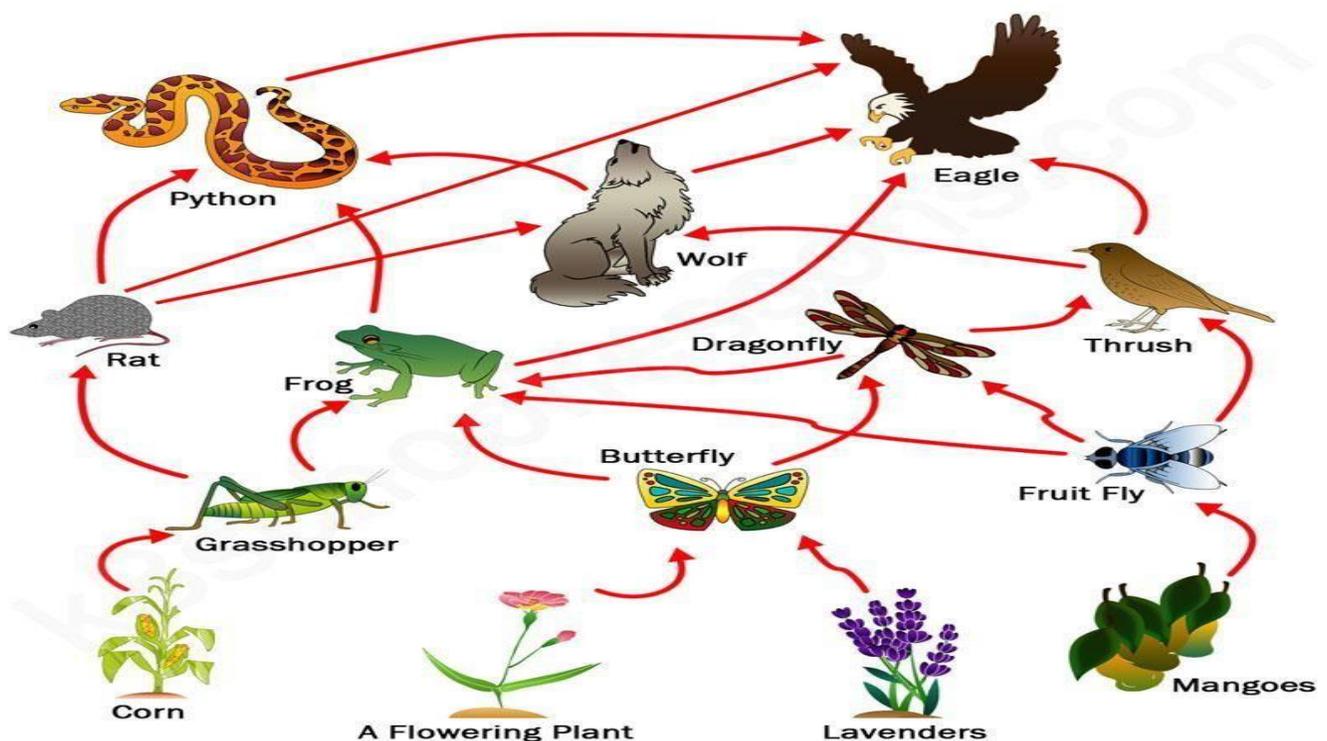
Definition:

A food web (or food cycle) is the natural interconnection of food chains and a graphical representation (usually an image) of what-eats-what in an ecological community. The interlocking pattern of various food chains in an ecosystem is food web. Many food chains are interconnected.

Energy Flow in Food web:

Grass → insects → fishes → birds → tigers
 Grass → insects → birds → tigers
 Grass → deer → tigers
 Grass → insects → birds → tigers
 Grass → cattles → tigers
 Grass → rats → snakes → eagles → tigers
 Grass → rats → eagles → tigers

A Food Web



(Source: online source)

Difference between food chain & food web:

In food chain, if one species gets affected, then species in all trophic levels are also affected. But in food web if one species gets affected, it does not affect other trophic levels.

ECOLOGICAL PYRAMIDS

Graphical representation of structure and function of trophic levels of an ecosystem is ecological pyramid.

Importance of Ecological Pyramid

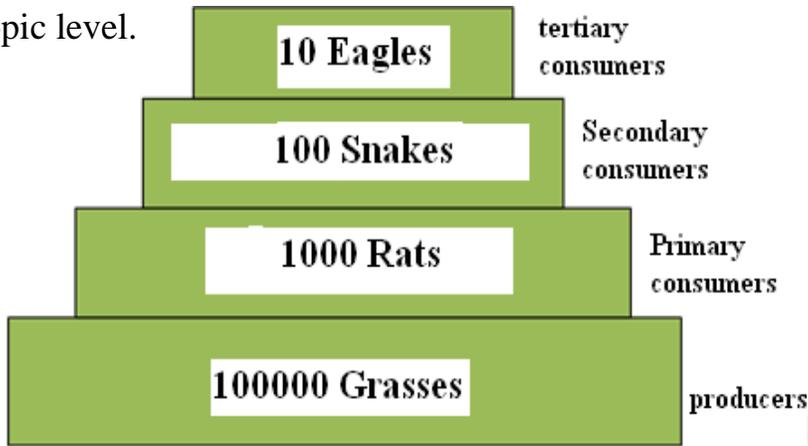
The importance of ecological pyramid can be explained in the following points:

1. They show the feeding of different organisms in different ecosystems.
2. It shows the efficiency of energy transfer.
3. The condition of the ecosystem can be monitored, and any further damage can be prevented.

Types:

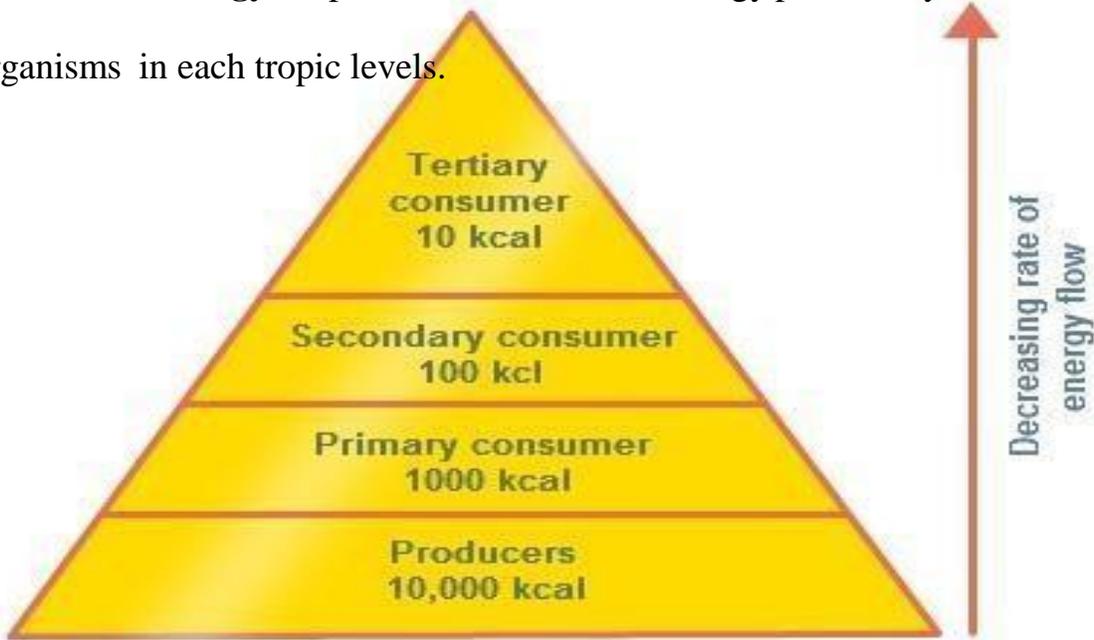
1. Pyramid of Numbers
2. Pyramid of Energy
3. Pyramid of Biomass

Pyramid of Numbers→ Represents the number of each individual organism present in each trophic level.



(Source: online source)

Pyramid of Energy: Represents the amount of energy possessed by the individual organisms in each trophic levels.

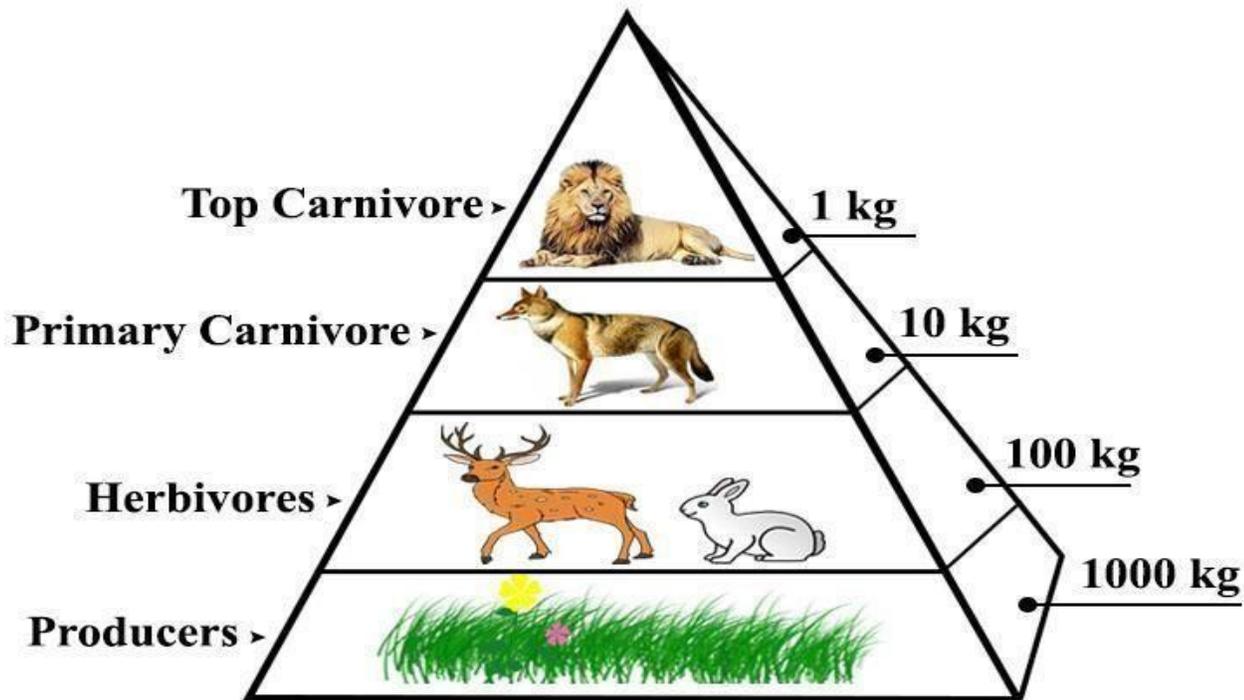


Pyramid of Energy

(Source: online source)

Pyramid of Biomass→ The amount of living or organic matter present in a particular environment is called biomass. There is a decrease in the biomass from the lower trophic level to the higher trophic level.

Upright Pyramid of Biomass in a Terrestrial Ecosystem



Source:online source

Limitations of the Ecological Pyramid

1. More than one species may occupy multiple trophic levels as in case of the food web. Thus, this system does not take into account food webs.
2. The saprophytes are not considered in any of the pyramids even though they form an important part of the various ecosystem.
3. These pyramids are applicable only to simple food chains, which usually do not occur naturally.
4. These pyramids do not deliver any concept in relation to variations in season and climate.

5. They do not consider the possibility of the existence of the same species at different levels.