

BHARAT SHIKSHAN SANSTHA'S
Shri Chhatrapati Shivaji College ,
Omerga.

A
PRESENTATION
ON

ECOSYSTEM PYRAMIDS

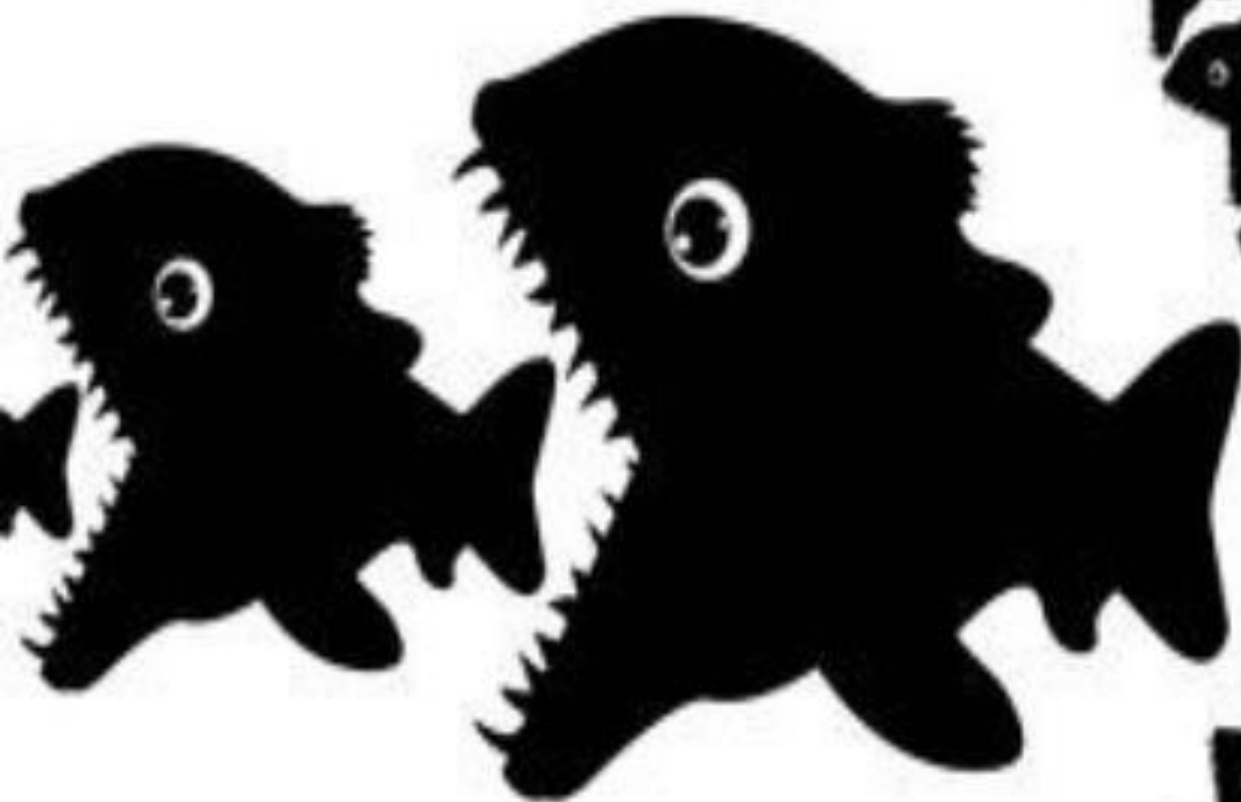
REPRESENTED
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**Food Chain,
Food Web
&
Ecological
Pyramids**

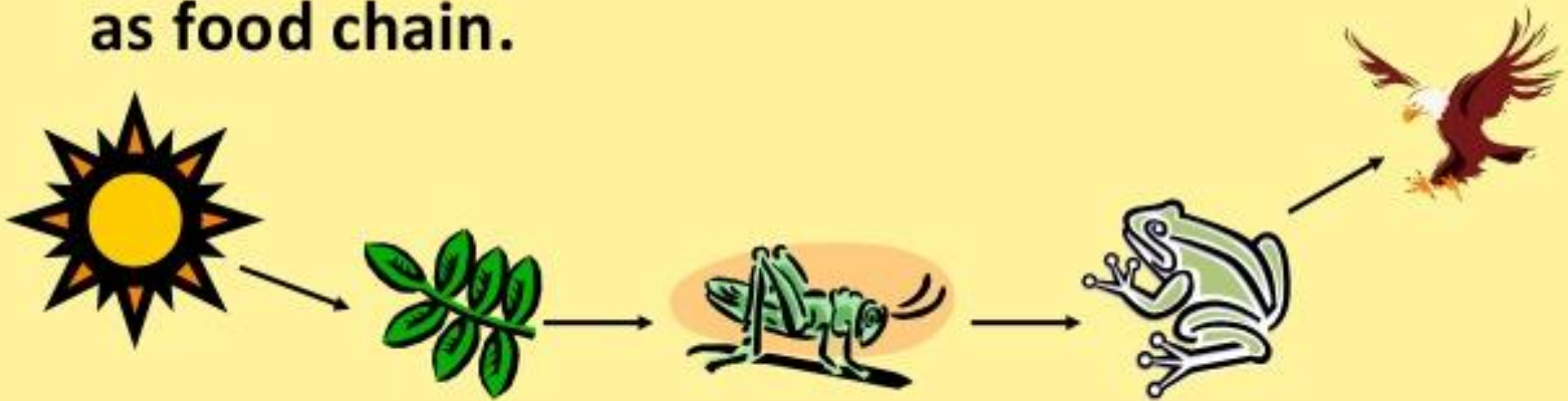


FOOD CHAINS



What is Food Chain?

Flow of energy in an ecosystem is one way process. The sequence of organism through which the energy flows, is known as food chain.



Important facts

- In a food chain each organism obtains energy from the one at the level below.
- Plants are called **producers** because they create their own food through photosynthesis
- Animals are **consumers** because they cannot create their own food, they must eat plants or other animals to get the energy that they need.

Tropic levels in a food chain

□ **Producers**

□ **Consumers**

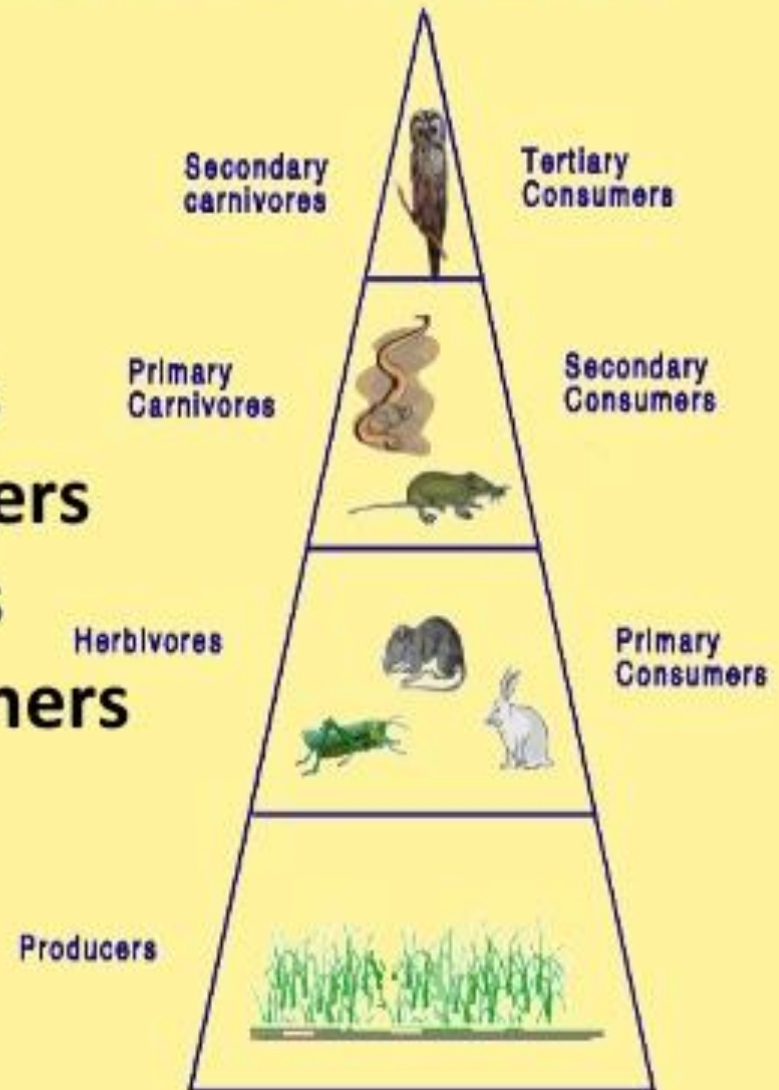
(i) **Primary consumers**

(ii) **Secondary consumers**

(iii) **Tertiary consumers**

(iv) **Quaternary consumers**

□ **Decomposers**



Types of Food Chain

(i) Grazing Food Chain

- The consumers utilizing plants as their food, constitute grazing food chain.
 - This food chain begins from green plants and the primary consumer is herbivore.
 - Most of the ecosystem in nature follows this type of food chain.
- Ex: grass => grasshopper => birds => falcon

Grazing Food Chain

Flower
(producer)

Caterpillar
(consumer)

Frog
(consumer)

Snake
(consumer)

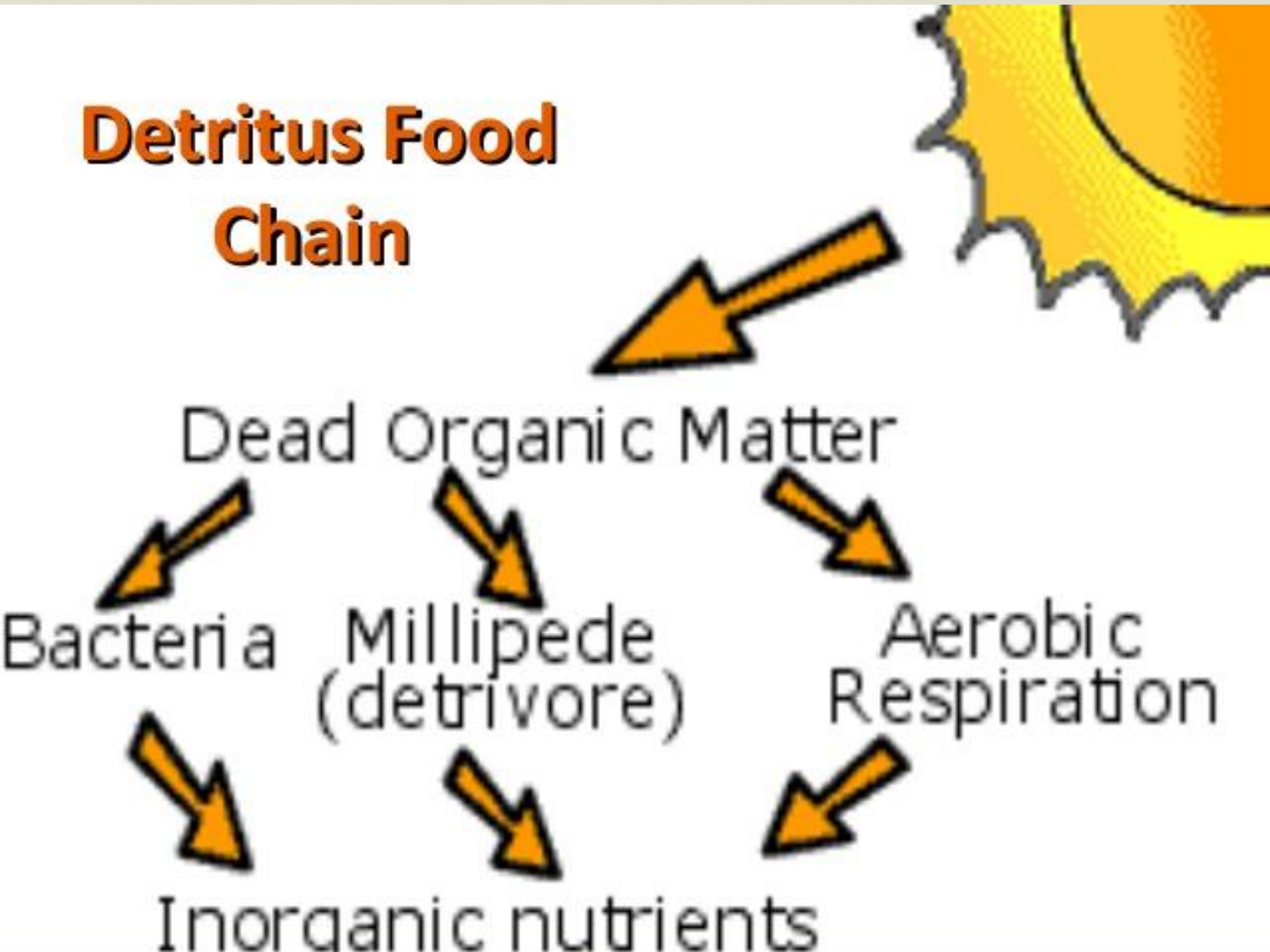
Owl
(consumer)



(ii) Detritus food chain

- This type of food chain starts from dead organic matter of decaying animals and plant bodies to the micro-organisms and then to detritus feeding organism and to other predators.
- The food chain depends mainly on the influx of organic matter produced in another system.
- The organism of the food chain includes algae, bacteria, fungi, protozoa, insects, nematodes etc.

Detritus Food Chain



Dead Organic Matter

Bacteria

Millipede
(detritivore)

Aerobic
Respiration

Inorganic nutrients

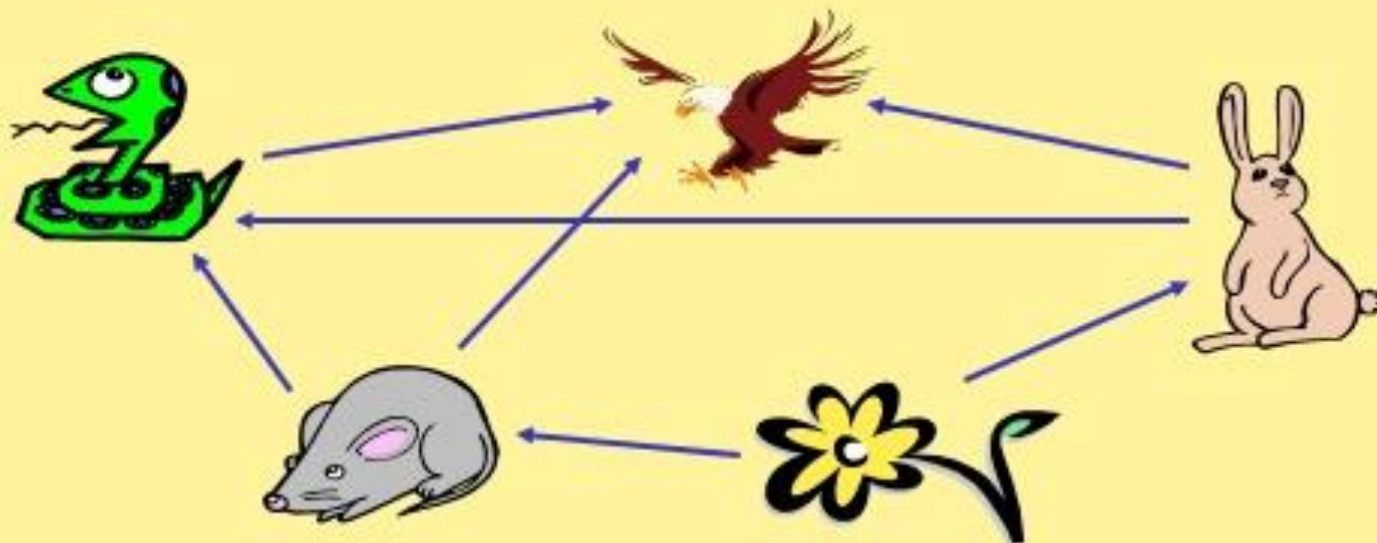
Significance of Food Chain

- The knowledge of food chain helps in understanding the feeding relationship as well as the interaction between organism and ecosystem.
- It also help in understanding the mechanism of energy flow and circulation of matter in ecosystem.
- It also helps to understand the movement of toxic substance and the problem associated with biological magnification in the ecosystem.

What is food web?

Food web can be defined as, "a network of food chains which are 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.



Important facts

- A **node** represents an individual species, or a group of related species or different stages of a single species.
- A **link** connects two nodes. Arrows represent links, and always go from prey to predator.
- The lowest trophic level are called **basal species**.
- The highest trophic level are called **top predators**.
- Movement of nutrients is cyclic but of energy is unidirectional and non-cyclic.

Types of food web representation

TOPOLOGICAL WEBS

- These food webs simply indicate a feeding relationship.

FLOW WEBS

- Bio-energetic webs, or flow webs, include information on the strength of the feeding interaction.

INTERACTION WEB

- In interaction the arrows show how one group influences another.

Different food webs

- Soil food web
- Aquatic food web
- Food web in forest
- Food web of grassland
- Food web in terrestrial and aquatic ecosystem

The Soil Food Web



Plants shoots & roots.



Organic matter



Mycorrhizae



Fungi



Bacteria



Earthworms

Nematodes -
root feeders.



Arthropods -
shredders



Nematodes -
fungal/bacterial
feeders



Protozoa



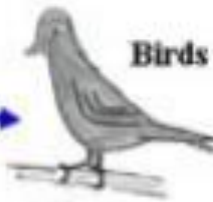
Arthropods -
predators



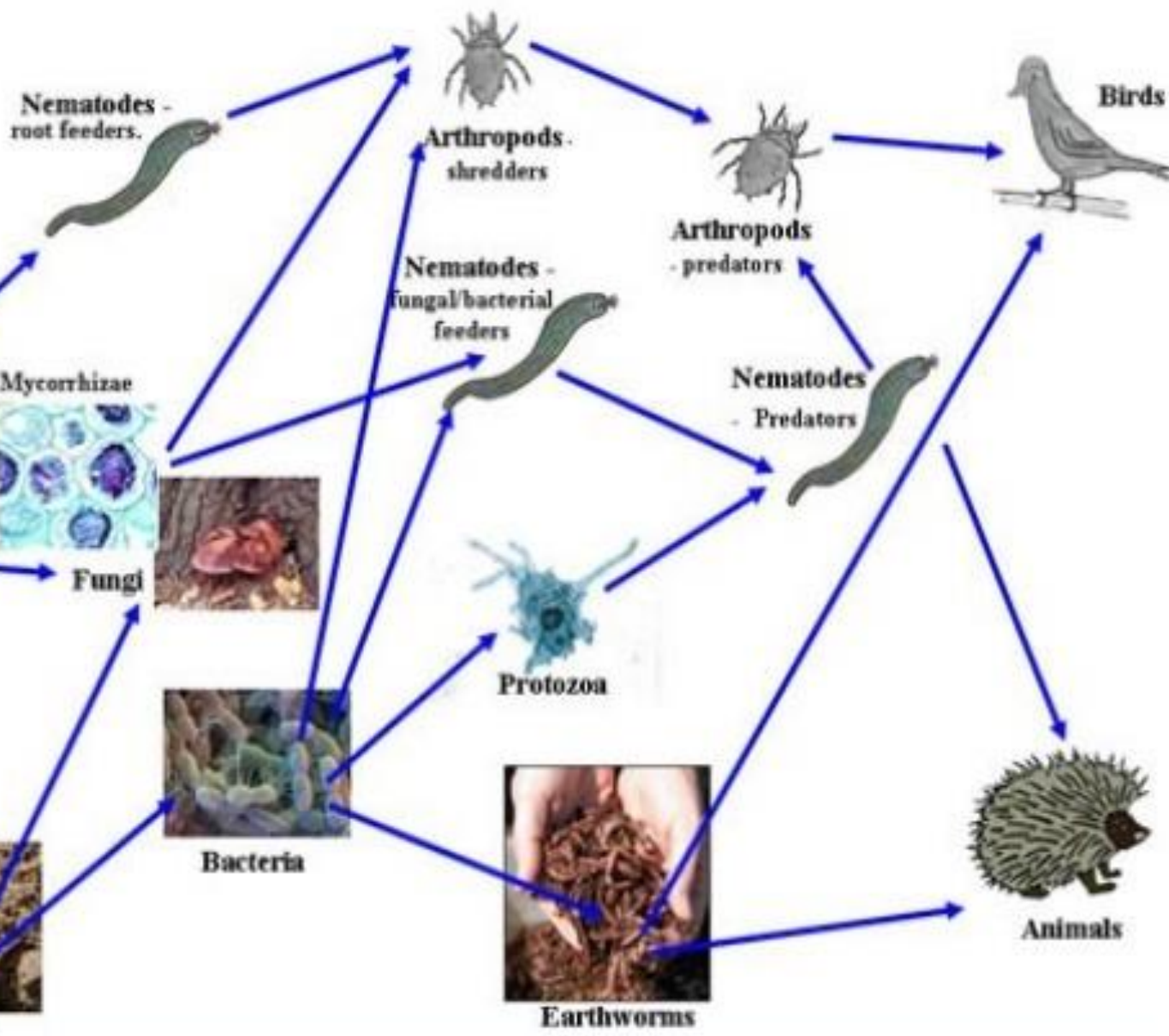
Nematodes
- Predators



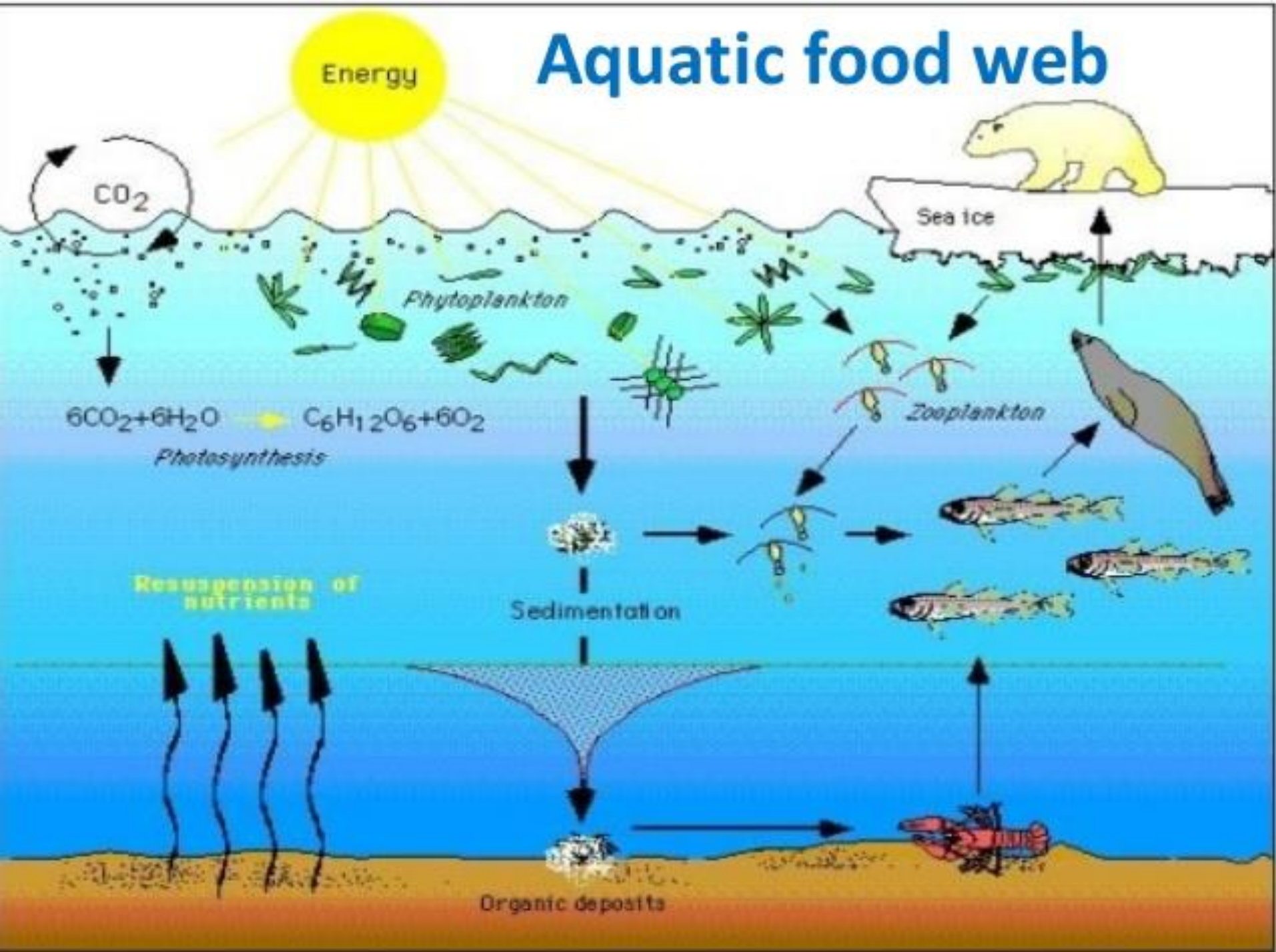
Birds



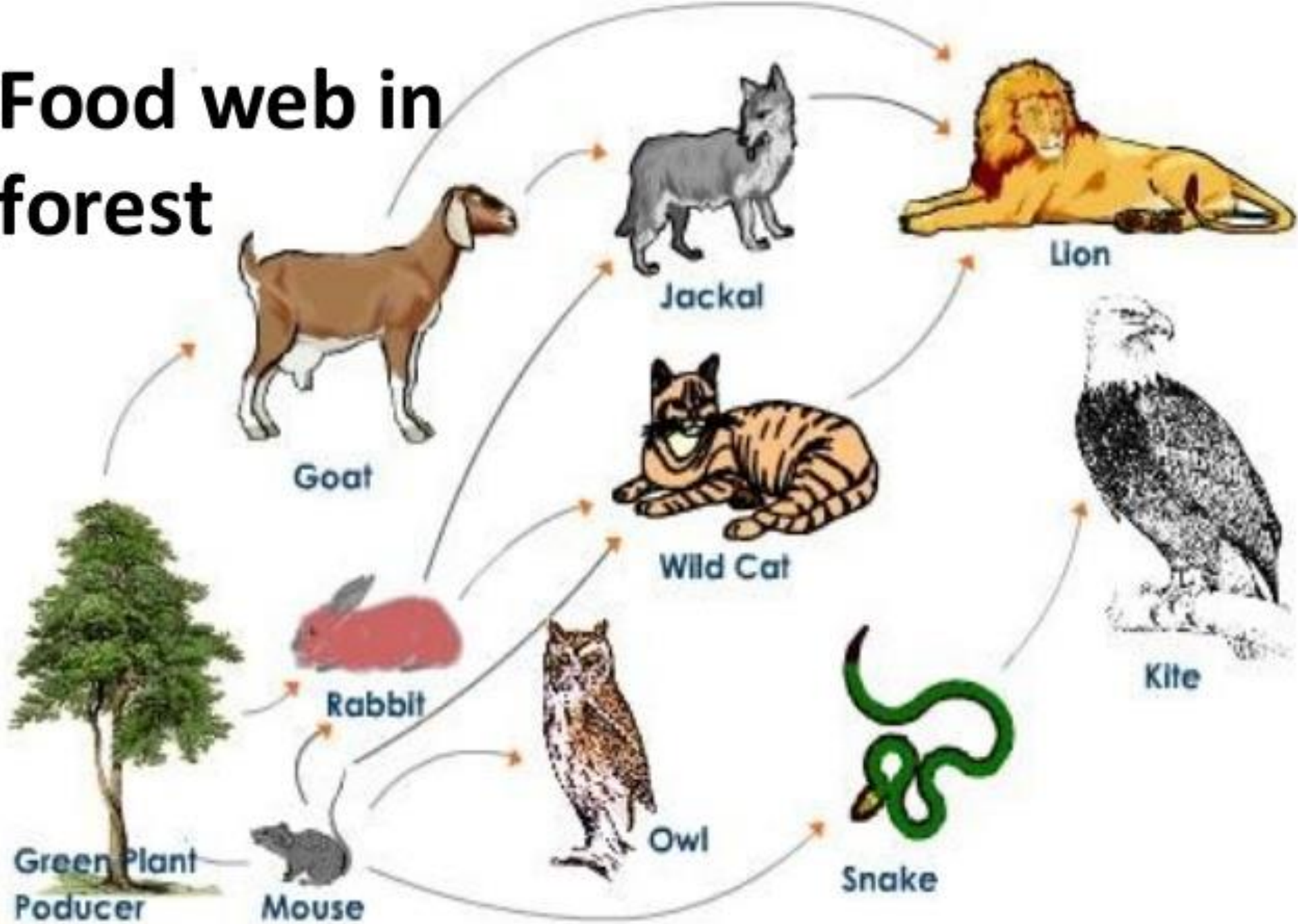
Animals



Aquatic food web

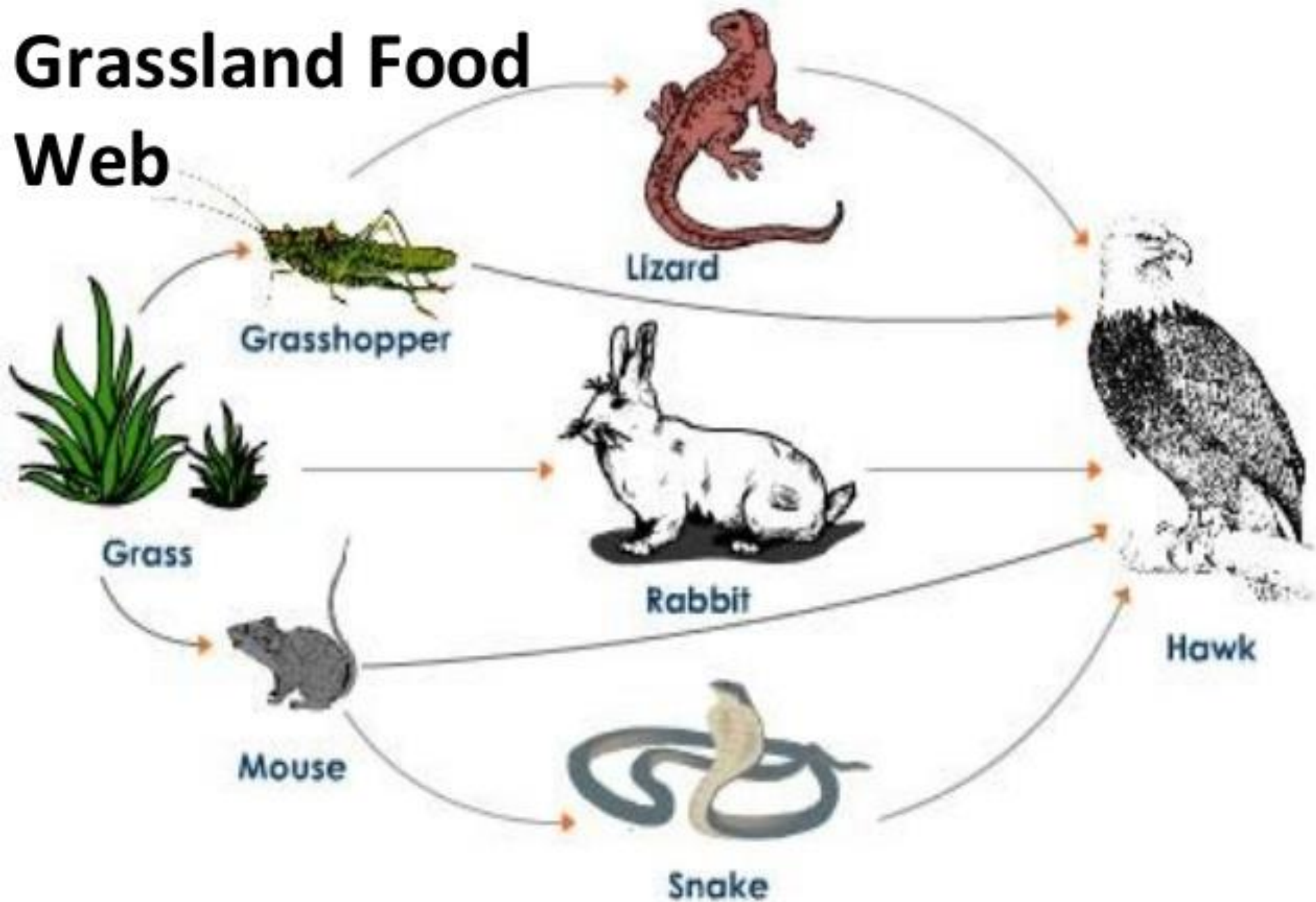


Food web in forest



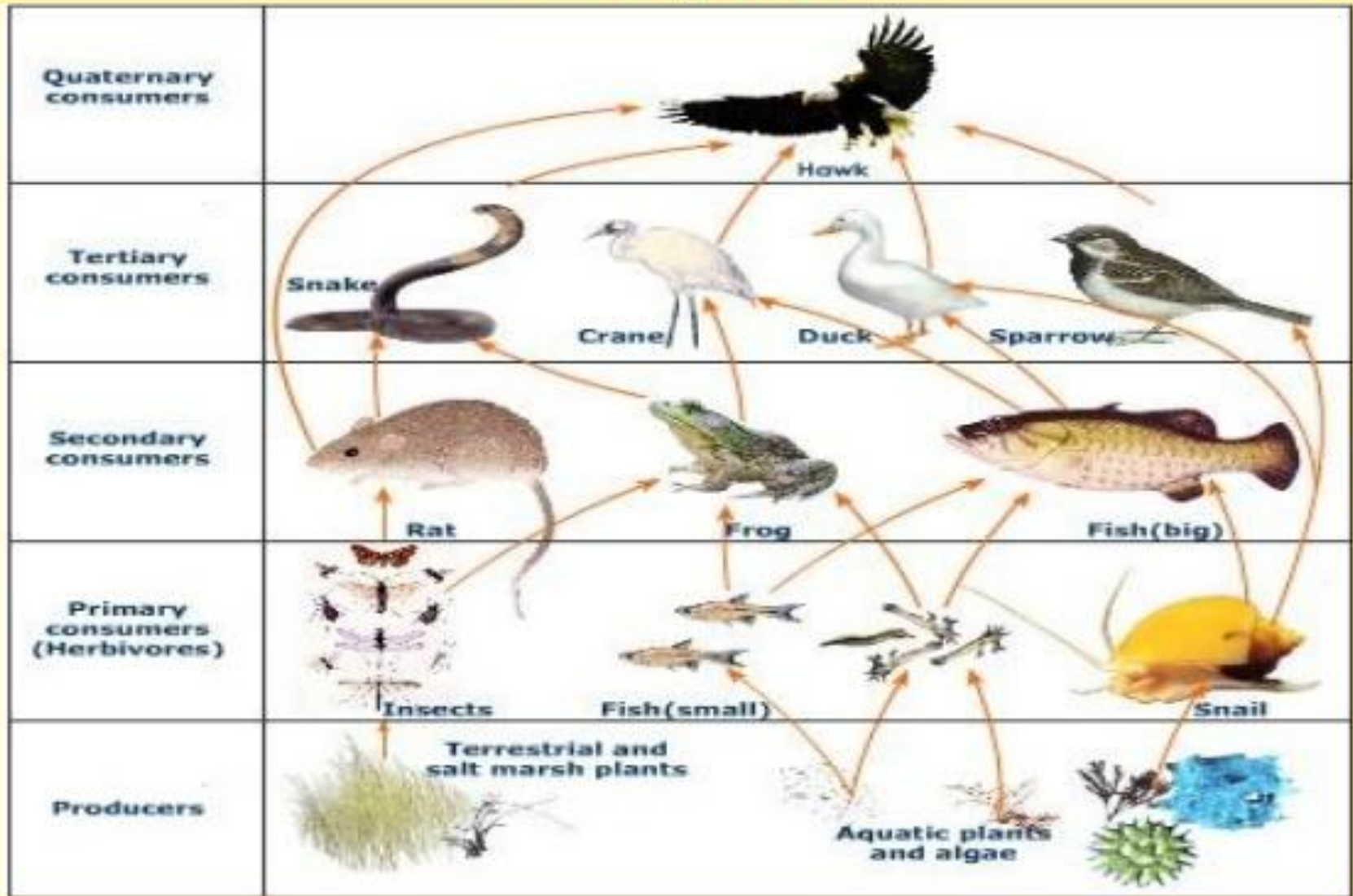
Food Web in a Forest

Grassland Food Web



A Food Web in a Grassland Ecosystem With Five Possible Food Chains

Food web in terrestrial and aquatic ecosystem



Significance of Food Web

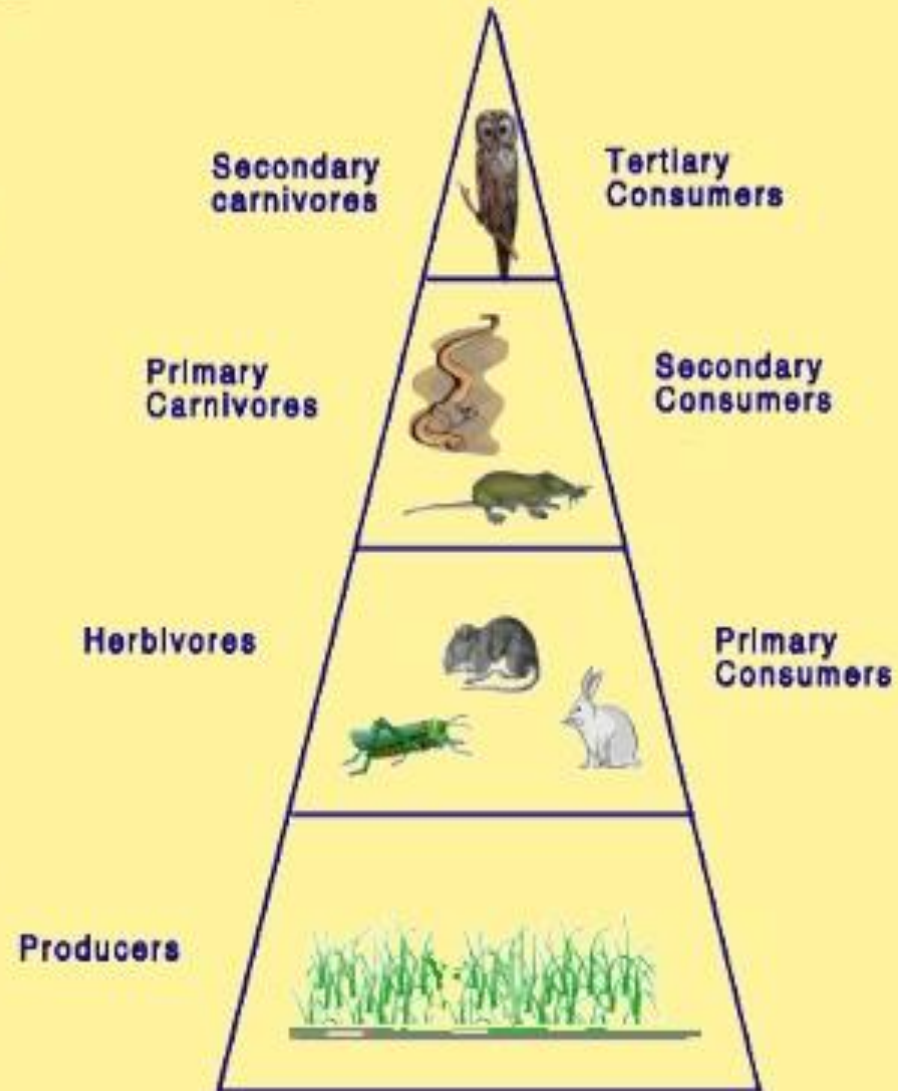
- Food webs distinguish levels of producers and consumers by identifying and defining the importance of animal relationships and food sources, beginning with primary producers such as plants, insects and herbivores.
- Food webs are important tools in understanding that plants are the foundation of all ecosystems and food chains, sustaining life by providing nourishment and oxygen needed for survival and reproduction.
- The food web provide stability to the ecosystem.



ECOLOGICAL PYRAMIDS

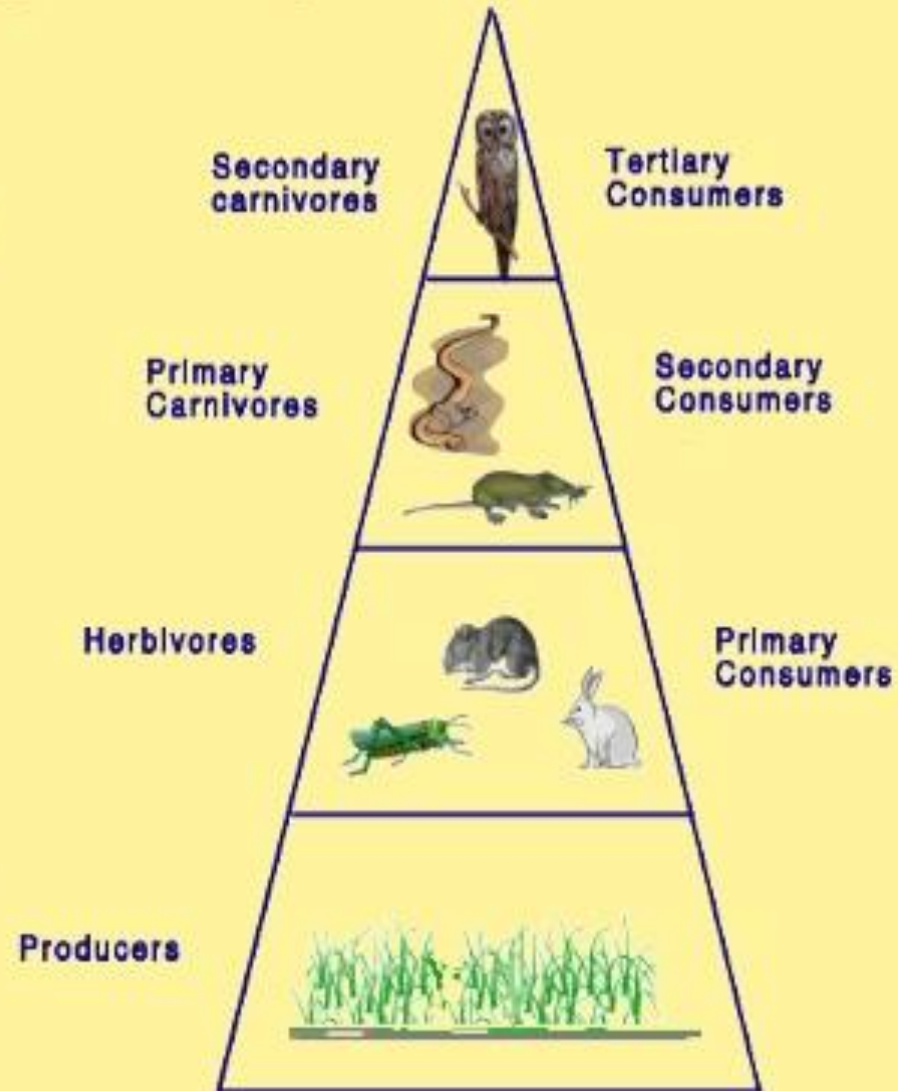
What are Ecological Pyramids?

- Ecological pyramids are graphical representations of the trophic structure of an ecosystem.
- Trophic levels are the feeding positions in a food chain such as primary producers, herbivores, primary carnivore etc.



What are Ecological Pyramids?

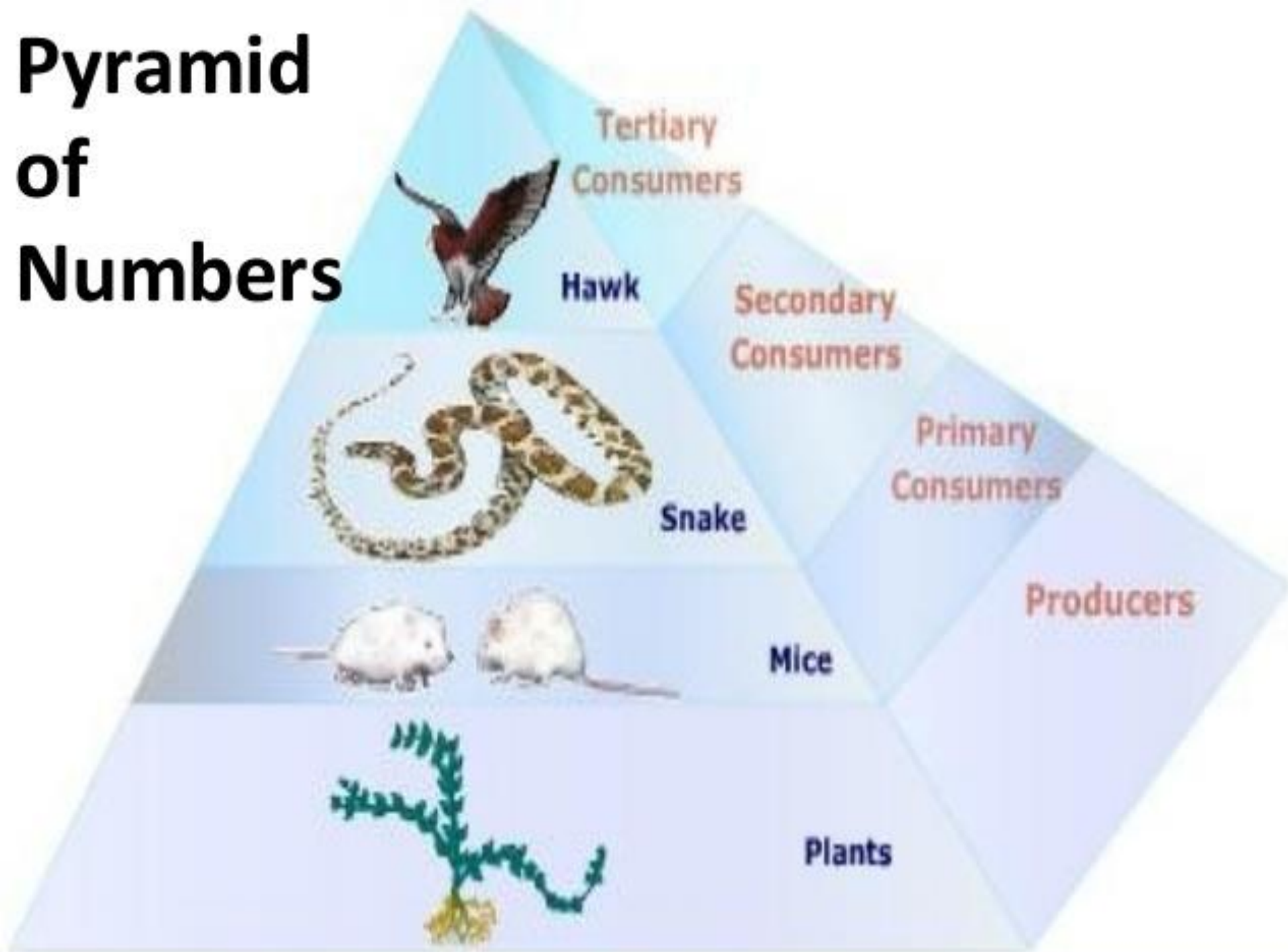
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Pyramid of Numbers

- It is the graphic representation of number of individuals per unit area of various trophic levels.
- Large number of producers tend to form the base.
- Lower numbers of top carnivores occupy the tip

Pyramid of Numbers



Evaluating pyramid of numbers

ADVANTAGES	DISADVANTAGES
Simple method of giving an overview	Number of specific species may be too great to measure accurately
Good for comparing changes to the ecosystem at different times	Does not take into account “juveniles” or immature forms
	All organisms are included regardless of size

Pyramid of biomass

- It is the graphical representation of biomass present per unit area at different trophic levels, with producers at the base and carnivores at the top.
- Biomass is calculated as
mass of each individual \times no. of individual at trophic levels

Top Carnivore



1 Kg

Primary Carnivore



10 Kg

Herbivores



100 Kg

Producers



1000 Kg

Upright Pyramid of biomass in a Terrestrial Ecosystem

Carnivore



12 gm/m²

Herbivores



8 gm/m²

Producers



4 gm/m²

Inverted Pyramid in an Aquatic Ecosystem

Evaluating pyramid of biomass

ADVANTAGES	DISADVANTAGES
Overcomes the problems of pyramids of number	Only uses samples for population so difficult to measure biomass exactly
	Time of year influences result
	Organisms of same size do not necessarily have the same energy content

Pyramid of productivity

- Pyramid of productivity is a graphical representation of the flow of energy through each trophic level of a food chain over a fixed time period.
- The input of solar energy may be indicated by adding an extra to the base.

Pyramid of productivity

Tertiary consumers



10 J

Secondary consumers



100 J

Primary consumers



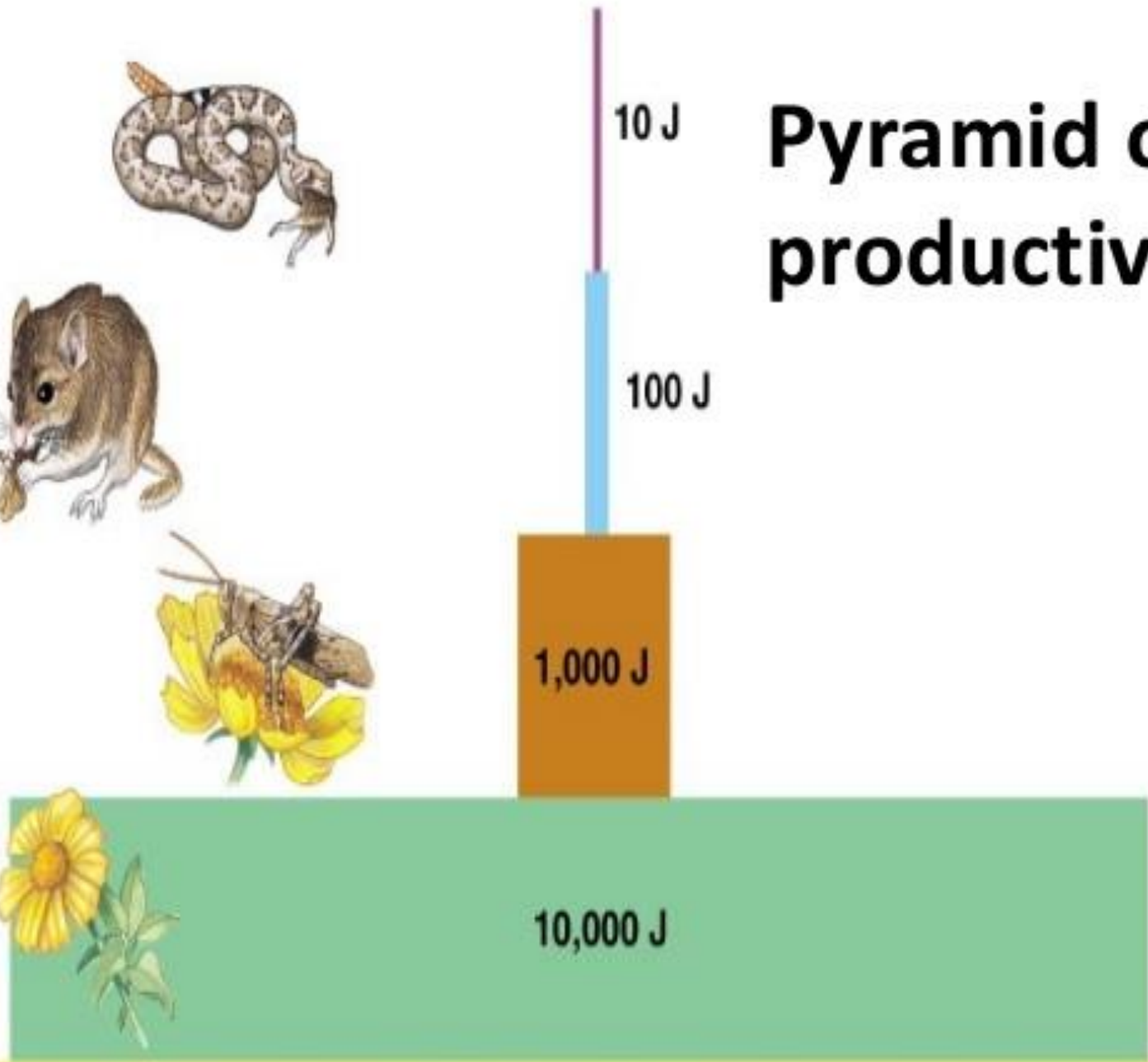
1,000 J

Primary producers



10,000 J

1,000,000 J of sunlight



Pyramid of productivity

Tertiary consumers



10 J

Secondary consumers



100 J

Primary consumers



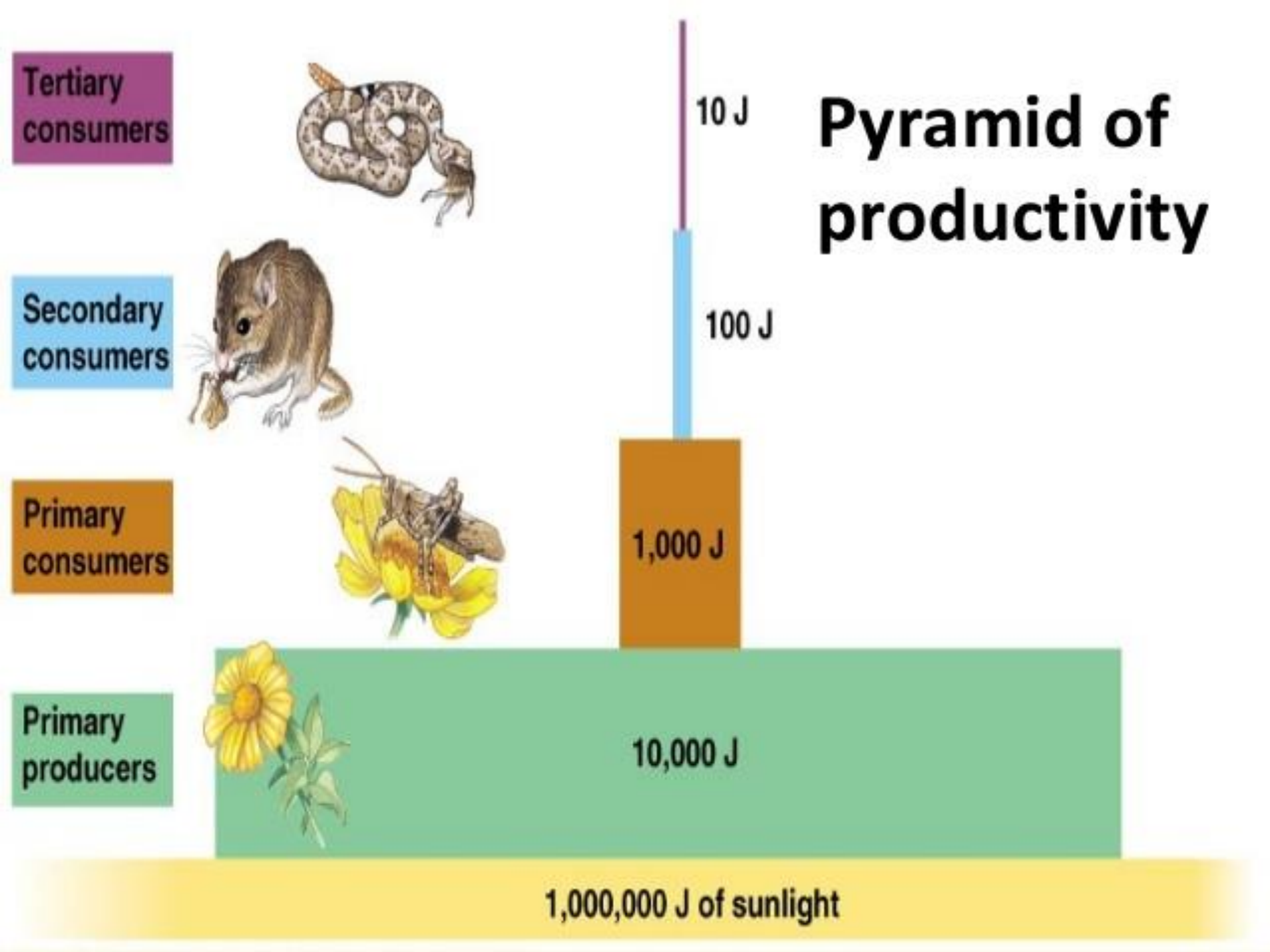
1,000 J

Primary producers



10,000 J

1,000,000 J of sunlight



Disturbances in ecosystem

- **Bioaccumulation** - When plants / animals take up a chemical from the environment and do not excrete it, the chemical builds up in the organism over time to a potentially lethal level.
- **Biomagnification** - Refers to the sequence of processes that results in higher concentrations of the chemical in organisms at higher levels in the food chain. The concentration of the chemical may not affect lower levels of the food chain but the top levels take in so much it can cause disease or death.
- **Extinction of species** – Due to decrease in population of various species the balance of various trophic levels is disturbed as a result some levels have more accumulation of species while others have very less population.

Thank you ...

