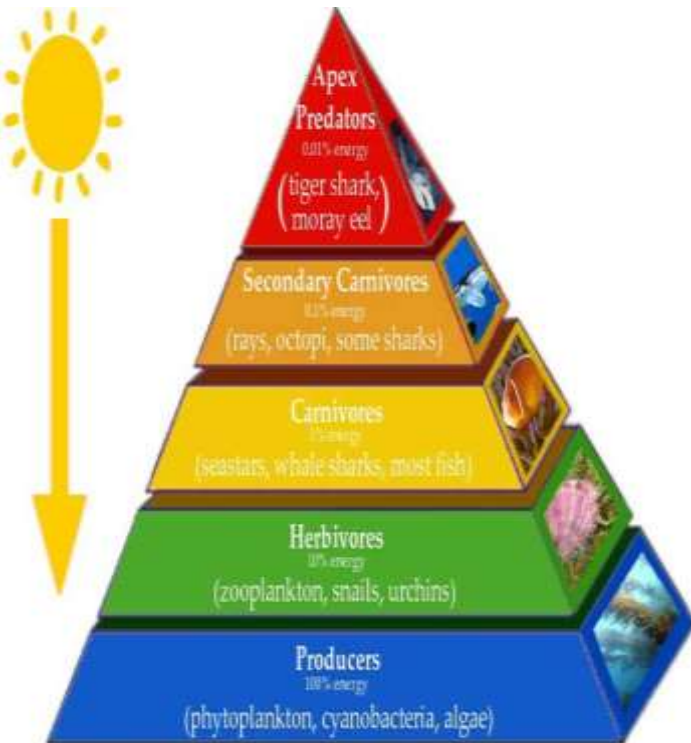


Presentation On :

# ECOLOGICAL PYRAMIDS



By- Ankit Abhilash Swain

# Contents:

- Ecological pyramids
- Types of ecological pyramids
- Pyramid of numbers
  - Evaluating a pyramid of number
- Pyramid of biomass
  - Evaluating a pyramid of biomass
- Pyramid of energy
  - Evaluating a pyramid of energy
- Conclusion
- References

# What are Ecological Pyramids?

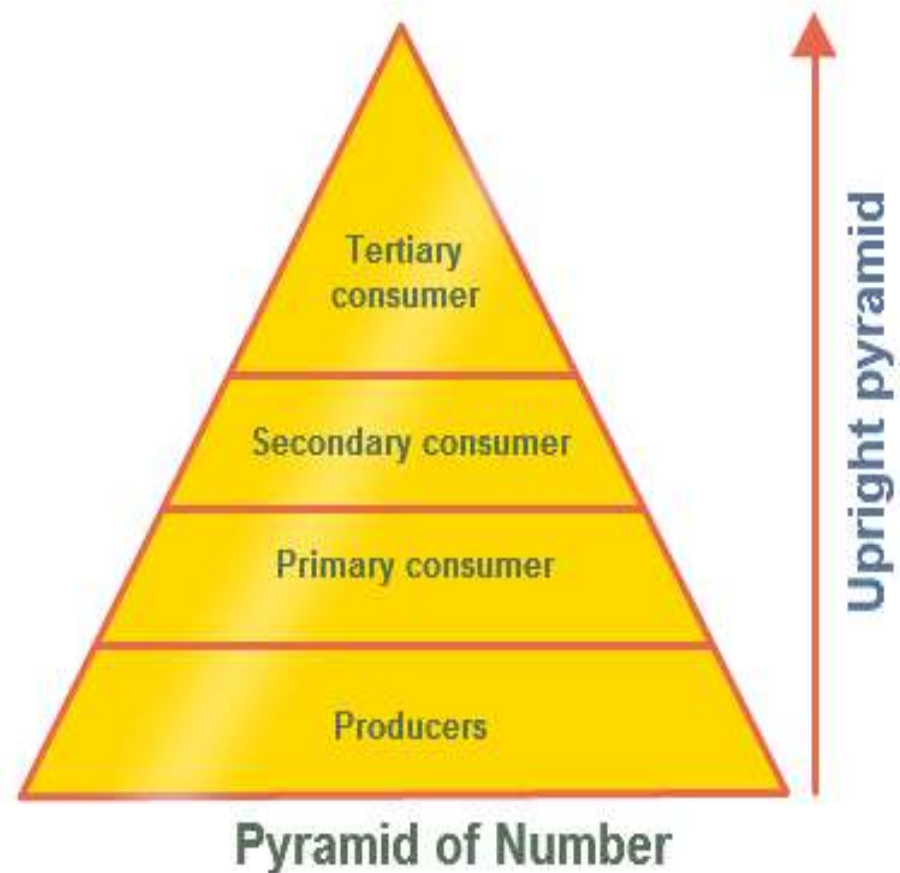
- Ecological pyramids are **graphical representations** of the trophic structure of ecosystems.
- **Trophic levels** are the feeding position in a food chain such as primary producers, herbivores, primary carnivores, etc.

# Types of ecological pyramid

- Three types of ecological pyramids can usually be distinguished namely:
  1. Pyramid of Numbers
  2. Pyramid of Biomass
  3. Pyramid of Energy

# Pyramid of Numbers

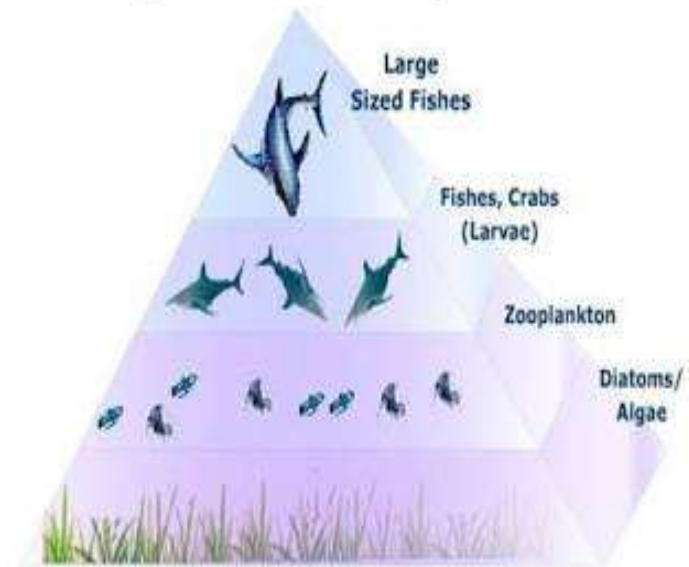
- Is the graphical representation of number individuals per unit area of various trophic levels
- Large numbers of producers tend to form the base
- Lower numbers of top carnivores occupy the top



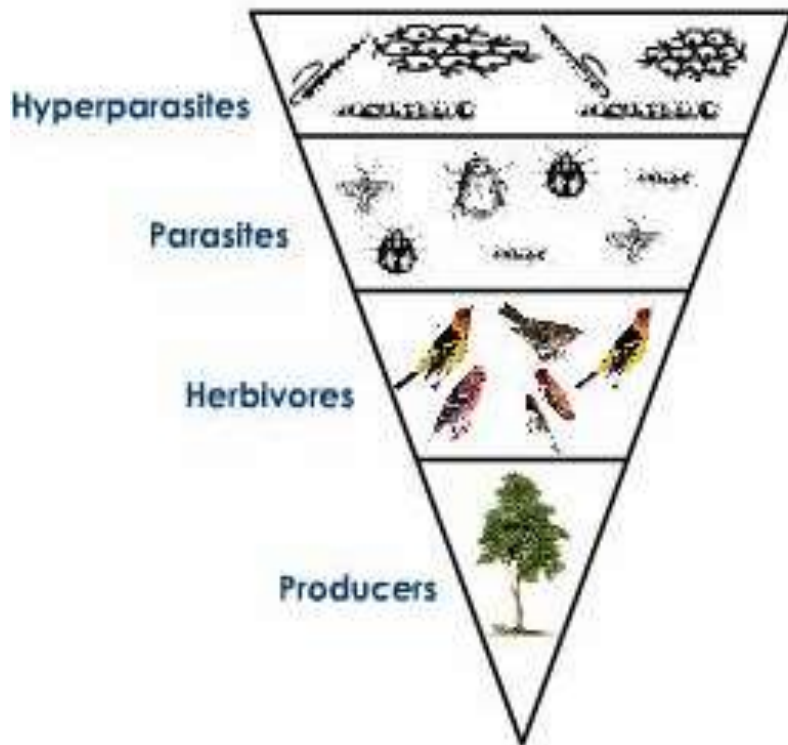
# Pyramid of numbers

- The shape of the pyramid of numbers vary from ecosystem to ecosystem.
- In aquatic ecosystems and grassland communities, autotrophs are present in large numbers per unit area.
- A lesser number of herbivores, which in turn support fewer carnivores.

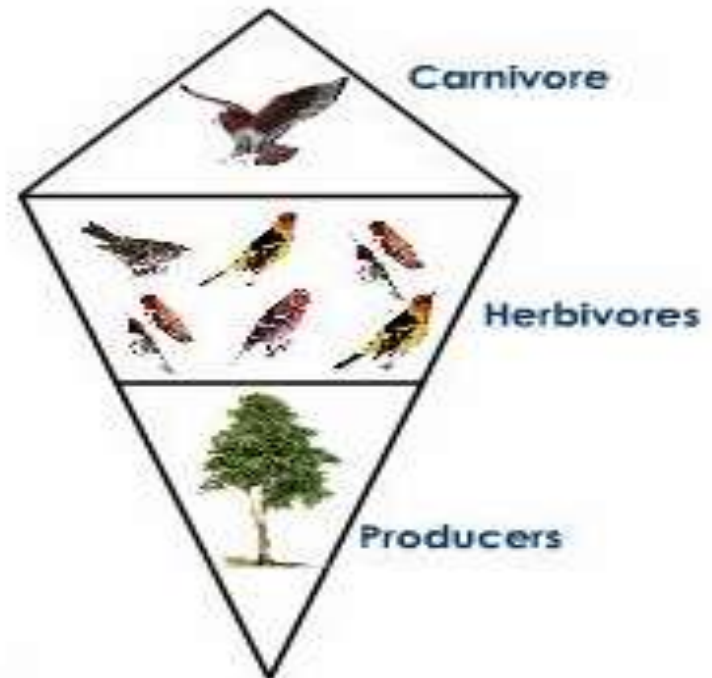
## Pyramid of Numbers in a Aquatic Ecosystem



# inverted + spindle-shaped pyramids



Inverted pyramid of number



Partly Upright  
Pyramid of Number

# Evaluating the pyramid of numbers

## ADVANTAGES

- Simple easy method (number counting) of giving an overview
- Good for comparing changes to the ecosystem at different times of year e.g. between seasons

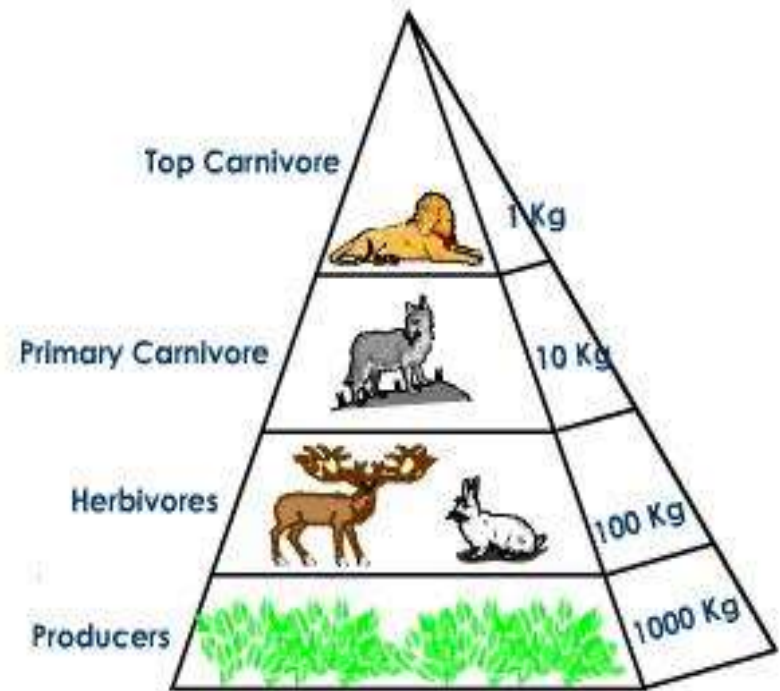
## DISADVANTAGES

- Numbers of a specific species can be too great to measure accurately
- Does not take into account 'juvenile' or immature forms
- All organisms are included regardless of size, hence 'inverted' pyramids



# Pyramid of biomass

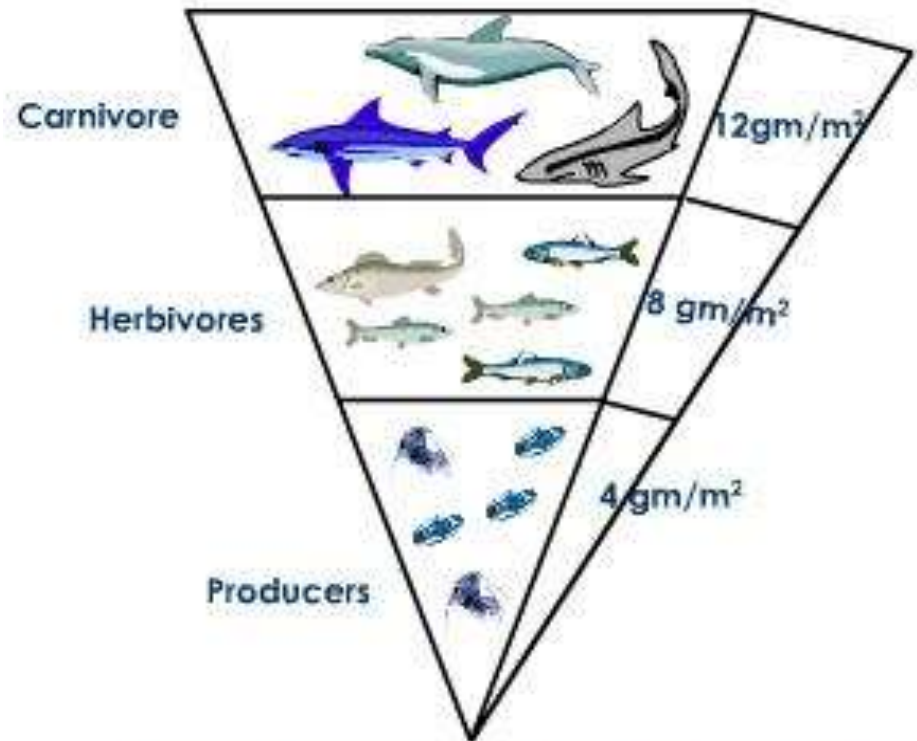
- Is the graphic representation of biomass present per unit area of different trophic levels, with producers at the base and top carnivores at the tip.
- Biomass is calculated by the mass of each individual x number of individuals at each trophic level ( $\text{gm}^{-2}$  or  $\text{gm}^{-3}$ )



Upright Pyramid of biomass in a Terrestrial Ecosystem

# Inverted pyramid of biomass

- In an aquatic habitat the pyramid of biomass is inverted or spindle-shaped where the biomass of trophic level depends upon the reproductive potential and longevity of the member.



Inverted Pyramid in an Aquatic Ecosystem

# Evaluating a pyramid of biomass

## ADVANTAGES

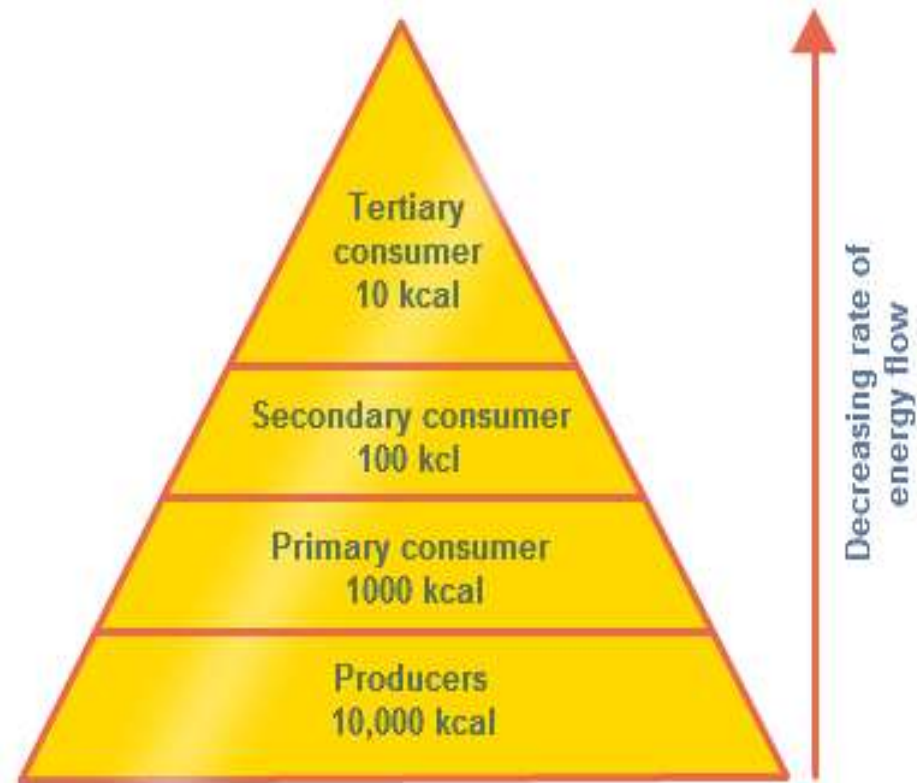
- Overcomes the problems of pyramids of number

## DISADVANTAGES

- Only uses samples from population, so difficult to measure biomass exactly
- Time of year that biomass is measured influences result e.g. trees in summer
- Organisms of the same size do not necessarily have the same energy content
- Inverted pyramids may result from producers with high turnover rate

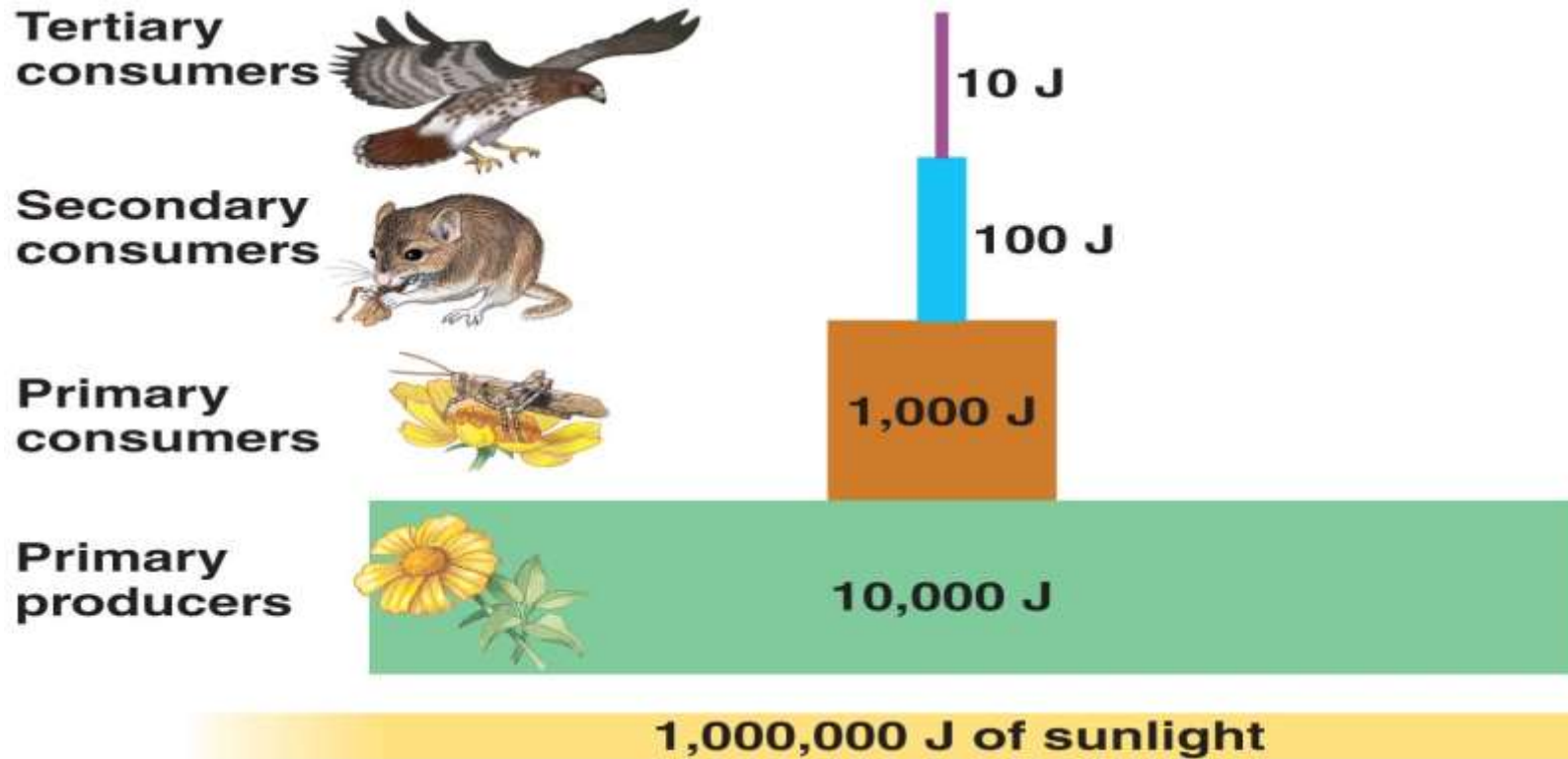
# Pyramid of energy

- Is the graphic representation of the flow of energy through each trophic level of food chain over a fixed time period.
- It is also known as “pyramid of productivity”
- The input of solar energy may be indicated as an extra layer at the base.



Pyramid of Energy

# Pyramid of energy



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- Only 10% of the energy is available to next trophic level (as per Lindemann's ten percent rule)
- The energy level of each trophic level has two parts i.e. Net Production (NP) and Respiration (R) and measured in  $\text{KJ m}^{-2} \text{yr}^{-1}$

# Evaluating a pyramid of energy

## ADVANTAGES

- No inverted pyramids are obtained
- Shows actual energy transferred and allows for rate of production
- Can compared different ecosystems based on relative energy flows

## DISADVANTAGES

- It is difficult and complex to collect energy data (rate of biomass production over time)
- Problem always exists in assigning a species to a specific trophic level

# Conclusion

- From the above content it was clear that the ecological pyramid gives information about the trophic structures and also provides a framework for the study of ecosystem energetics along with the study of number and biomass of the organisms in the ecosystem.
- Along with the brief knowledge about the trophic structures, it also allows us to observe the changes in the ecosystem due to several factors.

# References

- Ecology and Ecosystem, P D Sharma
- Environmental Sciences, Dr. Santilata Swain
- Fath, Brian & C. Killian, Megan. (2007). The relevance of ecological pyramids in community assemblages. Ecological Modelling - ECOL MODEL. 208. 286-294.  
[10.1016/j.ecolmodel.2007.06.001](https://doi.org/10.1016/j.ecolmodel.2007.06.001).





Thank You..