ECOLOGY

- The term ecology was coined and described by **E. Haeckel.** The term ecology was first authentically used by **Reiter.**
- Father of ecology - **Reiter**
- The term Ethology for ecology was used by - **Geoffroy Hilarie**
- The term Hexicology for ecology was used by - **G.H. Mivart**
- Study of ecology was initiated in India by - **W. Dudgeon**
- Father of Indian Ecology - **Prof. Ram Deco Misra**
- First of all term ecology was employed for study of plant by - **Warming**

The study of interaction or inter- relationship of organisms with their environment is called ecology.

Organism ⇌ Environment

Organism and environment as always interdependent, inter related or mutually reactive.

Branches of Ecology - It is based on organism level

1. **Autecology -** Study of the relation of a species with its environment is knows as autecology
2. **Synecology -** Study of the relation of the group of different species with their environment

ECOLOGICAL HIERARCHY

Organism → Population (species) → community → Ecosystem → Biome → Biosphere

size ⇒ **Increase**

complexity ⇒ **Increase**

ORGANISM

An organism is the smallest unit of ecological hierarchy and basic unit of ecological study.

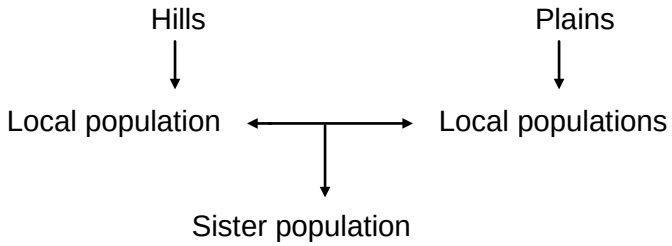
- It may be small, large, unicellular or multicellular.
- Fixed life span and organized life cycle (birth to death)

POPULATION

A group of individual (members) of same species living at one plane (specific geographical area) constitute a population.

- **Local Population or demes (Sub groups of population) -** Population of organism inhabiting a particular area.
  e.g. Homosapiens inhabiting hills, plains

- **Sister population -** Different populating of same king of organisms which are found in different laces are known as sister population.



- **Meta population -** A set of local population which are interconnected by dispersing individuals.

SPECIES

In a basic unit of classification, defined as the group of living organisms similar is structure, function and behaviour and produced by similar parents, have common gene pool, can inter breed under natural conditions and reproductively isolated from other group of organism.

SOME TERMS RELATED TO SPECIES :

- **Endemic Species or Endemism :**
  A species which is found only in a particular area is known as endemic species.
  e.g. Meta sequoia is found only in valley of China, Kangaroo is Australia

- **Key-stone species :**
  The species which have great influence of the community's characteristics relative to their low abundance or biomass are called key-stone species. The activities of key-stone species determine the structure of the community.
  e.g. Lion is forest, Kangaroo rat is desert

- **Critical Link Species :**
  The species which establishes an essential link with other species to help the latter in some vital activity is called link species.
  e.g. Mycorrhizal fungi, may insect species which works as pollinators of flowers.

INTRA - SPECIFIC INTERACTION

It is of two type :

(A) Cooperative interaction **(B) Competitive interactions**

COOPERATIVE INTERACTIONS (+ve)

1. **Group formation for breeding -**
   There are of two types –

(a) Monogamous : In this interaction one male and one female come together and form a breeding group. They live together whole life.

eg. Wolf, Fox, Swan Sparrow, predaceous insect, spiders, owls, tigers are solitary animals. Their partnership breaks down at the end of a breeding season. Adult male and female come together only for a short duration for mating purpose.

(b) Polygamous : It is an e.g. of group formation.
e.g. Seal, walrus and Deer

2. **Mating behavior -** It if the precopulatory sexual behaviour of two sexes of same species towards each other during copulation.
   e.g. Dancing behaviour in peacock, Whistling by cicada
   Nest building by male stickle beck to attract the female
3. **Parental care -**

   (a) Care of eggs (b) Nest building (c) Carrying eggs or persons

   Advantage - Protection, chances of survival of young ones, transfer of knowledge to young ones.

4. **Aggregation -** When a number of solitary animals aggregate for some particular activity it is called aggregations.
   Advantages - Protection, facility in sexual reproduction, transfer of knowledge.

There are two types of aggregation

- **Temporary aggregations -**
  e.g. During migration is birds, Snakes aggregate temporarily during hibernation.

- **Permanent Aggregation -**
  Term for Aggregations

Shoals : Group of Flying fish
Flocks : Group of Birds (Parrot's Duck's, Geese)
Troops : Group of Monkeys
Herds : Group of Mammals (deers, zebras, elephants, lions)
(herd = Adult male + Female + Children)

Multimale herds - The Group having a one female, many male and their offspring's,
e.g. mountain gorilla, olive baboon and macaque

Matriarchy - When the leader of a group is female
e.g. African elephant, Red deer, Honey bee

Patriarchy - When the leader of a group is male
e.g. Deer, Rabbit, Monkey, Zebra, Antelope, Hippopotamus

5. **Altruism -** It is the behaviour of an individual to increase the chances of survival of other individuals of same species i.e., sacrificial behaviour.
   e.g. Altruism is observed in spotted deer, wild turkey. workers of honey bee, termites etc **Note :** **Lemmings** are important example. When their number exceeds for supply, there is large scale exodus to commit mass suicide so that workable relationship or balance is re-established between food resources and population size.
6. **Dominance -** Subordinate behaviour or hierarchical social order in a flock or herd, where ranking of individuals is present for e.g. female subordinate to males, young to adult.
7. **Communication -** Transmission or exchange of information among the members of same species.
   Modes of communication -
   (i) Chemical signals - Some organisms release pheromones. Pheromones act as sec attraction alarms, signals, path indicator, territory markers etc.

- Ants release chemicals containing pheromones, which help other members of colony to find their path to the colony or to the source of food.
- In several animals sex pheromones are secreted by females during the breeding season, this indicates their receptivity to attract the male. A dog can smell a bitch from almost one kilometer.

(ii) Tactile Signals - By physical contact during courtship and mating
- Mutual preening in birds, grooming in mammals

(iii) Visual communication -
- Workers honey bee informs about the direction and distance of food-source by its dancing movements.
  Round dance - when food source is less than 75 meters
  Tail wagging dance - when food source is at long distance

(iv) Auditory communication - By producing some specific sound.
- Male frog → croaks
- Song of birds → for sex, location, mating call, alarm

COMPETITIVE INTERACTIONS

It is the competitive relationship between two organism of same species for getting the same resources (food, habitat, light, moisture)

Note : Intraspecific struggle is the strongest and severe type of interaction because members of same species have same requirement such as food, shelter and same structure, functional and behavioural adaptation.

e.g. Sparrows fight for a particular shelter, wall lizards fight to catch insects.
Plants also compete for space, water, light and minerals.

Advantage - It help is maintaining the ecological balance.

HOME RANGE AND TERRITORY

Home Range - Several members of a species may cover a definite area for searching food, mates and shelter, this is called home range.

- The home range of different groups can overlap
- Home range is larger is size and natural and has many breeding groups.
- It is usually not defended.
- Its size may be few meters (Ants) or many km. (African hunting dog)

Territory - In home range particular geographic space/area marked by an individual or a group of breeding individuals (breeding pairs) for breeding is known as territory. It is an area which is a family habitat.

- A home range is formed by many territory, territory is defended against member of same species except the mating partners.
- Boundaries of a territory are marked by urine e.g. Dogs, Tiger.
  Secretion like pheromones - e.g. Rabbit
- Territory of different groups can not overlap.

Note : Territory reduce the competition for the basic needs (shelter, food)