



# ORGANISM AND POPULATION

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# ADAPTATION

- Abiotic factors determine the type of habitat. The plants and animals must adapt to the changes in order to survive and flourish in the habitat.
- Many species have evolved a relatively constant internal environment that allows the species to flourish.
- The organism try to maintain the constancy of the internal environment (homeostasis) despite variation in external environmental condition.
- To survive in any environment organism must adapt to the change in the environment for which there are following possibilities



## 1.REGULATE:

- Some organisms are able to maintain homeostasis by physiological and behavioural changes which insure constant body temperature, constant osmotic concentration.
- All birds and mammals are capable of such regulation (Thermo and Osmoregulation).

## 2.CONFORM:

- Most of animals and plants cannot maintain a constant internal environment.
- Their body temperature changes with the ambient temperature. In aquatic animals osmotic concentration of the body fluids changes with the ambient water osmotic concentration.
- These animals and plants are simply conformers.
- If the stressful environment is localized or only for a short period of time the organism may migrate or suspend its activities.



### 3.MIGRATE:

- The organism can move away temporarily from the stressful habitat to a more hospitable area and return when the stressful period is over
- Birds during winter take long distance migration to a more hospitable area.

### 4.SUSPEND:

- In plants seeds serve as a means to tide over periods of stress; they germinate to form new plants under favourable conditions.
- They do so by reducing their metabolic activity and going into a state of dormancy.
- In animals the organism if unable to migrate may go into hibernation during winter.  
Eg. Polar bear.
- Some snails and fish go into aestivation to avoid summer heat.

# ADAPTATION

- Adaptation is an attribute of the organism (morphological, physiological and behavioral )that enables the organism to survive and reproduce in its habitat.
- Many desert plants have –
  - a) Thick cuticle on leaf surface
  - b) Stomata in deep pits to minimize loss of water through transpiration.
  - c) Special photosynthetic pathway (CAM) that enables stomata to remain closed during day time.
  - d) Some plants have their leaves reduced to spines and photosynthetic function is taken over by flattened stems.
- Mammals from colder climates generally have shorter snout, ears, tail and limbs to minimize loss of body heat.(allen's rule)
- In polar sea aquatic mammals like seal have thick layer of fat (blubber) below their skin acting as an insulator to reduce loss of body heat.



# ADAPTATION

- Some organism show behavioral response to cope with variation in their environment.
- Desert lizards manage to keep their body temperature fairly constant by behavioral adaptation.
- They bask in sun and absorb heat, when their body temp. drops below the comfort zone, but move into shade when ambient temp. starts increasing.
- Some species burrow into the sand to hide and escape from the heat.

# POPULATION

- ▶ In nature species are rarely find isolated they live in group in well defined geographical area, share or compete for similar resources, potentially interbreed and thus form a population.
- ▶ Population ecology is an important area of ecology because it links ecology to population dynamics, genetics, evolution.
- ▶ Basic physical characteristics of population are:
  - ▶ Size- Number of individual in a population.
  - ▶ Density- Number of individual present per unit space in a given time.
  - ▶ Natality, Mortality, Immigration, Emigration, Age Pyramids, Expanding Population, Population growth forms and Biotic potential.

# NATALITY

Natality is the birth rate of the population.

- Natality is of crude birth rate or specific birth rate.

- Crude Birth Rate:

It is used when calculating population size (no of births per 1000 population per year).

- Specific birth rate:

It is used relative to a specific criterion such as age.

- Absolute Natality:

Number of births under ideal conditions (with no competition, abundance of resources)

- Realized Natality:

Number of births when environmental pressure come into play.

Absolute natality will be always more than realized natality

# MORTALITY

- Mortality is the death rate of population.
- It measure no of death in a particular population in proportion to the size of that population per unit of time
- Mortality rate is expressed in deaths per 1000 individual per year.

- **Absolute Mortality:**

Number of deaths under ideal conditions (with no competition, abundance of resources).

- **Realized Mortality:**

Number of deaths when environmental pressure come into play.

Absolute mortality will be always less than realized mortality



# SEX RATIO

- The sex ratio of population affect and is reciprocally affected by birth, death, immigration, emigration rates.
- It is measured as the ratio of the number of individual of one sex to that of the other sex.
- The males and females in a ratio of 1:1 is generally the most common evolutionary stable strategy. (ESS).

# AGE DISTRIBUTION AND AGE PYRAMID

- Population is composed of individuals of different age. If the % of individuals of given age is plotted for the population the resulting structure is called as 'age pyramid'.
- The entire population is divided into 3 age groups as-
  - a. pre- reproductive – age 0 -14 years
  - b. Reproductive – age 15- 44 years
  - c. Post –reproductive – 45- 85+ years.
- Population size more technically called population density need not necessarily be measured in number only. If population is huge and counting is impossible then biomass is more meaningful measure of population size. eg: termite/ ants.
- For certain ecological investigation there is no need to know the absolute population density relative densities serve the purpose. Eg – 1. tiger census in national park is based on pug marks and fecal pellets. 2. number of birds and insects caught per trap is used to measure total population density.



THANK YOU

