

POPULATIONS SUMMARY NOTES

Ecology - The study of inter-relationships between organisms and their environment

Ecosystems - Made up of all the interacting abiotic and biotic features of a specific area

Populations - all the interbreeding organisms of one species in a habitat

Community - all the different populations of different species living and interacting in a given place at a given time.

Habitat - a place where a community of organisms live.

Ecological niche - Describes how an organism fits into its environment. Refers to where an organism lives and what it does there

Mark-release recapture assumptions:

- Proportion of marked/unmarked individuals in the second sample is the same for the whole population
- Individuals in the first sample distribute themselves evenly
- The population has a definite boundary. (no immigration/migration)
- Birth/Death is low
- Marking method is not toxic/ conspicuous
- Marking is not lost

Estimate of population = $\frac{\text{no. individuals caught in first sample} \times \text{no. caught in second sample}}{\text{No. recaptured}}$

LIMITING FACTORS ON POPULATION SIZE:

1. **Abiotic**

Temperature – If they are below the optimum temperature, metabolic rate maybe lower if they are cold blooded. However if they are mammals, they will produce heat during respiration, at low temperatures more energy is used to maintain a stable body temperature and less is used for growth.

Light – If light intensity is greater in plants, the more energy they can use to create spores and seeds and so they reproduce quicker.

pH – Affects the function of enzymes.

Water and humidity – humidity affects transpiration rates in plants and the rate of evaporation of water from animals.

PREDATOR PREY RELATIONSHIP:

- Predators eat their prey, thereby reducing the population of the prey
- With fewer prey available, the predators are in competition with one another for the prey that is still left
- Predator population decreases due to some predators not being able to catch enough prey
- With fewer predators around, fewer prey are consumed
- Prey population increases
- More prey available, predator population also increases

HUMAN POPULATIONS:

$$\% \text{ growth rate in a given period} = \frac{\text{population change during a period}}{\text{population at the start of a period}} \times 100$$

Factors affecting birth rates

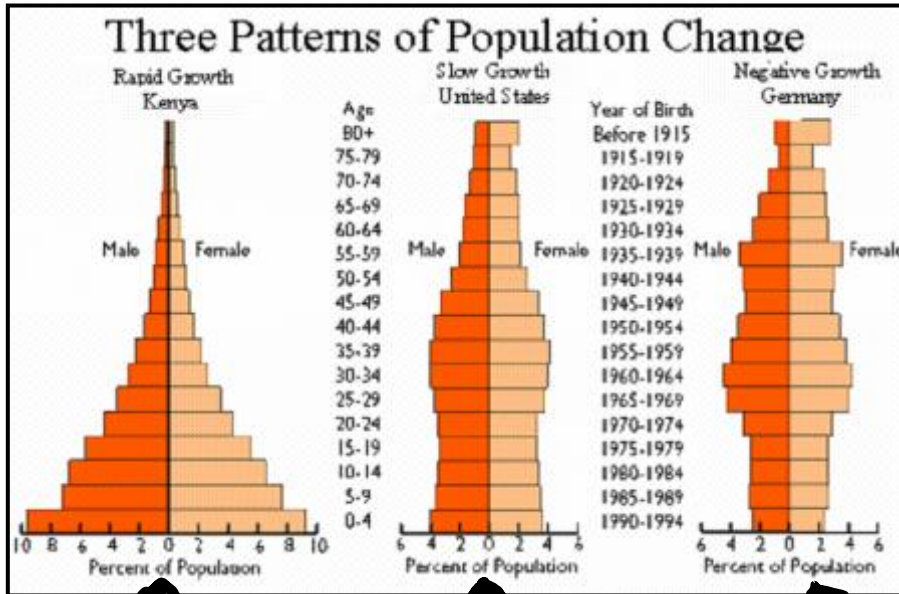
- **Economic conditions** – less developed countries tend to have higher birth rates
- **Cultural/religious backgrounds** – some countries/religions encourage larger families
- **Social pressures** – in some countries, a larger family improves social standing
- **Birth control** – the extent at which contraception/abortion is available affects birth rate
- **Political factors** – governments can influence birth rates through education and taxation

$$\text{Birth rate} = \frac{\text{number of births per year}}{\text{Total population in the same year}} \times 1000$$

Factors affecting death rate

- **Age profile** – the greater the proportion of elderly, the higher the death rate
- **Life expectancy at birth** – Residents of more developed countries tend to live longer
- **Food supply** – Poor nutrition will cause an increase in death rate
- **Safe drinking water** – poor quality drinking water will cause an increase in water born diseases thus increasing death rate
- **Medical care** – access to medical care will reduce death rate
- **Natural disasters** – the more prone a region is to drought/famine, the higher the death rate
- **War** – War will cause an increase on death rate

$$\text{Death rate} = \frac{\text{number of deaths per year}}{\text{Total population the same year}} \times 1000$$



↑
increasing

high birth rate + low death rate

↑
stable

balanced birth + death rate

↑
decreasing

low birth + death rate