:*Population Ecology or Demecology*

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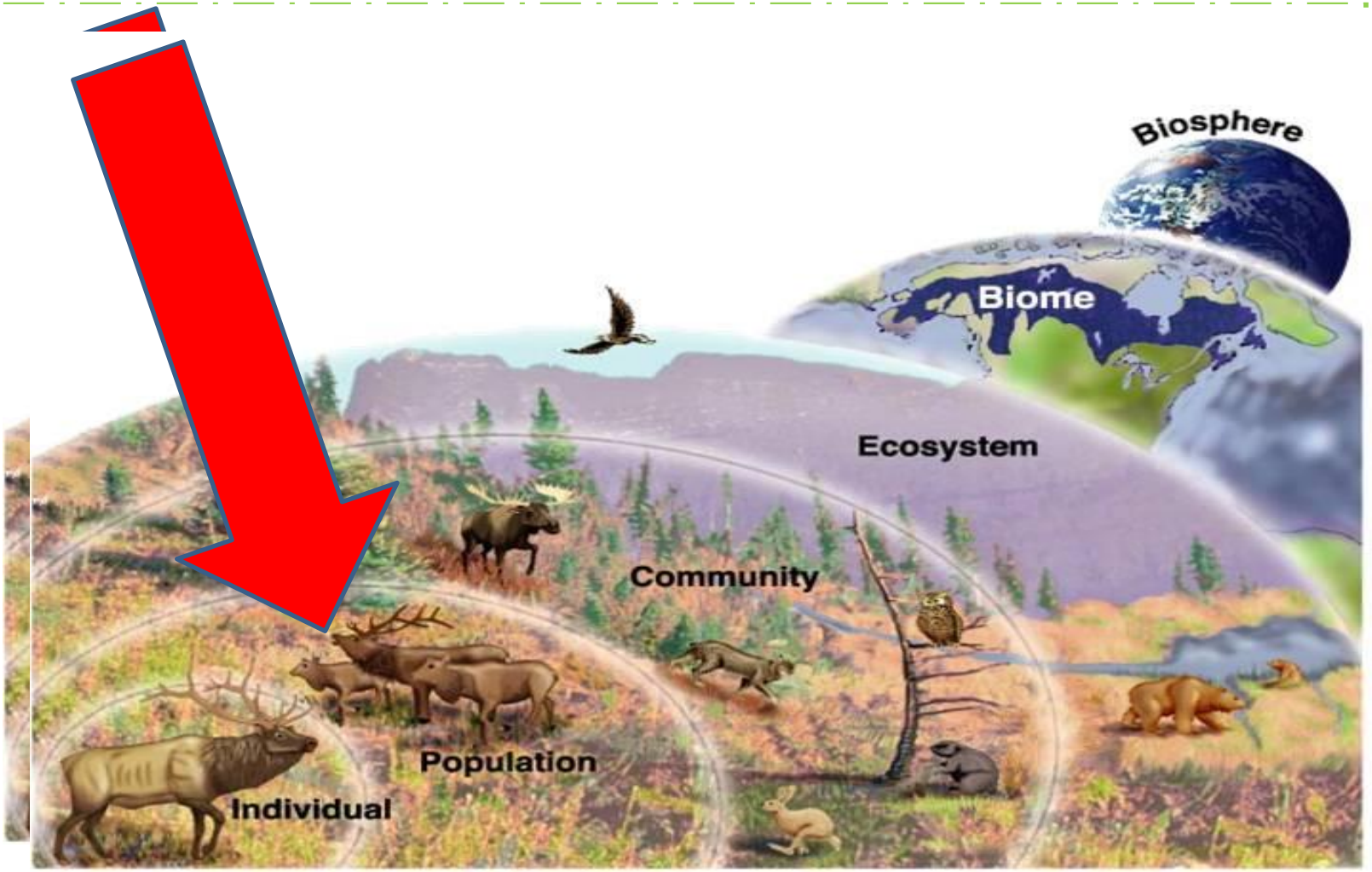
PLAN

- **Static characteristics of the population**
- **Dynamic characteristics of the population**
- **Factors dependent on population density**
- **Factors independent on population density**

- Population ecology is the study of how the population sizes of species living together in groups change over time and space.

Population means the members of a species living together in a particular locality for a long time (a large number of generations) and able to interbreed freely (panmixia).

Population


Biosphere
Biome
Ecosystem
Community
Population
Individual

Populations has certain environmental characteristics, which are not seen in some of its members, namely:

1) **a distinct *niche occupied by the population;***
2) ***abundance and biomass of the population;***
3) **dynamic characteristics of the population - fertility, growth rate, mortality, and survival.**

Ecological niche is a set of all the requirements of populations to environmental conditions (structure and modes of environmental factors) and locations where these requirements are fulfilled.

Static characteristics of the population

- **Population size is the number of individuals organisms in a population.** The population size can vary considerably in different organisms. Typically, population of large animals is relatively small and may consist of several hundred members; population of small organisms (invertebrates, unicellular organisms) can reach millions of species.

- The population size is intimately associated with the population **biomass,** which is its major characteristic. In particular, biomass of plants and animals is used by human being, that is why *the rate of biomass* growth is critical for both organism and practical need. In agriculture and forestry the damage caused depends on herbivores species numbers.

- **Density - is** the population size, per unit of space it occupies. For example, density of the moose and other large animal populations is determined by the number of individuals per 10 thou.ha, soil invertebrates population is calculated per 1 m2.

Dynamic characteristics of the population

- The dynamics of the population size is seen at interaction of four major population-dynamic processes:
- 1) fertility ;
- 2) mortality;
- 3) emigration
- 4) immigration

- *Fertility means* *ability to increase the population or the number of offspring* produced by one female per 1 year.

- Maximum birthrate is a theoretically maximum number of species produced under ideal conditions in the absence of limiting factors, and reproduction is limited to physiological factors.
- Ecological, or realized birthrate is birth of new species under actual environmental conditions.
- Anthropogenic impacts on the population can change the birthrate

Mortality

means the death of individuals per time unit in the absence of limiting factors.

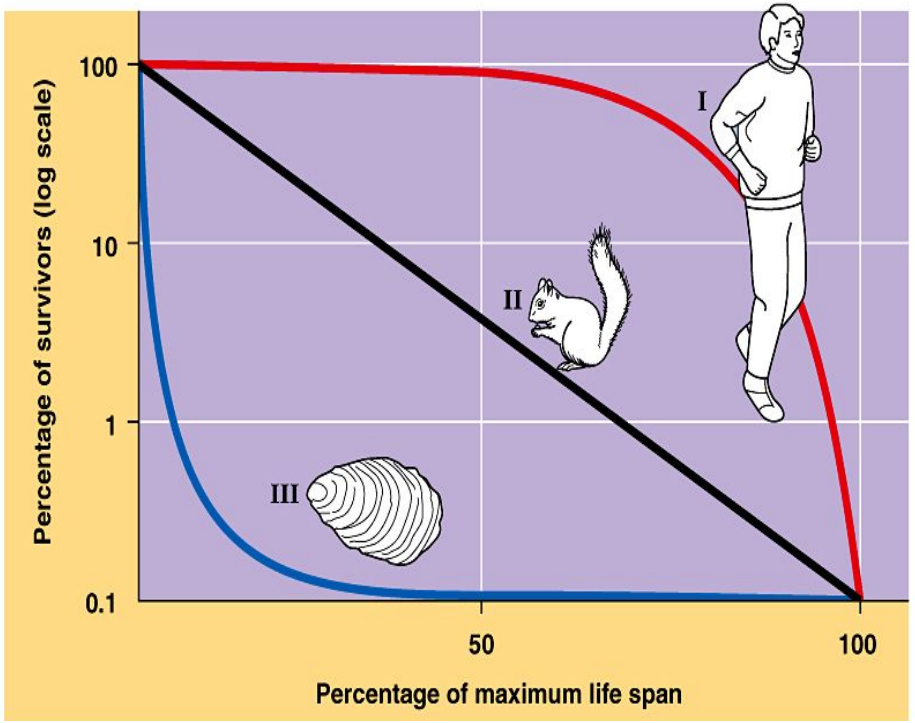
Ecological, or realized mortality means the death of individuals per time unit under actual environmental conditions.

The **difference** between fertility and mortality is a certain resulting parameter that determines the **actual dynamics** of a given population size.

- Both mortality and fertility vary greatly with age. For this purpose, the ecological mortality is determined for various environmental groups and survival curves, which are divided into 3 main types are drawn.

Survival curve

1. Highly convex
2. Intermediate
3. Highly concave

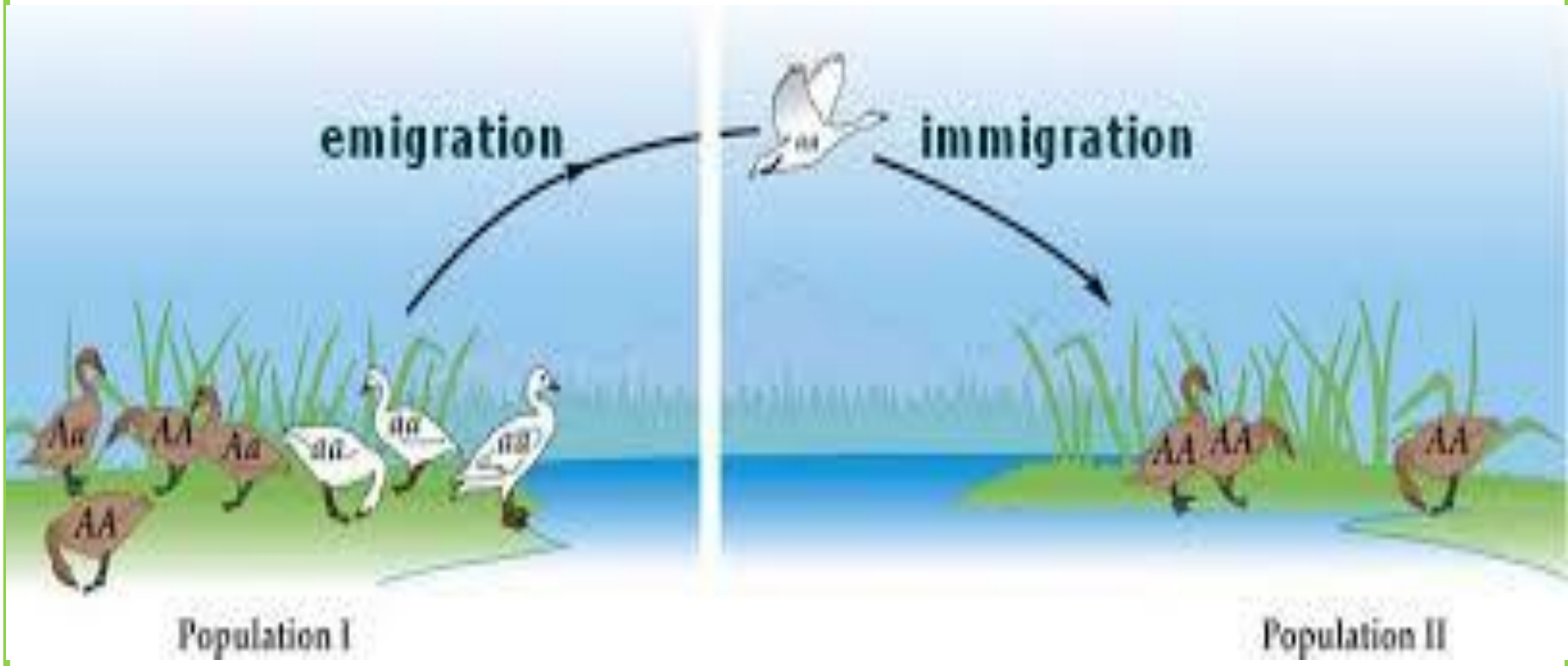


- The first type is characteristic to many mammals and humans and reflects a lower mortality rate in all age groups.
- The second type characterizes a relatively constant mortality in all age groups (birds, mice, rabbits, etc.).
- The third type reflects high mortality in the early stages of development (*ontogeny*) (molluscs, butterflies, etc.).
- ***The survival curve depends on the parental care level.***

Immigration is

new individuals which are arrived from other populations

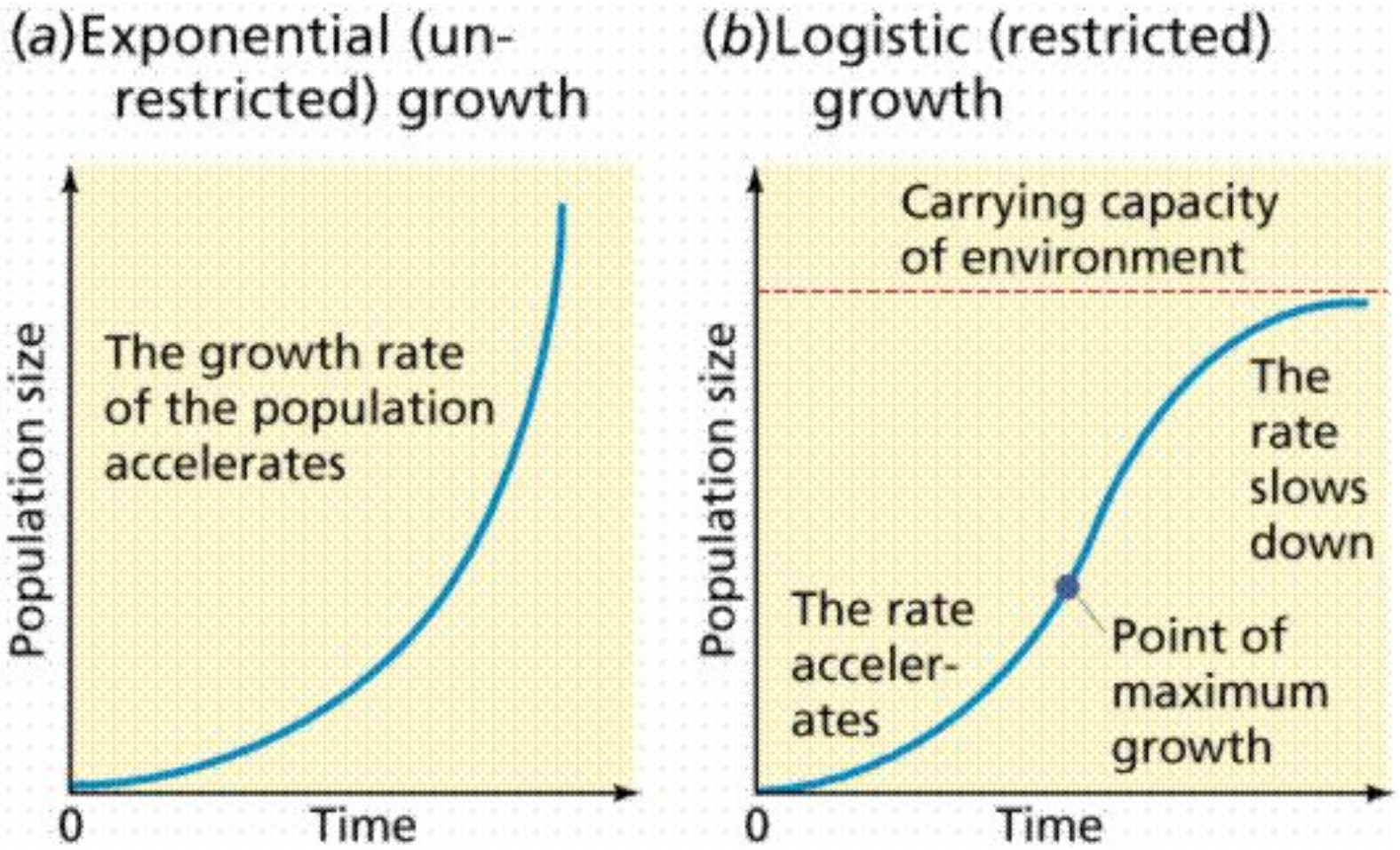
Emigration is some individuals which gone outside of this population area.



Growth of the populations

Population growth
occurs when birth rates exceed death rates or immigration exceeds emigration.

Types of growth



The reasons for decreasing population

- Population size increases and decreases over time. There are factors such as:
- resource availability;
- competition;
- parasitism
- predation;
- Climate;

- Often, human being or anthropogenic factor (reduction in food supply, reducing the oxygen in the water in case of eutrophication, etc.) cause exhaustion of needed populations.

Factor impacting the mortality.

Factors impacting the population fertility and mortality act more effectively if there is increased population **density.** Such factors are called ***dependent on population density***

Factors dependent on population density

If population density is high:

- lack of food;
- increase in the number of enemies, and morbidity.
- members are physically weaker and smaller;
- Animals birthrate reduces, even if there is no food-deficiency.

There are factors that are independent of the population density:

- The impact of unfavorable weather conditions (severe winters, droughts);
- natural disasters (fire, earthquake, flood, hurricane, etc.) may serve an example.

CONCLUSION

- In general, the population size and its growth rate (rate of its change, population dynamics) are instable parameters, which are highly sensitive to the effects of abiotic, biotic and anthropogenic factors. For this reason people should realize all the features of the population, which is somehow maintain, to ensure its sustainable long-term existence.