

Biogeography

Alexey Shipunov

Minot State University

Lecture 9

Outline

Very Basics of Ecology

- Human-related ecological factors

- Ecological niche

- Ecosystems and biosphere

Very Basics of Ecology

Human-related ecological factors

Anthropogenic factors

▶ Direct

- ▶ Collecting
- ▶ Hunting
- ▶ Plowing
- ▶ Tree cutting

▶ Indirect

- ▶ Grazing
- ▶ Polluting
- ▶ Melioration
- ▶ Recreation

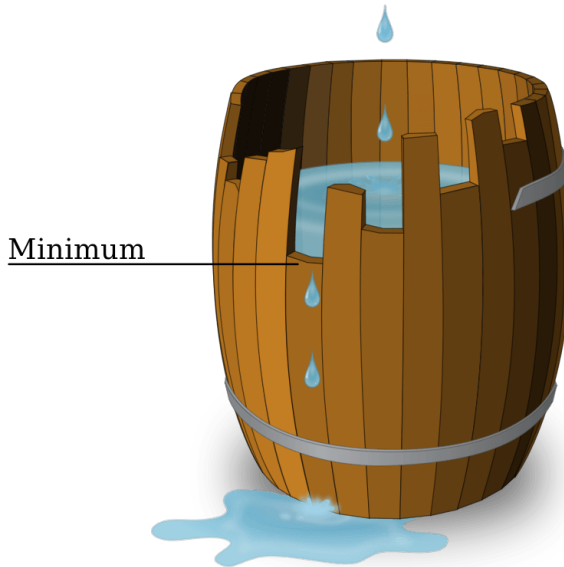
Very Basics of Ecology

Ecological niche

The cloud in hyper-space of ecological factors

- ▶ Response function: euryoecious and stenoecious species
- ▶ Fundamental and realized niche
- ▶ Liebig's law of the minimum

Liebig's barrel



Very Basics of Ecology

Ecosystems and biosphere

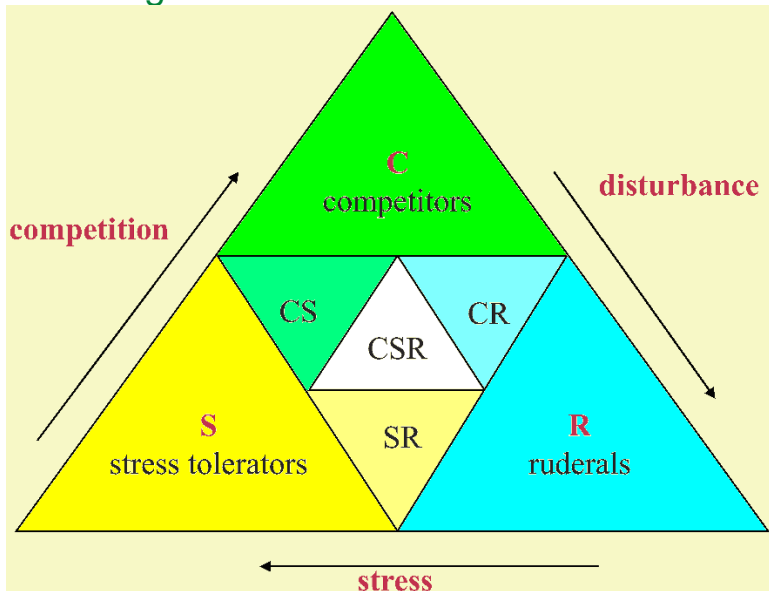
Features of ecosystem

- ▶ Biomass, diversity, structure (feeding network, stratification)
- ▶ Self-reproduction and self-regulation
- ▶ Biosphere is the largest ecosystem possible
- ▶ Ecosystem could be split in different ways, for example into life forms and then into populations

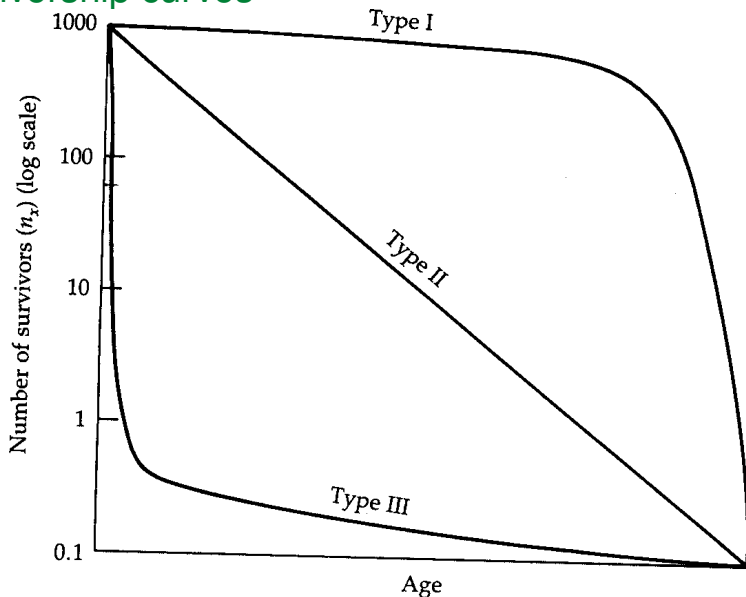
Populations

- ▶ Plant strategies: C (competitive), S (stress tolerant) and R (ruderal, or rapid propagation).
- ▶ Survivorship curves, population growth curves, r- and K-strategy

Grime's triangle



Survivorship curves



Strategies

r strategy

- Precarious equilibrium with the environment
- High rates of increase
- Violent and in some cases regular cycles of growth and decline



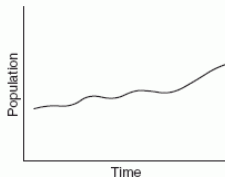
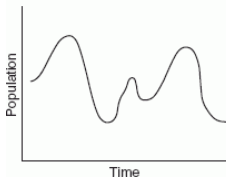
K strategy

- Stable equilibrium with the environment
- Rates of increase compatible with environment
- Slow and irregular cycles



Bioreproductive characteristics

- | | |
|----------------------------------|---------------------------------|
| • Small bodies | • Large bodies |
| • Short lives | • Long lives |
| • Short gestation | • Long gestation |
| • Large litters | • Single births |
| • Short intervals between births | • Long intervals between births |
| • Short length of generation | • Long generations |
| • High potential rates of growth | • Low potential rates of growth |



Food webs

- ▶ Plant-based: producer – herbivore (consumer I) – carnivore (consumer II) etc.
- ▶ Detritus-based: decomposer – detritivore – carnivore (consumer II) etc.

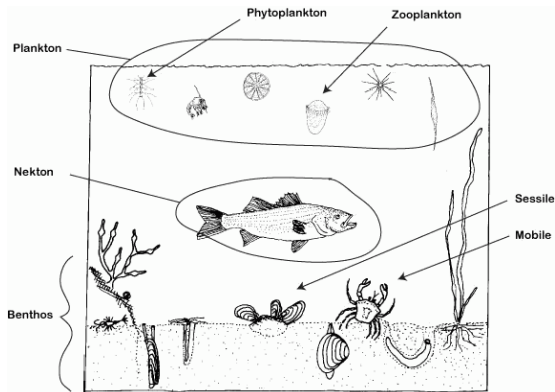
Energy and biomass pyramid (terrestrial)



Examples of ecosystems' structures

- ▶ Pond: phytoplankton, zooplankton, nekton, bentos
- ▶ Ocean: pelagic and littoral zones and some additional layers like neiston (first mm of surface)
- ▶ Forest: layers

Plankton, nekton and benthos



Succession

- ▶ Temporal chain of ecosystems
- ▶ Primary or secondary
- ▶ May start on bare minerals, river deposits, water
- ▶ May end with “climax” (F. Clements)

Biosphere, geomerid or Gaia

- ▶ All living things together with ecological factors
- ▶ Biomass: living matter
- ▶ Water, oxygen, carbon dioxide, nitrogen and phosphorous cycles
- ▶ Biosphere consists of biomes, geographically “packed” ecosystems

Summary

- ▶ Ecology studies relation between organisms and environment
- ▶ Ecosystems are self-reproduced and self-regulated units
- ▶ Biosphere (living Earth) is a biggest ecosystem
- ▶ Phosphorous cycle is the most critical to biosphere

For Further Reading



A. Shipunov.

Biogeography [Electronic resource].

2014—onwards.

Mode of access:

http://ashipunov.info/shipunov/school/biol_330



A. Shipunov.

Introduction to Biogeography and Tropical Biology [Electronic resource].

2017—onwards.

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