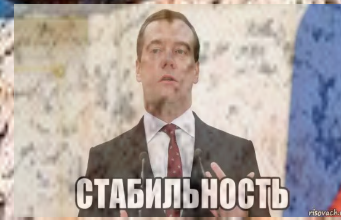


The stability of ecosystems and their resistance to contamination



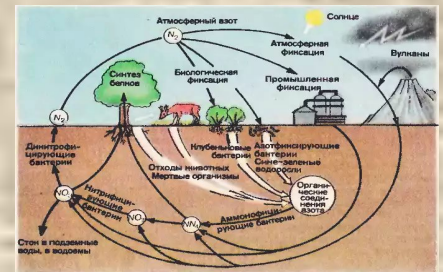
The concept of ecosystem resilience

- The stability of natural biological systems (population, or biocoenosis) should be understood as the ability for many generations continuously preserve the natural structure and function in a dynamic equilibrium with the environmental changes and the ability to repair itself after structural disturbance due to external influences

Ecosystem - an open, self-regulating and self-developing system

Provided by:

- resistant relationships between their components (community of organisms and abiotic components);
- trophic relationships and energy;
- variety of organisms that perform the same function, but occupy different ecological niches;
- permanent self-reproduction of populations, the capacity for evolution of species and microevolution of populations



Rapid adaptation to environmental changes

The biosphere natural unit principles

Circulation of substances

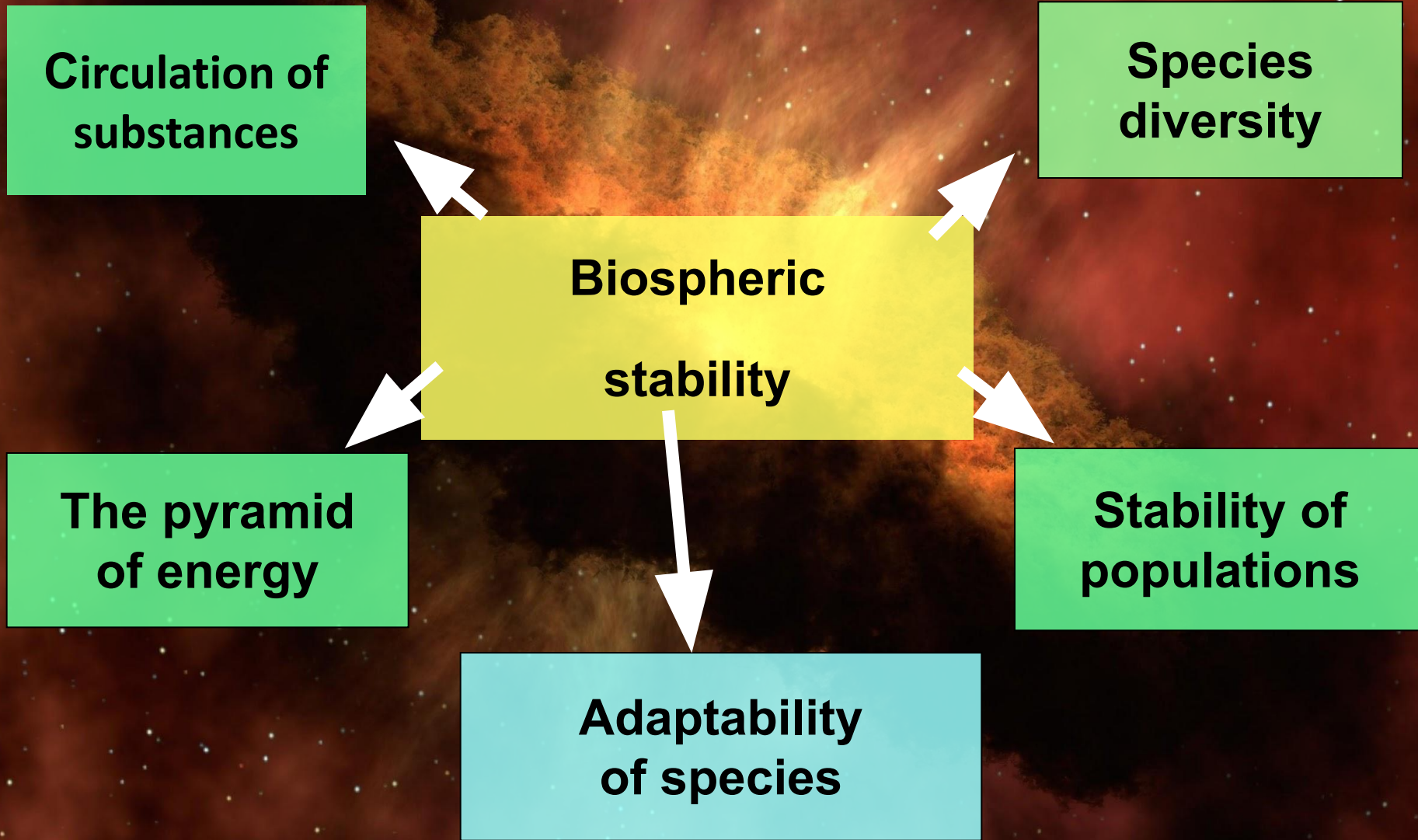
Species diversity

Biospheric stability

The pyramid of energy

Stability of populations

Adaptability of species



Features of natural and man-made ecosystems

Homeostasis - population or ecosystem ability to maintain stability in a changing environment

Under natural conditions:

- variability of ecosystem
- continuing violation of equilibria
- fluctuations in population size due to internal and external influences, interactions of different species

The stability of ecosystems:

- individual physical, chemical and biological balance
- stability of mass and energy exchange process,
- stability of matter and energy cycles

The stability of ecosystems

- Ability to return to its original state after the system was derived from an equilibrium state

Self Regulating Systems

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graph TD; A[Self Regulating Systems] --> B[Stable mobile equilibrium]; A --> C[Unstable equilibrium];
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Stable mobile equilibrium:
old relationships are renewed more rapidly, the duration of the resumption depends on the violations scale and on the specific system properties

Unstable equilibrium:
series of changes begin to develop rapidly and irreversibly even for small violations of existing relationships in natural systems.

Types of stability

- **resistant stability** - the ability to remain in the steady state under the load
- **elastic resistance** - the ability to recover quickly

Three degrees of ecosystems' deviation from equilibrium under the external factors:

- **stress** - the composition of biological communities is practically unchanged, the structure is changed significantly, there is a redistribution of species as a function of the dominant degree;
- **resistant state** - is sharply reduced species diversity and the changing composition of the community; resistant to the external factor population develop; this condition is characterized by the biomass stability of the total organisms community;
- **repression** - the complete suppression of the organisms' development

Resistant and resilient ecosystem sustainability

