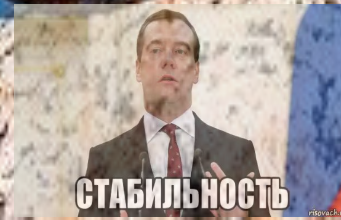


The stability of ecosystems and their resistance to contamination



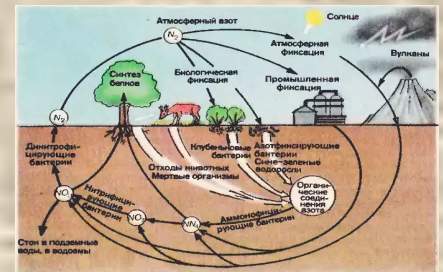
The concept of ecosystem resilience

- 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**

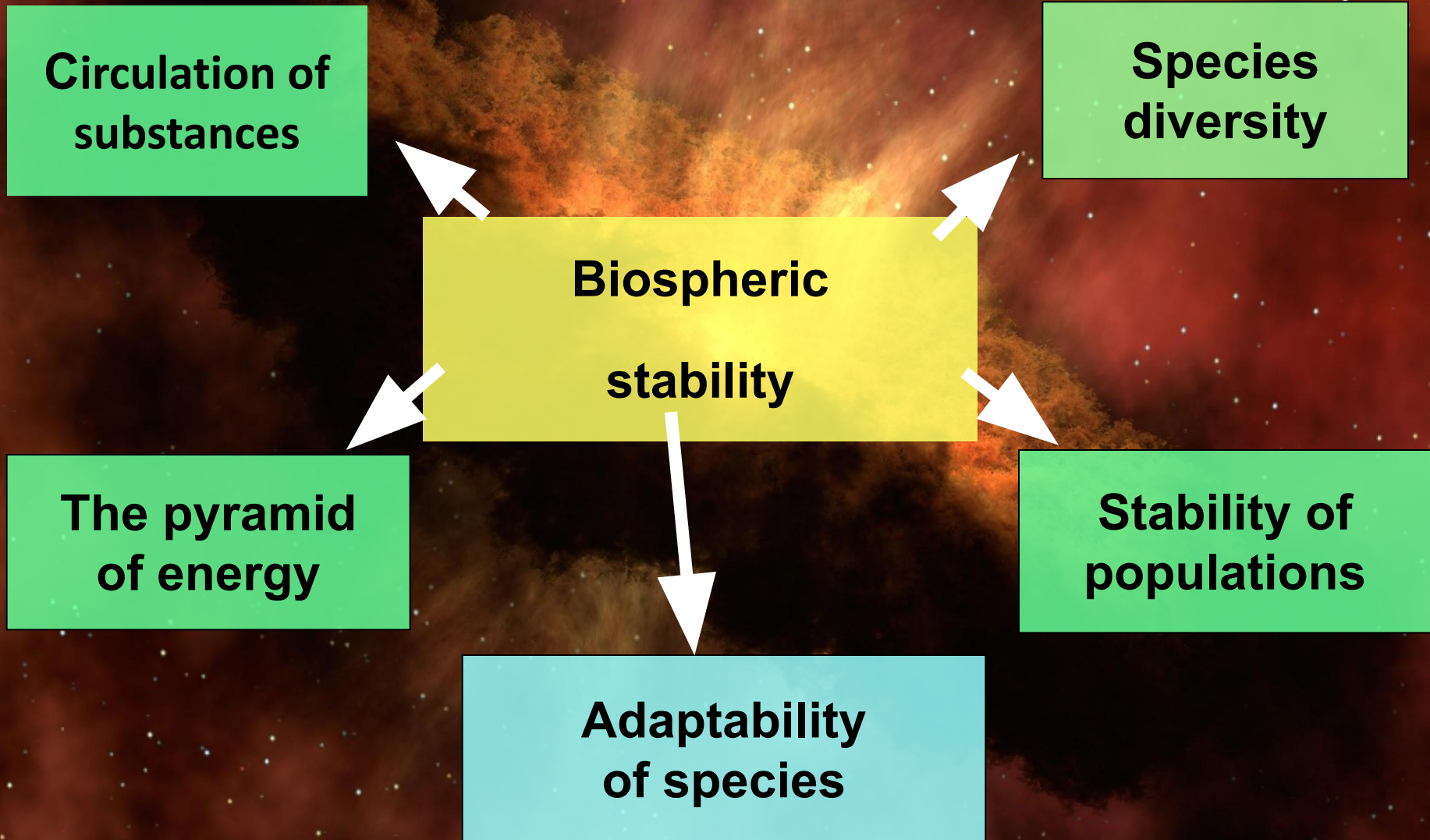
**Species
diversity**

**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:];
```

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

