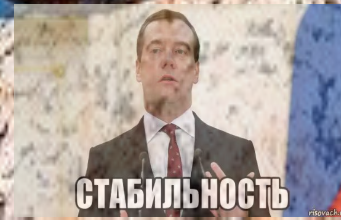


# The stability of ecosystems and their resistance to contamination





# The concept of ecosystem resilience

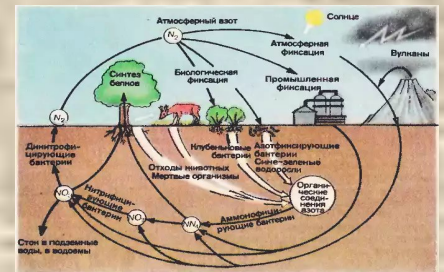
- The stability of natural biological systems (population, or biocoenosis) should be understood as the ability for many generations continuously preserve the natural structure and function in a dynamic equilibrium with the environmental changes and the ability to repair itself after structural disturbance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

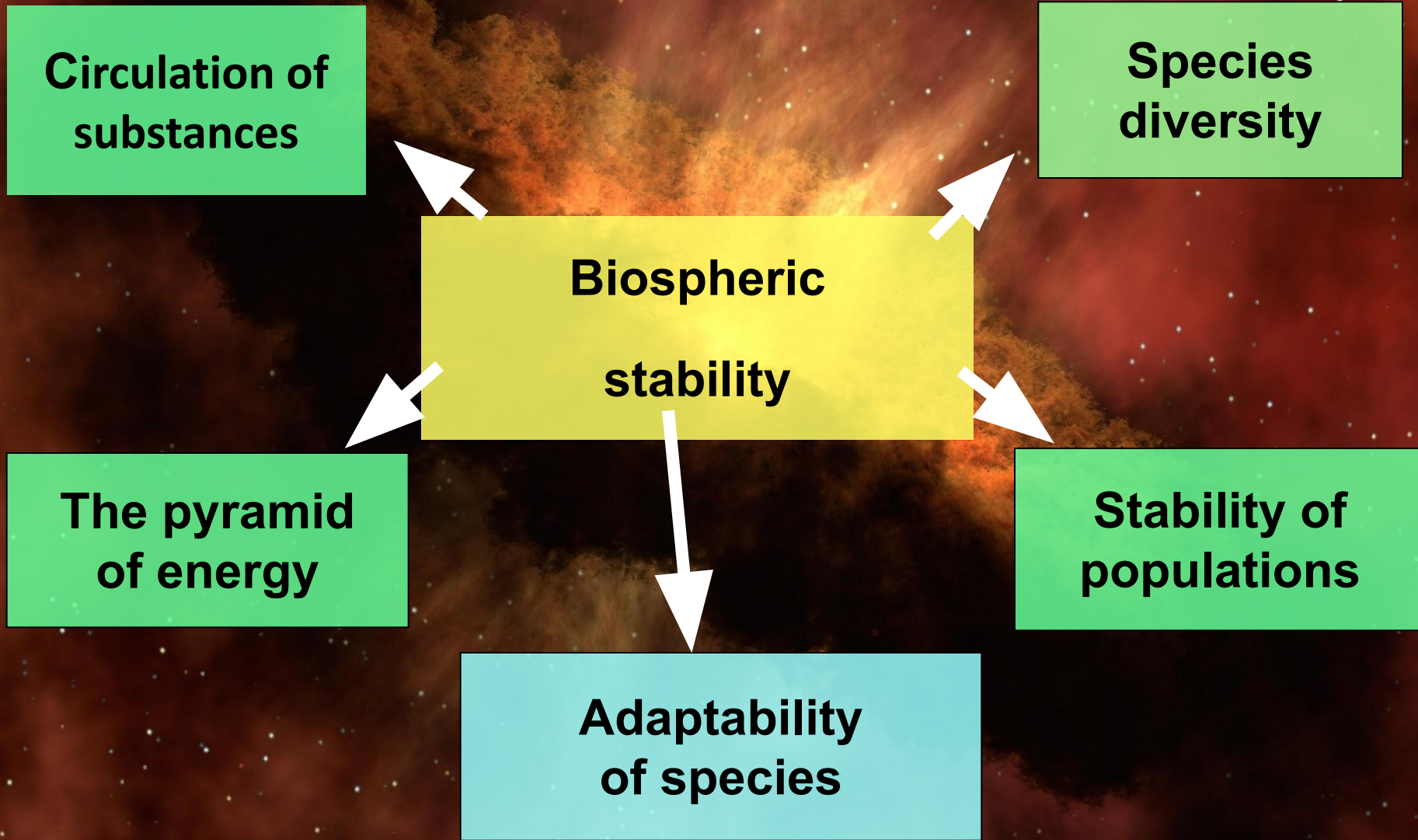
**Species diversity**

**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

```
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

