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THE STABILITY OF BIOLOGICAL DIVERSITY TO ANTHROPOGENIC INFLUENCE

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Annotation: The article examines biodiversity indicators and landscape ecotones as determinants of the stability of geosystems to anthropogenic impact. Additionally, criteria and approaches related to assessing biological and landscape diversity are analyzed.

Keywords: stability, biodiversity, ecotone, ecosystem, genetic diversity, biogeochemical cycles.

Protected natural areas in Uzbekistan play a particularly important role in preserving biodiversity. On December 3, 2004, the Law of the Republic of Uzbekistan "On Protected Natural Areas" was adopted. The purpose of this Law is to preserve typical, unique, valuable natural objects and complexes, the genetic fund of plants and animals, prevent the negative impact of human activities on nature, study natural processes, conduct environmental monitoring, and improve ecological education and upbringing. In various parts of our surroundings, an ecosystem refers to the interaction between living organisms and their environment. This interaction has existed since life first appeared on Earth, long before humans emerged. However, no form of life has impacted ecosystems as significantly as humans. Human influence on ecosystems is both positive and negative, but we can all agree that we often have more negative impacts on the environment. In recent decades, the world's population has grown exponentially and continues to do so. Our increasing numbers demand more food, energy, space, and resources. To meet the needs of a growing population, we cut down forests, leading to habitat loss for many wild species and resulting in biodiversity loss. Our industries release toxic materials into the environment, polluting air and water and destroying marine habitats. In 2019, marine heatwaves caused by global warming bleached 60% of Australia's Great Barrier Reef. This is just one example of the devastating impacts on these ecosystems. We can confidently conclude that the more people there are on this planet, the more its biodiversity and species will perish. Uzbekistan is not only the heir to great civilizations that have left numerous tangible and intangible heritage monuments to the world but is also a vast region distinguished by its unique nature and biodiversity. Like other countries, Uzbekistan faces serious environmental issues, including problems related to preserving rare species of flora and fauna. Since independence, significant legal, organizational, and socio-economic measures have been developed and implemented in our country to ensure environmental sustainability. On June 11, 2019, the Cabinet of Ministers adopted a resolution approving the Strategy for the Conservation of Biodiversity in the Republic of Uzbekistan for 2019-2028. This Strategy aims to implement priority directions and tasks, forming a system for the long-term conservation and sustainable use of biodiversity. Theoretical and practical issues of nature conservation and utilization have been extensively studied in the research of V.S. Preobrazhensky, A.G. Isachenko, A.N. Ivanov, I. Abduganiev, L.A. Alibekov, A.A. Rafiqov, Sh. Zokirov, L.S. Gruzdeva, A.S. Isaev, L.M. Nosova, Y.G. Puzachenko, E.A. Bykova, and others. According to A.D. Ursul, a researcher of the noosphere (the sphere of interaction between nature and society), the concept of "sustainable development" can be defined by two main characteristics: anthropocentric and biospherocentric. The anthropocentric characteristic broadly implies the survival of humanity (a country) and the need for future generations to have the same opportunities to meet their needs in natural and ecological conditions as the current generation. The biospherocentric (general ecological)

characteristic relates to ensuring that human development does not occur in an eco-phobic form, thus maintaining the natural basis, stability, and natural evolution of all life on Earth. Many geographers and ecologists attempt to determine the degree of resilience of any geosystem to anthropogenic impact. If the impact exceeds a certain threshold, the balance of matter and energy exchange among the components in geosystems is disrupted, leading to quantitative and qualitative changes initially in the biotic and then in the abiotic components, resulting in overall degradation of geosystems. Such changes can be explained by negative processes like soil fertility decline, increased salinization, accelerated erosion processes, deteriorating quality of surface and groundwater, and the rise of certain diseases among the population. Among the components of the landscape, the biota is considered the most active and can serve as an indicator in determining the stability of landscapes. Biodiversity is a crucial factor in ensuring the stability of biogeochemical cycles in the biosphere. Each species of living organism has its unique characteristics in the exchange of matter with the external environment. Studying the biological cycle of matter is essential not only for understanding the specific functions of landscapes but also for solving practical issues of their rational use. Understanding and studying the biological cycle of matter is particularly important when using landscapes for agricultural purposes, such as forests, pastures, hayfields, and crop cultivation. Ecosystems and each food chain exhibit a variety of metabolic processes. This diversity ensures that matter changes and energy is efficiently used at different stages of biogeochemical cycles to create primary products. The term "biodiversity" reflects the interrelationships among all parts of the biological world, rather than statistical data about a specific organism. Biodiversity is often considered at three levels: species diversity, genetic diversity, and ecosystem diversity. These levels form the components of biodiversity, shaping ecosystems such as forests, mountains, grasslands, savannas, and deserts.

Definitions and Importance

Biodiversity:

- Species Diversity: Includes all animals, plants, fungi, and microorganisms.
- Genetic Diversity: Refers to the variety of genetic material within species.
- Ecosystem Diversity: Involves different ecosystems like forests, mountains, and deserts.

A.S. Isayev, L.M. Nosova, and Y.G. Puzachenko describe biodiversity simply and accessibly. According to them, "Biodiversity is a fundamental characteristic of living nature, ensuring the stability of the biosphere and sustainable development of life on Earth. It reflects many features of evolutionary processes and functional structures."

Functional Role in Ecosystems. Biodiversity plays a crucial role in maintaining the stability of biochemical cycles in the biosphere. Each species has a unique way of exchanging matter with its environment. Understanding the biological cycling of matter is not only essential for grasping the functionality of landscapes but also for their proper and rational use. This is especially important for agricultural purposes, such as using landscapes for forests, pastures, hayfields, or cultivating crops.

Metabolism and Diversity in Food Chains .In ecosystems and food chains, there is notable diversity in metabolism types. This diversity ensures the complete and efficient assimilation of energy used at various stages of biogeochemical cycles to produce primary products. The term "biodiversity" encompasses the interactions among all parts of the biological world, highlighting the relationships rather than specific organism statistics.

The variety of biological species and their functions contribute to the stability of matter and energy exchange processes in landscapes. At the biogeocenosis level, the stability of biological cycles is achieved by increasing species diversity or the variety of life forms. Numerous studies have shown that species diversity in natural environments determines the resilience of natural landscapes to anthropogenic pressures.

Ecosystems' Stability Y. Isakov emphasizes that biodiversity enhances ecosystem stability, allowing them to respond quickly to environmental changes. This quick response is due to the "buffering" capacity within the biota. Plant world stability, as studied by R. Whittaker, relates to the prolonged existence of dominant species populations in ecosystems. In stable dominant communities, species populations may not always be stable. In such cases, ecosystem stability is achieved through the presence of non-dominant species.

Importance of Plant Indicators Determining biodiversity involves understanding plant indicators, their significance, and the distribution of plant species in the studied area. Researchers recommend studying "ecotones," transition zones between different landscapes, to assess species diversity and the resilience of

landscapes to human impacts. Ecotones, rich in organic life, form buffer zones between diverse landscapes.

The term "ecotone" was introduced in 1936 by American geographer F. Clements, who viewed it as a sharp transition zone in the plant world. Later, V.B. Sochava used it to describe transition areas between two regions or geographic boundaries. V.A. Nikolaev classified landscape ecotones into local and regional scales, with local ecotones at landscape unit boundaries and regional ecotones at larger landscape boundaries.

This understanding of biodiversity and its components helps in maintaining the stability and sustainable development of ecosystems, ensuring that human activities align with the natural processes of the biosphere. Ecotones fulfill the task of integrating biogeochemical pollution, positive natural, and anthropogenic influences within the landscape. An ecotone is an intermediate zone between adjacent landscapes, characterized by the partial activity of natural geographic phenomena, the diversity of ecological conditions, and, consequently, the high activity of living matter. It delineates a wide border that is not sharply defined and is adapted to its environment. In the modern understanding, it is described as an area of significant physiognomic differences within the transition zone.

Initially, ecotones are diverse and encompass all landscapes, allowing biological species from all landscapes bordering it to enter. Besides, each ecotone has its own characteristics and functions. In summary, it can be said that there are many ecotones in nature, and their role is very important. These transition zones have a unique structure that contributes to shaping and preserving biodiversity. In such areas, specific biotic communities and systems develop. They differ from zonal ecotones in terms of composition, structure, formation, and the emergence and continuation of various processes, as well as maintaining stability. Increasing activity in the surrounding environment is one of the main characteristics of ecotone areas. This reveals the specificity of their structure, functional regime, stability mechanisms, and the development conditions of ecotone systems. Ecotones ensure the continuity (continuity) of the biogeocenosis through the implementation of the aggregation function. Indeed, ecotones act as "buffers" between various natural or natural-anthropogenic complexes and also perform "nursery" functions for certain types of rare organisms for a certain period.

However, ecotones are relatively poorly understood compared to other natural systems. Transforming territories for anthropogenic purposes changes the natural composition of natural landscapes, which leads to a reduction in the number of ecotones. Consequently, reducing the number of ecotones relatively reduces them from the standpoint of diversity. In addition, by compensating for the integrity of natural biocenoses, ecotones are considered as a "stabilizing belt" that maintains the ecological diversity of natural landscapes. Each natural landscape is accompanied by its own set of ecotones. The reduction in their number contributes to the degradation of biological diversity and the disruption of stability.

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