

Stability and Dynamics of Mountain Landscapes

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Abstract - At present, most of the works devoted to the study of the stability problems of natural complexes are of a theoretical and methodological nature.

Keywords - Sustainability, Landscaping, Dynamics, Geography, Natural Complexes.

In the philosophical encyclopedic dictionary, stability and variability are considered as paired concepts of philosophy, and if stability reflects the specificity and organicity inherent in objects and phenomena, then variability means the process of their transition from one state to another. The dictionary emphasizes that sustainability has never been eternal, not volatile, and that society always needs stability [12, p. 496].

Currently, in physical geography, the term “stability” is used in relation to natural territorial complexes of various scales - geosystems, for example, “stability of geosystems”, “stability of natural territorial complexes”, “stability of landscape”, etc. Sh.S. Zakirov, having analyzed the work of a number of scientists (F.N. Milkov, D.L. Armand, Yu.K. Efremov, V.I. Prokaev, A.G. Isachenko, N.A. Solntsev, D.L. Armand), emphasizes the synonymy of the terms “Natural complex”, “Natural territorial complex”, “Geographic complex” or “geocomplex” used in geographical literature, as well as the use of the term popular in recent years is enough “Geosystem”, approves the use of the term “Natural geographical complex” not as identical to “Geosystem”, and next to it in the form of “natural-geographical complex is a geosystem”. Speaking about the landscape, the author indicates that the landscape is a genetically integrated

geosystem, a set of dynamically connected tracts with one geological structure, one type of relief, the same climate, inherent only to this landscape. On the one hand, the landscape is the smallest unit of the simple geographic envelope that makes up regional geosystems, such as the bir Zhigatdan Karaganda zone, province, okrug, district, and also the landscape is an open geosystem constantly interacting through metabolism and energy with neighboring multi-tiered and dynamic landscapes smaller than he, as a tract, facies. Therefore, it is advisable to consider the terms “stability of geosystems”, “stability of natural territorial complexes”, “stability of the landscape” as synonyms. However, in modern geography there is no complete unified interpretation of these concepts. Some opinions on this subject were cited in the works of scientists such as A.A. Krauklis (1979), A.G. Isachenko (1979, 1980, 1991), V.S. Preobrazhensky (1983), Z.V. Dashkevich (1984), T.V. Zvonkova (1987), D.L. Armand (1989), T.D. Aleksandrova (1989). This state of affairs, i.e. the multifactorial nature of “landscape stability” requires taking into account a number of aspects, in particular: 1) the quality and interconnection of landscape components; 2) types and quality of anthropogenic impact; 3) a factor in the period of landscape development. To date, from the point of view of the stability of the landscape, only its individual components have been

studied, general indicators of stability have not been developed (Tinnison, 1986, p. 58).

A.A. Krauklis (1979), defines stability through three components of the relationship - normal activity, recovery after destruction and irreversible change [7, p. 85].

I.G. Isachenko (1980) considers geosystems more capable of being able to quickly restore their former state after destruction [5, b. fifty].

V.S. Preobrazhensky (1983) understands the stability of geosystems as the use of external influence without destruction, i.e. not just a transition to another state, but to a state where the system acquires a different state.

Z.V. Dashkevich (1984) interprets stability in connection with the ability to maintain its structure under any circumstances as a result of various kinds of influences, as a return to its previous or close state, i.e. self-healing of geosystems [2, p. 212].

T.V. Zvonkova (1987) determines the stability potential of natural complexes in connection with their internal physical features (morphogenetic diversity, self-cleaning ability, etc.) and external factors (natural and extreme natural processes) [3, p. 123].

D.L. Armand (1989) divides all stability mechanisms into four groups: 1) state-preserving systems (stabilizing); 2) preserving activities (functions); 3) retaining structure; 4) preserving the direction of movement (trajectory) of the system [1, p. 82].

S.G. Pokrovsky (2001), determining the stability of geosystems, notes three of its types: 1) physical; 2) chemical; 3) biological stability [8, p. 61].

The Uzbek scientist A.N. Khodzhimatov, supporting the opinion of TD Alexandrov et al. (1989), understands the stability of natural landscapes as the ability to preserve his structure under external (natural and man-made) influence [16, p. 47].

It is proved that an increase in aridity and relative elevation of the terrain, as well as a corresponding decrease in temperature, leads to a decrease in the stability of landscapes. However, one should pay attention to the structural-evolutionary (dynamic) state of natural complexes, the tendency of their changes and evolutionary changes, the morphological structure of landscapes, the degree of assimilation, and other factors.

The stability of landscapes depends on the nature of the relationship, interdependence and interaction of the component structure.

The stronger these ties are in natural-territorial complexes, the less stable they are for economic activity. It is proved that the stronger the relationship between the components, the sooner any external influence can lead to a change in the entire landscape.

The stability of the landscape is often associated with the complexity of its structure: the more complex the structure, the higher the stability of the landscape and vice versa.

The stability of the landscape often depends on the physical and chemical properties of the soil and soil, which is a key factor in the field (Khodzhimatov A.N. 2016).

Also, according to I.S. Isachenko (1991), there are three natural signs (potential) of the landscape, due to which its position is a more pronounced and true natural space. The first ecological potential is his mission, which satisfies the human need, as part of wildlife, in the light, heat, air, water and food, which are the most important factors of his life; the second ecological potential is the resource or production potential, that is, the landscape provides social production with the necessary energy and raw materials; the third environmental potential is the sustainability potential, determined by the ability to withstand external factors, in particular anthropogenic influences, to maintain its structure and features, as well as the ability to clean and restore itself.

Not all components of nature are equally stable, stable, for example, the topography and most of the rock compositions that make up it are not variable, however, the vegetation and soil cover are very variable, not stable. At the same time, in particular, the vegetation cover is rapidly changing and is in close connection with other components, in other words, it is at the center of interactions and relationships of other components or passes through communication directions. As a result of degradation of vegetation in human activities, the relationship is broken and various adverse events occur, such as soil erosion, landslides on slopes, mudflows, etc. As a general result of all this, the existing ecological balance is disrupted, which continues until a new secondary equilibrium appears. With the formation of a new soil vegetation cover, the ecological balance is restored, but it will not be stable as before, since the regimes of soil, water and air undergo changes, and the vegetation cover changes. As a result, the biological productivity of the area decreases, and various processes occur. All this requires the rational use of natural resources.

Each landscape is characterized by dynamics that stabilize its development. To date, there is no consensus on the dynamics and development of the landscape. In the geographical literature there are inaccuracies, the use of one word instead of another. In fact, all changes in the landscape cannot be considered dynamics. The concept of "landscape dynamics" A.A. Krauklis (1979) defines briefly: dynamics - a change in the state of the landscape under the influence of internal and external forces.

According to F.N. Milkova (1990), dynamics is one of the central issues of landscape science. Landscape dynamics is a change in the landscape's performance of its functions depending on the territory and internal structure. Given their diversity, F.N. Milkov made an attempt to determine the types and images of changes, dynamics in the landscape. According to the author, the following are distinguished: corological dynamics associated with changes in the boundaries of the landscape; dynamics associated with the internal structure (changes in the morphological parts of the landscape and their connections), modern dynamics (landscape changes with time) and directional dynamics or development dynamics (one-sided landscape changes), which, in turn, are subdivided into genetic kinds.

G.D. Richter (1983) understands the dynamics of natural processes only as changes in the intensity of processes over the seasons. Such changes are mainly changes in air temperature, precipitation and evaporation during the year.

The versatility, complexity of the concept of "landscape dynamics", one of the main in landscape science, is recognized by A. G. Isachenko (1991). He believes that the dynamics can be called changes that are not able to lead to the formation of the landscape again, having the peculiarity to break. For example, changes occurring in the landscape per day, per year (seasons) are changes in the landscape. If as a result of the influence of external forces, in particular of a person, some changes occurred in the landscape, his state during restoration is also a dynamic. The presence of dynamic changes in the landscape testify to his property to return to its previous state within a certain time, even with changes under the influence of external forces, comparative resistance to them. In the explanatory dictionary "Protection of Landscapes" it can be read that the term "dynamics" is of Greek origin, means "strength", "dynamics of the landscape" should be understood as occurring within the same invariant and not capable of changing the internal structure of the landscape.

A close interpretation of the concept of "landscape dynamics" is given in

VV Sochava "Introduction to the doctrine of geosystems" (1978). According to the author, "dynamics of a geosystem" refers to variable states subordinate to one invariant in the landscape. The dynamics of the landscape can be attributed only to the possible changes in the period of the presence of a certain landscape composition. Violation of the internal structure of the landscape under the influence of internal and external processes VB Sochava (1978) calls evolutionary change. In other words, a dynamic change in the landscape does not lead to cardinal qualitative changes, since it occurs within the framework of one invariant. Evolutionary changes are the cause of changes in the internal structure, the formation in place of one landscape of another. Such changes often span geological time.

Since the concepts of "landscape dynamics" and the internal structure of the landscape "are based on the exchange of substances and energy, these concepts can be considered interrelated. Therefore, speaking about the internal structure of the landscape, and the dynamics, we certainly encounter the concept of "landscape condition". The dynamics of the landscape is determined by the change in the state of the landscape.

The development of the landscape means the displacement of the features inherent in the internal structure, the signs of a new composition. This process forms qualitative changes in the landscape, leading to the emergence of a new landscape. However, in the same landscape one can observe both modern and signs that have formed in the distant past. In addition, you need to know the history and age of the landscape in connection with some events and processes taking place currently in the landscape.

Possible changes in landscapes can be traced first in its smallest morphological parts - facies, later this or that tract can change. To change the internal structure of the whole landscape takes a long time. Another issue related to landscape development is the issue of landscape age.

Certain work has been done to establish large and small geosystems, the conclusion has been formulated that the larger the scale of the geosystem, the earlier it arose. However, the debatable question remains: from what time should the age of geosystems be calculated. Some representatives of physical geography believe that the age of a landscape should be calculated from the moment its geological and morphological basis is formed; others - from the period of covering the area of the geosystem with ice. In this case, the age of the landscapes can be equal to hundreds of thousands or millions of years, and can be measured by

geological periods. However, the exception is the landscapes of places freed from the sea (over the past few years), as in the Aral Sea region, since landscapes in these places are only being formed.

Studying the dynamics of the landscape is one of the complex issues of natural geography. Landscapes cannot exist without the movement of other material systems. The dynamics of the development of the process is their constantly existing features. Dynamics is the movement of material bodies as a result of the force acting on it. In the geosystems forming landscapes, there is a continuous movement: in the process of the activity of geosystems (seasonal changes and from year to year) or some other influencing factors (floods, etc.).

Extreme changes occur as a result of relationships between components. The concept of “dynamics” also includes changes that occur as a result of human exposure [9, p. 7-8].

The basic concepts and ideas of specialists in the field of landscape dynamics are reflected in “Questions of Geography” (No. 121, 1982) and the works of II Mamai (1992), we will consider some of them.

Dynamics, as noted by T.D. Alexandrova et al. (1989), a step in the development of geosystems. At the same time, there is no change in dynamic changes in the structures, but there is a gradual preparation for this [10, p. 46].

After dynamic changes in natural complexes, a continuous quantitative evolutionary transformation takes place [11, p. 44].

In our opinion, the most correct definition of the concept of “landscape” was given by A.G. Isachenko (1979), the author does not understand the dynamics as all changes in geographical complexes, but only those changes that restore the previous state (usually of a cyclic nature) and do not transform landscape structure [6]. Dynamics, according to A.G. Isachenko (1991), refers to the invariant of the landscape, the temporary persistent state of the landscape in it manifests itself as in its structural elements. Therefore, dynamics can be defined as a change in the state of geosystems within the framework of one invariant, while at the same time, a change in the invariant itself is a development [6, p. 217].

The dynamics and development of the landscape are strongly influenced by human activities. But humanity, although capable of alleviating or complicating its condition, cannot determine rhythmic changes. Nevertheless, as a result of intense external influence on the

state of geosystems, tendencies of changes unfavorable for humans can arise.

Among the components of the landscape, vegetation and animals are of particular importance. Although many researchers consider the plant and animal component as a secondary factor, their diversity occupies an important place in ensuring the stability of the landscape.

Plants form the primary organic matter, which is the basis of chemical, physical and biological processes in the landscape, animals alter the primary organic matter formed by the vegetation and are carriers of matter and energy between the morphological parts of the landscape and landscapes [4, p. 51-52]. Also, plants create the appearance of the landscape (for example, coniferous forests, reeds, etc.) and take part in the formation of soil (soil), relief and climatic properties, are crucial for the species and geographical distribution of animals; animals are significant in participating in soil formation, increasing its fertility, and spreading plant seeds. Therefore, these two components, like other landscape components, are other natural components.

By biological diversity, it is customary to understand the diversity of living organisms, as well as ecosystems, ecological complexes, and the links to which they exist. Biodiversity includes habitat diversity, biotic communities, and ecological processes in the biosphere. The diversity of the landscape (geosystem) is understood as the diversity of geosystems in time and space, natural components in which geographic processes are continuously ongoing, which have kept at a high level the geographic capabilities that also make up their complexes of various scales.

In the relations between nature and society, the diversity of nature has a priority effect. According to researchers, a greater variety of nature and resources creates favorable conditions for the development of society, and on the contrary. In this direction, the laws of unity of material systems, the diversity of their natural environment and landscape, act with equal faith. In these territories with a complex landscape structure, the natural (natural) environment undergoes changes rather quickly in large areas [13, p. 82-83].

Relations between animals and plants (regardless of the type of landscape) can be even more complex and varied. These two components of the landscape can be pollinators, seed carriers, and also distributors, carriers of diseases in relation to each other [14, p. 90].

Naturally, the decrease in the number and species of representatives of flora and fauna, the deterioration of their habitats occur in different ways in the plains and mountainous regions, in different geosystems.

The natural fragility of desert geosystems, the weakness of the interaction of geographical components and the communication mechanism, as well as the ever-increasing influence of natural and anthropogenic factors do not allow them to develop steadily. As a result, geoecological situations of varying degrees of tension arise [15, p. 33).

Mountain geosystems are quite stable in comparison with desert geosystems. Despite this, as a result of the irrational use of the natural resources of the mountains, the geoecological balance in these regions is also changing. The flora and fauna of mountain geosystems are interconnected, and if one species of plants disappears, 10-30 species of insects die out, some animals also leave these places.

In recent years, frequent changes in seasonal rests (stopping places) and nesting environment of birds, as well as the movement of fish in the middle and upper reaches of the river, changing their former habitats, indicate that the situation in ecosystems is changing. For example, fish species such as Turkestan (Central Asian) ide, Turkestan catfish, Turkestan barbel, Pike asp (bald) have changed their habitat from the lower reaches to the middle and upper reaches. The abundance and species prevalence of wildlife in the mountains is higher than on the plains, and most predatory mammals occur in mountainous regions.

Biodiversity in mountainous regions ensures their sustainability. As a result of anthropogenic impact on biodiversity in steppe, mountain and pasture areas, in particular in thickets and floodplain geosystems of plains and foothills, the geoecological situation and a decrease in stability are disturbed in these regions.

The widespread distribution of plants in terms of abundance and species prevents geoecological problems (for example, desertification) in mountain geosystems. Animals serve to expand the geographical areas of plants.

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