Modern geoecological aspects of natural management in the mountains (on the example of the Karachay-Cherkess republic)

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Abstract. The main provisions of geoecological monitoring in the organization of specially protected natural complexes on the territory of the Karachay-Cherkess Republic (KChR) are considered. It is proposed, taking into account the systemic and functional properties, to organize the «Western Prielbrusye» nature reserve. In modern conditions, the territory occupied by the projected complex "Western Elbrus" can be of great importance in order to preserve the natural and historical heritage. Modern aspects of specially protected natural areas organization, presented in the form of thematic modules for monitoring mountain landscapes, will improve the geoecology of the KChR, and will also provide an information basis for optimizing nature management.

1. Introduction
The large-scale implementation of the recreational and balneological possibilities of the North Caucasus and their safety is one of the most important resources for Russia's sustainable development. A scientific approach to its use is the key to a successful solution to this problem. To explore mountainous regions, you need to know their specifics. For this purpose, the study of formation peculiarities and use of traditional recreational resources of the Kuban River basin mountainous regions, called by geographers the Western Elbrus region, is of particular interest, it makes it possible to identify the mechanisms of recreational activity on the basis of cultural and geographical research, to assess the possibilities of progressive, harmonious development of modern recreational activity in the mountainous part and contributes to the preservation of the ethnocultural landscape. This makes it possible to implement the physical and geographical principle in the study of modern natural conditions for recreation, leads to the identification of relict tourist and excursion sites, plays a major role for the further development of social and cultural components, and as a result, all this allows to preserve unique recreational landscapes. The Western Elbrus region is a physical and geographical unit, a unique natural and historical region in the south of the Karachay-Cherkess Republic, characterized by a wealth of landscape-recreational and tourist-excursion resources. In the structure of the Western Elbrus region, one of the most important areas of specialization is the development of the tourism sector, which forms the priority sector of the economy. All this justifies the choice of study purpose: to determine the main approaches to the creation of geoecological monitoring system of natural and cultural landscapes on the basis of tourist and recreational complex "Western Elbrus" organization.
The object of research is upper reaches of the river Kuban, including the space of the Uchkulansky Makharsky, Ullukhurzuk and Uzunkolsky natural and cultural landscapes.

The subject is geocological features of nature management of mountain landscapes.

2. Research materials and methods

The basis for the analysis of modern geocological aspects of nature management in the organization of tourist and recreational activities in the mountainous regions of the Karachay-Cherkess Republic were materials from the study of natural resources of the upper reaches of the river Kuban, carried out by V V Onishchenko [1], N S Degas [2], Kh A Dzhanibekova [3], Kipkeeva [4-6], Chomayeva; materials from similar mountainous regions of the Republic of Dagestan [7]; as well as our long-term field, cameral studies of mountain landscapes, both with teachers and with students of the natural-geographical faculty of KChGU named after U D Alieva (Karachaevsk, Russia).

The carried out geocological monitoring of the Western Elbrus resources shows that it can be one of the most promising resort areas and areas of mass tourism and mountaineering in the territory of the KChR. The recreational potential of this region is associated with such well-known places in Russia and in the world as the Black Sea coast of the Caucasus, Teberda, Dombay, Arkhyz, Elbrus region, and the largest migration route "The Great Silk Road" passed here.

Consequently, the primary tasks in modernizing the recreational image of the Western Elbrus are to clearly position the entire region in the figurative space of the Karachay-Cherkess Republic, enhance the uniqueness, positive image, and attract the attention of tourists to other territories within the North Caucasus. For the resorts of the region, it is extremely important to revise their recreational sphere, to transform the pearl of Russia from a place for treatment into a territory of complex recreation for all categories of citizens, with the maximum possible list of types of tourism from health and educational to congress, festival and extreme. It is important to implement the experience of foreign countries located in mountainous areas and in the same natural and socio-economic conditions. The international mining partnership assumes important guidelines for the exchange of experience and cooperation of scientists from different directions.

The main principle of monitoring natural and cultural landscapes in the organization of the specially protected natural complex of republican significance "Western Elbrus" is in its structure. The system consists of 5 interdependent and interpenetrating thematic modules based on the tourist and recreational potential, based on the data of a comprehensive modern physical and economic-geographical and geocological assessment of the study area.

3. Results and its discussion

Let us consider the main approaches aimed at preserving natural and cultural landscapes on the example of the projected reserve of republican significance "Western Elbrus".

3.1. Module 1: General characteristics

As a result of a comprehensive physical and economic-geographical, social and geocological assessment of the territory, a model of republican significance is proposed - the State Specially Protected Natural Complex.

The territories presented for the projected complex, as well as the data obtained in the course of a comprehensive geocological study, allow us to offer the following profile - a specially protected natural area in the form of a reserve of republican significance "Western Elbrus".

Its area is 659 km². Location: Karachay-Cherkess Republic, Karachaevsky district.

3.2. Module 2. Natural complexes

The territory is located within a high-mountainous zone within three landscapes: Uchkulan Makharsky natural and cultural landscape, Ullukhurzuk and Uzunkol natural and cultural landscapes.

Uchkulanskiy Makharsky region, part of the Western Elbrus region, has positive data for all geographic parameters for the organization of a modern complex [8]. It is located in the spurs of the
Main Caucasian and Lateral Ranges, which includes not only river valleys, terraces above the floodplain, depressions, glades, glacial land forms, a huge number of outlets of mineral and thermal waters, but also alpine and subalpine meadows. The area can be designated as underdeveloped with specialization in geomorphological, balneological and biological complex.

Ullukhurzuk region is located at the foot of Elbrus in the valley of the Ullu-Khurzuk river and it can be defined as a complex with a specialization - the study and protection of geomorphological and balneological resources, as well as the protection of cultural landscapes in the highlands. This is due to the proximity of Elbrus, the relief requiring the protection of geomorphological natural monuments, the protection of a large number of thermal waters and mineral springs under the general name "Elbrus".

In the basin of the river Ullu-Khurzuk is the ancient Karachai mountain village Khurzuk, where residential log structures and irrigation canals of 400-500 years ago, the watchtower Mamiya-Kala, built in the 14-15th centuries, have been preserved; crypts. Modern memorial complexes were built to the heroes of the First and Second World War - the inhabitants of the aul (Kasaev Osman Mussaevich and Bogatyrev Harun Umarovich - the heroes of the Soviet Union and the hero of the First World War Bayramukov Jatay Kaitbievich). All this contributes to the organization of excursions on the territory of the region up to several hours, in order to get acquainted with the ancient culture of the Karachai people [9]. Cultural, historical monuments of nature and architecture are subject to geoeconomic monitoring. The area can be designated as an underdeveloped geomorphological, balneological complex with elements of ethnic culture.

Uzunkolsky or Gvandrinsky region is the easternmost high-mountainous region of the KChR. The border runs in the west along Dombai and Elbrus in the east. The Uzun-Kol and Ullu-Khurzuk rivers form the sources of the Kuban in this area.

Elbrus, Gvandra (3930 m) and high heights of the Dombai village (1680 m) and the Uzun-Kol river valley (2100 m) leave an imprint on the physiological potential of nature users, form positive psychological emotions, and also improve the aesthetic perception of landscapes. All this together contributes to the creation of a specially protected natural complex on this territory, the purpose of which is to preserve and protect the highlands. However, at the present time, the geoeconomic state of this area has not been sufficiently studied. The transport accessibility of the area also leaves much to be desired.

Thus, the Uzunkol high-mountain natural landscape can be designated as the newest poorly studied complex.

The organization on the proposed territory of a specially protected natural complex of republican significance "Western Elbrus" will contribute to the socio-economic development of the Uchkulanskiy and Khurzuk administrative formations and the Karachayevskiy district as a whole, as well as the formation of such a model of the spatial organization of society, which will ensure sustainable development and preservation of the main environmental indicators of this complex, taking into account the interests of the activities of natural resource users for the purpose of economic development.

3.3. Module 3. Analysis of the geoeconomic state of the tourist and recreational complex

3.3.1. The level of disturbance of natural complexes and cultural sites. The current state of natural resources of objects of economic importance located on the territory can be assessed as positive: natural and quasi-natural geosystems cover 95.2% of the area of the complex. This is due to the socio-economic crisis of the 1990s and other cataclysms that occurred in Russia, which significantly weakened the pressure on the geotopes of the highlands, and the use of natural resources in this area has decreased many times.

3.3.2. Sources of negative impact. Potential sources of negative anthropogenic impact on the natural and cultural landscapes of the Western Elbrus can be considered in two directions. The first is regional: they determine the main reasons that led to the deterioration of the geoeconomic state, hydrological regime and hydrochemical composition of water bodies, the impoverishment of modern
biocenoses of mountain landscapes. This is due to the inappropriate use of natural resources: unauthorized felling of coniferous forests, unregulated grazing, etc. The second is local: these include the economic and other activities of local residents involved in nature management, whose material interests are associated with lands allocated for specially protected natural and the cultural complex of republican significance "Western Elbrus".

The land allocated for the construction of protected areas has good natural potential. The preservation of the nature of the Karachaevskiy region, although it is less than 50%, but the territories allocated for a specially protected complex include relatively preserved and slightly altered geotopes, which make up 594 km², i.e. about 90% of the total area of the complex.

On the territory of the projected reserve, there are about half of all-natural monuments and recreational resources of the KChR. These are, first of all, geomorphological - 39.7%, climatic - 47.4%, balneological - 41.2%, etc. Conducting protective measures include the protection of 11.6% of plants and 31.7% of animal species included in the Red book of Russia and KChR. [10]. The projected area, ensuring the protection of alpine and subalpine meadows, occupies an important place in the ecology of Russia. It is also taken into account that, according to the decision of the Government of Karachay-Cherkessia dated 04.08.2011 No. 245 [11], the Kuban River, Makharskie mineral springs, glaciers of the western Elbrus region, together with the adjacent network of reservoirs, are part of specially protected natural objects of republican significance. The organization of a specially protected natural complex on the territory of the KChR will contribute to the rational use of natural resources in the drainage basin of the Kuban River.

The territory occupied by the projected complex of republican significance "Western Elbrus" can be of great regional importance in solving the problems of increasing the ecological component, as well as improving the cultural natural heritage, since there are still well-preserved towers, mounds and dwellings of the 10-15th centuries. Here passed one of the routes connecting Western Siberia, Kazakhstan and the Middle East with the Black Sea basin and Europe.

3.4. Module 4. Preservation and improvement of the state of the complex "Western Elbrus"

The main measures aimed at preserving the natural landscapes of the territory of the complex are aimed at developing methods that prevent an increase in negative anthropogenic impact from their potential sources, in particular:

- Organization of the environmental management system, which includes the control and regulation of special places for recreation, the use of the whole complex of recreational features and the correct arrangement of places for passage and parking of motor vehicles.
- Improvement of the ecological state of landscapes. In particular, take steps to normalize the forest balance. Any new logging should be mothballed and remediation options considered. This leads to a decrease in river flow, interferes with normal natural functioning and other environmental problems.

In general, it is necessary to comply with the regime established by the geoecological zoning of the territory of the tourist and recreational complex [12].

Measures aimed at improving the state of natural resources are quite complicated due to the fact that the organization of the complex of republican significance "Western Elbrus" does not imply a complete ban on economic activities. They should be based on the implementation of regular measures for the protection and rational use of natural resources, and then the development of a program for geoecological monitoring of the study area [13].

Serious and important is the conduct of educational activities [14, 15] aimed at informing the local population, potential users of nature and tourists with such issues as the system of organization and nature protection regime of the reserve, the rules for finding, permissible and unacceptable actions. [sixteen]. It is also possible to carry out measures for the ecological restoration of areas of coniferous forests, alpines, subalpines, steppe phytocenoses that are territorially part of the complex.
3.5. Module 5. Protection of the specially protected natural complex of republican significance "Western Elbrus"

We have identified 3 categories of functional zoning of the territory of the tourist and recreational complex "Western Elbrus" - according to typical restrictions on types of activities (based on government materials such as "Strategy of socio-economic development of the KCR for the period up to 2030" [17]): Category I. Zone environmental alienation of land from tourist and recreational activities. Category II. Zone of seasonal limitation of the load on recreational landscapes. Category III. Zone of limited use of tourist and recreational resources.

The proposed system of geocological monitoring on the example of the projected state tourist and recreational complex "Western Elbrus" on the basis of landscape monitoring in the production plan combines scientific research and practical use of the data obtained into a single whole. The system can have a two-level access, consisting of a level for users and monitoring compiled by an expert scientific community, that is, user and expert levels. Monitoring, compiled by experts, allows you to correct and supplement data, modify software modules, build up-to-date and predictive geoinformation models of the state of the complex and, thus, monitor the state of the complex. Promote the adoption of optimal management decisions aimed at changing the regime of a specially protected natural area, adjusting functional geocological zoning schemes. It should be noted that the proposed monitoring system makes it possible to create spatio-temporal models according to the main indicators reflected in thematic modules, as, for example, it is presented in the diagram "Thematic modules of geocological monitoring when organizing a specially protected natural complex".

4. Conclusions

In modern conditions, the territory occupied by the projected complex "Western Elbrus" can be important in solving the problems of improving the balance between nature and society.

Geocological assessment and organization of specially protected natural areas, presented in the form of thematic modules for monitoring cultural and natural landscapes, will improve the geocology of the KChR, and will also form an information basis for optimizing nature management in the mountains.

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