OPTIMIZATION OF NATURAL PROTECTION FACILITIES IN THE SUBALPIAN AND ALPINE HIGHLANDS OF CHORNOHORA (UKRAINIAN CARPATHIANS)

Karabiniuk M.M., *Ph.*D (Geography), Assistant, Deputy Dean of the Faculty of Geography for Educational and Methodological Work, State University "Uzhhorod National University"
Burianyk O.O., *Ph.D (Geography),* Assistant, Ivan Franko National University of Lviv
Gostiuk Z.V., Junior research fellow, "Hutsulshcnyna" National Park
Markanych Y.V., Master student, State University "Uzhhorod National University"

The structure of nature reserves of the subalpine and alpine highlands of Chornohora, its landscape representativeness are analyzed and the ways of optimization of two nature reserves – Carpathian Biosphere Reserve and Carpathian National Nature Park are proposed. The landscape features of these protected objects are characterized, the necessity of expansion of their areas by attraction to their structure of valuable high-mountain landscape complexes, in particular – to the northwest of Petros, and also improvement of functional zoning and other is substantiated.
Keywords: high-mountain landscape tier, natural territorial complexes, environmental activities, Carpathian Biosphere Reserve, Carpathian National Nature Park.

Along with the pasture farming and recreation, in the structure of nature use of natural territorial complexes (NTC) of the highlands of Chornohora, environmental protection occupies takes a prominent place. In general, the subalpine and alpine highlands of Chornohora are represented by a high-mountain landscape tier, which is formed by a set of NTCs of denudation, ancient-glacial-excavation and nival-erosion origin. This landscape tier is confined to the hypsometrically highest main watershed of Chornohora and covers an area of 80,5 km^2. Based on a continuous landscape survey, it was found that the landscape structure of the subalpine and alpine highlands of Chornohora is represented by 5 types of high-altitude terrains, 20 types of striyas, 73 types of complex tracts and 273 types of subtracts and simple tracts [3]. Significant landscape diversity and distribution of valuable, oldest and unique in genesis and properties of high-mountain NTCs in Chornohora encouraged the formation and development of environmental facilities at different times, which ensured the preservation of a significant proportion of high-mountain landscape complexes [1-3, 5]. Thus, the issue of development of protected areas in the highlands of Chornohora is directly related to the conduct of environmental activities within the mountain range.

In 1968, most part of Chornohora, mainly within the basins of the Bogdan and Hoverla rivers, Kevele and Brebeneskul streams, as well as the Prut River, became part of the Carpathian State Reserve, which was established by the Council of Ministers of the Ukrainian SSR № 568 "On organization of new nature reserves in the Ukrainian SSR" on 12.11.1968 [9]. Subsequently, on the basis of the resolution of the Council of Ministers of the USSR dated 03.06.1980 № 378 "On the establishment of the Carpathian National Nature Park", Hoverlyanske and Vysokohirne forestry of Carpathian State Reserve were transferred to the newly created in Ivano-Frankivsk region, the first in Ukraine park with a total area of 50,3 thousand hectares [8]. In 2001, it was renamed the Carpathian National Nature Park and now covers the entire north-eastern macroslope of the Chornohora highlands between the peaks of Hoverla and Pip-Ivan Chornohirsky. Instead, on the basis of the Carpathian Nature (State) Reserve by the Decree of the President of Ukraine № 563 "On Biosphere Reserves in Ukraine" on 23.11.1993 the Carpathian Biosphere Reserve was created [7].

Thus, today more than 87 % of the territory of the subalpine and alpine highlands of Chornohora is under the protection of two nature reserves – the Carpathian Biosphere Reserve (CBR) and the Carpathian National Nature Park (CNNP), which together cover 70,6 km^2 of highlands area. Their main goal is to preserve the unique NTC of the territories which they protect.

The Carpathian Biosphere Reserve covers the entire southwestern sector of the Chornohora highlands in the "Sheshul-Petros" section, as well as most of the upper reaches of the Hoverla River of this sector from the interfluve of the basins of Hoverla and Lazeshchyna Rivers and from Hoverla Mount to Brebeneskul Mount and Lemsky Spur. Within its boundaries is the territory of a

high-altitude landscape tier with a total area of 30,7 km^2, which is characterized by high landscape diversity, as there are NTCs of different genesis (denudation, ancient-glacial-excavation and nival-erosion), some of which are also used in recreational and tourist activities and pasture farming. According to the functional zoning of CBR, about 9,9 km^2 of high-altitude territory belongs to the protected are, which by its functional purpose provides the preservation in the natural state of the most valuable and minimally disturbed NTC by eliminating anthropogenic pressure.

The widest strip of the protected area is concentrated in the highlands part of the upper reaches of the Hoverla River, which is due to the presence of valuable NTCs amphitheaters of ancient firn fields with their inherent thickets of *Pinus mugo* [3]. The ridge surface of the watershed ridge of the massif and most of the ridge slopes are located within the buffer zone, the protection regime of which provides for the prevention of negative impact on the NTC, taking into account the economic activities of the surrounding areas. It covers most of the high-altitude area of CBR with a total area of 14,0 km^2.

Large areas of tracts of the ridge slopes of the south-eastern exposition mainly, which are close to the polonynas and are periodically involved in grazing, according to the functional zoning of CBR, belong to the zone of anthropogenic landscapes. In the "Sheshul-Petros" section, it also covers the tracts of the ridge slopes of the southwestern and southern exposures, etc., which are characterized by a large-scale distribution of secondary meadow vegetation.

Based on a landscape study of the subalpine and alpine highlands of Chornohora, we believe that it is not justified to allocate a large area of the protected area on the north-western ridge slopes of the upper reaches of the Keveleve stream, because the NTC of this area are intensively used for grazing sheep mainly. Instead, it is necessary to allocate a protected area at the upper reaches of the Brebeneskul stream, because the tracts of cirques, their moraine bottoms and glacial troughs are characterized by the most pronounced features that are inherent in the NTC of ancient-glacial-exarational genesis, which is extremely rare for the south-western macroslope of the landscape. Also, assigning these cirque a stricter protected status will require vacationers to treat the NTC with care, which will reduce the negative impact on the environment. Necessity for urgent use of a set of measures for the protection and necessity to preserve valuable high-altitude natural territorial complexes in the vicinity of Brebeneskul Lake is justified in the publication of some of the co-authors of this work [4].

In the area of the Carpathian National Nature Park is a part of the high-mountain landscape tier of Chornohora with a total area of 39,9 km^2. This natural protection object is confined to the northeastern sector of the landscape, which is characterized by significant landscape diversity and the spread of massive NTCs of ancient-glacial-exarational origin. More than 60 % of its territory is protected area, which covers the entire upper reaches of the Prut and Bystrets rivers and the Pohorilets stream. The rest of the highlands territory of the reserve belongs to the economic functional zone and only two small fragments of the spurs of the ridge of the south-western and south-eastern exposures are included in the zone of regulated recreation [8].

For the optimal formation of the functional zoning of CBR and CNNP it is advisable to use a landscape approach and information about the landscape structure of the territory, as the genetic unity of NTC also determines the functional homogeneity. Ensuring the protection of valuable NTC and its individual components is also a categorical ban on ATVs trips throughout the highlands territory of Chornohora. During the summer, sightseeing trips on ATVs were recorded in different parts of the highlands. This was most often observed in the tracts of the surface of the spurs of the ridges of the south-western exposition from Hoverla Mount and Pip-Ivan Chornohirsky Mount. This method of movement negatively affects the condition of the soil and vegetation cover of NTC, which is mainly manifested in the form of deformation and compaction of the soil profile, degradation of turf and shrubs, as well as creates a negative impact of significant noise pollution and others.

In the process of conducting field research, a number of valuable NTCs were also recorded and mapped, which are currently outside the protected areas we described before. One of such unique and interesting tracts is a system of tectonic-caused landslides in the upper basin of the Lazeshchyna River, numerous nival niches and avalanche trays on a very steep scree ridge slope of the northern exposure, etc. That is, despite the purpose in different parts of the subalpine and alpine highlands of Chornohora valuable NTCs are located, the distribution of which in the Ukrainian Carpathians is generally limited. Most of the territory of the high-mountain landscape tier of Chornohora outside the protected areas mainly belongs to the reserve lands of village councils outside the settlements, which are managed by the "StateGeoCadastre" (State Service of Ukraine for Geodesy, Cartography and Cadastre) [6].

Thus, the optimization of protected areas, in particular CBR and CNNP, we see in increasing their area and inclusion in their composition the entire territory of the subalpine and alpine highlands of the Chornohora in the future. Due to the fact that today this part of the valuable NTCs is outside environmental objects mentioned before, and the main direction of optimization of environmental activities in the highlands of Chornohora and the priority conditions for its implementation is to expand the area of protected areas in the northwest from Petros Mount. It is also important to improve their functional zoning, increase the share of protected areas and involve valuable high-mountain NTC, a categorical ban on ATVs trips, etc.

To reduce the negative impact on the NTC of the subalpine and alpine highlands of Chornohora, the administrations of CBR and CNNP also need to: regulate the number of vacationers and tourists in the area and determine the maximum capacity of each tourist route to the highlands; to limit the possibility of unauthorized placement of tents in the highlands of landscape are and to isolate and equip here places for rest and stops of tourists; to organize systematic cleaning of territories and garbage removal; introduce a mandatory check for the presence of burners and cylinders in visitors to highlands tourist routes at all checkpoints; at the beginning of tourist routes and paths to establish information stands about the value of high-mountain landscape complexes through which they pass; to establish warning instructions on the rules of conduct within nature protection facilities and measures of indication in case of their violation; to organize systematic patrolling of places of stops and rest of tourists by employees of the reserve; to monitor the condition of high-altitude NTCs, etc. It is also important today to improve the system of evidence and punishment of offenses. Therefore, in the future it is rational for CBR and CNNP to use remote video surveillance or photo-fixation systems and obtain real-time offense data, which can significantly enhance the effectiveness of the environmental system in the highlands of Chornohora and other landscapes of the Ukrainian Carpathians.

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ON SOME INSTRUMENTS FOR CONSERVATION AND DEVELOPMENT OF NATURE RESERVES IN THE EU

Porieva V.O., PhD student, Junior Research Fellow Department of Globalization, Eurointegration and National Security Management, National Academy of Public Administration under the President of Ukraine

In Europe, the main cause of biodiversity loss is land-use change. Farming and forestry practices have become more intensive, with more chemical additives, fewer spaces between fields, and fewer varieties of crops. This lack of variety means far fewer insects, for example, and consequently fewer birds. Subsidies linked to production, encouraging quantity over quality and variety, are also a factor. Cities and urban areas have also expanded enormously, sealing soils and leaving less room for nature. In addition, when farmland and urban developments leave no room for nature, the result is a loss of biodiversity. Many citizens and businesses are unaware of the extent to which our society depends on biodiversity [1].

There were survey carried out by the Kantar Public Brussels network in the 28 EU Member States between the 4th and 20th of December 2018. Some 27,643 respondents from different social and demographic groups were interviewed face-to-face at home in their mother tongue. The methodology used is that of Eurobarometer surveys. The understanding of the meaning of the term "biodiversity" has increased since 2015, with two in five Europeans now saying that they have heard of the term and know what it means: Over seven in ten Europeans (71%) have heard of the term "biodiversity". This includes 41% who have heard of it and know what it means, an increase from the 2015 survey (+11 ercentage points) [2].

Losing biodiversity means losing options for the future, like the possibility of developing new drugs. Some 70% of cancer drugs are either natural products or synthetic ones inspired by nature, and 4 billion people rely primarily on natural medicines. Biodiversity loss means the loss of countless medicines before they are ever discovered – an irretrievable loss to humanity. It matters on a personal level as well. Nature has many preventive and restorative effects on health. Regular