



Mykola M. Karabiniuk¹

OPTIMIZATION OF THE PASTORALISM OF THE HIGH-MOUNTAIN LANDSCAPE TIER OF CHORNOHORA (UKRAINIAN CARPATHIANS)

Natural territorial complexes (NTC) of the subalpine and alpine highlands in the Ukrainian Carpathians occupy the highest hypsometric level at altitudes above 1 450–1 600 m. above sea level. From a landscape science point of view they form a high altitude landscape tier, which is represented by three genetic types of altitude terrain – denudational alpine and subalpine high-mountain, ancient glacial-exaration subalpine high-mountain and nival-erosion subalpine high-mountain ([Melnyk, Karabiniuk, 2018a, 2018b]). The characteristic feature of this tier is the presence of relics of the Polonyna surface alignment and ancient-glacial exaration (kars, circuses, carlings, trogs) of pleistocene icing, which formed on roughly layered massive sandstones, and also domination in the plant cover of alpine meadows and subalpine crooked forest on the mountain-meadow- and mountain-peat-brown soils ([Melnyk, Karabiniuk, 2018b, 2018v]).

In the Ukrainian Carpathians high-mountain landscape tier the best expressed in the highest mountainous landscape of Chornohora, which is represented here by two regions with a total area of 80,5 km²: the first (“Sheshul-Petros”) is located in the northwestern part of the landscape between mount Petros (2020,2 m) and mount Sheshul (1727,8 m) – 12,2 km²; the second (Hoverla-Shuryn) – on the main ridge between mount Hoverla (2060,8 m) and mount Shuryn (1773 m) – 68,3 km² ([Melnyk, Karabiniuk, 2018a, 2018b]).

In the structure of nature management in the highlands of Chornohora for many centuries pastoralism (pasture farming) has been dominated, represented by nomadic animal husbandry. Large areas of natural meadows were important factors of the development of distant-pasture animal husbandry here, relatively rapid regeneration of vegetation cover under conditions of sufficient solar radiation and significant rainfall, dominance of convex and relatively aligned surfaces of crests of ridges and their spurs and very sloping and steep slopes suitable for grazing, mainly sheep, and the presence of large wind-protected negative forms of relief in the form of kars, etc.

Today, the functioning of polonynas in Chornohora is important for the maintenance of agriculture of the region, economic support of the local population, and has important historical and cultural significance. Therefore, it is necessary to preserve it in the territory of the massif, which is especially relevant for herding (sheep farming). This determines the relevance of scientific justification of ways to optimize pasture farming on a landscape basis with the prospect of reducing its negative impact on the ecological state of natural territorial complexes of the highlands of Chornohora.

Modern pasture farming in the high-mountain landscape tier of Chornohora is characterized exclusively by a grazing type and high altitude natural territorial complexes is used only as grazing land. Today there are about 20 fully functioning polonynas in the warm season of significant area (from 46,4 to 944,3 hectares), with which associated an active anthropogenic load on natural territorial complexes. Due to more favorable natural conditions and accessibility historically happened, that the largest number of large polonynas with an area of more than 100–200 hectares was and remains concentrated in the north-western part of Chornohora within the highlands area "Sheshul-Petros" and adjacent territories of the middle mountains. The largest among them are: Shumnieska, Harmanieska, Stupa-Syrylivka, Holovcheska, Sheshul and Rohneska.

¹Uzhhorod National University, 14 University Street, Uzhhorod 88000, Ukraine
mykola.karabiniuk@uzhnu.edu.ua



By specialization, the current high-mountain polonynas of Chornohora can be divided into three types: the first is specialized in cattle grazing, the second – sheep farming, the third – combined – combines cattle grazing with sheep farming, moreover the latter, usually, is the main direction. Most of the polonynas operating today in the highland of Chornohora belong to the first and third types.

Today, in the high-mountain natural territorial complexes of Chornohora grazing of sheep prevails. As of 2019 on polonynas of the highlands of the massif their number was 4,044 heads ([Results..., 2019]). Therefore, in the modern species structure of livestock, they occupy the largest part (82 %). Sheep farming requires considerable area for grazing, sheep are more mobile and not very fastidious to steepness of the slopes, easily move in the thickets of shrubs. The remaining 17 % of the livestock of polonynas are cattle (817 heads) and only 1 % are horses (71 heads).

From specialization of pasture farming and the amount of livestock largely depends the nature and the area of its impact on natural territorial complexes of the subalpine and alpine highlands. In turn on distribution of pastures of the polonynas in highlands of a landscape is important the landscape structure and properties of individual natural territorial complexes, in particular: steepness, exposure, nature of vegetation cover, degree of surface dissection, etc. Thus, the landscape structure and properties of particular geocomplexes influence the features of the functioning of the highlands plains of Chornohora and should play a key role in developing ways to optimize the management system in the highland of the landscape.

For scientific justification of ways to optimize the plain farming in the highlands of Chornohora using a landscape approach we have carried out large-scale landscape survey of the entire study area on the basis of theoretical and methodological principles of mountain landscape science of H. Miller (Miller, 1974) and the corresponding landscape maps are enclosed at the level of simple tracts and subtracts. As a result of the study, it was found that the modern landscape pattern of the high-mountain tier of Chornohora formed by 5 types of types of altitude terrain, 20 types of landscape striyas, 73 types of complex tracts and 273 types of subtracts and simple tracts, that indicates a high landscape diversity.

Recommendations. Reducing of negative impact on natural territorial complexes of the highlands of Chornohora can be achieved by distinguishing between high-mountain pastures and middle-mountain pastures and the observance of special rules of farming in them. Until recently, the main of such rules was the implementation of the grazing system as the basis for sustainable grazing farming in the plains, but with the decline in livestock numbers and the general decline of pasture farming, the need for it has lost its relevance. Therefore, the optimization of the land use system in the polonynas is reduced to the dispersal of loading of the pasture farming on the high-mountain natural territorial complexes. This can be achieved by spraying individual powerful polonynas with numerous livestock numbers, including Rohnieska, Konec-Polonyna and Menchul, into pasture lands of non-functioning polonynas. In this way, to achieve the optimal number of livestock in different parts of the highlands.

In order to maximize the dispersal effect of pasture farming, it is advisable to carry out an inventory of pastures and determine the degree of anthropogenic modification of the natural territorial complexes of the highlands of Chornohora. From the point of view of natural-conservation purpose of most lands of the massif it is not advisable to involve in operation valuable highlands natural territorial complexes or territories with primary vegetation. For the harmonious development and greening of the traditional pasture farming, it is advisable to combine it with recreational activities, limiting livestock, but attracting tourists to visit plain farms and thus promote other recreational facilities and tourist routes. A similar approach from recent years began to be used in Chornohora on the example of plain Gropa located in the springhead basin of the river Lazeshchyna.

As the majority of pastures are located in the complex tracts of the ridge slopes of the southern and south-eastern expositions and kars, so it is important to monitor the current state of these natural territorial complexes. Subtracts of the bottoms of kars with characteristic slow wastewater mode and mountain-peat-brown soils during periods of rains and thunderstorms it is necessary to exclude from daily runs of livestock, as such weather conditions contribute to a significant moisturizing of the natural territorial complexes and increasing vulnerability to trampling and general degradation of soil and vegetation cover. In the tracts of steep and very steep slopes it is necessary to avoid the straightforward grazing up the slopes, which is very rarely observed, but still takes place in practice. For giving drink to livestock it is necessary to continue using special wooden tanks for water intake (local name "valiv"), which do not disrupt the natural functioning and flow mode, and does not promote waterlogging and clogging because it is suitable for natural rotting, etc.

When developing the above-mentioned recommendations for optimization of pasture farming in the highlands of Chornohora was investigated the level of landscape organization, formation factors and properties of high-mountain natural territorial complexes, features of spreading and intensity of manifestation of modern negative physical and geographical processes were taken into account (Karabiniuk, 2019), development of tourism in different parts of the highland, peculiarities of environmental regime and functional zoning of the Carpathian Biosphere Reserve (CBR) and the Carpathian National Nature Park (CNNP) in general, etc. The most promising way of implementing our recommendations is their use by the above-mentioned environmental objects, within which there are more than 87 % of highlands natural territorial complexes and most polonynas. The Carpathian Biosphere Reserve and the Carpathian National Nature Park annually issue permits to various polonynas administrations for annual grazing and therefore they have an actual impact on the real distribution of pastures, used on farms, and the possibility of regulating and limiting the intensity of the load on the main grazing centers, etc.

References

1. Karabiniuk M. M. Landscape differentiation of negative physical-geographical processes in the subalpine and alpine highlands of Chornogora ("Sheshul-Petros" section). *Physical geography and geomorphology*. 2019. No 93 (3). pp. 7–17. (In Ukrainian). DOI: <https://doi.org/10.17721/phgg.2019.3.01>
2. Melnyk, A. V., Karabiniuk, M. M. Natural territorial complexes of the subalpine and alpine highlands of Chornogora (section "Sheshul-Petros"). *Issue of Geography and Geoecology*, 2018a. No 3. pp. 56–70 (In Russian).
3. Melnyk A. V., Karabiniuk M. M. Formation factors and criteria of the allocation of high-altitude landscape stage in Chornogora (Ukrainian Carpathians). *Problems of Geomorphological and Paleogeography of the Ukrainian Carpathians and adjacent areas: Scientific Journal*, 2018b. No 8. pp. 24–41 (In Ukrainian). DOI: <http://dx.doi.org/10.30970/gpc.2018.08.2012>
4. Melnyk, A. V., Karabiniuk, M. M. Subal'piys'ke i al'piys'ke vysokohir"ya landshaftu Chornohora: kryteriyi vydilennya, poshyrennya, vykorystannya [Subalpine and alpine highlands of the Chornogora landscape: selection criteria, distribution, use]. *Natural resources of the region: problems of use, revitalization and conservation: Proceedings of the Third International Scientific Seminar*. Lviv: Publishing Center LNU of Ivan Franko, 2018v. pp. 24–41. (In Ukrainian).
5. Miller G. P. *Landshaftnye issledovaniya gornyh i predgornyh territorij [Landscape studies of mountain and foothill areas]*. Lviv: Higher school, 1974. 202 p. (In Russian).
6. Results of livestock accounting in the meadows of Rakhiv district of Transcarpathian region / Department of Agroindustrial Development of Rakhiv RSA. Rakhiv : Funds materials of the Department of Agroindustrial Development of Rakhiv RSA, 2019 (In Ukrainian).