Фізична географія та геоморфологія
https://doi.org/10.17721/phgg.2020.3-4.04

Man-induced transformation of the territory of Staryi Sambir raion of Lviv Region

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Abstract

Types of man-induced impact in the territory of village councils in Staryi Sambir raion have been analyzed. The most significant changes in the raion's territory have been caused by agricultural, forestry, pastoral, residential, industrial, and recreational impacts. Many types of impact are characterized by a rather clear landscape confinedness. Each of the types of impact causes different anthropic transformations in specific environmental components. Following P. Shyshchenko's methodology, the factors of man-induced transformation for the territory of village councils of the raion in question have been estimated on the basis of analysis of the structure of agriculturally used lands. Five levels of territory transformation have been outlined according to the value of the man-induced transformation factor: very slightly transformed, slightly, moderately, severely and very severely transformed. It has been clarified that the territories of village councils with moderate level of transformation stand for almost a half of the raion's area. A bit smaller is the share of very slightly transformed ones – 24.9% and slightly transformed ones – 23.1% of the territory. The territories of severely and very severely transformed village councils occupy, respectively, 1.6% and 1.5%. These are mainly the territories around the towns of Staryi Sambir, Dobromyl, and Khyriv. The overall man-induced transformation factor for the territory of Staryi Sambir raion is some 3.51.

Keywords

Man-induced impact, man-induced transformation, village councils, Staryi Sambir raion

Received: 21 April 2020 / Accepted: 30 October 2020

Антропогенна трансформація території Старосамбірського району Львівської області

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Реферат

Проаналізовано види антропогенного впливу на територію сільських рад Старосамбірського р–ну. Найбільші зміни на території району спричинені землеробським, лісогосподарським, пасторальним, селитебним, промисловим та рекреаційним впливами. Для багатьох видів впливу характерна досить чітка ландшафтна приуроченість. Кожен із видів впливу спричинює різноманітні антропічні трансформації для окремих компонентів довкілля. За методикою П. Шищенка на основі аналізу структури земельних угідь обчислено коефіцієнти антропогенної трансформації для території сільських рад досліджуваного району. Відповідно до величини коефіцієнта антропогенної трансформації виділено п'ять рівнів трансформації території: дуже слабо трансформовані, слабо-, середньо-, сильно- і дуже сильно трансформовані. З'ясовано, що майже половину площі району займають сільські ради із середнім рівнем трансформації. Дещо меншою є частка дуже слаботрансформованих – 24,9% і слаботрансформованих – 23,1% території. Сильно- та дуже сильнотрансформовані сільські ради займають відповідно 1,6% та 1,5%. Це переважно території навколо міст Старого Самбора, Добромиля та Хирова. Загальний коефіцієнт антропогенної трансформованості для території Старосамбірського р–ну – близько 3,51.

Ключові слова

Антропогенний вплив, антропогенна трансформація, сільські ради, Старосамбірський р–н

Надійшла до редакції: 21 квітня 2020 / Прийнята: 30 жовтня 2020

1. Introduction

Staryi Sambir raion, with its rich and diverse wildlife and inorganic nature, plays an important role in the economic life of frontier areas, is of great significance for the development of economy in the mountainous part of Lviv region. Therefore, the problem of preserving environmental balance in the territory is gaining critical importance. That is all the more necessary because as the result of not always rational use of the region's resources dynamic balance has been disturbed. Suffice it to say, in the region where forests constitute the main water level regulator in the upper part of the Dniester basin, forestation rate has reduced from 90–95% in the pre-agricultural period (Herenchuk et al., 1974) to 30–45% as of today (Telish, 2009), which fact has produced a negative impact not just on the hydrological regime, but on the overall sustainability of the territory.

Man-induced changes have disturbed all components of the ecosystems – flora and fauna, soil cover, resources of not just river waters, but ground waters as well. In many cases undesirable changes have

led to degraded landscapes and irreversible processes in them, with all the resulting negative consequences for the economy and human health.

Thus, the issue of balance restoration and ensuring normal functioning of the landscapes of the Upper Dniester Beskids is acquiring an important environmental, economic, and social sense. It is necessary to develop scientific principles of rational nature management, without any disturbing of the dynamic balance in the environment. They need to become the basis for the preservation of restorative capacity of the region's landscapes. To develop such principles it is primarily necessary to analyze the depth of man-induced transformation in the landscapes of the Upper Dniester Beskids.

Therefore, the objective of this publication is to analyze different types of man-induced impact, to determine the degree of man-induced transformation of the territory of Staryi Sambir raion for the sake of further development of the scientific basics of rational nature management in the raion's territory.

2. Materials and methods

Staryi Sambir raion is one of the three mountainous raions of Lviv region, with the area of 1,245 km^2. A number of studies related to man-induced impact on specific components of the landscape systems have already been conducted in its territory. The state of forests and problems of forestry have been highlighted in the publications of many authors (Herenchuk et al., 1974; Holubets et al., 2007; Telish, 2009), historical and geographical peculiarities of the development, planning forms and toponymy of rural settlements have been clarified (Telish, 2010). Some problems are covered in the publications related to the Carpathians in general (Melnyk, 1999), Lviv region (Holubets et al., 2007), or the Dniester basin (Herenchuk et al., 1974; Mukha et al., 2003), in particular.

The territory of Staryi Sambir raion is characterized by low-mountain topography, with soft contours. The territory of the raion includes the Upper Dniester Beskids – a part of the Eastern Beskids within Lviv region. In the north-east they are limited by Subcarpathia, in the south-east – by the Skole Beskids, in the south-west – by the Stryi-San Highland (Stryi-San Verkhovyna). The internal part of the Upper Dniester Beskids ends up in the Mahura Limnianska ridge, or the Rozluch ridge. The top Mahura Limnianska (1,021 m) is the highest in the raion. The average height is approximately 750 m. There prevails low-mountain topography, with cupola-shaped tops of ridges demarcating tributes of the Dniester, Stryvihora, Stryi, and other rivers. The mountains are covered with coniferous-deciduous forests. This area, as compared to other parts of the Carpathians, is densely populated and has well-developed agriculture in place.

The region has 700–800 mm of annual precipitation, the average air temperature is 6.6–8.3°C. Fertile brown mountain-forest soils of different capacity are widespread here. Within the area under study B. Mukha (2003) has pointed out two individual landscapes: Oriv (486 km^2) and Upper Dniester (825.6 km^2), within which five altitude parts are differentiated, of which the largest area is occupied by low-mountain wide interlayer hollows and stair-step and steep-slope dissected ridges (Mukha et al., 2003).

Human economic activity in the territory of Staryi Sambir raion is characterized by considerable intensity and high diversity, since that is one of the most accessible raions of the Ukrainian Carpathians. Due to a rather rich natural capacity forestry and agriculture, recreation have developed here significantly, with industry and transport construction being a bit less developed. Specific types of nature management, for instance, forestry, meadow cultivation, arable farming here act as man-induced loads causing changes in the landscapes.

The typology of anthropic impacts can be developed by multiple indicators (Shyshchenko, 1988). Of importance is their grouping by the nature of changes taking place in the landscape. First of all, it should be indicated that different types of man-induced impact are clearly confined to specific landscape components and are characterized by a certain spatial distribution. For instance, forestry is mainly related to tree vegetation, though its outcomes also affect other components of nature, in particular, soil cover or moisture regime. Therefore, a specific type of man-induced impact causes certain changes in natural systems. The key man-induced changes in the territory of Staryi Sambir raion have been placed by us in the order of reduction of the frequency of their distribution and united into seven groups.

The following types of man-induced impacts are most wide-spread in the territory of Staryi Sambir raion: agricultural, forestry, pastoral, residential, city planning, industrial, and recreational. All these types of impact are characterized by different intensity and different territorial distribution. A certain integrity of environmental problems, and, respectively, specific eco-situation is connected with each type of impact. The consequences of their effect lay an imprint on the structure of agriculturally used lands, which has developed historically in each natural territorial complex. Therefore, analysis of land use is of great importance for the understanding of the essence of man-induced changes in landscape complexes and for the development of ways to reduce their negative impact.

Agricultural impact includes mechanical, chemical (application of mineral fertilizers, pesticides), physical (use of agricultural machinery), agro-technical (rotation of crops, technologies of their development). It is manifested via contour and strip farming, slope terracing, forest plantations. Agricultural impact is one of the most long-term ones. The consequences of farming on the landscape include one-sided process

of taking away nutrients together with the harvested crops. That requires regular compensation in the form of fertilizers.

In the Upper Dniester Beskids area agricultural impact has led to considerable transformations in the landscape components. That is the part of the Skybovi Carpathians with the highest rate of ploughed lands. Over the last decades this impact has decreased a bit, since a considerable part of ploughing lands, mainly the ones that are in private ownership, have not been used by people according to their designation.

Forestry impacts on landscapes can be united into three groups: operational, preparatory and forest-caring. The greatest impact is made by clear felling during which microclimate in ground layers changes, the same as soil properties, the structure and species composition of the plant cover and fauna, the level and regimes of ground waters, runoff, etc. Forestry impacts, along with agricultural ones, have caused the largest transformations in the natural territorial complex. Forests have been used in the region with different intensity for over 200 years. Particularly substantial transformations took place after World War II, when calculated felling rate was exceeded many a time for the sake of rebuilding of the war-ruined economy.

Pastoral impact is manifested in meadow landscapes. Grazing directly affects plants (destruction of shoots and roots), soil (compaction, change in water regime), nutrient supply, seed dissemination, change in the overall phytomass and its species composition. Development of livestock breeding is accompanied by new types of impact on the landscape: water supply for pastures, their simplificated improvement and reclamation.

Pastoral impact in the Upper Dniester Beskids has reduced greatly over the past years. That is related to the fact that livestock population decreased considerably when collective agricultural enterprises collapsed. Natural territorial complexes started spontaneously overgrowing with forest.

Residential impact is accompanied by cutting of positive and filling of negative relief forms, soil alluvion, violation of plant and soil cover. Slope cutting activates erosive and displacement processes, this causing the need for respective protective activities, introduction of new man-induced elements into the landscape.

City planning impact gets manifested at deeper ground water horizons and in the layers of the atmosphere higher than in rural and natural landscapes. Vertical profile of urbanized landscapes is determined by the depth of the used ground water horizon and the height of industrial emission into the atmosphere. Urban landscapes are distinguished for their microclimatic differences, greening, floristic and faunistic features.

Residential and city planning impacts in the area under study also have a long history. The first settlements in the Upper Dniester Beskids area date back to the 14th century (Telish, 2010).

Industrial impact on landscapes is mainly local, but highly intensive. Over the last decades it has gone down a bit, which fact is connected with the general economic situation in Ukraine.

Recreational impact on natural territorial complexes gets manifested mainly in the digression of the plant cover, soil compaction due to tourist flows, during construction of recreational facilities and infrastructural elements, when actions are taken to enrich landscape scene variety of natural sites.

Diversity of the type of nature management, their technologies lead to the development of new specific functional features in modern landscapes and to the set level of their man-induced transformation. The rate of man-induced transformation of the landscapes of the Upper Dniester Beskids has been determined by us using P. Shyshchenko's methodology (1988). Each type of nature management has been assigned a man-induced transformation rank: conservation areas – 1, forests – 2, marshes and marshy lands – 3, meadows and pastures – 4, gardens – 5, ploughing lands – 6, rural areas – 7, urban areas – 8, industrial lands – 9. According to the cartographic materials and land registration data (6-ZEM form) as of 2018 (Fondovi..., 2018) the area sizes of nature management types for the territory of each village and city/town council have been estimated.

The index of man-induced transformation rate has been calculated by the following formula:

$$Iat = \sum(rq),$$

where Iat – man-induced transformation index; r – its rank; q – specific share (%) of the given type of nature management.

While determining this indicator, in order to take into account the depth of man-induced transformation, the 'share' of each type of nature management in the general transformation rate of the area was determined by an expert method. The following index figures were accepted for transformation depth: conservation areas – 1, forests – 1,05, marshes and marshy lands – 1.1, meadows and pastures – 1.15, gardens – 1.2, ploughing lands – 1.25, rural areas – 1.3, urban areas – 1.4, industrial lands – 1.5.

With due account of this, the value of man-induced transformation factor can be calculated as follows:

$$Kat = \frac{\sum(r \cdot \rho \cdot q)}{100},$$

where Kat – man-induced transformation factor; r – rank of man-induced transformation by a type of nature management; ρ – share (%) of a nature management type; q – index of landscape transformation depth.

Division by 100 was used for the sake of factor value use simplification. In this case these values will vary within the range of $0 > K_{at} > 10$ and will characterize the following regularity: the larger the size of the area of a nature management type and the higher the transformation depth index, the more transformed the territory is due to economic activity (table).

Different values of man-induced transformation factor for the landscapes of the raion's territory have

Table 1. Economic use and man-induced transformation of the territory of Staryi Sambir raion.

Village council	Total area, ha	Economic use (% of the total area)							
		ploughing land		gardens		meadows and pastures		forests and shrubs	
		ha	%	ha	%	ha	%	ha	%
Bilychi	3,696.0	554.0	14.9	14.0	0.3	521.3	14.1	2,468.1	66.8
Boloziv	2,486.0	1,392.0	55.9	70.0	2.8	89.0	3.6	674.0	27.1
Borshevychi	1,419.0	935.9	65.9	60.0	4.2	192.0	13.5	59.0	4.2
Velyka Linyna	4,018.0	833.0	20.7	7.0	0.1	712.6	17.7	2,294.6	57.1
Velykosillia	4,950.0	447.0	9.0	37.0	0.7	629.0	12.7	3,651.2	73.8
Velyka Sushytsia	2,899.0	1,031.0	35.5	11.0	0.3	429.8	14.8	1,231.8	42.5
Verkhniy Luzhok	3,123.7	380.8	12.1	67.0	2.1	238.9	7.6	2,241.4	71.8
Voloshynovo	3,353.4	683.0	20.3	18.0	0.5	364.0	10.9	2,176.9	64.9
Volia	1,371.7	316.0	23.0	18.0	1.3	236.1	17.2	732.3	53.4
Holovetsko	3,955.0	521.0	13.1	23.5	0.5	903.7	22.8	2,320.0	58.7
Hroziova	2,229.0	462.0	20.7	16.0	0.7	428.0	19.2	1,272.9	57.1
Hrushatychi	3,385.4	1,837.5	54.2	73.0	2.1	567.0	16.7	551.3	16.3
Drozdovychi	1,885.4	1,055.5	55.9	42.0	2.2	233.1	12.4	271.9	14.4
Kniazhpil	3,617.1	860.0	23.7	18.0	0.5	445.0	12.3	2,106.8	58.2
Koniv	1,448.1	1,091.0	75.3	5.0	0.3	166.7	11.5	123.0	8.5
Liutovyska	4,664.5	2,080.0	44.5	71.0	1.5	928.0	19.9	1,073.4	23.0
Mizhenets	2,663.0	1,370.9	51.4	106.27	3.9	268.1	10.1	722.6	27.1
Murovane	2,264.1	793.0	35.0	38.0	1.6	429.2	19.0	828.8	36.6
Mshanets	3,571.2	555.0	15.5	16.0	0.4	1392.0	39.0	1,452.3	40.7
Nove Misto	3,984.6	2,063.0	51.7	53.0	1.3	317.9	8.0	1,044.8	26.2
Ripiana	3,004.1	647.0	21.5	23.0	0.7	751.0	25.0	1,504.9	50.1
Skelivka	2,167.0	1,294.0	59.7	29.0	1.3	327.0	15.1	341.0	15.7
Slokhyniv	2,680.8	1,350.9	50.3	15.5	0.5	352.0	13.1	741.3	27.7
Solianuvatka	2,486.2	758.8	30.5	15.0	0.6	261.0	10.5	1,349.3	54.3
Stariava	4,735.7	1,015.9	21.4	9.5	0.2	358.8	7.6	3,133.5	66.2
Strashevychi	3,130.3	1,248.2	39.8	17.9	0.5	516.9	16.5	1,194.3	38.2
Strilky	3,488.2	523.3	15.0	60.6	1.7	175.6	5.0	2,508.8	71.9
Strilbychi	3,475.1	694.0	19.9	8.0	0.2	665.6	19.2	1,867.9	53.8
Susidovychi	2,754.1	1,786.0	64.8	49.5	1.8	222.6	8.1	525.3	19.1
Terlo	4,237.0	550.1	12.9	30.0	0.7	317.0	7.5	3,166.9	74.7
Ternava	2,336.3	736.0	31.5	28.6	1.2	344.0	14.7	1,033.6.9	44.2
Tershiv	3,280.0	327.0	9.9	22.2	0.6	353.9	10.8	2275.1	69.4
Tysovytsia	1,419.3	318.0	22.4	13.0	0.9	91.0	6.4	932.8	65.7
Topilnytsia	3,969.9	706.0	17.7	21.0	0.5	411.4	10.4	2,721.8	68.6
Torchynovychi	2,427.0	1,059.3	43.6	78.0	3.2	556.0	22.9	352.0	14.5
Trushevychi	2,141.1	1,281.6	59.8	40.0	1.8	483.0	22.6	91.0	4.3
Turye	4,561.1	647.0	14.1	17.0	0.3	768.8	16.9	2,958.3	64.9
Chapli	2,464.0	1,271.0	51.5	35.0	1.4	637.4	25.9	317.7	12.9
Yasenytsia Zamkova	2,821.0	554.0	19.6	31.0	1.1	344.6	12.2	1,657.4	58.8
urban village of Nyzhankovychi	439.0	205.0	46.7	14.0	3.1	44.0	10.0	11.0	2.5
urban village of Stara Sil	3,166.4	1,232.7	38.9	106.0	3.3	391.9	12.4	1,210.4	38.2
town of Dobromyl	1,182.2	520.5	44.0	32.3	2.7	139.0	11.8	143.0	12.1
town of Khyriv	343.00	71.0	20.7	12.0	3.5	–	–	7.0	2.0
town of Staryi Sambir	824.00	400.0	48.5	20.3	2.4	87.0	10.6	14.0	1.7
Total	124,517.0	38,459.3	30.9	1,492.2	19.8	18,090.9	14.5	56,321.8	45.2

Table 1. *Continued.*

Village council	Total area, ha	Economic use (% of the total area)						Kat
		waters, marshes		residential development		industrial development		
		ha	%	ha	%	ha	%	
Bilychi	3,696.0	20.5	0.6	7.9	0.2	–	–	2.82
Boloziv	2,486.0	45.4	1.8	25.0	1.0	1.6	0.1	5.25
Borshevychi	1,419.0	37.0	2.6	5.0	0.4	–	–	6.02
Velyka Linyna	4,018.0	22.4	0.6	12.0	0.3	–	–	4.64
Velykosillia	4,950.0	18.7	0.4	48.0	1.0	1.5	–	3.52
Velyka Sushytsia	2,899.0	45.4	1.6	6.0	0.2	–	–	4.22
Verkhniy Luzhok	3,123.7	94.6	3.0	11.0	0.4	1.0	–	2.97
Voloshynovo	3,353.4	14.4	0.4	9.0	0.3	–	–	3.76
Volia	1,371.7	8.6	0.6	4.0	0.3	–	–	2.56
Holovetsko	3,955.0	49.4	1.2	4.0	0.1	2.0	0.1	3.48
Hroziova	2,229.0	10.6	0.5	3.0	0.1	–	–	4.09
Hrushatychi	3,385.4	168.2	5.0	20.0	0.6	–	–	5.52
Drozdovychi	1,885.4	159.0	8.4	9.0	0.5	3.0	0.2	5.52
Kniazhpil	3,617.1	27.0	0.7	7.0	0.2	2.6	–	3.75
Koniv	1,448.1	8.0	0.6	6.0	0.4	–	–	6.43
Liutovyska	4,664.5	254.6	5.5	15.0	0.3	–	–	5.04
Mizhenets	2,663.0	54.6	2.1	10.0	0.4	0.5	–	5.22
Murovane	2,264.1	34.7	1.5	6.0	0.3	1.4	0.1	4.34
Mshanets	3,571.2	27.9	0.8	4.0	0.1	1.8	0.1	3.96
Nove Misto	3,984.6	106.7	2.7	48.0	1.2	–	–	4.78
Ripiana	3,004.1	34.7	1.2	6.0	0.2	–	–	4.12
Skelivka	2,167.0	29.0	1.3	25.0	1.2	–	–	5.57
Slokhyniv	2,680.8	28.0	1.0	10.0	0.4	15.6	0.6	5.64
Solianuvatka	2,486.2	19.3	0.8	8.0	0.3	2.0	0.1	5.22
Stariava	4,735.7	33.4	0.7	20.3	0.4	4.0	0.1	3.53
Strashevychi	3,130.3	15.7	0.5	11.1	0.4	21.7	0.7	4.96
Strilky	3,488.2	51.3	1.5	20.0	0.6	7.2	0.2	2.08
Strilbychi	3,475.1	37.9	1.1	5.0	0.1	24.5	0.7	2.79
Susidovychi	2,754.1	25.1	0.9	10.0	0.4	9.8	0.4	5.29
Terlo	4,237.0	40.3	1.0	6.0	0.1	0.6	0.0	3.41
Ternava	2,336.3	31.4	1.3	8.0	0.3	6.0	0.3	3.77
Tershiv	3,280.0	86.7	2.6	6.0	0.2	1.0	0.0	2.83
Tysovytsia	1,419.3	3.8	0.3	4.0	0.3	–	–	3.80
Topilnytsia	3,969.9	36.5	0.9	11.0	0.3	–	–	2.92
Torchynovychi	2,427.0	127.0	5.2	6.0	0.2	29.2	1.2	6.12
Trushevychi	2,141.1	55.0	2.6	4.0	0.2	20.0	0.9	4.76
Turye	4,561.1	35.9	0.8	20.0	0.4	–	–	3.23
Chapli	2,464.0	33.3	1.4	14.0	0.6	4.7	0.2	5.09
Yasenytsia Zamkova	2,821.0	22.5	0.8	10.8	0.4	4.5	0.2	3.89
urban village of Nyzhankovychi	439.0	9.00	2.1	15.0	3.4	1.6	0.4	5.44
urban village of Stara Sil	3,166.4	118.2	3.7	8.0	0.3	1.0	0.0	4.46
town of Dobromyl	1,182.2	23.0	1.9	23.6	2.0	22.1	1.9	5.12
town of Khyriv	343.00	25.0	7.3	9.0	2.6	19.5	5.7	6.13
town of Staryi Sambir	824.00	65.0	7.9	25.6	3.1	31.7	3.8	6.47
Total	124,517.0	2,194.7	1.8	546.3	0.4	242.1	0.2	3.51

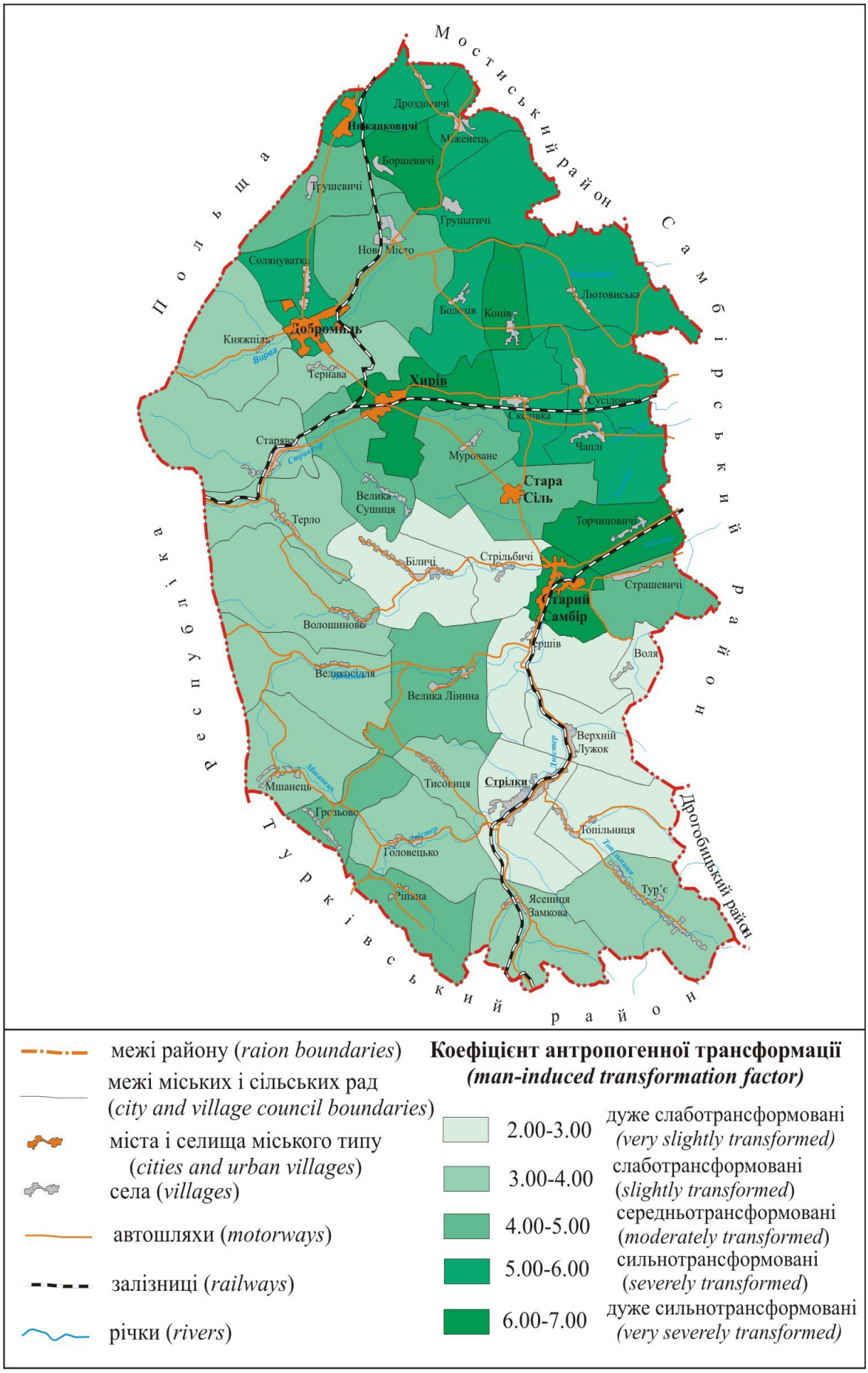

Fig. 1. Man-induced transformation of the territory of Staryi Sambir raion.

enabled to develop a five-point scale of landscape transformation rate: 2.00-3.00 – *very slightly transformed*, 3.01-4.00 – *slightly transformed*, 4.01-5.00 – *moderately transformed*, 5.01-6.00 – *severely transformed*, 6.01-7.00 – *very severely transformed*.

The determined K_{at} have been alculated for the sake of developing the most efficient structure of nature management. They can be considered as standard regional factors. They rather clearly reflect economic development of the territories and determine what impact prevails in the transformation of the landscape systems. K_{at} are used as a quantitative measure of the differences in natural differentiation and substantiation of regional planning schemes for regional designing. They will serve as the basis for further development of recommendations on reduction of the negative impact of man-caused transformation on the region's landscapes. Besides that, they can be used in the work of state authorities and local self-government bodies in the development of the system of activities aimed at making the structure of agriculturally used lands in Staryi Sambir raion more effective.

A characteristic and most wide-spread consequence of man-induced transformations of landscapes in the Upper Dniester Bedkids is transformation of original plant cover and development of derivative forest stands and secondary meadow phytocenoses on large areas. Forestry could not but affect the soil cover, water regime, etc. Due to this, the percentage of forests and meadows in landscape units should be considered as important indicators of their man-induced transformation. Woodiness rates in the region are the highest in the territory of Bilychi, Tershiv, Velykosillia, Terlo, Verkhniy Luzhok, Stariava village councils.

Particularly rapid woodiness decrease took place in the Beskids after World War II, that being caused by excessive felling. That led to catastrophic windfalls, this immediately resulting in floods. The negative consequences of over-felling of the post-war period and growing of mono-dominant spruce forests in their place are still felt today and get manifested as regular windfalls, floods.

Considerable man-induced changes with negative environmental consequences in the territory of Staryi Sambir raion are related to man-caused ploughing load. The highest ploughing rate (some 40%) is characteristic of the suburbs of Staryi Sambir, Dobromyl, Khyriv, urban villages of Stara Sil and Nyzhankovychi. It should be indicated that it is complicated to analyze current ploughing loads due to the fact that a considerable part of lands recorded in the land surveying materials as ploughing lands have not been ploughed over the past years.

Within the structure of agriculturally used lands in Staryi Sambir raion the lowest is the share of developed territories occupied by inhabited settlements, roads, and other lands. However, territories with these types of land management are characterized by the highest man-induced transformation. It is important to bear in mind a certain conditionality of the development indicator, since the territories of inhabited settlements also include considerable areas of garden plots, where people do farming, horticulture, and meadow cultivation.

By the volume of construction development the territories of three towns of the raion noticeably stand out among others. It should be noted that the regime and intensity of man-induced impacts on landscapes depend considerably on the seasonal characteristics of a natural territorial complex. For instance, grazing or hay making in meadow natural territorial complexes take place only in the warm period of the year, and the most intensive impact of ploughing, in particular, tillage, harvesting, etc. are also confined to specific, relatively short-term periods.

The prevailing type of land management in combination with natural characteristics of landscape complexes acts as the basic factor in the development of landscape and environmental situation that can be made considerably more complicated as the result of man-induced geochemical pollution of the natural territorial complex. Different combinations of territorial distribution and the scale of manifestation of forestry, meadow, agricultural, residential and other man-induced loads cause different changes in the natural territorial complexes, stipulate their general man-induced transformation rate.

In general, the consequences of specific man-induced impacts on landscape complexes manifest themselves in the development of relatively sustainable perennial man-induced conditions of the natural territorial complex. Each of these impacts is characterized by a certain value of impact and scope of territorial distribution. That, in total, creates preconditions for the development of a specific eco-situation in landscape complexes. Due to this, synthetic assessment of landscape units, which in this case is expressed as K_{at}, constitutes a logical completion of the analysis of man-induced loads.

Assessing the degree of man-induced transformation of the landscapes of the Upper Dniester Beskids, it can be pointed out in general that it is the highest at the foothills of the landscape systems of Staryi Sambir, Dobromyl, and Khyriv, and makes up 5.00-6.50 (Fig. 1). For most natural territorial complexes of the village councils of both landscapes Кат varies within the range of 3.00-4.00. The lowest values of man-induced transformation in the area can be traced in the natural territorial complexes with the highest altitude.

3. Discussion and conclusions

The most wide-spread types of man-caused impact in the landscapes of the Upper Dniester Beskids are forestry, pastoral, and residential ones. In the cities these are city planning and industrial impacts. Recreational impact is most frequently observed near the objects of historical and cultural as well as nature conservation

stock. Each of these impacts causes different man-induced transformations not just of specific landscape components, but changes the overall landscapes. All types of impact are characterized by clearly confinedness of the landscape, and therefore, further detailed studies at lower levels of natural territorial complexes are necessary.

Almost half of the area (some 49.6%) of the raion is occupied by moderately transformed landscapes. The share of very slightly transformed – (24.9%) and slightly transformed (23.1%) landscapes is a bit smaller here. Severely transformed and very severely transformed landscapes take 1.6% and 1.5%, respectively. These are mainly natural territorial complexes around the towns of Staryi Sambir, Dobromyl, Khyriv. The overall man-induced transformation factor for Oriv and Upper Dniester landscapes is almost the same – some 3.51.

Thus, moderately transformed landscapes prevail within Staryi Sambir raion of Lviv region. Therefore, a number of activities need to be taken in order to reduce the negative impact of anthropic activity on the territory under research. The calculated man-induced transformation factors can be used to determine the most effective nature management structure in the region.

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References

Fondovi materially upravlinnia zemelnykh resursiv Starosambirskoyi RDA. Forma 6-ZEM stanom na 1 sichnia 2018. [Archival materials of the administration of land resources of Staryi Sambir Raion State Administration. Form 6-ZEM as of January 1, 2018]. (in Ukrainian). [Фондові матеріали управління земельних ресурсів Старосамбірської РДА. Форма 6-ЗЕМ станом на 1 січня 2018 р.].

Herenchuk, K.I., Stoyko, S.M. (1974). Vidtvorennia ekolohichnoyi rivnovahy baseynu Dnistra i ratsionalne vykorystannia yoho pryrodnykh resursiv [Restoration of environmental balance of the Dniester basin and rational use of its natural resources]. B*ulletin of the Academy of Sciences of the USSR*, 81–87 (in Ukrainian). [Геренчук, К.І., Стойко, С.М. (1974). Відтворення екологічної рівноваги басейну Дністра і раціональне використання його природних ресурсів. *Вісник АН СРСР*, 81–87].

Holubets, M.A., Hnativ, P.S., Kozlovskyi, M.P. (2007). *Kontseptualni zasady staloho rozvytku hirskoho rehionu* [Conceptual principles of sustainable development of a mountain region]. Lviv: Polli (in Ukrainian). [Голубець М.А., Гнатів П.С., Козловський М.П. (2007). *Концептуальні засади сталого розвитку гірського регіону*. Львів: Поллі].

Melnyk, A.V. (1999). *Ukrayinski Karpaty: ekoloho-landshaftoznavche doslidzhennia* [The Ukrainian Carpathians: environmental and landscape study]. Lviv: LNU Publishing House (in Ukrainian). [Мельник, А.В. (1999). *Українські Карпати: еколого-ландшафтознавче дослідження*. Львів: Видавництво ЛНУ].

Mukha, B., Zakharko, E., Yamelynets, T. (2003). Landshaftna karta verkhivja basejnu riky Dnister u mezhakh Lvivskoyi oblasti masshtabu 1:400 000 [The landscape map of the upper Dniester river basin within Lviv region at the scale of 1:400 000]. *Bulletin of Lviv University. Series Geography*, 29, 71–77 (in Ukrainian). [Муха, Б. Захарко, Е., Ямелинець, Т. (2003). Ландшафтна карта верхів'я басейну Дністра в межах Львівської області масштабу 1:400 000. *Вісн. Львів. ун-ту. Сер. геогр*., 29, 71–77].

Shyshchenko, P.H. (1988). *Prikladnaya fizichieskaya geografiya* [Applied physical geography]. K.: Vyshcha shkola (in Russian). [Шищенко, П.Г., (1988). П*рикладная физическая география*. К.: Вища школа].

Telish, P.S. (2009). Antropohenna transformatsiya v lisakh Verkhniodnistrovskykh Beskydiv i shliakhy yiyi optymizatsiyi [Man-induced transformation in the forests of the Upper Dniester Beskids and ways to optimize it]. *Bulletin of Lviv University. Series Geography*, 37, 187–199 (in Ukrainian). [Теліш, П.С. (2009). Антропогенна трансформація в лісах Верхньодністровських Бескидів і шляхи її оптимізації. *Вісн. Львів. ун-ту. Сер. геогр*., 37, 187–199].

Telish, P.S. (2010). Istoryko-heohrafichni osoblyvosti rozvytku ta toponimika silskykh poselen u Verkhniodnistrovskykh Beskydakh [Historical and geographical peculiarities of the development and toponymy of rural settlements in the Upper Dniester Beskids]. *Bulletin of Lviv University. Series Geography*, 38, 332–340. (in Ukrainian). [Теліш, П.С. (2010). Історико-географічні особливості розвитку та топоніміка сільських поселень у Верхньодністровських Бескидах. *Вісник Львівського університету. Сер. географ*., 38, 332–340].