MONITORING AND PROTECTION OF LAND

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LAND RESOURCES OF THE ZVENIGOROD DISTRICT OF CHERKASY REGION: ASSESSMENT OF THE STATE AND OPTIMIZATION

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Abstract. *The article presents a comparative analysis of the optimal environmental parameters and the current structure of lands in the Zvenigorod district of Cherkasy region. The purpose of the study is to assess the current state of land use in the Zvenigorod district of Cherkasy region and to identify problems and justify ways of solving it. An analysis of the current state of land use in the district indicates a high level of technological load on land resources, which results in low ecological stability of land use in general. An assessment of ecological stability of the territorial structure land of the district and sustainability of lands to anthropogenic load is provided. Only 10% of the area of the district's land can be attributed to medium-stable territories relatively low level of anthropogenic loading and least landslide of agricultural lands - the Territories of the Morin, Popivska and Khlipnivska village councils.*

In the result of carrying out researcheskey directions in the optimization of territorial land use in the Zvenigorod district are grounded: improvement of the structure of crops and crop rotation by increasing the proportion of perennial grasses, leguminous crops; reduction of the area of arable lands due to their withdrawal from arable land and transfer to hayfields and pasture lands (increasing the area of ecologically stabilizing lands); preservation of degraded, unproductive and technogenically polluted land and to rehabilitate affected lands.

Keywords: *land use; agrilandscape; ecological stability of a territory; anthropogenic load*

Relevance.

State land policy in Ukraine envisages the activity of state authorities in the field of land relations aimed at the rational use and protection of land, ensures food security of the country and creates environmentally safe conditions for the conduct of economic activity and citizens residence. The quality of the state

land policy is determined taking into account the criteria (requirements) of good state management of land resources contained in the recommendations of the Food and Agriculture Organization of the United Nations (FAO) [1].

The level of intensity of land use is an extremely important indicator in agricultural production. However, the effectiveness of management on the ground is determined by the size of gross output and yield, and the rationality of nature is characterized by the structure of the use of territory and the quality of the ecological potential of land. Therefore, the main objective of land evaluation is to identify areas with unsatisfactory ecological status and to develop proposals for optimizing land use.

Analysis of recent research and publications.

Significant contribution to the development of the solution to the problem of optimization of agricultural land use was made by such scientists as D. S. Dobriak, O. P. Kanash, I. R. Karplyuk, V. M. Krivov, A. M. Tretiak [2,3,4]. In their works the directions of optimization of stabilizing and destabilizing lands are grounded by bringing to the optimal sizes of areas of hayfields, pastures, forests, protected areas, creation of an effective mechanism for managing the land resources. However, despite existing scientific studies, the issue of environmentally safe use of land requires a more detailed study.

The purpose of the study is to assess the current state of land use in the Zvenigorod district of Cherkasy region and to identify problems and justify ways of solving it.

Presenting main material.

From the total area of Cherkasy region (2 091.6 thousand hectares), the total area of Zvenigorod district is 100996.9 hectares: agricultural land is 74181.37 he, including agricultural lands 72608.48 he, of which arable land is 62618.08 he, fallows – 601.22 he, perennial plantations – 2033.48 he, hayfields and pastures – 4348.16 he (fig. 1 and fig. 2).

The use of agricultural land is determined by the principles that are in the pursuit of agricultural commodity producers to increase production volumes due to the increase in the share of arable land. That is, with more arable land there is a decrease in ecological-

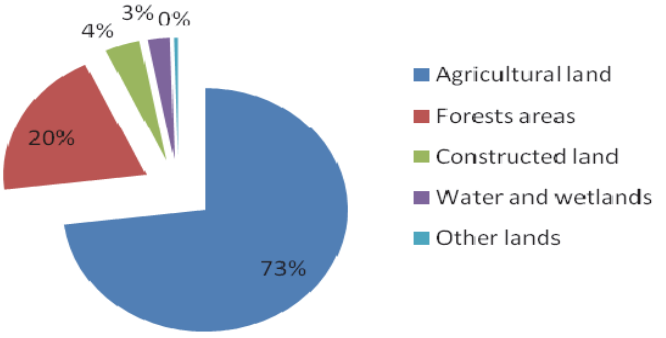

Fig. 1. Distribution of lands of Zvenigorod district of Cherkasy region by main types of lands, 2018*

* According to the The State Service of Ukraine for Geodesy, Cartography and Cadastre, 2018

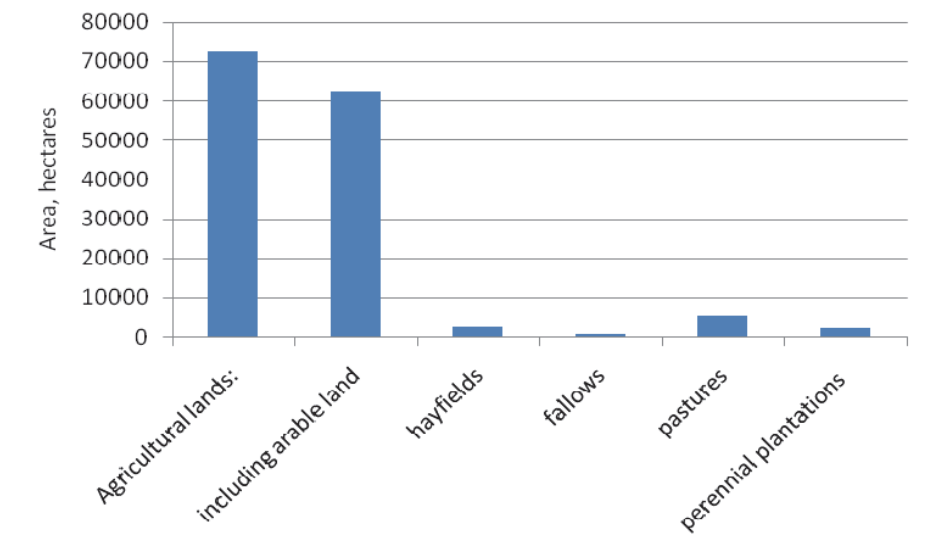

Fig. 2. Structure of agricultural lands of Zvenigorod district of Cherkasy region*

* According to the State Geocodist of Ukraine, 2018.

ly stabilizing lands (forests, hayfields, pastures, shrubs, etc.), the increase of which worsens the ecological situation in the studied area.

Modern use of land resources in the Cherkasy region, and in particular in Zvenigorod district, does not meet the requirements of rational nature management. So, as in Ukraine, significant violations of the ecologically permissible ratio of arable land, natural forage lands, forest plantations, which negatively affects the stability of biocenosis, are noted in the area.

The main fertility losses of soils are related to the high degree of land cultivation and the increase of erosion processes; violation of the structure of crop rotation; an increase in the deficit of the balance of nutrients and organic matter, and therefore the depletion of their reserves in the soil; weakening of the microbiological activity of the soil; the presence of acid soils; an increase in the density of the soil and a drop in its water-retaining capacity; the slow introduction of modern soil protection technology of cultivation [2].

The average weighted index of humus content in the soils of Zvenigorod rayon according to the last (X round) agrochemical survey is 2.8%, and in the district the average ecological-agrochemical bonite of arable land is 55.7 points [8].

To characterize the qualitative state of the lands of the Zvenigorod district and to determine the level of their suitability, a number of indicators were determined which reflect the ecological state of land holdings (by A. Tretiak's methodology) [4]. As a result of our research, it was found that the overall coefficient of ecological stability of Zvenigorod district is 0.37.

This characterizes the area as environmentally stable unstable. The average indicator of ecological stability in Ukraine is 0.41. The results of calculation of the coefficient of ecological stability of the territory of Zvenigorod district of Cherkasy region are graphically shown in Fig. 3.

According to the degree of ecological balance of territories and the level of anthropogenic load, the analysis and ranking of administrative-territorial units of the district have been carried out. According to the characteristics of the ecological state, the administrative-territorial units of Zvenigorod district are divided into 3 groups.

The first group included environmentally instable territories with a higher level of anthropogenic loading, which make up 60% of the district's area (17 administrative units). The second group includes environmentally unstable territories, which make up 28% of the district's area (8 administrative-territorial units). Only 10% of the area of the district's land can be attributed to medium-stable territories – the Territories of the Morin, Popivska and Khlipnivska village councils.

The coefficient of anthropogenic loading characterizes the magnitude of the impact of human economic activity on land resources. The level of anthropogenic impact, which affects the state of ecosystems, shows that the moderate anthropogenic load corresponds to areas where the value of this indicator is within the range of 3,1–3,5. The coefficient of anthropogenic loading in the region is 3.57 (Table). The average indicator for Ukraine is 3.42 [5], which indicates an increased level of anthropogenic load on the territory. In particular, only the territory of three administrative-territorial units of the Morin, Popivska and Khlipnivska village councils has an average level of anthropogenic pressure. This is due to the fact that in these areas the largest share is occupied by forestland and areas under water and covered with wetlands.

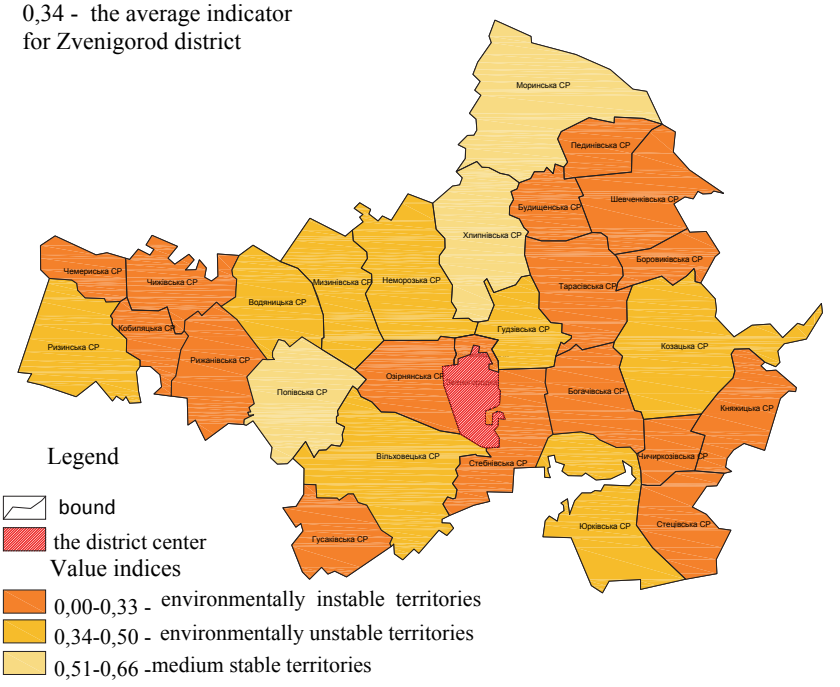

Fig. 3. Mapping scheme of Zvenigorod district on the coefficient of ecological stability

Indicators of the ecological state of land resources Zvenigorod district of Cherkasy region*

№	The name of the village council	Total area, ha	Area agricultural land, ha	The area of arable land, ha	Coefficient		Plowing total territory	area's wooded
					ecological stability	anthropogenic loading		
1	Bogachev	3813,90	3158,65	2494,00	0,33	3,60	65,4	10,8
2	Borovikivska	1701,80	1546,20	1368,12	0,21	3,88	80,4	4,0
3	Budyshchenskaya	1715,00	1392,80	1169,12	0,32	3,63	68,2	14,0
4	Vilkhovets	7312,30	5210,30	4644,84	0,37	3,50	63,5	22,5
5	Vodnyatskaya	3302,10	2692,60	1927,47	0,36	3,56	58,4	12,7
6	Hudziv	2217,90	1583,70	1045,60	0,44	3,41	47,1	23,5
7	Gusakiv	3036,40	2455,50	2192,57	0,30	3,64	72,2	14,3
8	Knyazhitsky	3265,40	2703,90	2574,93	0,25	3,75	78,9	11,1
9	Kobylyatsky	2161,20	1999,50	1538,90	0,24	3,84	71,2	3,1
10	Cossack	6615,90	4078,00	3655,90	0,46	3,28	55,3	33,6
11	m. Zvenigorodka	2466,96	1551,20	1306,99	0,23	3,98	53,0	9,5
12	Myzynivska	3193,70	2465,77	1603,07	0,43	3,38	50,2	16,9
13	Morinsky	7451,40	4112,86	3214,77	0,55	3,09	43,1	40,6
14	Nemorozka	5148,30	2837,66	2303,41	0,50	3,17	44,7	31,6
15	Ozernyansky	2864,70	2514,90	2229,99	0,24	3,80	77,8	6,1
16	Pedinovsky	2310,40	1935,23	1630,62	0,30	3,65	70,6	11,5
17	Popov	7451,40	4112,86	3214,77	0,55	3,09	43,1	40,6
18	Ryzhaniv	5148,30	2837,66	2303,41	0,50	3,17	44,7	31,6
19	Rizin	4456,80	2838,28	2479,88	0,47	3,25	55,6	33,4
20	Stebnovsky	3575,34	2860,08	2571,79	0,27	3,71	71,9	9,5
21	Stetsiv	3636,10	3190,90	2980,60	0,21	3,83	82,0	4,8
22	Tarasiv	3969,80	3544,26	2954,84	0,27	3,73	74,4	6,7
23	Chlipniv	4573,50	2181,65	1826,30	0,59	2,99	39,9	47,3
24	Chemeri	1677,00	1429,40	1208,90	0,29	3,67	72,1	10,2
25	Chizhiv	2624,00	2355,68	1938,56	0,25	3,81	73,9	5,6
26	Chichirkuzovsky	1998,50	1644,27	1440,58	0,29	3,66	72,1	8,5
27	Shevchenko	4325,10	3775,72	3331,27	0,24	3,81	77,0	6,7
28	Yurkiv	4020,10	2836,12	2537,56	0,37	3,48	63,1	19,1
	Total	106033,3	75845,65	63688,73				
	Average in the area				0,34	3,57	0,67	0,17

*Calculated by the A. Tretiak's methodology

In 2018, in the Zvenigorodsky District, 30 agribusiness entities are operating on the basis of collective agricultural enterprises, including: 10 Agricultural limited liability companies, private enterprise – 3, agricultural production cooperatives – 2, limited liability company – 9, large peasant farms – 5, private agricultural enterprises – 1, in the use of which is located and processed 72609 hectares agricultural lands, including arable land 62618g (95 and 98% of the total area of the land). There are also 114 economically active farms operating in the use of which there are 4357 hectares of arable land [6].

For commercial use, more than 71 percent of the territory is involved. Extremely high level of cultivation of the territory and is more than 60 percent (in developed countries of Europe - does not exceed 35 percent [7]). As we see the greatest degree of tilled land area observed such as village councils Stetsivskiy (82%), Borovykivskiy (80%), Kniazhytskyi (79%), Ozirnyanskiy (78%), Shevchenkivskiy (77%). Such a correlation is not ecologically optimal, due to increased agricultural development and cultivations of lands significantly reduced ecological stability of landscapes (Table 1).

The actual forest area of the district is only 14 percent, which is not enough to ensure ecological balance (the average indicator of European countries - 25-30 percent [7]. As we see, the smallest forested area (up to 10%) is observed on the territory of such village councils as Borovikivska (4%), Kobylyatskaya (3.1%), Ozernyanska (6.1%), Stebnovskaya (9.5%), Stetsivska (4.8%), Tarasivska (6.7%), Chizhivska (5.6%), Chichirkuzovskaia (8.5%), Shevchenkivska (6.7%).

Agricultural land is a priority in the implementation of measures for the protection of land resources, since they are the main means of production and can not be replaced by another means.

Conclusions and perspectives.

Consequently, the analysis of the use of land resources in Zvenigorod district shows continuous process of deterioration of ecological state. Only 10% of the area of the district's land can be attributed to medium-stable territories relatively low level of anthropogenic loading and least landslide of agricultural lands - the Territories of the Morin, Popivska and Khlipnivska village councils.

Therefore, there is a need for decisions on rational use and protection of land namely in changing the structure of the land fund and increasing the area of ecologically stabilizing lands.

The land tenure structure of the Zvenigorod district of Cherkasy region should be optimized in the following areas: improvement of the structure of crops and crop rotation by increasing the proportion of perennial grasses, leguminous crops; reduction of the area of arable lands due to their withdrawal from arable land and transfer to hayfields and pasture lands (increasing the area of ecologically stabilizing lands); preservation of degraded, unproductive and technogenically polluted land and to rehabilitate affected lands.

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ЗЕМЕЛЬНІ РЕСУРСИ ЗВЕНИГОРОДСЬКОГО РАЙОНУ ЧЕРКАСЬКОЇ ОБЛАСТІ: СУЧАСНИЙ СТАН ТА ОПТИМІЗАЦІЯ ЇХ ВИКОРИСТАННЯ

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Анотація. *Подано порівняльний аналіз оптимальних екологічних параметрів і сучасної структури земель території Звенигородського району Черкаської області.*

Метою даної праці є дослідження та оцінка сучасного стану використання земельних ресурсів Звенигородського району Черкаської області та виявлення проблем і обґрунтування шляхів їх вирішення. Матеріалами дослідження є дані державного земельного кадастру, побудовані на методичних прийомах наукової абстракції, синтезу та аналізу окремих елементів.

Аналіз сучасного стану використання земель в районі свідчить про високий рівень технологічного навантаження на земельні ресурси, який зумовлює низьку екологічну стабільність землекористування в цілому. Лише 10 % площі земель району можна віднести до середньостабільних територій із середніми рівнем антропогенного навантаження та найнижчим ступенем розораності – це території Моринської, Попівської та Хлипнівської сільських рад.

У результаті проведених досліджень обґрунтовано основні напрями оптимізації територіальної структури землекористування Звенигородського району: удосконалення структури посівних площ і сівозмін шляхом збільшення питомої ваги багаторічних трав, зернобобових культур; скорочення площі орних угідь за рахунок виведення їх із ріллі й переведення в сінокісно-пасовищні угіддя (збільшення площі екологостабілізуючих угідь); провести консервацію деградованих, малопродуктивних і техногенно забруднених земель та рекультивацію порушених земель.

Ключові слова: *землекористування; розораність; екологічна стабільність території; антропогенне навантаження*

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Бавровская Н., Шлихта Т.

ЗЕМЕЛЬНЫЕ РЕСУРСЫ ЗВЕНИГОРОДСКОГО РАЙОНА ЧЕРКАССКОЙ ОБЛАСТИ: СОВРЕМЕННОЕ СОСТОЯНИЕ И ОПТИМИЗАЦИЯ ИХ ИСПОЛЬЗОВАНИЯ

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Аннотация. *Представлен сравнительный анализ оптимальных экологических параметров и современной структуры земель территории Звенигородского района Черкасской области.*

Целью данной работы является исследование и оценка современного использования состояния земельных ресурсов Звенигородского района Черкасской области и выявление проблем и обоснованных путей их решения. Материалами исследования являются данные государственного земельного кадастра, построенные на методических приемах научной абстракции, синтеза и анализа отдельных элементов.

Анализ современного состояния использования земель в районе свидетельствует о высоком уровне технологической нагрузки на земельные ресурсы, который обусловливает низкую экологическую стабильность землепользования в целом.

В результате проведенных исследований обоснованы основные направления оптимизации территориальной структуры землепользования Звенигородского района: необходимо усовершенствование структуры посевных площадей и севооборотов путем увеличения удельного веса многолетних трав, зернобобовых культур; сокращение площади пахотных угодий за счет вывода их из пашни и перевода в сенокосно-пастбищные угодья (увеличение площади экологостабилизирующих угодий); проведение консервации деградированных, малопродуктивных, техногенно-загрязненных земель и рекультивации нарушенных земель.

Ключевые слова: *землепользование, распашка, экологическая стабильность территории, антропогенная нагрузка*