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The structure and territorial features of agro-resource potential of Volyn Region

Potapowa A., Pogriebskij T., Golub G. **Struktura i cechy przestrzenne potencjału zasobów rolnych obwodu wołyńskiego.** Dokonano oceny elementów i funkcjonowania struktury naturalnego potencjału zasobów rolnych oraz cech jego przestrzennego zróżnicowania. Określono wpływ wielkości i struktury tego potencjału na efektywność i wydajność produkcji rolnej na obszarze obwodu wołyńskiego. Przeprowadzono regionalizację naturalnych zasobów rolnych i określono poziom wydajności naturalnego potencjału zasobów rolnych.

Потапова А., Погребский Т., Голуб Г**. Структура и территориальные особенности агроресурсного потенциала Волынской области.** Оценивается компонентная и функциональная структура природного агроресурсного потенциала и особенности его территориальной дифференциации. Определено влияние величины и структуры данного потенциала на эффективность и производительность сельскохозяйственного производства на территории Волынской области. Проведено природно-агроресурсное районирование и определен уровень производительности природного агроресурсного потенциала.

Потапова А., Погребський Т., Голуб Г**. Структура та територіальні особливості агроресурсного потенціалу Волинської області.** Оцінюється компонентна та функціональна структура природного агроресурсного потенціалу й особливості його територіальної диференціації. Визначено вплив величини та структури даного потенціалу на ефективність і продуктивність сільськогосподарського виробництва на території Волинської області. Проведено природно-агроресурсне районування та визначено рівень продуктивності природного агроресурсного потенціалу.

Key words: natural agro-resource potential, natural agro-resource area, optimization of natural agro-resource potential use, land-resource potential, agricultural nature use, social security of the region
Słowa kluczowe: naturalny potencjał zasobów rolnych, naturalny region zasobów rolnych, optymalizacja wykorzystania naturalnego potencjału zasobów gruntów, potencjał zasobów gruntów rolnych, rolnicze wykorzystanie warunków naturalnych, socjalne bezpieczeństwo regionu
Ключевые слова: природный агроресурсный потенциал, природно-агроресурсный район, оптимизация использования природного агроресурсного потенциала, земельно-ресурсный потенциал, сельскохозяйственное природопользование, социальная безопасность региона
Ключові слова: природний агроресурсний потенціал, природно-агроресурсний район, оптимізація використання природного агроресурсного потенціалу, земельно-ресурсний потенціал, сільськогосподарське природокористування, соціальна безпека регіону

Abstract

The component and functional structure of natural agro-resource potential and features of its territorial differentiation are estimated in this article. The influence of the size and structure of this potential on the efficiency and productivity of agricultural production in the Volyn region is determined. Natural agro-resource zoning was carried out and the level of productivity of natural agro-resource was determined.

Introduction

Formulation of the problem

The introduction of commodity-market relations between the owners of natural resources and nature management leads to new approaches to solving practical problems of nature management. In modern conditions, the issues of studying the natural potential remain, namely, its components that determine the integrated development of the region's economy. Natural agro-resource potential is the basis for the development of agriculture – an industry that has undergone significant restructuring in all regions of Ukraine. This is especially true of agro-industrial regions, where natural agricultural potential is the basis of economic development, a resource that meets the needs of the population and the economy in raw materials and consumer goods, as well as reduce the region's dependence on food imports.

Analysis of recent research and publications

A comprehensive analysis of natural conditions and natural resources is needed to solve theoretical and applied research problems related to agricultural nature management. Therefore, it is necessary to determine the essence of natural agricultural resource potential, features of its use, amount and structure both in the state and in individual areas. The structure and level of use of natural agro-resource potential can be traced in the relationship between natural and social elements.

The concept of "natural agricultural potential" in the modern scientific literature is not used very often. The term "agro-resource potential" is more common (Мольчак, Потапова, 2010). The term "agricultural resource potential" is also used. First, it is necessary to consider the concept of "natural resource potential" in order to understand what "natural agro-resource potential" is. Ukrainian geographer A. Synyavsky in the early twentieth century noted that natural resources are means of subsistence and natural resources that are means of labor in production. Thus, the means of labor in agriculture is land (natural agricultural resource), and the means of subsistence of agriculture – climate, water, etc. (Гродзинський, Шищенко, 1993).

There is no clear definition of "potential" and "resources". Different interpretations of economic and social geography can find different interpretations of this concept, analyzing which, we can conclude that the potential (from the Latin "*potentio*" – power) – available resources, with optimal structure and the ability to rationally use them to achieve a certain goals. According to Y. D. Dmitrevsky, potential is a quantitative assessment of natural resource or resources. In his opinion, the whole natural complex of the territory forms its natural agricultural potential, and its most important constituent elements are soil, climatic, water and plant resources.

The potential of agriculture, as the availability and balance of natural, biological, material and labor resources, A. E Yuzefovich considers in the process of interaction of the implementation of their integral properties to produce adequate amounts and types of products (*Оцінка земель…*, 2005).

Most researchers believe that the main components of agricultural resource potential (ARP) are: natural resources, labor resources and production assets (material and technical base) (Мольчак, Потапова, 2010). Some authors do not use the term ARP, using synonyms of integrated agro-resource potential, which reflect

the assessment of resource security and the impact on the final results of agricultural production.

A. Potapova, M. Melniychuk, I. Netrobchuk, N. Tarasyuk, A. Kicha, V. Boreyko and others are engaged in research of agro-resource potential of Volyn region. V. Petlin, O. Mishchenko, M. Melniychuk, V. Fesyuk, N. Tarasyuk, T. Pavlovska study landscape systems; A. Kicha, V. Boreyko – efficiency of using NRP.

Thus, natural agro-resource potential is an integral part of agro-resource potential, which has its own structure and features. For the development of production, each component of agricultural resource potential has its meaning and place. Interchangeable, dynamic and reproductive factors that are subject to conscious influence and economic regulation include material and technical means and labor resources. The functioning of natural resources in agriculture is associated with organisms and biological processes that are partially restored.

The purpose of the article

The purpose of the article is to assess the natural agro-resource potential of the territory, determine its structure and territorial features of use for agricultural nature; identifying the effectiveness of nature management in the agricultural landscapes of Volyn region and establishing relationships between natural and geographical indicators of the territory and environmental and economic consequences of agricultural activities. The following tasks were chosen for this purpose: to find out the features of modern nature management in agriculture and to determine the productivity of natural agro-resource potential in natural agro-resource areas of Volyn region.

Research methodology

The methodological basis of the study is the provisions of constructive geography, the concept of sustainable development of the region, the doctrine of natural resource potential. The study substantiates the main directions of optimizing the use of natural agro-resource potential of Volyn region in order to create regional environmentally sustainable agricultural systems.

The research used the scientific works of M. D. Grodzinsky, Y. A. Dmitrevsky, F. D. Zastavny, R. A. Ivanukh, A. G. Isachenko, Y. O. Molchak, O. O. Mints, M. M. Palamarchuk, V. M. Petlin, M. D. Pistun, M. V. Pitulyak, V. P. Rudenko, O. I. Shabli, P. G. Shishchenko and others, as well as methods: general science, system, landscape, statistical and mathematical, zoning, comparative geographical, cartographic and others.

Results of the research

Based on the cost assessment of each type of land resources and their qualitative characteristics, as well as the assessment of other components of the NARP, natural and agroresource areas (NARA) of Volyn region are identified: Polissya (North Polissya and South Polissya) and Forest-Steppe (POTAPOVA et al., 2022a, b).

The largest in area (715.6 thousand hectares) is Polissya NARA, which has a significant land resource potential – 5 562.37 million UAH (Table 1), in which the plowed land is 55.8%, which contributes to the low-lying flat terrain, large wetlands, as well as historical features of development and settlement of the territory. The majority of 57.5% of agricultural land is owned by citizens who have been granted ownership and use of agricultural land.

In the Forest-Steppe NARA, the potential of arable lands in the component structure of land resource potential is 89.0%. In this NARA, the potential of arable land is much higher – 81.8% and perennial plantations – 1.5%. Forest-steppe NARA is characterized by the presence of large areas of agricultural land (335.03 thousand hectares), as well as favorable soil and climatic conditions that ensure the intensive development of agriculture, especially vegetables. This is evidenced by the structure of agricultural land, in which 81.8% is arable land, and, accordingly, the plowed area is 61.1%.

Table 1. Land resource potential in natural agro-resource areas (million UAH)
Tabela 1. Potencjał zasobów ziemi w naturalnych regionach zasobów rolnych (mln UAH)
Таблица 1. Земельно-ресурсный потенциал в природно-агроресурсных районах (млн. грн.)

Natural agro-resource area	Types of agricultural land					
	Arable	Perennial plantings	Hayfields	Pastures	Total land resource potential	Potential density (thousand UAH/ha)
Polissya	3055,0	52,1	1182,3	1273,0	5562,4	7,8
Forest-Steppe	3980,1	102,9	204,0	185,6	4472,6	13,0

Compiled and calculated by the authors

The calculation of the functional structure of land resource potential is calculated in terms of its components in administrative districts and NARA according to the method of M. G. Ignatenko and V. P. Rudenko with changes and additions. Its essence is the quantitative division of the same phenomenon by value and can be represented by resources interstate, intra-regional, district and local. The definition of the functional structure is based on the cost assessment of the land resource potential of the Volyn region.

The functional structure of the land resource potential of the Volyn region is dominated by resources that have interregional and intra-regional significance. Hayfields (88.5%), pastures (84.3%), arable land (81.8%) and perennial plantations (74.7%) have a fairly high functional value (interregional and intra-regional rank). More than 47% of the region's land resources have the highest level of efficiency and potential complexing ability and the ability to participate in the territorial division of labor. According to the analysis of the functional structure of NARA, the highest rate of arable land (100%) and perennial plantations (80.5%) of interregional importance in the Forest-Steppe NARA, and hayfields (82.4%) and pastures (78.8%) – in Polissya NARA. Thus, this type of land resources in the future will determine the development of nature management in the region.

According to the density of land resources in the region, the following groups of districts can be distinguished: with high (more than 9 thousand UAH/hectare), medium (7–9 thousand UAH/hectare), low (up to 7 thousand UAH/hectare) levels. The maximum indicators of potential density are typical for perennial plantations (12.0.....23.7 thousand UAH/ hectare) and arable land (12.1....14.5 thousand UAH/ hectare) of the region. The potential density of forage lands in the region is much lower and averages 6.7.....8.8 thousand UAH/hectare. The average density of land resource potential is 9.75 thousand UAH/hectare, and the highest is in the Forest-Steppe NARA (Tables 1, 2).

First of all, in each of the these natural and agro-resource areas, the productivity of NARA was determined, land resources. The following indicators were used for this purpose: the value of gross output of agriculture and crop production per unit area of agricultural land and one person, the yield of individual crops and natural forage land, production of basic agricultural products per person.

It is established that the highest productivity of lands in the Forest-Steppe NARA. In general, the productivity of the region's lands has decreased in recent years, as evidenced by the decline in production of almost all crops.

The discrepancy between the magnitude of natural land potential and the level of its use is due to ecological inconsistency of agricultural production structure with soil and climatic conditions, inconsistency of soil conditions with biological requirements of crops, high agricultural development and plowing of agricultural landscapes, soil degradation.

Table 2. Territorial differentiation of land resource potential in natural agro-resource areas (UAH/hectare)
Tabela 2. Zróżnicowanie przestrzenne potencjału zasobów ziemi w naturalnych regionach zasobów rolnych (UAH/ha))
Таблица 2. Территориальная дифференциация земельно-ресурсного потенциала в природно-агроресурсных районах (грн/га)

Natural agro-resource area	Arable	Perennial plantings	Hayfields	Pastures
Polissya	7196,35	11671,40	8958,46	7106,31
Forest-Steppe	14294,62	20552,98	8478,51	5971,71

Compiled and calculated by the authors

The main direction of increasing land productivity is to align the specialization of agriculture with the volume and structure of NARA. In particular, in all NARA it is expedient to increase the share of vegetable crops and fodder crops, including perennial grasses. In the Forest-Steppe NARA it is expedient to expand the area under gardens, and in Polissya – to develop berry growing. In all areas it is necessary to address the issue of optimal ecologically acceptable limits of concentration of certain crops in crop production, ensuring the reproduction of soil fertility, the most rational use of water and agroclimatic resources, as well as increasing agricultural productivity, reducing production costs.

It is important to clarify the size of sown areas of these crops in accordance with the norms of the maximum possible load on the environment.

To protect soils from erosion, to restore their fertility, it is necessary to introduce soil-protective tillage technologies and scientifically sound crop rotations. In improving crop productivity, it is important to improve seed production, sowing in regional varieties.

A study of the state of land resources, which is an indicator of the total environmental assessment (TEA), made it possible to identify such territorial differences. There are three groups of areas with different states of agro-ecological situation: pre-crisis, satisfactory and favorable. The first group includes Lutsk, the second Volodymyr-Volyn administrative district. Favorable agro-ecological condition of land resources in Kamin-Kashirsky and Kovel administrative districts of the region.

Estimation of anthropogenic transformation of the territory of the region by different types of nature management was carried out according to the method of K. I. Hoffman and P. G. Shishchenko. Determination and analysis of the indicator of anthropogenic change gives grounds to say that the region has a high level of anthropogenic transformation – 5.0 points. The highest level of anthropogenic transformation is characteristic of the southern part of the region (Forest-Steppe NARA) – 5.3…6.3 points. The indicators of anthropogenic transformation obtained by this method are divided into four categories: weakly transformed (3.0…4.0), moderately transformed (4.1…5.0), transformed (5.1…6.0) and strongly transformed (6.1…7.0). The agrarian load determined by the same method averages 5.0 points for the territory of the region.

In order to create environmentally sustainable agricultural systems in the Volyn region it is necessary to: increase the area occupied by natural plant communities (meadows, forests) and perennial forage grasses by reducing the area of crops, especially row crops; ensure the loss of humus in the soil through the application of organic fertilizers and green manure crops (lupine, burkun), differentiated application of mineral fertilizers, etc., remove degraded soils from the field of active agricultural development and create conditions for their conservation and gradual regeneration in biology; to carry out the ecological organization of agro-landscapes due to the inclusion of the natural territories system (Руденко, 2010).

The formation and ecological organization of agricultural landscapes will help to establish balance in nature, will neutralize the negative effects of agricultural nature management in the long-developed region.

Conclusions and prospects of further research

The analysis of the component structure of NARA of Volyn region shows the leading role of land resources in it, which are characterized by a high level of development, significant soil degradation, low productivity. Land resources are both the main component of natural and agro-resource potential and an integrated resource that provides the ability to produce agricultural products, taking into account the influence of other natural factors. The current state of development of natural agricultural resources of Volyn region gives grounds to define it as one that has the opportunity to further increase the efficiency of natural agricultural resources, provided it is rationally used.

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