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LAND RESOURCES MANAGEMENT ACCORDING TO AGRARIAN LAND ZONING

Management of land resources as a state system of measures is aimed at providing the population with food and other branches of the national economy with raw materials at the optimal level of capital investments in resources and their maximum return under the conditions of compliance with environmental goals and programs to ensure the norms and requirements of the rational use of land by agricultural enterprises with the aim of obtaining an ecologically clean plant and animal products while preserving natural resources. It is proposed to manage land resources of agricultural enterprises based on indicators of agricultural zoning, which provides information on zoned crops and types of crop rotation that are most suitable for growing on the territory of a specific agricultural enterprise, the implementation of technological measures for the use and protection of land, the level of influence of these measures on productivity and efficiency land use by an agricultural enterprise.

Keywords: land management, land zoning, agricultural zones, agricultural enterprise.

1. INTRODUCTION

Management of land resources as a state system of interconnected, legal, technical-economic, organizational-economic, technological measures of the state in market conditions, aimed at regulating land relations, organizing a rational, efficient and ecologically stable territorial unit at the appropriate levels on the basis of sustainable development.

The science of management is based on the works of F. Taylor (1991), F. Gilbreth, L. Gilbreth and G. Gantt The instability of the market capitalist economy and the need for government intervention in management was first proved by J. Keynes (2012).

Great merit in the development of scientific directions and ideas of humanizing production management belongs to R. Owen (1950), who practiced the introduction of socio-psychological management methods unknown at the time.

D. Ricardo paid considerable attention to issues of management in the conditions of industrialization – distribution of the value of goods between different classes of society, coordination and organization of production control at the enterprise (Ricardo, 1971).

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A. Smith (2007) analyzed the duties of the state and the individual. He believed that the state should ensure the safety of a person's life and property, resolve disputes, ensure compliance with rules, perform other functions that an individual is unable to perform independently or does so ineffectively.

For the first time, management functions (planning – forecasting – scientific prediction of the development of the national economy) were formulated by A. Fayol (1991).

Modern domestic scientists paid considerable attention to the management of land resources in Ukraine.

Such scientists as A.P. Verveiko (2001) and H.Y. Horokhov (1984) were engaged in studies of the issue of territory organization and management of land resources of agricultural enterprises using land management methods.

Methodological principles of economic and ecological management of land resources are investigated by A.Y. Sohnych (2018). Organizational and economic aspects of land resource management are studied by V.V. Horlachuk (2019).

The characteristics of economic management methods, which represent methods of achieving economic goals based on the implementation of the requirements of economic laws that apply to modern land ownership and land use, are explored in his works by A.M. Tretyak (2020).

A. Martyn (2018) proved in his research that economic methods of management are more flexible and respond faster to changes in social needs.

D.S. Dobriak (2016) paid attention to the ecologically safe use of agricultural land in the management of land resources.

The issue of land zoning as a component of land resource management, allocation of units of natural-agricultural zoning, establishment of their boundaries, classification features, development of schemes of natural-agricultural zoning of the territory of Ukraine was studied by such scientists as O. Kanash (2007), H.K. Loik (2011), B.S. Nosko (1985), S.O. Osypchuk (2011), B.M. Chepkov (1985) and others.

2. METHODOLOGY, MATERIALS AND METHODS

The methodological basis of the study is a dialectical method of cognition and a systematic approach to the analysis of the problems of the development of ecological and economic management of land resources of agricultural enterprises in the conditions of zoning. The theoretical basis of the study was made up of the scientific works of domestic and foreign scientists on the issues of land resource management, formation and development of agricultural enterprises in the conditions of zoning.

The following methods were used in the research process: historical-evolutionary (the theory of zoning in development and as a separate scientific field), abstract-logical (theoretical generalizations and formulation of conclusions), calculation-constructive (determining the optimal ratio of land plots for administrative regions), comparative and other generally accepted methods and modern economic and statistical techniques.

The purpose of the article is to substantiate the theoretical provisions of agrarian land zoning and to characterize its classification features. The task is the formation of agricultural zoning and taking into account its provisions in the management of land resources of agricultural enterprises.

The object of the study is the process of economic and ecological management of land resources of agricultural enterprises through the land zoning system. The subject of the study is theoretical, methodical and applied aspects of agrarian land zoning.

3. RESULTS AND DISCUSSION

Land zoning is carried out in the context of the management of land resources of agricultural enterprises on the territory of the object, according to which the sign of zoning is identified or manifested within the administrative-territorial unit, under the influence of the land resources management system while ensuring the use of land in accordance with their intended purpose. Land zoning should establish the presence or absence of restrictions on the use of a specific land plot, taking into account its location within a certain zone; restriction of the rights of land owners and land users. These restrictions should relate to spatial characteristics, the formation of the type of agricultural enterprise, the system of soil cultivation, restrictions on the location and cultivation of certain agricultural crops, types of crop rotation, etc.

Land zoning is the establishment, allocation and unification of homogeneous territories and land massifs in accordance with defined properties, which are established in accordance with the assigned task, the category of land, existing restrictions on the use of land resources and the type of land use.

In the USA, Germany, France, land zoning has been introduced into the legal field. Information on land zoning is open, and an entrepreneur or investor can get all of it about existing restrictions and risks in certain zones. The experience of the Russian Federation, which has already introduced certain types of land zoning, shows the perspective and effectiveness of this measure. It is obvious that this direction is also acceptable for the conditions of Ukraine.

In order to improve land use planning, form a land use regime and improve the effectiveness of land relations regulation, in accordance with the draft Law of Ukraine "On Land Zoning", types of land use are distinguished, one of which is agricultural.

Accordingly, there is a need to allocate a separate sectoral zoning for the agricultural type of land use – agricultural zoning, which is applicable to agricultural enterprises.

Land zoning as a direction of the State Land Cadastre is recorded in the Law of Ukraine "On the State Land Cadastre" (Article 17). Attempts to apply land zoning were made in accordance with the Law of Ukraine "On the General Planning Scheme of the Territory of Ukraine" with the aim of creating a full-fledged living environment and favorable conditions for the development of the economy, according to the provisions of which agricultural zones are allocated.

Zone boundaries are specified in the process of territory planning at the regional and local levels and are determined in accordance with the procedure established by law.

Land zoning is carried out on the territory of the council, where the interests of territorial communities and executive authorities are coordinated.

Natural and ecological conditions have a significant influence on the development of the economy in agriculture. There are six natural and economic zones on the territory of Ukraine: Polyssia, Forest Steppe, Northern and Central Steppe, Southern Steppe, foothills and mountain areas of Crimea, foothills and mountain areas of the Carpathians. Each of them has its own characteristics and differs in the sectoral structure of agriculture.

The natural and economic zoning of lands affects the concentration of means of production, land and labor resources in order to increase the output of products in specialized enterprises and associations – the concentration of agricultural production.

In order to provide more accurate recommendations to agricultural producers, it is necessary to take into account the indicators of ecological zoning – the division of the territory according to the intensity of use into 3 ecological and technological groups (ETG).

Such a division helps to use agricultural land differently, makes it possible to move from a rectangular organization of the territory to a contour one, provides information on the optimal ratio in crop rotations of row crops and continuous sowing, depending on the potential danger of the manifestation of erosion processes, intensive and biological agriculture.

The basis of zoning of agricultural lands is natural-agricultural zoning – the division of the territory of Ukraine and individual regions, taking into account the natural conditions and agrobiological requirements of agricultural plants.

As a result of carrying out research work in several stages, 5 natural-agricultural zones and 2 mountain regions, 19 natural-agricultural provinces, 33 natural-agricultural districts, including 1 sub-district, and 222 natural-agricultural districts. Each natural-agricultural taxon has a developed ecological-economic characteristic according to the indicators given in Table 1.

Table 1. Indicators of ecological and economic characteristics of natural and agricultural taxa of Ukraine

No.	Indicator	Basic elements, that characterize the indicator
1	Climate (multi-year averages)	a) distribution of precipitation by month and year; b) minimum and maximum amounts of annual precipitation; c) average annual air temperature; d) the sum of active temperatures (above + 10 degrees C); e) hydrothermal coefficient according to Selyaninov (GTK); f) duration of the growing season; g) reserves of productive moisture in the soil at the beginning of the growing season; h) the number of dry days.
2	Geomorphology, relief and hydrology	a) belonging of the territory to certain geomorphological regions and their characteristic features; b) the main types of relief, their ratio, dismemberment and drainage of the surface; c) surface waters (river network); d) groundwater (the depth of occurrence according to relief elements and mineralization).
3	Soil cover	a) areas and specific weight of agricultural soil groups; b) the main properties and indicators of soils (humus – content, profile depth; content of physical clay and silt; acidity – pH, etc.); c) the area and specific weight of degraded and unproductive lands as part of arable land; d) area and specific weight of particularly valuable lands.
4	Qualitative characteristics of agricultural lands	a) mechanical composition; b) salinity; c) acidity; d) waterlogging; f) deflation and erosion.
5	Suitability of soils for growing the main agricultural crops	a) points of separate crediting of arable land for the placement of agricultural crops; b) economic assessment of the effectiveness of growing the main agricultural crops.
6	Ratio of land plots	a) forest cover (area, specific gravity); b) optimization of land structure.

Source: tabular data created by the author.

As a result of the detailed analysis of types of land zoning, taking into account the priority of agricultural land use and the agrarian direction of Ukraine's development, it is expedient to form such a type of zoning as an agrarian one.

In our opinion, agrarian zoning is a sectoral zoning of land in the agricultural sector of the economy, which is based on natural-climatic, economic and ecological indicators, includes homogeneous land massifs with the corresponding production potential, the level of ecological and anthropogenic load, is characterized by a certain ratio of land areas, type agricultural production and zonal specialization, the level of labor productivity and allows the state administration bodies to determine the potential possibilities of the production activity of agrarian enterprises.

Agrarian zoning combines elements of a natural-agricultural, natural-economic, ecological and socio-economic nature that influence the activities of agricultural enterprises, provides directions for managing their development and provides for the allocation of agrarian zones within the territory of administrative regions.

The boundaries of agricultural zones are formed taking into account natural and agricultural zoning. In accordance with the affiliation of land use to the agrarian zone, the agricultural enterprise is provided with information about the zoned crops and types of crop rotations that are most suitable for growing on its territory, the implementation of technological measures for the use and protection of land, the level of influence of these measures on the productivity and efficiency of land use by the farm (Table 2).

Table 2. The component structure of natural-agricultural zoning as part of agrarian land zoning and its influence on the management of the development of agricultural enterprises

Natural and agricultural zoning	
Classification features	Rural development management of agricultural enterprises
• Soil and climatic conditions; • Dismemberment and drainage of the territory; • Level of erosion (deflation); • Agroclimatic conditions; • Zonal types of rural and urban areas production, systems of agrotechnical and reclamation measures.	• Influence on the productivity, level of land use and efficiency of agriculture. production; • Differentiation of technological measures regarding land use and protection; • A set of cultivated agricultural crops.

Source: created by the author.

Taking into account the classification features of the elements of ecological zoning, which are part of the agar, restrictions are given on the cultivation of certain crops on the territory of the agricultural enterprise, taking into account its local features and the optimal ratio of crops in crop rotations (Table 3).

Such economic indicators in the organization of the economy as specialization, concentration and integration of production with skillful application will contribute to increasing the efficiency of land use by agricultural commodity producers (Table 4).

Table 3. The component structure of ecological zoning as part of agrarian land zoning and its influence on the management of the development of agricultural enterprises

Ecological zoning	
Classification features	Rural development management of agricultural enterprises
• Degree of anthropogenic impact; • Intensity of erosion processes; • Soil contamination with pesticides, heavy metals, radionuclides, etc.; • Provision of soils with nutrients, trace elements; • Ratio of land plots.	Optimum ratio of crops in crop rotations taking into account local features.

Source: created by the author.

Table 4. The component structure of natural and economic zoning as part of agrarian land zoning and its influence on the management of the development of agricultural enterprises*

Natural and economic zoning	
Classification features	Rural development management of agricultural enterprises
• Zonal, economic, production specialization; • Combination of production branches; • Concentration and integration of production.	• Ensuring comprehensive development of the region's economy; • Agro-industrial integration; • Increasing the efficiency of land use.

Source: created by the author.

Socio-economic classification features of agrarian zoning will allow to determine the level of labor productivity and implement labor integration by increasing the qualification level of the population by sending them to training at the expense of enterprises in connection with the need to provide qualified personnel (Table 5).

Table 5. The component structure of socio-economic zoning as part of agrarian land zoning and its influence on the management of the development of agricultural enterprises

Socio-economic zoning	
Classification features	Rural development management of agricultural enterprises
• Trends in raising the qualification level of personnel and providing qualified personnel to agricultural and processing enterprises; • The level of labor productivity (time spent on the products obtained).	Integration of labor of producers and processors of agricultural products

Source: created by the author.

Agrarian zoning should be defined as a mechanism of ecological and economic management of land resources, during the implementation of which zones are allocated within administrative regions, which are characterized by such classification features as

the ratio of land areas, the coefficient of erosion danger, soil washing, the presence of territories polluted by industrial waste, the relative homogeneity of soil and climatic conditions of the territory, which leave an impression on the efficiency of the use of available land resources and the development of zonal types of agricultural production, taking into account the specialization of agricultural enterprises.

In order to study the provisions of agrarian zoning of lands, the Kharkiv region was chosen as a specific example.

The border of the forest-steppe and steppe zones divides the territory of the Kharkiv region almost in half. The Steppe zone includes Zachepylivsko-Blyzniukivskyi (04), Balakliiskyi (05) and Kupianskyi (06) natural and agricultural districts.

In addition to natural-agricultural zoning, ecological zoning has been studied in the territory of Kharkiv region in two directions: soil erosion on the territory of the regions in the cross-section of administrative districts, t/ha per year; pollution of the territory with industrial waste.

As a result of the research, the following areas of increased soil erosion risk (A) were identified, which include Krasnokutskyi, Kolomatskyi, Valkivskyi, Novovodolaz, Zolochiv, Dergachiv, Zmiiv, Chuguiv, Pecheniz, Balakli, Izyum, Vovchan, Velikoburlut, Dvorichan, Kupian, Shevchenki and Boriv districts of Kharkiv region; and areas of reduced soil erosion risk (B).

Kharkiv region belongs to the moderately polluted region. In the territory of the Kharkiv region, the polluted areas are located around the cities of Kharkiv, Bogoduhova, Izyum, Barvinkovo, Lozova, and Pervomaiskyi. Lands in the northwestern part of Krasnokutsky district, in the southeastern part of Novovodolazhsky district, to the northwest of the city of Balakliya, to the south and north of Shevchenkive village, in the western and eastern parts of Kupyanskyi district, to the north of Bliznyuki village are also subject to pollution. and to the east of the village of Zachepylivka. Pollution has a local nature and is related to the activities of industrial enterprises, GRES, gas production.

When managing land resources of an agricultural enterprise, it is mandatory to take into account the impact of pollution by technical elements. On lands polluted by industrial waste, we introduce vetch-oats and peas into the crop rotation (cleans the land and ensures ecological balance).

There are 57.1 thousand hectares of degraded, unproductive and polluted lands in Kharkiv region, 2339.2 thousand hectares in Ukraine.

According to the data of the State Agency of Forest Resources of Ukraine [28], for the Kharkiv region, the optimal forest coverage of the territory is 15.00%, for Ukraine – 20.00%.

The removal of eroded and polluted lands from cultivation, their reclamation, afforestation, or transformation into other lands should be important measures to optimize the land structure both in the territory of the studied regions and in Ukraine as a whole (Table 6). This will make it possible to reduce the level of plowing of the territory to ecologically optimal, to establish the optimal ratio of land and the recommended forest cover of the territory, to increase the fertility of the land.

The actual and optimal ratio of land areas within the agricultural zones of the Kharkiv region was calculated (Table 7).

On the territory of agricultural enterprises within the boundaries of agricultural zones, it is proposed to carry out land resource management measures: cultivation of agricultural products, which according to international and state quality standards are competitive on

foreign and domestic markets; preferential taxation of producers of ecologically clean products; economic stimulation of rational use of land resources.

Table 6. Areas of conversion of arable land into natural fodder lands and forests, liming and plastering of soils in the territory of agricultural zones Sumy and Kharkiv regions, thousand ha

Agrarian zones	Prejudice	Reforestation	Liming	Plastering
I	1,4	22,5	18,2	-
II	0,1	1,4	51,4	-
III	1,2	21,1	12,4	-

Source: created by the author.

Table 7. Actual and optimal ratio of land plots within the agricultural zones of the Kharkiv region

Agrarian zones	Ratio of land plots (arable land: natural fodder lands: forests areas)	
	actual	optimal
I	1 : 0,21 : 0,18	1 : 0,22 : 0,21
II	1 : 0,27 : 0,29	1 : 0,28 : 0,30
III	1 : 0,19 : 0,04	1 : 0,20 : 0,08

Source: created by the author.

Economic stimulation of the rational use of land resources consists in the provision of tax and credit benefits in the event of the implementation of measures for the use and protection of land, the allocation of funds from the state and local budgets to legal entities and individuals for the restoration of the previous state of land disturbed through no fault of their own, exemption from fees for land for land plots that are in the stage of development and restoration of their fertility, compensation of funds to legal entities and individuals for land plots that are subject to conservation or assignment to the national state reserve fund. Economic stimulation involves saving money by agricultural enterprises as a result of reducing the costs of environmental measures due to the withdrawal from intensive use of eroded areas of land that are part of the agricultural enterprise, by exchanging them for non-eroded ones.

Soil washing in the territory of agricultural zones and the cost of 1 ton of humus are presented in the table 8.

Table 8. Soil leaching in t/ha per year and the cost of a ton of humus, dollars USA, within the agricultural zones of the Kharkiv region

Agrarian zones	Soil washing, t/ha per year	Cost of a ton of humus, US dollars
I	5–10	200
II	3–7	200
III	~ 5	200

Source: created by the author.

The purchase of lands for the purpose of their transformation into other lands must be carried out by local state administrations by order of the departments of state control over the use and protection of lands, which have discovered eroded lands.

4. CONCLUSION AND RECOMMENDATIONS

The scientific novelty of the obtained results concerns the improvement of land resource management of agricultural enterprises in the conditions of zoning, taking into account the potential of agricultural zones.

In our opinion, the management of land resources of agricultural enterprises in modern conditions should be considered as an activity in agricultural production, which is aimed at providing the population with food and other branches of the national economy with raw materials at the optimal level of capital investments in resources and their maximum return while complying with environmental goals and programs for providing norms and requirements for the rational use of land of agricultural enterprises with the aim of obtaining ecologically clean crop and livestock products while simultaneously preserving natural resources.

Agrarian zoning is identified as a sectoral one in the agrarian sector of the economy, and its component structure is revealed. It has been proven that agrarian zoning is a sectoral zoning of land in the agricultural sector of the economy, which is carried out according to such classification features as the ratio of land areas, the coefficient of erosion danger, soil erosion, the presence of polluted areas, the relative homogeneity of soil and climatic conditions, which have an impact on efficiency use of available land resources, zonal types of agricultural production, specialization of agricultural enterprises. The agrarian zone includes homogeneous land massifs with the corresponding production potential and the level of ecological and anthropogenic load and allows the state administration bodies to determine the potential possibilities of the production activity of agrarian enterprises. Three agricultural zones were allocated in the Kharkiv region. Depending on whether the land use belongs to the agricultural zone, the agricultural enterprise receives information about the zoned crops most suitable for cultivation on its territory, types of crop rotation, technological measures for the use and protection of land, restrictions on the cultivation of certain crops. Such economic indicators of enterprise development as specialization, concentration and integration of production, with skillful application, will contribute to increasing the efficiency of the use of land resources. Socio-economic classification features of agrarian zoning will allow determining the level of labor productivity and implementing labor integration.

For the economic substantiation of the coefficients of the optimal ratio of land areas using the zonal approach and to take into account the areas of eroded, unproductive and polluted lands located on the territory of administrative territorial units, the optimal ratio of land areas was determined (arable land: natural fodder land: forests and other wooded areas): in the Kharkiv region – 1.00:0.23:0.25. The optimal recommended ploughability of the territory is determined for the Kharkiv region at the level of 59.6. The economic expediency of the transformation of eroded lands, the economic use of which is not economically efficient according to its purpose, is substantiated. This should contribute to reducing the amount of capital investments of agricultural enterprises in production, ensure an increase in the amount of ecologically clean products from a unit of area and increase its competitiveness.

When introducing research into production, we take into account that ecological zoning gives restrictions on the cultivation of certain crops, taking into account local characteristics. It is proposed to introduce vetch-oats and peas into the crop rotation on polluted lands, which ensure ecological balance and contribute to the purification of lands from harmful elements.

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