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MODERN METHODS FOR DETERMINING THE EFFICIENCY OF LAND USE IN AGRICULTURE

Abstract.

This article substantiates the aspects of assessing and determining the efficiency of agricultural land use in Ukraine. Scientific approaches to the rational use of land resources in agriculture and balanced land use are analyzed. It is established that all scientific - theoretical approaches are based on such main factors as ecological, economic and legal, it is found that the assessment is based on the calculation of a complex comparative indicator, and weights are determined by the method of expert assessments.

The level of land use intensity and economic efficiency of land use are determined, which are mainly based on calculations related to the area of agricultural land or arable land used for economic purposes. It is proved that for the practical implementation of the concept of sustainable land use in terms of completing the reform of land relations, agricultural producers need to adhere to comprehensive measures through which they can effectively use land.

Keywords: *methodology, efficiency, agriculture, land, land resources, complex indicators, expert assessments.*

Introduction. In the transformational period of the current formation and active development of the economy, there is an urgent need to model the management system in which agricultural land and market land relations occupy a large share in the functioning and intensive development of the agricultural sector. Integrating into the modern world community, our country needs to take into account current trends and make the most of available land resources that have strong potential and enable not only food security, but also to become one of the competitive players in the global agrofood market. demand for food. The issue of incomplete agrarian reform, its limited market operations with agricultural land, lack of clear and consistent state policy on land use, disposal and ownership is holding back investment in the agricultural sector and causing a crisis in the socio-economic development of the rural economy.

Modern needs for the establishment and regulation of land relations are caused by a qualitatively new approach to the development of land use processes, ownership and disposal and the conditions under which the free land market should be formed today, it provokes broad discussions, which sometimes take the opposite meaning, but have one thing in common. attitude to tillage due to the objective action of at least two groups of factors: global, climate change, frequency of abnormal natural phenomena, intensification of production, development of bio economy and bioenergy, food and energy problems and corporatization of agribusiness and institutional, which means lack unified approach and methods to land management, land valuation and valuation, introduction of the institution of pledge and leasing of agricultural land.

Today, the issue of abolishing tax benefits and the current level of state support for agriculture, which makes it virtually impossible to lend to it, producers and farmers should actively develop market mechanisms of financial security using the mechanism of capitalization of land resources. subject to the completion of land reform and the introduction on this basis of a full-fledged market for agricultural land.

Therefore, examining this issue, we at the present stage, which concerns the formation of infrastructure for the market circulation of land, we can say that the legal field, unfortunately, does not create the necessary restrictions on irrational, from an environmental point of view, land use, which require refinement of land valuation. and the formation of rental policy.

Unfortunately, during the period of independence Ukraine failed to implement and solve the main task of land reform - the transfer of land for use to efficient farmers and landowners on the basis of scientifically sound use and their transformation into a key indicator of economic growth, given the level of land use in economic circulation. high soil fertility, diversity of land resource potential.

In agriculture, the main means of production is land resources, so their efficient use to a greater extent affects the efficiency of economic activity in general, therefore, it can be argued that the level of efficiency of agricultural land is influenced by both objective and subjective factors. regulate the volume and structure of production, specialization of economy, production technology, forms of land ownership, organizational and legal forms of enterprises, management system, employee motivation, labor skills, land use, land area, soil quality, fertilizer application, provision of agricultural machinery, weather conditions, psychological climate in the team, the use of innovative developments and many other factors.

Land resources have always been and remain a strategic component of nature management, their efficiency from use depends on the simultaneous performance of several functions, among which the basic function of the territorial basis of production capacity, natural resources and fixed assets. Land resources are

extremely important as the main means and object of labor in agriculture and forestry. At the same time, in recent decades we have seen a tendency to deteriorate as a result of the intensification of economic activity and the corporatization of agrarian business. According to the theory of sustainable nature management, studied by Cherevkom G.V., the rational use of land resources in agriculture includes two components: economic - protection of land from depletion and increase its fertility and environmental - prevention of environmental pollution [21, p. 24-32]. Rational use of agricultural land in terms of balanced land use involves:

- optimization of the distribution of land between the branches of the agricultural sector of the economy and the most efficient use of it in each of them;
- balancing the structure of certain types of land (arable land, perennials, hayfields and pastures) in accordance with natural and economic zones and areas;
- development and implementation of ecological and economic assessment of lands and its use for planning the location and specialization of agricultural production.

Kaletnik G.N. [5, p. 17-23]., Orel S.A. notes that the use of natural resources by citizens, enterprises, institutions and organizations should be carried out in compliance with the rational and economical use of natural resources on the basis of widespread use of new technologies [15, p. 53-57]. The requirement of rational use of land is reflected in the Land Code of Ukraine [4, p. 22], Article 5 of which defines the rational use and protection of land by the principle of land legislation. At the same time, none of the existing legislative acts provides criteria and methods for determining the rational use of land. Rational use of land, according to research Melnyk L., he believed that providing all land users in the production process of the maximum effect in the process of economic activity, taking into account land protection and optimal interaction with natural factors [12, p. 11-17]. Rationality of land use is associated with economic activity, it is wrong, because land is used not only as a means of production, but also as a basis for resettlement, location of sectors of the economy, and is an integral condition, place, means and source of living organisms, human life.

Chudovska V., and Stupen N., these scientists studying the conceptual foundations of the process of reproduction of land resources in the agricultural sector, note that in terms of extensive methods of economic activity to achieve maximum effect in achieving the purpose of land use means only the economic effect, which is illegal, because land users have other goals, such as health, recreational and aesthetic, which are not taken into account in regulations [19, p. 33-35]. At the same time, the effect of land use in the normative-legal aspect is not defined, but is an evaluation category, the understanding of which depends on the commentator, his knowledge, experience and skills [22, p. 24-26]. In view of the above, it is necessary to develop a new system of criteria and methods for determining the rational use of land resources that would meet modern economic, environmental and social requirements of economic activity. The normative-legal acts of land direction, which outline the peculiarities of the use of land resources, contain a number of discrepancies, namely: the current Land Code of Ukraine [4, p. 20-21] in Art. 91, 96 and the Law of Ukraine «On Land Lease» in Art. 22 among the responsibilities of landowners, land users and tenants do not stipulate the obligation of their rational use. It is indicated only the need for their intended use, which does not fully regulate the specifics of land use, because the concept of rational land use is much broader than the target. At the same time, the Law of Ukraine «On Environmental Protection» in Art. 2, in contrast to the above-mentioned regulations, one of the responsibilities of citizens determines the rational rather than targeted use of natural resources [14, p. 135-139]. The lack of a clear and perfect definition and methodology for calculating the rational use and evaluation of land in domestic environmental and land legislation indicates the need for methodological refinement of scientific and regulatory developments on this issue. The existing concepts of rational land use were developed in the Soviet period and later, like many other institutions of land law, such as the right of permanent land use and the right of state ownership of land, acquired a different meaning and need to be refined [6, p. 46-53]. To assess the rationality of land use at the local level, it is advisable to use quantitative and qualitative indicators, this will allow all potential stakeholders to obtain data to assess land relations in each region, help identify problem areas and identify possible measures to improve the situation the formation of the investment climate of the regions [7, p. 12-18]. The main task in solving the problem of proper and rational use of agricultural land is to increase their fertility and useful qualities, which is necessary to meet the material and social needs of man and society [2, p. 133-150]. Given the specifics of land use, ownership and disposal in a market economy, rational land use can be defined as the establishment of such a legal regime of certain categories of land, which, firstly, would correspond to their main economic purpose, and secondly, would provide scientifically sound use of these lands, thirdly, would make it possible to make a profit from economic activity. The priority use of the term “rational land use” in the context of the proposed study is its definition as a targeted use of agricultural land, which achieves a balance (optimal, proportional and harmonious comparison) between land use efficiency and environmental requirements. Thus efficiency of land use can be carried out only on condition of development of the corresponding methodical device. General approaches to agricultural land use are: economic, social, technical, organizational, geopolitical and legal (Fig. 1.1).

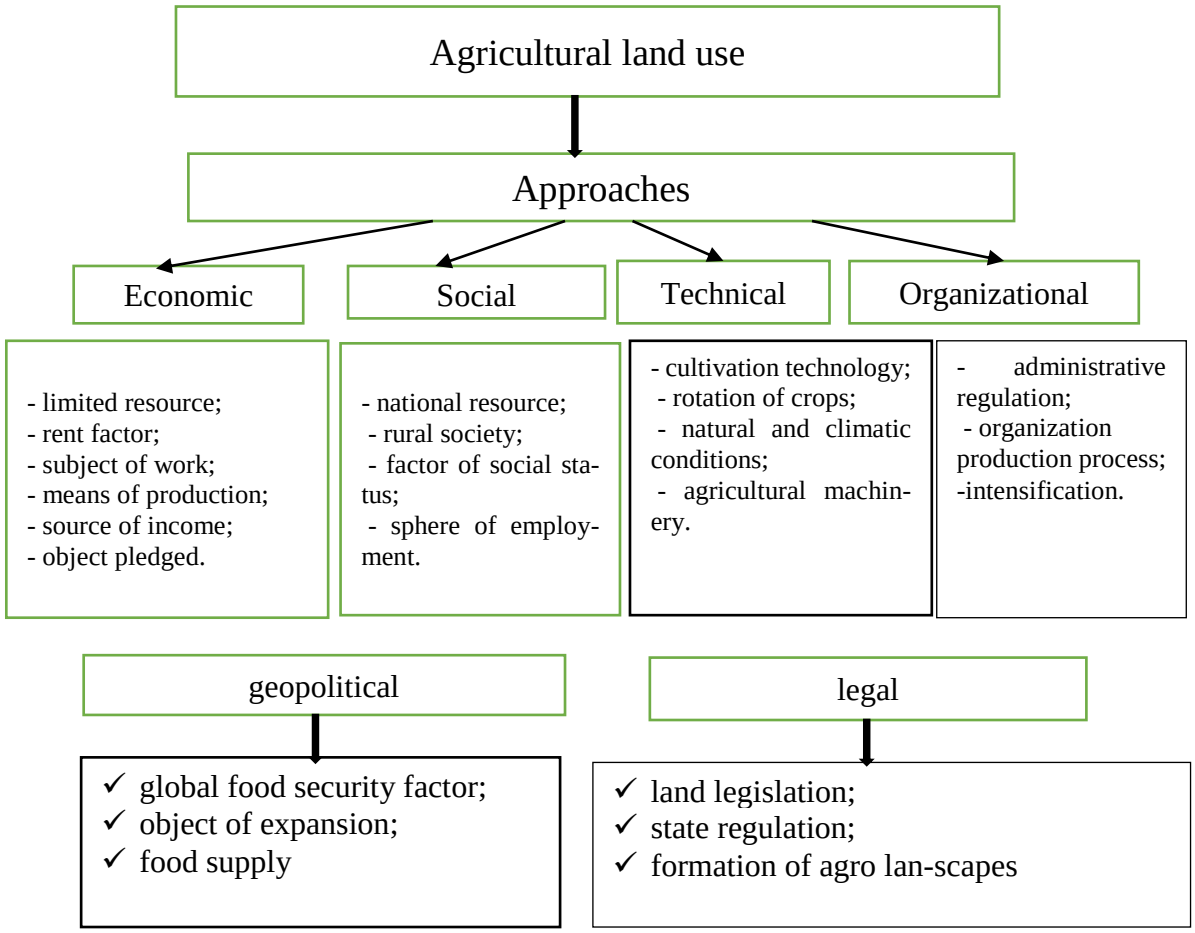

Fig. 1.1. Basic approaches to agricultural land use

Source: [12, p. 4-7]

Efficiency is considered from the standpoint of land users - producers of agricultural products and from the standpoint of conservation of natural agricultural landscapes, as the efficiency of land use in agriculture are positive and environmentally destabilizing factors to improve its methodology, it is urgent to calculate economic indicators (Table 1.1). Leading positions among these indicators are: the share of privately owned agricultural land, the ratio of organic production to its total volume, rent, yield, specific land productivity, value added per 1 ha of land, the share of perennial crops in the structure of agricultural land, the cost of additional products obtained through the transformation of sown areas [14, p. 135-140].

Table 1

The main indicators of land use efficiency

Indexes	Method
The share of privately owned agricultural land	the share of agricultural land cultivated in private farms, farms and private farms
The share of perennial plantations in the structure of agricultural land	opportunity for the most costly type of agricultural activity, which involves a larger list of lands in terms of quality and quantity
The ratio of organic production to it	characteristics
Total volume	the level of natural harmonization of production in agriculture
Crop capacity	the share of regulatory assessment of land, which
Specific productivity of land	paid as rent to the landlord
Added value per 1 hectare	natural return of land resources
agricultural land	comparative assessment of land use of different
The cost of additional products obtained by placing crops on environmentally friendly	forms of management
Land transfer (taking into account	the amount of value added per unit of land
value of land)	resources
Land transfer (excluding	absolute increase in production according to expert estimates from the increase in greening of agricultural production

value of land)	absolute increase in production according to expert estimates of crop rotation optimality
The mass of profit per 1000 UAH	rate of return according to the normative assessment (market
value (regulatory assessment) of land	value) of land
Gross output growth rate	specific profitability of the entire agricultural sector
Growth rate of sown areas	economy

At the same time, land protection requirements remain secondary to economic use, for example, Kucher A. notes that the rational use of natural resources is primarily an economic category [10, p. 11-16], the issue of economic efficiency of land use has become particularly acute in the context of intensifying economic activity.

In the conditions of intensification of agricultural activity in the process of formation of the categorical apparatus "rational land use" it is necessary to take into account some aspects: the definition should be universal, general and intended for the longest use both in modern, prone to change legal space the definition should not contain detailed descriptions of the concepts used, as there is no need to translate the interpretation or discussion to the legislative level; the definition should not contain objections, an exhaustive list of criteria that constitute the definition should be provided [6, p. 44-61].

Outlining the organizational and economic regulation of sustainable development of agricultural production, Makarenko N.O. notes that the economic efficiency of land use in agriculture is represented by a system of indicators that characterize the state of land use both at the level of individual enterprises and regionally [11 p. 254-282].

Systematization of available indicators of land use efficiency gives grounds to divide them into 4 groups: the first characterizes economic efficiency, the second - technological, the third - social, the fourth - environmental.

The main indicators of land use efficiency are: land return, number of employees per 1000 hectares of land and the dynamics of nutrient content in the arable soil layer, the share of agricultural land in private ownership, the share of perennials in the structure of agricultural land, the ratio of organic production to its total, rent rate, yield, specific productivity of land [8 p. 9-12].

Analysis of the state of use of land resources of agricultural enterprises S.A. Orel proposes to carry out in two successive stages: determining the composition and structure of agricultural land (arable land, hayfields, pastures, perennials, the presence of irrigated or drained land); determining the composition and structure of sown areas (sown areas of cereals and legumes, technical, fodder and other crops) [15], such indicators are used for strategic planning of land management.

To determine the level of intensity of land use, producers calculate the degree of economic use of land, which is determined by dividing the area of agricultural land by the total land area of the farm; an indicator of the level of plowing, which is defined as a share of the division of the arable land area by the total land area of agricultural lands; the proportion of intensive crops. Indicators of the economic efficiency of land use are mainly based on calculations related to the area of agricultural land or arable land used for economic purposes.

Saiko V. F. considers the main criterion for determining the efficiency of land use in agriculture to be the profit per unit area and the level of profitability [18]. At the same time, O. Krasnolutsky and Y. Fedorova note that such a criterion can be objective only under favorable environmental conditions and the introduction of a scientifically sound system of land use [20 p. 4-12]. Pashko I.A., studying the systemic foundations of sustainable land use, notes that the main indicator of the efficiency of sown areas is yield [16 p. 149-155].

Substantiating the specifics of land policy to create a system of environmental and economic administration of land use, V. Drugak notes that one of the indicators of land use is the structure of production and especially the structure of sown areas [3 p. 29-32], but at the same time this indicator has changed significantly in recent years. use of land for growing energy-intensive crops.

Forming the scientific basis of the economy of land use and land management, A.M. Tretyak and V.M. Drugak note that the economic efficiency of land use must also be determined on the basis of a system of natural and cost indicators. Natural indicators include crop yields; production of certain types of livestock products per 100 hectares of relevant land (livestock and sheep products are expected per 100 hectares of agricultural land, pig breeding - on arable land, poultry - on the area of grain). The cost indicators include: production of gross output at comparable prices, marketable products at current sales prices, net output and profit per hectare of agricultural land [2, p. 133-150].

Natural indicators characterize the productivity of only a certain part of agricultural land, and value - the entire area. These two groups of indicators should be calculated both per hectare of physical area and taking into account the monetary value of a hectare of agricultural land, which reflects their economic fertility [22, p. 245]. In the first case, it is possible to state the actual level of land use without taking into account its quality, and in the second - to objectively assess the results of management. Therefore, to determine the efficiency of agricultural production around the world use several key indicators: the share of value added of agriculture (% of GDP), the index of production, the value added index of agriculture per 1 worker, the index of grain yield per 1 ha of harvested area [13, p. 11-17].

Voronenko V.I., developing scientific and methodological approaches to optimizing the use of land resources, notes that land use on leased land does not motivate land users to increase soil fertility and make capital investments in landscape optimization [1]. The above is confirmed by the fact that the activities of landowners and land users are aimed primarily at the

need for intensive use of soil to produce the maximum amount of agricultural products in a limited period of time. Under such management conditions, in the long run, producers will face problems associated with the destruction of soil cover and the loss of its inherent properties.

T. Kolyadynska and V. Zvirko note that modern management methods are incompatible with the concept of protection and improvement of the quality of land resources. At the same time, declarations on the rational use and protection of land remain a common slogan, as landowners and land users strongly oppose the introduction of "environmental" laws in the process of land use, citing significant costs of production, which reduces their competitiveness. Consumer attitude to land resources provides only one reference point for economic activity - "income", while excessive enthusiasm for material values has formed a consumer philosophy in land use, which has negative environmental, economic and social consequences [8, p. 8-15], in this situation there is a need to move to scientific sound management to obtain socio-economic results in the long run.

Reforming the agricultural sector of the economy has created opportunities to increase the number of land users, increase land use and increase production, but the level of agricultural land use in many enterprises still remains quite low. In conditions when natural resources are limited and the needs of the population are constantly growing, improving the economic efficiency of their use is of paramount importance. An effective system of agricultural land use should be based on the protection and expanded reproduction of land resources.

Optimal agricultural land use should be based on the following general principles: [11, p. 118-145].

1) the use of land resources is impractical if it does not meet the interests of man and nature;

2) the use of land resources must always be accompanied by their protection and reproduction;

3) the use of land resources should take into account the laws of nature and natural conditions, and it is important to note that in Ukraine there is a high agricultural development of land - 68.9%, and forest cover is 17.6%. The great plowing of lands requires not only a large amount of machinery, material and human resources for tillage and care of crops, but also reduces the possibility of an overall increase in arable land productivity by environmentally friendly means. In recent years, there has been a particularly sharp trend towards the deterioration of the quality and ecological condition of agricultural land. In the conditions of ecological crisis and lack of necessary material and technical means the general culture of agriculture has decreased, soil-destroying types of systems of agriculture and technology are applied and therefore agricultural use of lands acquires exhausting character. Such unfavorable processes in the future may become a threat to Ukraine's national security in terms of providing its residents with food [13 p. 12-18]. It is especially important not only to determine the optimal ratio of lands, but also the minimum required area of individual natural biogenesis and the optimal structure of their location in the agricultural landscape. In this case, you can achieve a greater effect, even with the use of smaller areas [14, p. 135-140].

It should be noted that the reform of land relations, change of ownership and land management have not yet led to improved land use, increased agricultural productivity, as only the form of land ownership (public, communal and private) can`t guarantee protection of land from destructive processes, if these issues are not regulated by the state, but on the contrary, there is a tendency of irrational land use and deviation from the mandatory system of crop rotations [14, p.135-140]. Ecologically dangerous phenomena are observed in land use, which reduce land fertility, destruction of sanitary protection forest belts, in particular along rivers and reservoirs, intensification of erosion processes, processes of secondary salinization of soils, unfortunately, measures to increase land fertility are sporadic, but problematic programs to protect and increase land fertility. The main factors that destabilize the environmentally safe state of land are a number of violations of environmental and land legislation [6, p. 44-55]. Recently, state support for programs to increase soil fertility has been suspended. Significant reductions in livestock have led to a sharp decline in the use of organic fertilizers, and high prices for mineral fertilizers are becoming an obstacle to their use, this situation has exacerbated the development of degradation processes, and the potential for agricultural production can be realized only through soil fertility. In developed countries, about half of the increase in yield is obtained through the use of mineral fertilizers, but the practice of world agricultural production shows that fertilizers increase yields by 41%, herbicides - by 13-20%, crop rotation and tillage - by 11-18%, climate - by 15%, hybrid seeds - by 8%, hydraulic reclamation - by 5%. The main assessment of soil condition and planning and implementation of measures to prevent degradation and regulation of soil processes requires a monitoring service, the main reasons for low efficiency of agricultural land use in Ukraine are the following: [19, p. 33-36]

1. Weakness of the financial and economic situation of agricultural enterprises, which makes it impossible to improve the technological operations of growing crops, updating the material and technical base, the introduction of innovations in production.

2. Violation of the optimal structure of sown areas of crops, which leads to depletion of soil cover. The high level of profitability of production of certain crops (especially sunflower seeds), as well as the specialization of large agricultural enterprises in the cultivation of export-oriented crops of the grain group led to the expansion of crops and legumes in the total sown area of crops and agricultural crops.

3. Insufficient application of organic and mineral fertilizers, which leads to a deficiency of nutrients in the soil. In addition, due to the predominant application of nitrogen fertilizers by agricultural enterprises, the optimal ratio of nutrients in the soil is violated, which leads to its acidification and deterioration of the quality of products.

4. Low level of state support for measures to improve the efficiency of land use, protection of agricultural land, their rational use, conservation of degraded and unproductive lands.

5. General low culture of agriculture and lack of interest of farmers in the introduction of new tillage technologies.

6. Low level of use of precision farming technology by agricultural land users with the use of GIS technologies - a management system that with the help of information technology allows to make rational decisions on managing the agro-ecological potential of land during the organization of crop production.

This technology allows: to monitor yields in differentiated areas of the field; perform work around the clock; to create an electronic map of agricultural lands for soil analysis in the program of the geographic information system; differentiated application of fertilizers in the on-line system depending on the supply of soil nutrients and in the on-line system depending on the needs of plants at present [14, p. 135-140].

Looking at efficiency from an economic point of view, it is clear that it is closely linked to the main purpose of human activity - to meet the ever-increasing material and spiritual needs of society. Economic efficiency of land in agriculture is characterized by a system of natural and cost indicators [5, p. 18-21].

Natural indicators include: crop yields; production of agricultural products per 100 hectares of land.

The cost indicators include: the cost of gross and marketable products per 1 hectare of agricultural land; gross and net income and profit per 1 hectare of agricultural land.

Improvement and rationalization of land use in agricultural enterprises is achieved through the implementation of measures to increase soil fertility, protection from environmental damage and erosion. The policy of the state should be aimed at such land use that future generations have it in the best possible condition. Current trends and many intensive technologies in agriculture must be carefully studied and tested before application to prevent the negative consequences caused by the specific manifestation of the means of production [10, p. 12-14].

In addition, the characteristics of the industry should be taken into account, namely: the relationship of economic reproduction with the reproduction of natural resources; the property of land to simultaneously perform the role of the main means of production and the object of production relations; seasonality of production; interdependence of agriculture with other branches of the agro-industrial complex [15, p. 55-59].

The efficiency of land use can be measured by economic indicators, but before that it is necessary to analyze a number of factors of a different nature that directly affect the efficiency of land use. The expediency of agricultural land use is closely related to soil fertility and the amount of material and financial contributions to production, in terms of fertility - this factor is due to geographical location and climatic and natural influences, and if the next factor - it depends on the nature of land use, agricultural culture, use of agricultural machinery and fertilizers, labor organization, etc. [4, p. 17-21].

The development of efficient land use will have a positive impact on improving the economic efficiency of agricultural production and the functioning of the domestic agricultural market, therefore, important preconditions will be created to increase the availability of food and meet consumer needs. With regard to the legal aspect of improving the efficiency of land use and protection, the main thing here is to further improve land legislation, develop a mechanism for applying the laws. Realization of land transformations, change of forms of ownership and management did not lead to improvement of land use, increase of soil fertility. Given the current situation, land relations policy should be aimed not so much at changing land ownership, but at creating conditions for effective environmentally safe land use, increasing soil fertility and increasing agricultural production, modern and high-quality reclamation of disturbed and contaminated lands.

Given that agricultural land occupies about 71% of the territory of Ukraine, it is important to optimize these lands so that land remains a constant source of human wealth, it must be used rationally [17, p. 14-15]. Optimization and rational use of land resources are possible under the formation of a new paradigm - the concept of sustainable land use, sustainable land use - is a system of social development, which achieves the optimal relationship between economic growth, normalization of land resources, meeting material and spiritual needs [12, p. 3-7].

For the practical implementation of the concept of sustainable land use in terms of completing the reform of land relations, agricultural producers must adhere, first of all, to the following principles: a systematic approach to the rationalization of land tenure and land use; land protection; timely elimination and prevention of the negative impact of degraded lands on the health and well-being of the population, the environment; ensuring the satisfaction of socio-economic interests in the field of land relations and their harmonization with the environmental component [2, p. 287-300].

Land use optimization involves a set of scientifically sound measures aimed at eliminating excessive withdrawal of land from agricultural turnover, improving physical and chemical properties, preventing soil contamination by industrial waste, fuel and lubricants in the process of agricultural work and protection, protection soil-forming process in the conditions of intensification of agricultural production [3, p. 30-32].

The transition to the principles of sustainable development justifies the need to find the optimum between environmental, economic and social effects, analyzing existing views on the methodological support of this process, we can conclude that the priority of determining the environmental and economic efficiency of agricultural land.

In our opinion, the meaning of this concept lies in the effectiveness of a set of measures to rationalize land management, which is manifested in the reproduction of soil fertility and sustainable yields of crops capable of meeting social needs, while indicators of environ-

mental and economic efficiency of land use reflect multifactorial interaction. language of ecological and economic processes in agriculture, so for the completeness of its definition it is necessary to apply a systematic approach.

A fundamental feature of the system approach is to take into account the environmental, economic and social results of various technologies for growing crops, its application to determine the efficiency of use and reproduction of productive lands of agricultural enterprises will allow: [16, p. 150-153].

- to establish the relationship between the factors influencing the level of land use in agricultural enterprises, to analyze the dynamics of their development in time and space;

- monitor the trend of development of productive forces and their role in ensuring efficient production of agricultural products;

- to investigate the effectiveness of organizational measures of the enterprise for the formation of rational land management.

Thus, land use efficiency is a complex process based on the results after analysis of many factors and indicators that accompany the process of land cultivation. Various factors and their influence determine the different views of scientists to assess the effectiveness of land use. It should be emphasized that the very concept of "efficiency" can also have different shades: environmental, economic, social, and so on [23, p. 26-29].

Given the specifics of the agricultural sector, the most noteworthy is the environmental and economic efficiency of land use, the content of which is generally manifested in the main mission of the entity; profit and efficient land management, sustainable harvest of environmentally friendly products, etc., for efficient use of land, in order to preserve the environment it is necessary, first of all, to pay attention to the protection of agricultural land resources, their reproduction and fertility, to this end, it is recommended to implement the marketing concept of restoration and preservation of useful properties of land for various purposes and functioning, in order to effectively monitor the environment.

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