

LAND USE AND LAND MANAGEMENT IN KAZAKHSTAN

ҚАЗАҚСТАНДАҒЫ ЖЕР ПАЙДАЛАНУ ЖӘНЕ ЖЕР РЕСУРСТАРЫН БАСҚАРУ

ЗЕМЛЕПОЛЬЗОВАНИЕ И УПРАВЛЕНИЕ ЗЕМЕЛЬНЫМИ РЕСУРСАМИ В КАЗАХСТАНЕ

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Abstract. Global climate warming annually leads to a decrease in the agro-climatic potential of farming, many areas of traditional cultivation of land become unsuitable for agriculture due to desertification, swamping and erosion processes. *Purpose* - the concept of sustainable land use is considered, taking into account foreign experience. *Methods* are based on the system analysis of works of domestic and foreign scientists and data from the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan, analytical reports of the Committee on Land Resources Management. *Results* - different approaches to solving the problems of agro-industrial complex are presented, the main trends in the development of the agrarian sector of the republic, the need to combat land degradation, to preserve their productivity and ecosystem functions are shown. *Conclusions* - the analysis of world practice shows that the principles of land cultivation based on environmental, social and economic criteria should be implemented based on the effective use of agricultural land, that is, through the optimization of agricultural land fund. The research has an interdisciplinary character. The systematic study of this issue contributes to the application of rational methods of land management in agricultural production. The authors note that the use of digital technologies in the sphere of land relations will help to increase the efficiency of production and economic activity, to unite the main factors and efforts of the participants of this

Introduction: Agriculture is one of the most important sources of growth for long-term sustainable development, economic diversification and improvement of living standards in Kazakhstan. The country has huge agricultural potential due to its vast territory and availability of important resources. Kazakhstan possesses significant land resources, but to date, the allocation and utilization of resources has not been optimal for agricultural development.

Despite strong state support for agriculture, the agricultural sector is growing slowly and still remains inefficient and uncompetitive. One of the main advantages of the country's agriculture is its wide territory with low population density, the total area of agricultural land is 217 million ha, of which arable land occupies 35 million ha, and it ranks 10th in the world and 2nd in terms of arable land area.

Despite the fact that Kazakhstan is well endowed with land resources, it is insufficiently endowed with water and is one of the countries with the largest deficit of water resources on the Eurasian continent: only 2.8% of its territory is covered with water, while two thirds are represented by arid zones where access to water is very difficult. Today we see severe water scarcity and according to UN forecasts by 2040 we are likely to face significant water scarcity. Degradation of agricultural land remains a serious problem, among the main causes of which are:

- use of out-of-date tillage technologies that create risks for erosion development;
- inefficient irrigation methods causing salinization;
- non-compliance with crop rotations;
- unbalanced application of fertilizers leading to loss of soil fertility;
- pollution of soils and groundwater by industry, transportation and municipal services.

Today, more than 75% of soils used in agriculture are subject to degradation, and the remaining 25% are at risk. All this leads to reduced yields and financial losses for agricultural producers.

The Sustainable Development Goals developed by the UN in 2015 recognized land degradation as an imminent threat to the livelihoods and well-being of people around the world. For this reason, Goal 15 was established to "protect, restore and promote the sustainable use of land ecosystems, sustainably manage forests, combat desertification and halt and reverse land degradation and halt biodiversity loss".

Volatility of the level of intensification, lack of scientific approach to farming are features of the market system of management. Mechanisms for the rational use and protection of land should be developed taking into account different natural conditions, forms of ownership and management, i.e. based on the principles of sustainable land use.

By analyzing many interpretations of various authors, we can say that sustainable land use is such a system of relations of society development, in which the optimal ratio between economic growth, normalization of the qualitative state of land resources, satisfaction of material and spiritual needs of the population is achieved.

Literature Review

In today's conditions, growth and development require more progressive innovative principles to meet the needs of the present generation without compromising the ability of future generations to meet their needs.

Axelsson R., Angelstam P., Elbakidze M. et al. [1] in his work mentioned that the issue of sustainable land use has increasing importance because of accumulated environmental problems. These include increased demand for natural resources, climate change, regional climate extremes, the threat of environmental pollution, biodiversity loss, disturbed landscape stability, economic globalization, energy security, water supply, and increasing conflicts between sociocultural, political-economic, and environmental goals.

There are not many common theories and general conceptual frameworks relating to land use, despite the numerous models of land use. Platt R.H. [2] presented a broad tripartite structure of the environmental and land use sectors, as well as the legal-political actors influenced by their social context. More recently, Aspinall R., Staiano M. [3] developed a general land systems model framework as a guide to understanding aspects of sustainable land use, identifying how different types of research fit into land systems science.

The concept of sustainable land use is derived from the general concept of sustainable development. Sustainable development is the foundation of today's leading global framework for international cooperation, as described in the 2030 Agenda for Sustainable Development and its Sustainable Development Goals (SDGs) (IISD. Sustainable Development) [4]. Economic crises have led society to a new type of functioning, civilization -

sustainable based on economic, environmental and social factors.

Most definitions emphasize that sustainable development requires socio-economic development that preserves the principles of sustainable land use and respects the natural and cultural-historical resources and potential of the territory (Axelsson R., Angelstam P., Elbakidze M. et al.; IISD. Sustainable Development) [1,4]. The focus of our study should be especially directed to support Goal 15 "Life on Land" of the specific SDG on sustainable land use, as sustainable land use contributes to halting and reversing land degradation and natural hazards, as well as halting the loss of biodiversity and maintaining landscape stability.

The requirements for sustainable land use management come from:

- the need to ensure and increase the spatial stabilization of the territory. The stated criterion here is the requirement to achieve biological balance in the country;
- the need for nature protection and rational use of natural resources, in particular, protection of land, water, forests and the gene pool;
- the need to protect cultural and historical resources;
- the needs for the restoration of human resources and the protection of human health;
- requirements for the humanization and aesthetic appeal of the landscape.

These requirements include the fundamental principles of sustainable development of society. Sustainable development emphasizes care for the Earth by putting into practice the principles of sustainable living and combining conservation and development: conservation to sustain human activity within the Earth's capacity, and development to enable people everywhere to enjoy long, healthy and fulfilling lives (Zhou X., Chu Z., Ji X.) [5].

Materials and methods

The method of system approach and analysis of complex systems was used to study the problem, since land use in structural and organizational-functional terms is a complex material-abstract system. Since sustainable land use is objectively considered as an integral part of the development of nature management, economy and society as a whole, the categories of sustainable use of land resources legitimately derive from the categories of general development, but with their own specificity.

In the framework of this study, land use practices documented in open sources (scientific literature, databases), which by their characteristics belong to the category of "sustainable", were studied. The authors used

the method of systematic analysis of works of domestic and foreign scientists on the concept of sustainable land use. Special attention was paid to both theoretical and empirical studies showing that sustainable land use contributes to the rational use of land resources and, accordingly, to the increase in agricultural productivity. The issue of land market development in Kazakhstan was also investigated, along with regulatory legal acts and reforms carried out over the past 30 years.

In the study of this issue, the system-analytical method was used to reveal the essence of sustainable land use as a complex abstract-material system, as well as the method of statistical analysis to visualize the dynamics of the main indicators of agriculture in Kazakhstan.

Results

Dolmatova O.N. [6] in her work writes that sustainable land use is the ability to support rational and efficient land use, increasing the qualitative and quantitative content of land resources with the stability of land rights, invariability of boundaries, territorial distribution and improvement of environmental sustainability for the purposes of formation of effective agricultural production.

At present, a new concept of land management has not yet been created in Kazakhstan, and the existing ones are not practically oriented towards sustainable land use. Land resources management at the state level is unstable, it is necessary to modernize the legal framework, economic and environmental mechanisms to stimulate the formation of new economic entities focused on sustainable development.

In his study, Chinese author Gong, M. writes that the ongoing reforms on agricultural land promote land turnover by providing an institutional guarantee for the co-management of agricultural land (Gong M., Xi R., Qi Y.,) [7]. The investigation of sustainable land use and tools for its realization in agriculture is a new direction for research worldwide, it is connected with soil fertility disturbance, land degradation and multipurpose use of land resources.

The institutional basis for the development of agricultural land use is represented by the Land Code of the Republic of Kazakhstan, the Law of the Republic of Kazakhstan "On Amendments and Additions to Certain Legislative Acts of the Republic of Kazakhstan on the Development of Land Relations" dated June 30, 2021 № 59-VII ZRC, Rules for the Rational Use of Agricultural Land and other regulatory and legal acts (Aitkhozhayeva G., Tireuov K., Pentayev T.) [8].

In the system of approaches to ensure sustainable land use, many scientists pay special attention to the set of problems of increasing the economic efficiency of agricultural land use. The problems of sustainable land use are studied in the aspects of clarifying the term, conditions and indicators, the system of measures to ensure the transition to sustainable land use (Anarbaev E.A., Aitkhozhayeva G.S., Pentaev T.P. et al; Izakovičová Z, Špuleroval J, Petrovič F.) [9,10].

Agricultural scientists study sustainable land use in four main areas: crop production, which examines soil processes and various crops; water management, which examines the efficient use of water in irrigated farming zones, as well as the prevention of water bodies; analysis of land use change; and agricultural economics in terms of the introduction of new innovative management practices, such as organic farming, no-till technologies (Xie H., Zhang Y., Zeng X.) [11]. To improve land quality and minimize soil degradation process, it is necessary to study coherently land use as environmental sustainability, land use profitability as economic sustainability, land use equity as social sustainability (Trung Thanh Nguyen, Ulrike Grote, Frank Neubacher et al.) [12].

Improvement of the qualitative condition of agricultural lands depends on the development of the theory of their use as a whole, as a component of the system nature management. The development of this theory implies an interdisciplinary, integrated and targeted approach. This means the need for an integrated combination of biosphere theory, rent theory, as well as the connection of the laws of ecological development with a number of economic laws.

The mechanism of formation of sustainable and efficient use of agricultural land, taking into account its ecological component, is an integral set of methods and tools that are used to organize, regulate and coordinate the processes of land use and protection, to ensure the reproduction of soil fertility as a natural-resource element of social wealth and a specific environmental benefit. Today, the use of agricultural land should be carried out on an ecological basis, that is, while ensuring ecological balance in the adjacent territories in the process of interaction between man and nature, harmonization of environmental and economic interests.

At the same time, the methods of agricultural land use should include the establishment of the composition of agricultural land by optimizing their ratio, similar to the optimization of the structure of crops, the introduction of

scientifically-based crop rotations adapted to specific natural and climatic conditions, providing not only profitable agricultural production, but also a positive balance of humus, the introduction of ecological and precision farming, implementation of two-way regulation of water regime or drip irrigation (Kalashnikov P., Kulanov A., Nesipbekov E. et al.) [13]. So, sustainable land use is a system of balanced socio-economic and ecological land use, which is characterized by an integral process of reproduction of the whole complex of links "man-land-ecosystem".

The principle of sustainable land use, the aim of which is to obtain the maximum possible mass of agricultural production per unit of land area.

This principle can be observed only if new varieties of plants and livestock breeds are developed, and the use of fertilizers and means of vegetation protection are scientifically justified (Anarbaev E.A., Aitkhozhayeva G.S., Pentaev T.P. et al; Kozlova V.Ya., Demesova O.) [9,14]. This concept implies a gentle regime of land use, i.e. it is necessary to determine which area will be used for what. This will help to develop and support ecological stability.

The legal principle of the mechanism of sustainable land use is the interaction and joint development of land and environmental legislation, providing effective regulatory activity in the system of effective land use.

Today, Kazakhstan does not properly ensure the rational use of land resources and the reproduction of the productive potential of agricultural lands. Since the processes of land reform are slow, the land issue has become extremely politicized, and the transfer of land to effective owners is practically blocked. In this regard, the issues of conservation, rational use and expanded reproduction of land resources as the basis for sustainable development of Kazakhstan have become more acute (Petrick M., Pomfret R.) [15].

While conducting the research, the reasons for the reduction of utilized agricultural lands were studied. The analysis of the dynamics of the land fund by categories of land users for the period from 1991 to 2022 showed that the area of agricultural land decreased from 218 375.8 to 115 966.2 thousand hectares, i.e. by 44.9% while the area of residential areas expanded from 3 747.2 thousand ha to 24 592.8 thousand ha, i.e. 6.6 times, reserve lands from 18 952.3 thousand ha to 85 114.6 thousand ha (4.5 times), and lands used by other states from 993.7 thousand ha to 9 561.1 thousand ha (9.6 times) (Summary analytical report on the state...) [16].

Expansion of the area of settlements took place at the expense of reduction of arable land and pastures (table 1). These changes in the structure of land use occurred in the absence

of scientifically grounded norms regulating land relations. This situation has been preserved up to the present time.

Table 1 - Dynamics the situation of fund land by years and categories for 1991-2022, thousand hectares

Category of lands	1991	2021	2022	Changes by 1991 г., %	
				2021	2022
Agricultural lands	218 375.8	113 961.4	115 966.2	52.2	55.1
Settlement lands	3 747.2	24 288.7	24 592.8	648.2	656.3
including:					
towns and villages	2 053.5	4 190.9	4 106.2	204.1	199.6
rural settlements	1 693.7	20 097.8	20 486.6	1 186.6	1 209.6
Lands for industry, transport, communications and other purposes	18 796.8	2 239.1	2 273.0	11.9	12.1
Lands of specially protected natural areas	775.1	7810.7	7811.3	1 007.7	1007.8
Forest fund lands	1 0179.2	22 435.3	22 963.5	220.4	225.6
Water fund lands	819.9	4 206.5	4 209.4	572.1	573.4
Reserve lands	18 952.3	87 989.1	85 114.6	464.3	449.1
Total lands	271 646.3	262 930.8	262 930.8	96.8	96.8
Land used by other States	993.7	9 561.1	9 561.1	962.2	962.2
Territory of the Republic	272 490.2	272 491.0	272 491.0	100	100

Note: based on data from Committee reports on Land Resources land Management (Summary analytical report on the state...) [16].

By November 1, 2022, 26 452 thousand hectares of arable land or 23.4%, including 1 625.3 thousand hectares of irrigated land, 60.7 thousand hectares of perennial plantations (2.1%), and 82 418.5 thousand hectares of

pastures (72.9%) were used in agriculture of the republic (table 2). The area of fallow land remains significant – 1 824.5 thousand hectares, or 2.1%.

Table 2 - Distribution of the land fund by composition in the context of land categories by November 1, 2022, thousand hectares

Land categories	Total agricultural land	Arable land					
		total	incl. irrigated	perennial plantings	fallow land	hayfields	pastures
Agricultural lands	113 096.9	26 452.0	1 625.3	60.7	1 824.5	2 341.2	82 418.5
Structure,%	100	23.4	1.44	0.05	0.72	2.1	72.8
Settlement lands	22 036.5	378.4	132.7	68.1	194.8	218.7	21 176.5
Structure,%	100	1.7	0.6	0.3	0.9	1.0	96.1
Lands for industry, transport, communications, defense and other non-agricultural purposes	3 530.5	2.5	0.3	0.7	1.4	127.53	398.4
Structure,%	100	0.07	-	-	0.4	3.6	11.3
Forest fund lands	6 833.2	93.8	7.0	0.5	9.9	231.6	6 497.4
Structure,%	100	1.4	0.1	0.01	0.14	3.4	95.1
Reserve lands	67 297.6	29.7	12.9	16.6	1 424.0	1 933.0	63 884.3
Structure,%	100	0.04	0.0	0.01	2.1	2.9	94.9
Lands used by other states	5 397.8	-	-	-	-	220.0	5 177.8
Structure,%	100	-	-	-	-	0.4	95.9
Territory of the Republic	219 099.8	26 971.4	1 778.9	146.9	3 471.7	5 104.3	183 405.5
Structure,%	100	12.3	0.8	0.7	1.6	2.3	84.0

Note: based on data from Committee reports on Land Resources land Management (Summary analytical report on the state...) [16].

In the pre-reform period (1991) agricultural crops were cultivated on the area of 34 935.5 thousand hectares. At the initial stage of market transformations agriculture declined and by 1999 the area of cultivated agricultural crops decreased to 15 285.3 thousand hectares and since 2000 the sown areas gradually expanded and in 2022 they amounted to 22 980.7 thousand hectares (Zhyrgalova A., Yelemessov S., Ablaihan B. et al.) [17].

There are 378.4 thousand hectares of arable land, including 132.7 thousand hectares of irrigated land, 68.1 thousand hectares of perennial plantations, 218.7 thousand hectares of hayfields, 21 176.5 thousand hectares of pastures.

These changes in the use of arable land were accompanied by the breakdown of the established system of the industry, violations of the adopted crop rotation schemes, monoculture began to be practiced, which led to degradation of the arable layer of soil, reduction of humus in it.

In existing problems and solutions to the issues of land involvement in agriculture, it is necessary to take into account natural-climatic, soil, spatial conditions, availability of labor resources and feasibility of farming. One of the innovative methods of sustainable land use is the transition to adaptive-landscape farming. This will make it possible to create agricultural products that meet economic, environmental, phytosanitary and soil protection requirements.

The main goal of such a method as one of the mechanisms of sustainable land use is to ensure the reproduction of land resources, prevention of degradation processes, introduction of progressive crop rotations and sustainable intensification of agricultural production.

Discussions

Long-term use of land resources leads to their deterioration, which requires the adoption of science-based organizational and management decisions that allow for sustainable land use.

The tendency of the modern stage of society development has led to the need to implement the latest approaches in the use of natural resources, combining environmental, economic, social and other directions. All this exists that in the current conditions the solution of the problems that have developed in the field of land use is impossible without transition to sustainable development models. Sustainable development strategy as a means of integrating economic, social and environmental objectives for the development of the agricultural industry from the position of the

interests of the essence, one of the directions of which is to balance sustainable land use.

As we know, the land-resource potential of the Republic of Kazakhstan is 272.5 million hectares, and the total area of agricultural land in Kazakhstan in the initial period of agrarian reform amounted to 218.4 million hectares, i.e. occupied approximately 80% of the entire territory, and now it has almost halved.

The territory of Kazakhstan is mainly located in steppe, semi-desert and desert natural zones. Extensive development of agricultural production has left a trace in the form of land degradation and deterioration of landscapes, more than 60% of the territory of the Republic is subject to desertification, which leads to a decrease in soil fertility and, as a consequence, to a reduction in crop and livestock productivity.

Practically in all natural zones and regions of Kazakhstan there is a tense ecological situation, therefore the problem of rational use of land resources, reproduction of fertility and their preservation from desertification should become an integral part of the national policy, the basis of sustainable economic development of the country. Consequently, the current situation of land resources utilization requires rational changes in land use.

To ensure sustainable development, it is necessary to form a permanent hierarchy of land use in terms of ownership, use and disposal of land. Ensuring such a principle will contribute to the sustainable development of society.

Conclusion

1. Kazakhstan has favorable prerequisites (natural-climatic, socio-economic) for the development of various types of land use, including sustainable land use.

2. The mechanism of formation of sustainable land use should include such directions as ecologization of production processes in the use of agricultural land, implementation of measures to stop degradation, soil destruction and environmental pollution, as well as support from the state in the form of implementation of effective programs aimed at improving land fertility.

3. The sustainability of land use is indicated by the interaction of material and labor resources, which not only generate links with land, but also ensure the preservation and improvement of its fertility.

4. In the conditions of Kazakhstan with its diapason of soils by regions, the role of sustainable land use increases, which is a determining condition for ensuring the efficiency of agricultural production.

5. Long-term use of land resources leads to their deterioration, which requires the adoption of science-based organizational and management decisions that allow for sustainable land use.

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