

Assessment of the quality of agricultural land in Kazakhstan

Yermek A. Anarbayev

PhD student

Kazakh National Agrarian Research University

Aida B. Omarova

PhD student

Kazakh National Agrarian Research University

Aiganym Yergali

PhD student

Kazakh National Agrarian Research University

Toleubek Pentayev

Doctor of Technical Sciences, Full Professor

Al-Farabi Kazakh National University,

Kazakh National Agrarian Research University

Vasily I. Nilipovskiy

Candidate of economic Sciences, Professor

State University of Land Land Use Planning,

Moscow, Russia

Abstract. In the article the issues of research and assessment of the qualitative condition of agricultural lands, taking into account the peculiarities of their use in the Turkestan region are considered. The increase in the production of agricultural products primarily depends on how rationally and skillfully the land is used; also, the complete and correct use of the land has the most important conditions for increasing the production of grain, milk, meat and other products. Research and production work should be aimed at solving these problems. Therefore, to begin with, it is very important to analyze the condition of agricultural land resources and outline ways to improve their use, taking into account the qualitative condition.

Keywords: land resources, agricultural land, land valuation, quality condition of land, cadastral value of agricultural land, base rate, reactive income.

Introduction

The problem of rational use of lands extorts a wide range of activities. One of the priority research and applied areas is the effective use of the potential of land resources. At the same time, the general goal is to maximize the yield of each plot of land, increase productivity, taking into account the bioclimatic potential of soils, while observing the environmental safety of production.

Assessment of the qualitative condition of lands, taking into account the peculiarities of their use in the Turkestan region, depends on their qualitative condition and economic factors [1].

Therefore, in such a study, it is important to analyze the structure of the agricultural land fund and the processes of economic evaluation.

Turkestan region possesses significant land reserves, which are extremely important in solving agricultural years, since the natural conditions allow it.

Among the regions of the Republic of Kazakhstan, the Turkestan region takes 13th place in terms of the total area, and the administrative-territorial structure of the region includes 13 districts and 3 cities of regional subordination: Baydibek district, Zhetisay district, Kazygurt district, Keles district, Maktaaral district, Ordabasy district, Otyrar district, Sayram district, Saryagash district, Suzak district, Tolebi district, Tyulkubas district, Shardara district, c. a. Arys, c. a. Kentau, c. a. Turkestan. [2].

Results of the study of the land fund of the Turkestan region is 11609.5 thousand hectares.

The entire land fund is located in natural areas characterized by warm climate. In the southern part, agriculture is possible under conditions of regular irrigation, and in the northern regions, rainfed agriculture is possible, which require comprehensive measures to preserve moisture in the soil, and semi-desert is used as arid low-productivity pastures for animal husbandry.

The distribution of the land fund by category for 2020 is shown in Table 14, Figure 1.

Table 1 - Distribution of the land fund by land category for 2020

No.	Land categories	Area, ha	%
1	Agricultural land	4114,3	25,0
2	Lands of settlements	785,6	14,0
3	Lands for industry, transport, communications, defense and other agricultural purposes	99,7	0,4
4	Lands of specially protected natural areas	430,9	11,0
5	Forest lands	3010,3	18,0
6	Water fund lands	133,4	7,0
7	Reserve lands	3035,3	21,0
	Total	11609,5	100

As can be seen from the data in the table, the total structure of the region's land fund is 4114.3 thousand ha, land of settlements - 785.6 thousand ha, industrial, transport and communications, defense and other non-agricultural lands - 99.7 thousand ha, lands of specially protected natural areas - 430.9 thousand ha, forest lands - 3,010.3 thousand ha, water fund lands - 133.4 thousand ha, reserve lands - 3,035, 3 thousand ha.

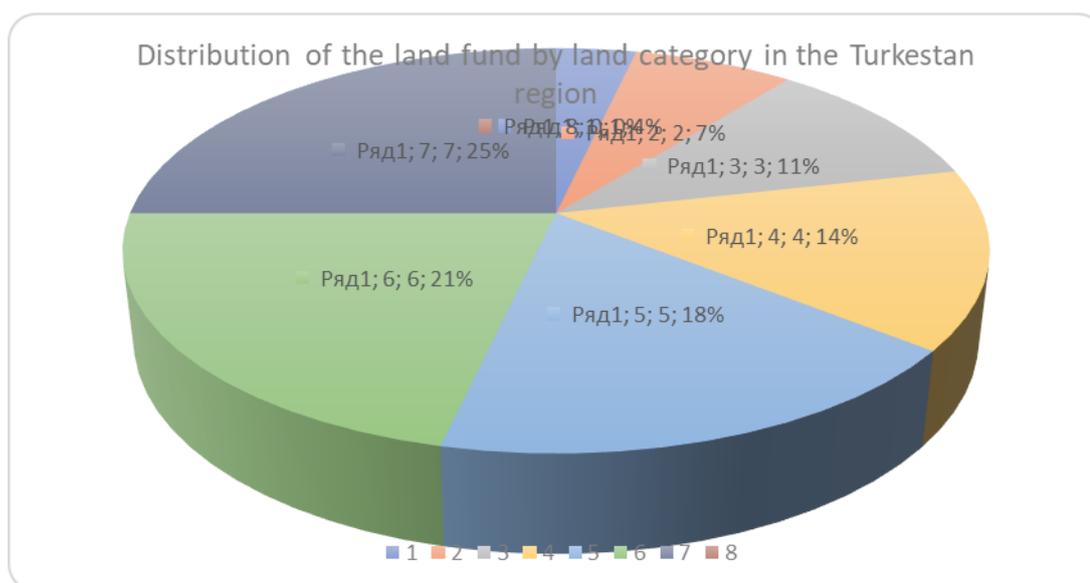


Figure 1. Distribution of the land fund by land category

The area of land of the special land fund (reserve land) is 3091.0 thousand ha, including laylands - 22.0 thousand ha, perennial plantations - 0.1 thousand ha, hayfields - 14.6 thousand ha, pastures - 2710.5 thousand ha.

Table 2 - Dynamics of the area of agricultural land in the Turkestan region for 1991-2018 (million ha)

Region	1991	2005	2017	2018	Changes, (+ , -)	
					from 2018 to 1991	from 2018 to 2017
Turkestan region	11,5	4,4	4,1	4,1	-7,4	-
Total	11,5	4,4	4,1	4,1	-7,4	-

During the period of reforming agricultural enterprises in 1991-2005, the area of agricultural land in the region decreased by 7.1 thousand ha, but subsequently the area of land in this category decreased annually and its overall decrease, from 2005 to 2018, amounted to 0.3 thousand ha [2].

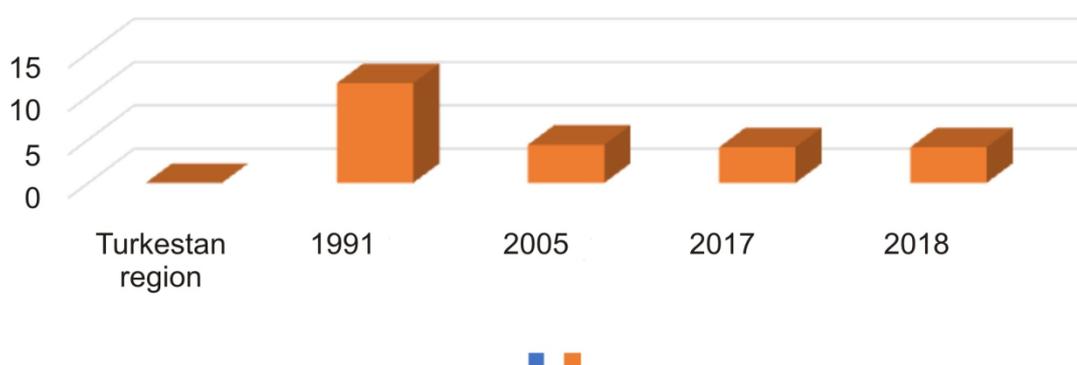


Figure 2. Dynamics of the area of agricultural land in the Turkestan region

Agricultural land in the districts of the region is characterized by a variety of soil and vegetation cover. The uniform part is characterized by a distinct latitudinal zoning, and in mountainous areas - vertical zoning, which in turn is characterized by soil vegetation cover within individual zones and altitudinal belts. The composition of agricultural land by type of land can be seen in Table 3 and Figure 2.

Table 3 - Composition of agricultural land by type of land in the context of the Turkestan region as of November 1, 2020 (thousand ha)

Region	Total area	Total agricultural lands	Arable land	Perennial plantations	Laylands	Hayfields	Pastures	Gardens and service allotments
Turkestan region	11609,5	4114,3	863,4	28,4	101,2	69,5	2932,4	-
Total	11609,5	4114,3	863,4	28,4	101,2	69,5	2932,4	-

The total area of land in the Turkestan region is 11609.5 thousand ha, agricultural land is 4114.3 thousand ha, including: arable land - 863.4 thousand ha (20.9%) (*incl. irrigated - 462.60 thousand ha*), pastures - 2932.4 thousand ha (71.2%), hayfields - 69.5 thousand ha, other lands 129.6 (3.14%) (*many plantations, laylands and other lands*).

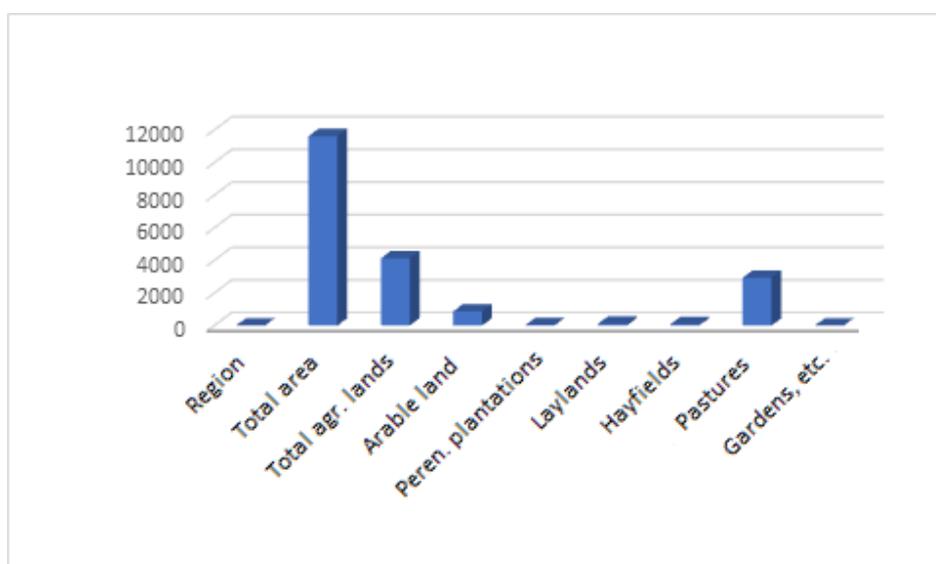


Figure 3. Composition of agricultural land by type of land

When performing work on the economic assessment of land, base rates are used. Basic payment rates are necessary to prevent price imbalances for individual land plots when they are sold for private ownership or provided for land use by the condition, as well as to optimize taxation and rent.

In order to form a unified approach to the assessment of land plots on the territory of the Turkestan region and to ensure the comparability of its results, the basic standard for the cost of one hectare of agricultural land, approved by the Government of the Republic of Kazakhstan, is used as the initial indicator for determining the cadastral value of a land plot [3].

The base rate of payment is determined by the income rental method using the following basic estimates:

- cost of gross production per hectare (estimated productivity);
- production costs per hectare (production costs);
- estimated rental income per hectare.

Taking into account the integral values of the calculated correction factors, the basic standards of agricultural land determined at the first stage are differentiated, and the final cadastral (estimated) value of agricultural land is established.

The economic assessment of lands of administrative districts and cities of regional significance is carried out by types of land in the context of the main types and subtypes of soils. On the territory of the Turkestan region, two zones of soils are distinguished: brown and gray-brown.

When conducting the economic assessment of lands, the data of land balances, materials of soil surveys, soil appraisal, and land inventory were also used [4,5].

Correction factors to the basic rates of payment for agricultural land plots are established by paragraphs 2, 3, 4 of Article 11 of the Land Code and are applied depending on:

- quality condition;
- water cut (water supply);
- distance from the service center.

If there are several factors that increase or decrease the cadastral (estimated) value of agricultural land, the coefficients are multiplied. The total amount of the increase or decrease in the cadastral (estimated) value should not exceed fifty percent of the base rates of payment.

Correction factors are calculated with an accuracy of two decimal places.

Correction factors to the base rates of payment for arable land are applied depending on the quality of the condition and distance from the service centers.

The qualitative condition of arable land in the Turkestan region is characterized by two indicators: reclamative condition and a slope of the surface.

The correction factor for the slope of the arable land is taken as a unit, since the value of its slope, in general, does not exceed 3 degrees.

The reclamative condition of the types and subtypes of soils is taken in accordance with their distribution by reclamation groups according to the method adopted by the example [II] are given in Table 4.

Table 4 - Distribution of agricultural land by reclamation groups as of November 1, 2020

Reclamation groups	Area, thousand ha	Share, in %
Total agricultural land	4114,3	100
Of them:		
Uncomplicated by negative signs	541,1	17,1
including degraded and stony ones	138,6	
that are completely suitable for	84,0	10,5
agriculture	32,5	21,7
Saline	7,5	9,8
Solonetzic	6,9	9,3
Washed	2,9	30,3
Deflated	-	-
Exposed jointly to water and wind		
erosion	2,2	1,1
Waterlogged	0,7	0,1
Wetlanded	0,3	0,1
Others		

Uncomplicated by negative signs, it occupies -4114.3 thousand ha or 17.1% of all agricultural land. In arable land, this group is -863.4 thousand ha, or -48.4% of its area. A significant area of land (863.4 thousand ha) without negative signs affecting soil fertility cannot be used in agriculture due to insufficient atmospheric moisture, lack of water for irrigation and due to relief conditions. Of this group, there are 4114.3 thousand ha of undoubtedly suitable land for agriculture, of which 863.4 thousand ha or 98.9% are in arable land.

Lands of reclamation group 1. "Uncomplicated by negative signs" are established as lands with good reclamative condition and the application of a correction factor - 1.2 to them.

Table 5 - Cadastral value of arable land in the Turkestan region

Reclamation groups	Type, subtype of the soil (sierozem, light sierozem)		Correction factors			Cadastral (estimated) value, thousand tenge
	area, thousand ha	base rate, thousand tenge/ha	reclamative condition, K1	distance from service centers, K2	total (integral) coefficient K=K1*K2	

1	2	3	4	5	6	7
I. Uncomplicated by negative signs	24,8	87,8	1,2	1,31	1,5	326616 0
II. Stony weak, medium and strong	2,6 -	87,8 -	0,9 -	1,31 -	1,18 -	269370, 4 -
III. Saline weak, medium and strong	2,9 0,9	87,8 87,8	0,9 0,6	1,31 1,31	1,18 0,79	300451, 6 62425,8
IV. Solonetzic weak, medium and strong	0,2 -	87,8 -	0,9 -	1,31 -	1,18 -	20720,8 -
VIII. Waterlogged	0,4	87,8	0,6	1,31	0,79	27744,8
Total	31,8	526,8	5,1	7,86	6,62	394687 3,4

Lands of reclamation groups II. “Stony”, III. “Saline”, IV. “Solonetzic”, V. “Washed”, VI. “Deflated”, IX. “Wetlanded” with a weak degree of negative signs are established as lands with a satisfactory reclamation condition, with a correction factor of 0.9. With the presence of these groups of negative signs in an average and strong degree*, they are defined as lands of unsatisfactory reclamation condition, with a correction factor of -0.6.

Lands of reclamation groups VII. “Exposed jointly to water and wind erosion”, VIII. “Waterlogged”, X. “Others” are accepted as lands of unsatisfactory reclamation condition, with a correction factor of 0.6.

The correction factor for the slope of the arable land is taken as a unit, since the value of its slope, in general, does not exceed 3 degrees.

For the distance of plots of arable land from service centers, depending on the quality of the roads, correction factors are applied in accordance with the subparagraph of the Land Code of the Republic of Kazakhstan [1, 8].

Service centers are considered to be the most closely located cities, towns, regional or district centers, which are the zone of gravitation to them of economic centers, where the main network of institutions and organizations of social, medical, cultural, household and other services for the population, sales markets and processing of agricultural products, bases logistics.

Rural settlements, which are the main place of residence of the population, where infrastructure facilities, points of primary processing of agricultural products, warehouses and other facilities are located, are taken as economic centers [5, 6].

Provided that the plots of arable land in the Turkestan region are evenly distributed throughout the territory of the administrative region, the weighted average correction factor for distance, taking into account the quality of the roads,

is determined as the sum of the correction factors from each economic center to the service center divided by their number.

Table 6 - The cadastral value of the reserve land of the Turkestan region

Reclamation groups	Type, subtype of the soil (sierozem, light sierozem)		Correction factors			Cadastral (estimated) value, thousand tenge
	area, thousand ha	base rate, thousand tenge/ha	reclamation condition, K1	distance from service centers, K2	total (integral) coefficient $K=K1*K2$	
1	2	3	4	5	6	7
I. Uncomplicated by negative signs	3	87,8	1,2	1,31	1,5	395100
II. Stony weak, medium and strong	0,3 0,2	87,8 87,8	0,9 0,6	1,31 1,31	1,18 0,77	31081,2 13521,2
III. Saline weak, medium and strong	0,7 0,6	87,8 87,8	0,9 0,6	1,31 1,31	1,18 0,79	72522,8 41617,2
IV. Solonetzic weak, medium and strong	0,2 0,1	87,8 87,8	0,8 0,5	1,31 1,31	1,17 0,67	21081,2 3521,2
V. Washed weak, medium and strong	0,5 0,4	77,8 77,8	0,7 0,4	1,31 1,31	1,16 0,59	52522,8 21617,2
VI. Deflated weak, medium and strong	0,2	87,9	0,7	1,31	0,80	7936,2
VII. Exposed jointly to water and wind erosion	2	67,8	1,0	1,31	1,3	295100
VIII. Waterlogged	0,1	87,8	0,6	1,31	0,79	6936,4
IX. Wetlanded weak, medium and strong	0,5	77,8	0,7	1,31	1,17	21080,2
X. Others	0,1	87,8	0,8	1,31	1,16	42522,6
Total	8,9	1179,3	10,4	18,34	14,23	1026160,

Reserve lands of the Turkestan region - according to land law, all lands not provided for ownership, possession, use and lease. They also include land, the right of ownership, possession and use of which has been terminated (in accordance with land legislation). The cadastral value of the reserve land in the Turkestan region is 1026160.2 thousand tenge.

Table 7 - Cadastral value of other land in the Turkestan region

Indicators	Units of measurement	Type, subtype of the soil (sierozem, light sierozem)	Total
1	2	3	4
1. Base rate of payment for pasture	thousand tenge/ha	4,4	4,4
2. General (integral) correction factor in the assessment of pastures	units	1,31	1,31
3. Base rate of payment for pastures, taking into account the correction factor	thousand tenge/ha	5,76	5,76
4. Base rate of payment for other land (50% of paragraph 3)	thousand tenge/ha	2,88	2,88
5. Area of other land	thousand tenge/ha	33,8	33,8
6. Cadastral (estimated) value of other land	thousand tenge/ha	97411,6	97411,6

The cadastral value of other land in the Turkestan region is 97411.6 thousand tenge.

In connection with the attraction in the Turkestan region to economic centers of various sizes of arable land, correction factors for distance are calculated taking into account their shares. If there is no arable land in the sphere of influence of some economic centers, only those economic centers to which it belongs are taken into account [2, 7].

If the economic centers in the Turkestan region are connected to the service centers by roads of various quality, the correction factor is calculated as a weighted average, taking into account the type of road surface. Roads are divided into hard, stony and ground covers.

The soil cover of the territory of the Turkestan region, which determines the quality of lands, is characterized, on the one hand, by a distinct latitudinal zoning in the distribution of soil types and subtypes, on the other hand, by a change in soils from west to east due to an increase in climate aridity in this direction.

The soils of the territory of the Turkestan region are grouped into the following zonal types and subtypes:

1. Gray-brown soils of the desert zone;
2. Sierozem northern and southern desert-steppe zone;
3. Piedmont chestnut soils of the desert-steppe zone;
4. Mountain alpine and subalpine soils;
5. Mountain chestnut soils (mountain brown).

In the mountainous systems of the south, mountainous subalpine soils and mountain chestnut soils have formed. In addition to plain and mountainous zonal soils, intra-zonal soils are widespread on the territory of the South Kazakhstan region: salt marshes, solonchaks.

An important feature of the soil cover is heterogeneity, high complexity associated with the aridity of the climate, relief and soil-forming rocks, which is manifested everywhere throughout the region.

The heterogeneity of the soil cover significantly reduces the productivity of agricultural land [1, 9].

The high-quality condition of soils in large areas in the region is complicated by the presence of signs that negatively affect their fertility. To take into account the quality of agricultural land, reclamation groups were adopted that combine soils with a general orientation and nature of reclamation measures:

- uncomplicated by negative signs;
- saline;
- solonchak;
- washed;
- deflated;
- exposed jointly to water and wind erosion;
- wetlanded;
- others.

Conclusion. According to the results of the economic valuation of the quality condition of agricultural land in the Turkestan region, the total area of agricultural land is 4114.3 thousand ha, including: arable land - 863.4 thousand ha (13.8%) (including irrigated - 462.60 thousand ha), pastures - 2932.40 thousand ha (84.4%), hayfields - 69.5 thousand ha, others - 129.6 thousand ha (1.7%) (many plantations, laylands and other lands), cadastral value is 5168817.480 thousand tenge. Irrigated arable land is 462.60 thousand ha with a cost of 9456000 thousand tenge, vegetable gardens are 0.1 thousand ha with a cost of 4728.000 thousand

tenge, pastures occupy 2932.40, their value is 4980737 thousand tenge. Other lands amount to 129.6 thousand ha with a cost of 173896.200 thousand tenge.

The area of reserve lands is 3035.3 thousand ha, the cost is 895904.320 thousand tenge. Other lands amount to 129.6 thousand ha, with a value of 421864.000 thousand tenge.

Total (the sum of the I category and the VII category of land) in the Turkestan region thousand ha, with a cost of 6064721.800 thousand tenge, arable land irrigated ha, their cost is 9456.00 thousand tenge, vegetable gardens are 0.1 thousand hectares with a cost 4728.000, other land is 129.6 thousand ha with a cost of 173896.200 thousand tenge.

Comprehensive indicators for the economic valuation of the region's land are used to ensure the regulation of land relations, as a starting level for the cost of land on the market, when establishing the amount of land tax and rent.

References

1. B. Ospanov, Z. Dusenbekov. Land resources and land reform in the Republic of Kazakhstan. Astana, 2011 - p.352.
2. Consolidated analytical report of RK. 2019-2020.
3. Materials of reports of the Kazakh Research Institute of Economics of AIC and RUTI, -Almaty, 2014.
4. Molzhigitova.D.K. The ways of increasing the efficiency of land resources considering regional features, Actual Problems of Economics. №6 (156) 2014, 311-315.
5. Federal Law Russian Federation of 18.06.2001 No. 78-FZ «O land management».
6. Jonson W.C. Controlled soil cracking as a possible means of moisture conservation on wetlands of the Southwestern Great Plains. // W.C. Jonson / Agronomy Journal, 2011. № 54. -P. 323-325.
7. Orlov D. Soil humus status, ecological and geochemical principles of its formation. Trans. // D. Orlov / 13 Congr. Int. Soc. Soil Sei. - Hamburg, 13-20 Aug., 2011. Vol. 2.-P. 413-414.
8. Reuter G. Zwanzig Jahre Rostocker Dauerversuche zur Humusbildung im Boden. // G.Reuter / Mitteilung: Humus bilanzierung und Entwicklung der Humusqualität. /"Arch. Acker und Pflanzenbau und Bodenkunde - 2012, - № 5. - P. 273-281.
9. Ridly A.O. Soil organic matter and crop yields as influenced by the frequency of summer following. // A.O. Ridly, R.A. Hedlin / Canad. J. of Soil Sei., 2012, vol.48, №3. - P.315-322.
10. G. Aitkozhasyeva, K. Tireyov, T. Pentayev. Land Policy and land Marvet Activity in Kazakhstan. ASERS Publishing Journal of Environmental Management and Tourism /ISSN 2068-7729 Journal DOY Volume X JSSUE3 (35) Summer 2019, D.590-597
11. Gendelman, M.A., Krynbayev, Zh.K. Scientific bases of land management and cadastre. Astana, Faliont, 2004 – p.172.