

A.A. Tokbergenova , **Mehmet Arslan, D.M. Kaliyeva**

Al-Farabi Kazakh National University, Almaty, Kazakhstan, *e-mail: tokbergen@mail.ru

INCREASING THE EFFICIENCY OF THE USE OF ARABLE LAND OF THE ALMATY REGION (ON THE EXAMPLE OF RAIYMBEK DISTRICT)

Abstract. The article presents problems associated with enhancing the efficiency of arable land use in Raiymbek region of Almaty Oblast. The dynamics of changes in the area of agricultural land, including arable land, are shown based on statistical data for 2011–2018. As a result of the study, the main factors hindering the increase of soil fertility of arable lands and ways to prevent them were considered. The monitoring of rainfed and irrigated arable land was carried out in comparison with the statistical indicators of cultivated areas of rural regions. The number of land users and owners (private farms, joint-stock companies, cooperatives and non-state enterprises) was also determined; the dynamics of arable land areas owned by them for 2013–2018 were shown. The analysis of the level of development of arable land identified the main reasons for the withdrawal of land from agricultural turnover. Moreover, the modern system of irrigation system development was studied; recommendations for monitoring and rational use of irrigated lands were developed. Priority areas of efficiency of arable land use, taking into account territorial features of the area, are defined. A map of the area's agricultural land was developed using the GIS (ArcGIS) program.

Key words: agricultural land, rainfed arable land, irrigated land, land monitoring, GIS.

*А.А. Тоқбергенова, Мехмет Арслан, Д.М. Калиева

Әл-Фараби атындағы Қазақ ұлттық университеті, Алматы қ., Қазақстан, *e-mail: tokbergen@mail.ru

Алматы облысының егістік жерлерін пайдаланудың тиімділігін арттыру (Райымбек ауданы мысалында)

Аңдатпа. Мақалада Райымбек ауданының жалпы егістік жерлерінің соңғы 8 жылдағы көлеміне экономикалық-статистикалық әдіс негізінде бағалау жұмыстары жасалып, ауданның егістік жерлерін тиімді пайдалануды жетілдірудің мәселелері қарастырылған. 2011–2018 жж. статистикалық мәліметтер негізінде ауданның ауылшаруашылық жерлері, соның ішінде егістік жерлердің динамикасы көрсетілді. Зерттеу жұмыстарының негізінде топырақтың құнарлығына кері әсер етуші негізгі факторлар анықталып, олардың алдын-алу жолдары қарастырылған. Аудандағы ауылдық округтер бойынша егістік жерлердің статистикалық көрсеткіштері салыстырылып, тәлімі және суармалы егістік жерлердің мониторингі жасалды. Сонымен қатар, аудандағы жер пайдаланушылар мен жер иеленушілердің (жеке шаруа қожалықтары, акционерлік қоғамдар, кооперативтер мен мемлекеттік емес кәсіпорындар) саны анықталып, олардың меншігіндегі егістік жерлер көлемінің 2013–2018 жылдардағы динамикасы көрсетілді. Егістік жерлердің игерілу деңгейіне сараптама жасалып, жерлердің ауылшаруашылық айналымнан шығып қалуының басты себептері анықталды. Сонымен қатар, суландыру жүйесінің қазіргі кездегі даму жүйесі зерттеліп, суармалы егістік жерлердің мониторингісі мен тиімді пайдалану бойынша ұсыныстар әзірленді. Ауданның аймақтық ерекшеліктерін ескере отырып, егістік жерлерді тиімді пайдаланудың басым бағыттары анықталды. ГАЖ бағдарламаларын (ArcGIS) пайдалану арқылы ауданның ауылшаруашылық алқаптарының картасы жасалынды.

Түйін сөздер: ауылшаруашылық алқаптары, егістік жерлер, суармалы егістік жерлер, жер мониторингі ГАЖ.

Токбергенова А.А., Мехмет Арслан, Калиева Д.М.

Казахский национальный университет имени аль-Фараби, г. Алматы, Казахстан, *e-mail: tokbergen@mail.ru

Повышение эффективности использования пахотных земель Алматинской области (на примере Райымбекского района)

Аннотация. В статье были рассмотрены проблемы, связанные с повышением эффективности использования пахотных земель Райымбекского района Алматинской области. На основе статистических данных за 2011 и 2018 гг. показана динамика изменения площади сельскохозяйственных земель, включая пахотные земли. В результате исследования были выявлены

основные факторы, препятствующие повышению плодородия почв пахотных земель, и пути их предотвращения. Проведен мониторинг богарной и орошаемой пашни в сравнении с статистическими показателями посевных площадей сельских округов. Также было определено количество земледельцев и землевладельцев (частные крестьянские хозяйства, акционерные общества, кооперативы и негосударственные предприятия), показана динамика площадей пашни, находящихся в их собственности за 2013–2018 годы. Был проведен анализ уровня освоения пахотных земель, выявлены основные причины изъятия земель из сельскохозяйственного оборота. Кроме того, изучена современная система развития оросительной системы, разработаны рекомендации по мониторингу и рациональному использованию орошаемых земель. Определены приоритетные направления эффективности использования пахотных земель с учетом территориальных особенностей района. Была разработана карта сельскохозяйственных угодий района с использованием ГИС (ArcGIS) программы.

Ключевые слова: сельскохозяйственные угодья, богарные пахотные земли, орошаемые земли, мониторинг земель, ГИС.

Introduction

Agrarian reforms in the country have significantly changed the system of agricultural production and the use of scientific achievements and best practices. Over the past decade, the Almaty Oblast has been reforming the agrarian sector of the economy on the basis of a developed legislative framework that promotes the development of market relations, taking into account world practices. Proceeding from this, the land market was formed, the productivity in plant growth and the number of livestock in stock raising increased. Nevertheless, an analysis of the state of the agricultural sector shows, that the main reason for low revenues in this sector is the low level of introduction of modern agricultural technologies and proven agricultural technologies in production. Naturally, this leads to the noncompetitiveness of domestic products in the domestic and foreign markets. Against the backdrop of the main achievements of the region, problems remain still unresolved which joined with the gap between the real sector of agricultural production and scientific developments. The annually changing conjuncture of the market for the sale of agricultural products and the increase in the requirements for its competitiveness determine the need for the timely widespread introduction of new developments in agrarian science in the production of the region.

Materials and Methods

The works of foreign (Burlakova L., Gataulin S., Zhelyaskov S.L., Nazarenko V., Nesmyslov S.R.) and domestic scientists, as well as factual and statistical data for 2011–2018 years obtained from the management of land relations and agriculture of the region.

In the process of determining the level of use and crop trends and its quality, the following methods were used: cartographic method, economic

and statistical, systematic and comparative analysis, expert evaluation, computational methods.

In my research work, I mainly focused on the cartographic method, including the use of GIS programs (ArcGIS 10). Since the use of this method allows to obtain qualitative estimates and quantitative characteristics of objects, phenomena, and processes on the map; to study the relationship and interdependence between them; to study their dynamics and evolution in time and space; to determine the trends of their development and predict their future state.

Results and Discussion

The land is the most basic of all economic resources, fundamental to the form that economic development takes. Its use for agricultural purposes is integral to the production of the means of our subsistence.

Today, the issues of rational land use and land-use monitoring are urgent both nationally and globally. Managing land-use rights, restrictions, and responsibilities in accordance with land policies and sustainable development principles enhances the value of land resources. Land use is related to the use of the beneficial features of the land. The evolution of land administration systems over decades and recent scientific studies regarding the usage of land resources for the public good lead to an integrated land-use management framework (Williamson, Enemark, 2010; Ingram, Hong, 2012).

The efficiency concept is ambiguously defined in economic theory. The word „efficiency” may be determined as a relative estimate of either the conscious action of a person or the outcome of a process that shows the ratio of both the achieved effect and the resources consumed to achieve this effect (Vanags, 2004).

The problem of efficient use of land resources is an important link in state policy since the

independence of any country is determined primarily by food security. The modern practice of agricultural land use and the tendency of the quantitative and qualitative state of its main part – arable land, give grounds for serious concerns about the future production of food and raw materials, food and raw material independence of the country (Gataulin, 2003).

Population growth in developing countries is driving a rapid increase in the demand for food. At the same time, rising population density in rural areas diminishes the farm size. Small farmers are forced to extend cultivation to new areas, which are fragile and not suitable for cultivation. Crop intensification, which has contributed significantly to agricultural growth in recent years, can ease the pressure on cultivating new lands but farm practices adopted for raising yields can also, in some situations, result in damaging the environment (such as when expanding into new areas). Changes in the indicator value over time or between various components may show increased or decreased pressure on agricultural land. This indicator is of value to land planning decision-making.

Fertile land in another world “arable lands” are the most precious of all resources, land that can support agriculture to feed a surging global population tipped to rise a staggering 24 % from 7.5 billion today to about 9.8 billion by 2050. That rise means the world’s farmers will need to produce at least 60 % more food than it currently does if all mouths are to be fed adequately.

While the world currently has a “glut” of wheat, barley, rice, corn, and some dairy products, this is at odds with the fact about 800 million people around the world are either starving or suffering from chronic undernourishment. With increasing urbanization of populous countries such as China and India, water aquifers drying up in some countries, agricultural land is degraded and water pollution rising in others, questions arise as to whether there will be enough land to maintain food production or that agricultural productivity will keep pace.

United Nations Food and Agriculture Organization data show that in 1961 there were an estimated 3886 million hectares of agricultural land worldwide.

That included nearly 1400 million ha of arable land – land cultivated or able to be cultivated to grow pastures and temporary crops, such as lucerne, wheat and rice – and 90 million ha of permanent crops, such as nut trees, grapes or coffee.

By 2014, as the available data shows, the area of agricultural land had risen to 4894 million ha,

a level at which it has largely reached a plateau. About 1523 million ha of that was arable land and the area planted to permanent crops had doubled to 180 million ha.

The top 20 nations with the largest areas of agricultural land include food production heavyweights Kazakhstan, Russia, and the European Union – the latter a conglomeration of 28 countries (including the UK). The list also includes six African nations, each with an agricultural land area about the same size as Canada, another powerhouse agricultural exporter and a strong competitor to Australia.

The results of agricultural production depend on the effectiveness of the use of productive resources, primarily land. In modern conditions, the use of land in agricultural production is considered effective when not only profit increases, output of products from a unit of area, its quality is increased, the cost of producing a unit of production is reduced, but soil fertility is increased, the environment is protected and most importantly, villagers.

In economics, the problem of increasing the efficiency of the use of agricultural land is paid much attention. However, many scientists see the solution to the problem in the regulation of land relations: “... Deprived of property and economic freedom, the right to choose, he had no incentive to show his abilities, was not interested in high-performance work, rationally use land and other resources. The existing system ousted the farmer not only from the land but also deprived him of the opportunity to dispose of the results of his labor. He was left with the right and duty to work. “ (Gataulin, 2003).

It is necessary to solve the problem of effective land use in agrarian production systematically, focusing on the realization of both internal and external factors. The main condition for the effective use of land in agriculture is to increase soil fertility. It is carried out on the basis of improving the existing system of farming: organization of land area, crop rotation, substantiation of the structure of sown areas, soil cultivation system, fertilizer system, meliorative measures, a set of measures to protect the soil from water and wind erosion and to control pests, diseases, weeds, scientific seed production, crop cultivation technology, machine systems, environmental protection measures, motivation of workers’ labor, etc. (Burlakova, 2005).

Arable lands are the type of lands capable to be ploughed and therefore are critical for grain production (Nath, Luan, 2015). Thus, maintaining a certain extent of arable land is the basis and guarantee for food security in many countries and regions, including the Raiymbek region. It

is located in the south-eastern part of the Almaty Oblast, in the mountain ranges of the Tien Shan – more than 1200-3400 meters. In this region, there are 23 rural regions, the number of settlements 47. According to the Decree of the President of the Republic of Kazakhstan N.Nazarbayev dated April 3, 2018, the region is divided into two parts: Kegen region, administrative center – village Kegen and Raiymbek region, its center is Narynkol. According to the statistics of 2018, the total area of this region is 1,422,235 hectares, including 64,042 hectares of agricultural land, the area under cultivation is 82981 ha (irrigated arable land – 32177 ha), reservoirs

are 12212 hectares, meadow – 32554 hectares and pastures – 529507 hectares.

Arable land is mainly located in large mountain valleys such as Kegen, Tekes (Fig. 1), located at an altitude of 1200-2000 meters above sea level. In addition, these zones are dark soils and dark brown soils. The territory of the region is mountainous, with average rainfall. The climate is very continental, the maximum temperature in summer is + 35 ° C, and in winter – up to 45 ° C. According to many sources, annual precipitation on agricultural lands is 378 – 477 mm at medium altitude and even higher in mountainous areas.

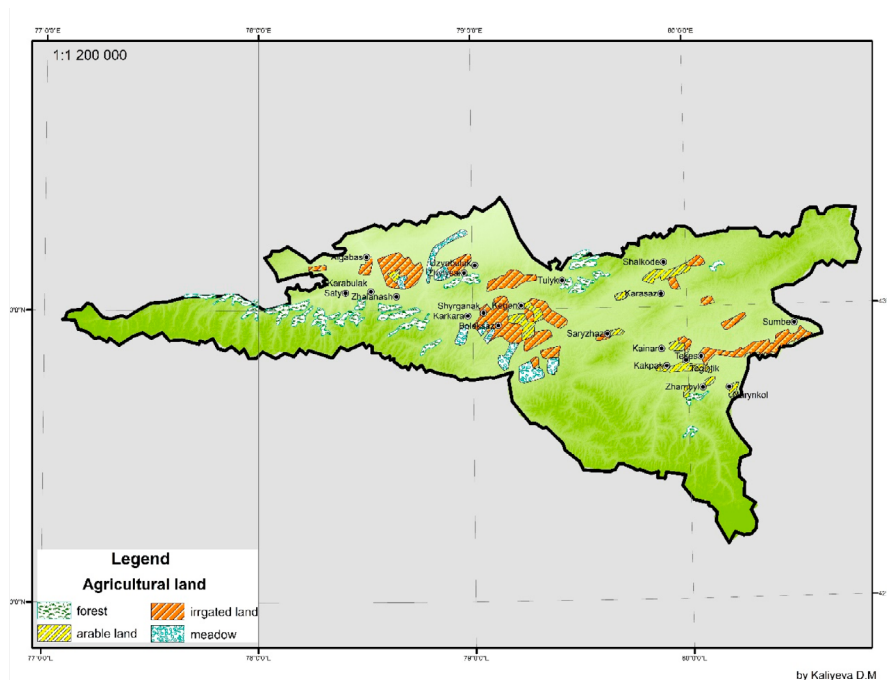


Figure 1 – Location of arable land in Raiymbek region

According to the data from the statistical information was taken from Department of Agriculture of Raiymbek Region, it has been calculated 2011-2018 dynamics of the change in the

number of arable land in the region of the 23 rural regions mentioned above. Correspondingly, results show that there is a significant difference in the last 8 years (Table 1).

Table 1 – Indicator of changes in arable land for 8 years

№	Rural region	Total area		Arable land, ha		Comparable indicator of change	Absolute indicator
		2011	2018	2011	2018		
1	Narynkol	14274	28751	3232	3420	+ 188	+5
2	Sumbe	44004	51039	6085	7100	+1015	+16
3	Zhambyl	122066	23667	3410	3450	+40	+1,17

4	Uzak	29330	43002	2943	3358	+415	+14
5	Tekes	12961	9610	3973	3459	-514	-12,9
6	Tegistik	21188	19967	4366	5059	+693	+15,8
7	Kakpak	21315	99829	3834	3796	-38	-1
8	Kainar	25416	37057	2367	4420	+2053	+86
9	Saryzhaz	73518	57710	5509	4937	-572	-10
10	Karasaz	21677	44479	3221	3519	+298	+9,2
11	Shalkode	30812	52410	4497	4900	+403	+8,9
12	Algabas	32644	45624	2473	2673	+200	+8,0
13	Boleksaz	12067	8183	2715	1916	-799	-29,4
14	Zhalanash	30999	45666	6250	7526	+1276	+20,4
15	Tasashy	18438	24259	2576	4660	+2084	+80
16	Karkara	29866	32711	4281	4523	+242	+5,65
17	Kegen	42865	44094	4715	5215	+500	+10,6
18	Uzynbulak	38636	7428	1960	2334	+374	+19,0
19	Zhylysai	28845	31886	1610	426	-1184	-73
20	Saty	24656	15597	986	551	-435	-44
21	Karabulak	23672	32843	3108	2850	-258	-8,3
22	Shyrganak	27301	28314	3486	2799	-687	-19,7
23	Tuiyk	6251	5486	227	90	-137	-60
Total		732801	789612	77724	82981		

In the period from 2011 to 2018 the size of arable land increased in 14 regions, and in the remaining 9 areas decreased. The regions with the largest arable land areas are Kainar – up to +2053 hectares or 86% by 2011, Tasashy – the arable area has increased to

+ 2084 hectares or up to 80%. On the contrary, the area under cultivation was sharply reduced in the following regions: in Zhylysai – 1,184 hectares or -73%, in Tuyuk – from 227 hectares to 90 hectares, which is composed 60% nowadays (Fig. 2).

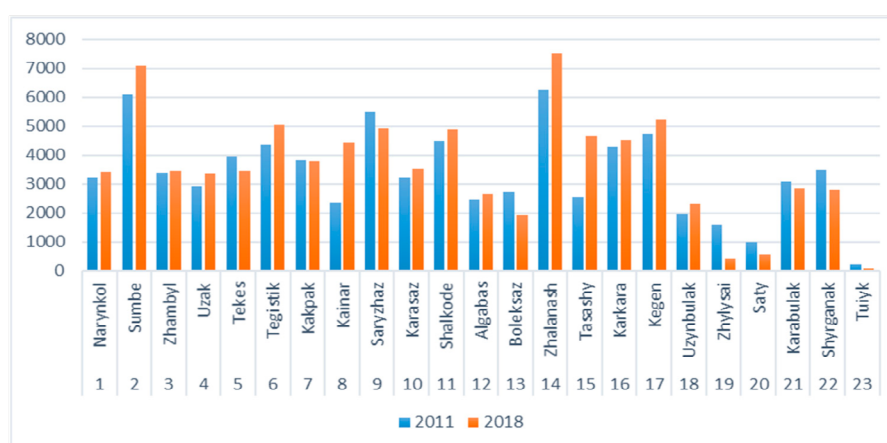


Figure 2 – The indicator of change in arable land for two years (2011-2018), ha

Table 2 below shows the list of owners and users using the region's farmland for long-term leases in 2018 and their actual number.

Table 2 – Land users and landowners of the region and the area of existing arable land, ha

Name of categories, owners and land users	Number (by 2018)	Area, ha		
		total	arable land	irrigated arable land
I. agricultural land	5770	668505	82981	28038
1. peasant farm	4840	461970	56882	21809
2. Economical and joint-stock companies	77	191222	24178	5282
3. agricultural cooperative	5	15029	1770	861
4. other non-state agricultural enterprises	9	284	151	86

As shown above, in the table, 68% of arable land belongs to private farms, 29% belong to business partnerships and joint-stock companies.

Compared to these figures, there are significant differences between 2013 and 2016 (Table 3, Fig. 4).

Table 3 – Number of peasant farms and limited liability partnerships, sown area, ha

Name of land user and landowner	Quantity			Arable land, ha		
	2013	2016	2018	2013	2016	2018
Economical and joint-stock companies	86	79	77	25763	24487	24178
Peasant farms	4965	4834	4840	49951	55982	56882

Note – The statistical information was taken from the Department of Agriculture of the Raiymbek Region.

According to the above table, we note that the number of farms and limited liability companies in the region is much lower than 5 years ago. In particular, the number of peasant farms declined by 125 people, and its share composed just 2%, meanwhile, the number of farms decreased by 10% and amounted to 77%. Despite the decrease in the number of legal entities, the size of arable land granted to them has been practically enlarged. For example, this year 56402 hectares of arable land were leased to 4840 farms, which are 13% more than in 2013.

Arable land is a fundamental resource and is therefore critical to food security (Long, Li, 2012). The introduction of land into agricultural turnover is one of the priorities and strategic tasks of the agricultural production of the region. In turn, the timely and misuse of land is the only factor that leads to a deterioration in the quality of agricultural land and a sharp reduction in soil fertility (<http://rosreestr.ru>)

In the Raiymbek region, the number of undeveloped and degraded lands enhance annually. First of all, let's focus on the dynamics of cultivated land in this area (Fig. 4).

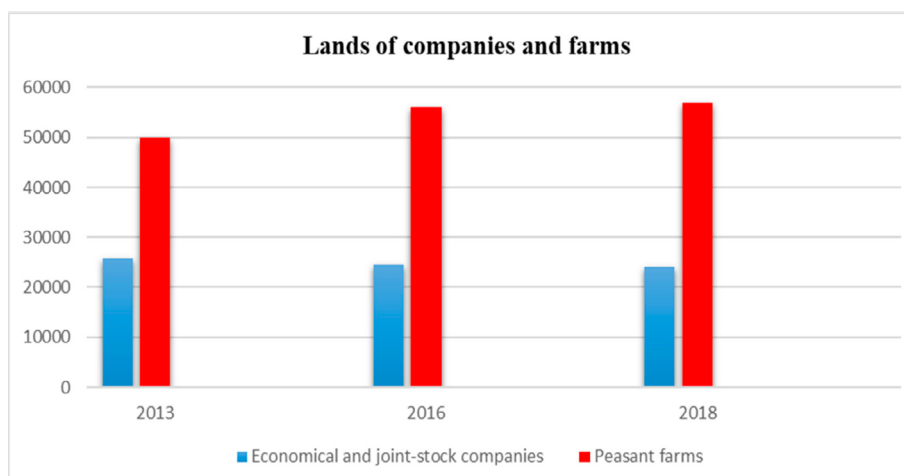


Figure 3 – The area of arable land owned by farms and companies, ha

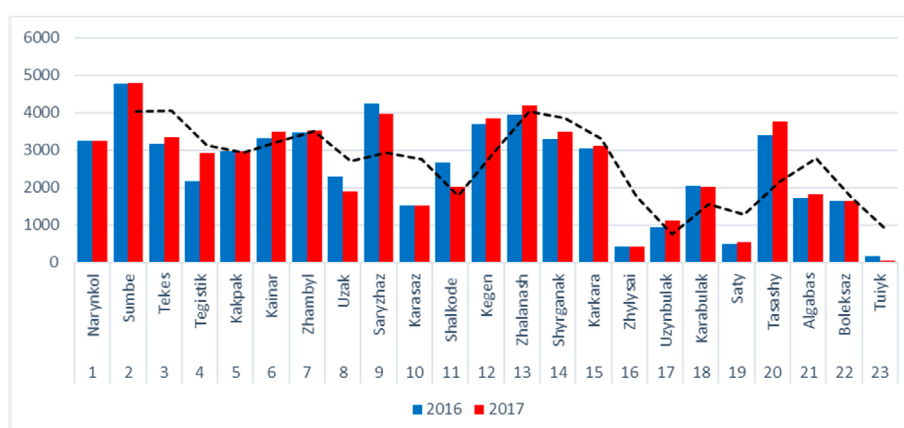


Figure 4 – Comparative indicator of cultivated areas for the last two years (2016-2017) in the area, ha

The largest amount of arable land is shown in figure 4: they are Tehstik (+744 hectares), Tasashy (+360 hectares), Zhalanash (+250 ha) and Shyrganak (+217 ha).

Conversely, less cultivated arable lands are located in such regions as Uzak (-399 hectares), Shalkkode (-345 hectares), Saryzhaz (-262 ha) and Tuiyk (-120 ha) than in the 2016 year. In addition, it is necessary to identify the areas of Boleksaz and Narynkol, because in these regions for two years the area of arable land remained unchanged.

The high percentage of unused land, the negative dynamics of the sown areas of the main agricultural crops, the overgrowing of the land by shrubs and small forests show that measures are needed to improve the quality characteristics of land resources and return highly productive agricultural lands to the turnover. Moreover, the Department of Agriculture of the region reported,

that there had not yet been any selective activities in the area. It should be noted, that this problem not only covers this area, but also the entire republic.

To introduce unused agricultural land into circulation, the following measures should be taken to correct the land use potential:

1. Exercise control over agricultural land:
 - a) determine the structure of land resources;
 - b) studying the quality of agricultural land;
 - c) providing a description of the subject of land tenure, land and land ownership;
 - d) identification of unused agricultural production areas;
2. Evaluation of agricultural land
 - a) determination of factors affecting the ability of the land to be put into circulation;
 - b) assessment of the potential and assessment of land use objects: technical, soil properties, location, individually designated indicators, etc.;

3. Calculation of financial efficiency and economic efficiency of unused agricultural lands in circulation;

4. Identify economic, social and environmental performance indicators (Zhelyaskov, Denisova, Seturidze, 2014).

The introduction of a large number of lands into the agricultural sector will not only attract the population of the region but will also increase the investment attractiveness of the region and increase the incomes of the population. Thus, the full use of arable land and the introduction of unused land have a positive effect not only in the agricultural sector but also in other sectors of the national economy (Simova, 2018).

Moreover, experts from the Department of Agriculture of the region said that the area of arable land was not estimated. This problem not only covers this area. The definition of the assessment of soil bonnet is a direct basis for determining the number of fines paid for the non-use of land. The last time, the work on determining the soil-site index was carried out on the recommendation of the Agency for Land Management and the Research and Production Center for Land and Land Resources of the Republic of Kazakhstan in 1979 before the market reform (Orynbekov, 2017).

According to the Tselinograd Design Institute, the amount of humus of ordinary chernozem in Kostanay oblast is 7%, 0-20 cm – 6.5 %, for 0-50 cm – 5.27%, that is, the percentage of recommended standards is too high for arable lands in Kazakhstan. This methodology

(1979) has its drawbacks. Meadow grassy soil for the total area of irrigated soils of the republic is 0-50 cm – 2.5%. However, the soil composition in some regions of the country is relatively small, which, according to this method, is considered very bad. At the same time, the shortcomings of this method also negatively affect the country's budget – the land tax of irrigated lands in semi-desert, desert and mountain desert zones of the southern and south-eastern regions of the republic is very low for low-lying soil ponds, which in turn is a defect.

The state of soil quality in Kazakhstan is aggravated by the fact that 39 years (1979 – 2018) of the previously adopted “benchmark” indicator and assessment of soil balance remained unchanged.

Of course, the quality of soils taken in the Kostanay region as a “standard” for thirty-four years without using agricultural land will not increase. Summarizing this issue, it should be noted that in the republic we need to assess the quality of the soil (Orynbekov, 2017).

Now, with regard to the status of unused arable land in the Raiymbek region, their number has slightly decreased compared to 2016. The largest area of uncultivated arable land in comparison with 2016 belongs to such regions as Sumbe (2294 ha), Kainar (633 ha), Karasaz (1142 ha) and Uzynbulak (244 ha). At the same time, there are regions in which, the area of unused land has decreased. They are Shalkode (1078 hectares), Kegen (718 hectares), Tegistik (725 ha), Karkara (639 ha) and Algabas (539 ha) (Fig. 5).

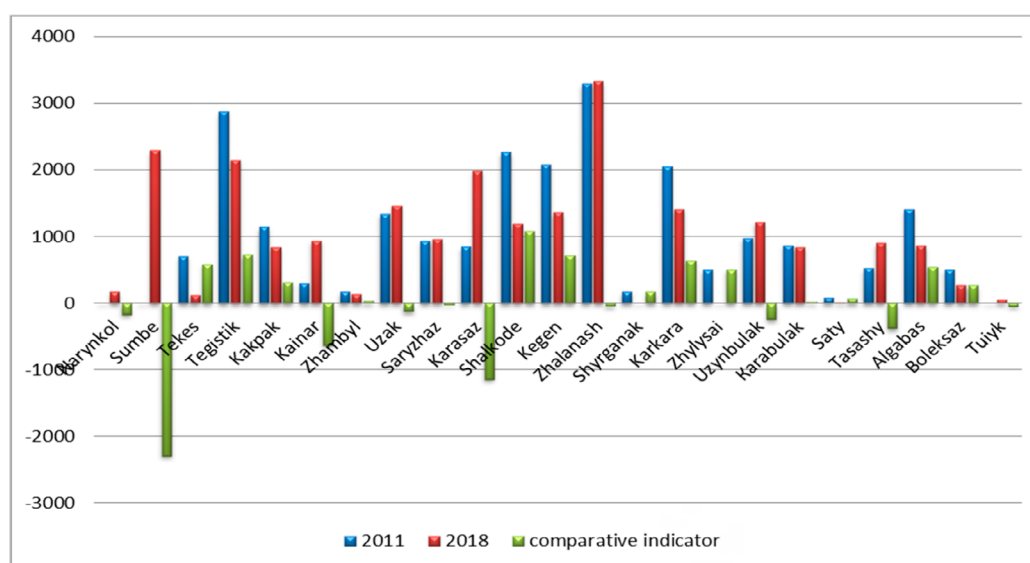


Figure 5 – Comparative figures of unused land (2011-2018), ha

Taking everything into consideration, it can be said, that the introduction of unused land plots into agricultural circulation will increase the area of agricultural land.

The concept of “effective land use” is widely used in organizational and territorial aspects – from a specific land plot to the entire country’s land. In the case of irrigation, the nature of the use of land resources becomes difficult. Here, along with the rational use of irrigated land, water and other irrigation processes should be used effectively (Nazarenko, 1999).

Therefore, the use of irrigated land should be considered in various aspects:

economically – land is used in all sectors of the national economy, and irrigated lands increase the productivity of agricultural production in conditions of using dry land.

socially: the land is used on a voluntary basis, taking into account ownership of property, and the production of goods is controlled by landowners and users, and the landowner or user becomes its owner at his own expense.

technical: land use is carried out through the construction of additional technical means (channels, pumping station, water treatment plants, etc.) for the purposes of irrigated land.

Ecology: land use should be carried out in accordance with the requirements of compliance with the ecological balance in neighboring adjacent landscapes. The use of land on this basis depends on the purpose, and in this context, it can be concluded that the law on land use or land use acts in objective reality (Nazarenko, 1999).

Effective use of irrigated land provides:

- use of different types of agricultural land (vegetable crops, fodder production, rice cultivation) in accordance with their intended use;
- protection and protection of fertility and soil contamination;
- high efficiency of use of each irrigated hectare taking into account the protection of natural ecosystems;
- high economic level of use of each hectare;
- introduction of various types of intensive technologies for growing crops;
- opportunities for effective and non-wet use of water bodies and irrigation water;
- effective use of facts of social production;
- effective use of various types of land ownership and introduction of new forms of farming;

Summarizing the above, irrigated lands are of complex nature and are used in close contact with irrigation equipment, irrigation water, and

other basic means, human resources and natural and biological conditions that correspond to the landscape of the agrolandscape (Zeldner, 1997). The intensity of development of agricultural production is determined by the degree of use of irrigated arable land, which directly depends on the intensity of use of these resources and conditions (Chechev, Tsvyleva, 1991).

Today, the analysis of the dynamics of the land fund shows that the number of arable land in the country increases every year, and the arable land area for the past 25 years has decreased by 10 million 600 thousand hectares. The main decline occurred in 1991-2000.

According to the Deputy Minister of Agriculture of the Republic of Kazakhstan Erlan Nyssanbayev, the reduction in the number of arable land in the region is due to the following factors: firstly, due to economic conditions, economic entities and territories suitable for agricultural organizations, plowing land use of the correct result of replacement of the land category stock; secondly, because of the increase in arable land and the lack of irrigation systems for irrigated land; Thirdly, the main reason for transferring the objectives of arable land to another type of agricultural land (Nesmysylov, 2004).

Irrigated land plots after their introduction into circulation will be used for their direct purpose, and this, in turn, is an expedient and efficient use of resources. The increase in cultivated areas will strengthen the yield of crops, which will positively affect the provision of food to the population. Correct target the use of land resources will lead to an increase in economic profits and the number of jobs for the able-bodied population wishing to work in the agricultural sector.

In the current economic conditions, the adaptation of agricultural production to land reclamation has not lost its importance both in production and in social terms.

Irrigated agriculture, in comparison with the rainfed lands, is characterized by a greater resource intensity and economic reforms in the agro-industrial complex have had the most negative impact on the productivity of irrigated arable land, the reduction of the area of irrigated land and the technical condition of irrigation systems. Researches show that, on average, the annual yield of fodder crops can be 3-5 times on the irrigated field and 1.5-2 times more in cereals.

The main source of irrigation in this area is small rivers flowing from the snow. These include Narynkol, Bayynkol, Sumbe, Shalkode, Karkara, Karabulak, Shelek, Sata, Kegen and other rivers.

In general, the volume of irrigated arable land in this area does not include all land reserves and is unevenly distributed. In 2010, the area of irrigated

land was 26,477 hectares (Fig. 6), which for 8 years increased by 13.17% to 3,486 hectares, nowadays, the total area is 29,963 hectares.

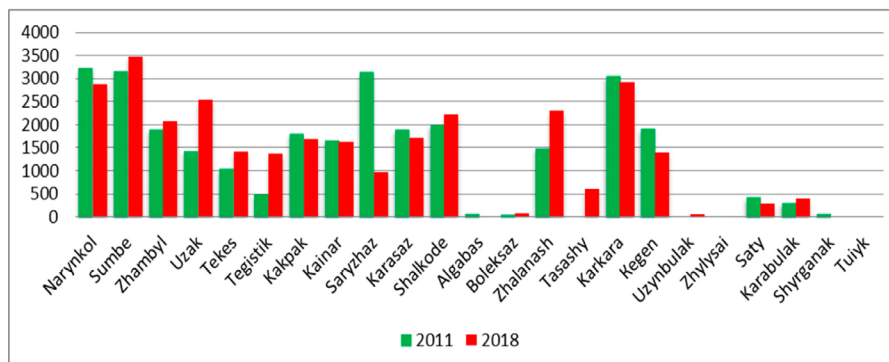


Figure 6 – Dynamics of changes in the area of irrigated land, ha

Summarizing the results of research on the arable land of the Raiymbek region, the main factors that may be related to the reduction of the volume of irrigated land and the quality of the soil are:

- the quality of arable land deteriorates due to the fact that most of the land plots are privately owned and not used in accordance with special instructions;
- deficiency of agricultural specialists;

- lack of strict and permanent special control by the region administration;

- lack of soil assessment;

- Incorrect use of the crop rotation system;

- wear and aging of agricultural machinery;

- lack of distance learning courses that increase the interest of rural residents in mastering new technologies and techniques;

- low level of use of modern technologies and the Internet;

Conclusion

Mostly, based on the results of the research, the main measures to improve the efficiency of the use of arable land. These include assessment of soil lands, carrying out rigorous administrative research; organization of public control over the state of the land, attracting qualified personnel to the agricultural sector; modernization of the transitional seed system; cultivation of plants for soil cultivation; organization of measures to protect and improve degraded lands. And now

let's pay attention to proposals aimed at improving the quality of arable land in this area. One of the key issues of modern agriculture is the use of resource-saving technologies for growing crops. In this regard, in recent years, a new method of growing crops is widely used in many countries of the world – a technology of processing soils with limited use. There is no need to limit the consideration of the case: the first, energy and labor costs: the abundance of cultivating the soil of crops (about 40 percent of the energy consumed and 25 percent of labor costs), and secondly, under the influence of heavy tractors and soil treatment, the yields of excessive soil compaction decrease by 15-30 percent; thirdly, because of the erosive process of soil dust and the intensity of mechanical processing, the decomposition of organic matter in the soil increases. Consequently, the transition to resource-saving technologies is crucial for the sustainable growth of energy prices. In this case, the main technology is to limit tillage and zero tillage (direct seeding). Processing of reverse processing consists of one or several minor changes. Thus, straw and vegetable stalks (mulch) remain on the surface of the soil. However, when implementing such a technology, it is necessary to use organic and mineral fertilizers, as well as modern means of plant protection, including mythical wastes. It is also necessary to provide agricultural enterprises with equipment and multifunctional equipment that performs this technology with high accuracy.

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