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ASSESSMENT OF LAND RESOURCES OF THE ZHAMBYL REGION AS THE BASIS OF RECREATION DEVELOPMENT AND FOOD SECURITY OF THE REPUBLIC OF KAZAKHSTAN

Gulnar ALDAZHANOVA*
Abai Kazakh National Pedagogical University, Department of Geography, Ecology and Tourism, Almaty, Kazakhstan, e-mail: gulnara.aldazhanova@mail.ru

Aliya BEISSENOVA
Abai Kazakh National Pedagogical University, Department of Geography, Ecology and Tourism, Almaty, Kazakhstan, e-mail: zhandosova1974@mail.ru

Irina SKORINTSEVA
Institute of Geography and Water Security Science Committee, Almaty, Kazakhstan, e-mail: skorintseva@mail.ru

Zhumakhan MUSTAFAYEV
Institute of Geography and Water Security Science Committee, Almaty, Kazakhstan, e-mail: z-mustafa@rambler.ru,

Duman ALIASKAROV
Abai Kazakh National Pedagogical University, Department of Geography, Almaty, Kazakhstan, e-mail: duman_06@mail.ru

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Abstract: The article presents the scientific results of a study for the assessment of agricultural land in Zhambyl region of the Republic of Kazakhstan based on field studies in 2020-2021 and modern GIS technologies. The purpose of the study of the article is a comprehensive assessment of land resources used for agricultural production in Zhambyl region, identifying the prevailing areas of agricultural land, irrigated and rainfed pastures by administrative districts of the region. In the course of the scientific study, proven Kazakhstani methods of assessing the state of agricultural land, successfully applied to the arid agricultural regions of Kazakhstan, as well as methods of geographical and agricultural sciences for land analysis and calculation according to the structure of use, were used. Based on the statistical data of the Committee of Land Resources and preliminary regional plans, a map of the land fund of the Zhambyl region by land categories was created. The results of the study allow business entities, especially farms, to organize the rational use of irrigated lands, including pastures and hayfields, including the sustainability and profitability of agricultural production, as well as successfully develop agro-landscape tourism.

Key words: land fund, agriculture, reserve land, arable land, pastures, hayfields, and irrigated agriculture

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INTRODUCTION

The balance of agricultural sector is determined by the interaction researches that study: natural systems, agricultural environmental management (Quinio et al., 2022), assessment of natural resource potential, based on the landscape-ecological approach (Kuderin et al., 2019). From the new pressures of international economic integration and the impact of climate change, the need for the development of high-tech agriculture (HTA) is put at the forefront towards the goal of improving efficiency, breakthrough in productivity, and quality of products (Vu et al., 2021). Reaching sustainability goals at a regional scale requires an adequate combination of innovations at the field scale (agro ecological techniques) and adaptation of farm structure organization (integrated farming system, resource allocation), markets, supply chains, and policies (Selbonne et al., 2022). Agricultural land provides the largest share of food supplies and ensures an essential number of ecosystem services (e.g., providing food, fuel, fibre) (Viana et al., 2021). Agricultural food products (Hou et al., 2022) remain in perpetual demand because of the increasing population, rapid urbanization and urban growth, declining productivity of the agricultural land, climate change. Land suitability appraisal is the evaluation and aggregation of the suitability of particular areas of land for defined uses. It is a tool for deciding the factors that inhibit a crop from growing (Talukdar et al., 2022). Land suitability evaluation involves qualitative valuations of topography, vegetation, climate, hydrology, and soil properties and quantitative valuations that rely on yield estimates (Schmidt et al., 2022).

Zhambyl region is one of the largest agricultural regions of the Republic of Kazakhstan. Zhambyl region of the Republic of Kazakhstan has agro-climatic, land and water resources, capable of providing the population of the region with its own agricultural products. However, in the future, the region's water supply may become a serious limiting factor in the development of irrigated agriculture and flooding of pastures. The growing limitation of water resources is associated with their interstate distribution, severe limitation of water use, and changes in the regime of the Shu and Talas rivers (Geldyeva et

* Corresponding author

al., 2011). For the agriculture of the region, the problems of providing industries (crop raising and livestock) with water resources and fertile agricultural land, and the related problems of providing the population with food is one of the key problems of sustainable development of agriculture (Recommendations on the agricultural system of the Zhambyl region, 1978).

Naturally and climatically, the region is located in the desert zone of the temperate zone, characterized by a low amount of precipitation, high evaporation, significant daily and annual fluctuation in air temperature, which results in a sharp continentality and aridity. The key peculiarity of the climate is aridity, which directly determines the uniqueness of the region's landscape. Aridity and the anhydrous conditions of the territory, the salinity of soils and the low productivity of vegetation hinder the economic development of these vast lands (Vlasenko et al., 2011). The annual precipitation is no more than 250 millimetres and in many areas their amount varies from 100 to 200 millimetres (Consolidated Report on environmental protection in the Republic of Kazakhstan: statistical publication, 2020). For summer, high temperature is typical. The average air temperature in July ranges from 23-25°C in the north to 30°C in the south of the region. The amount of precipitation increases from north to south. In the desert part of the region, precipitation is 100-150 mm per year, while in the mountains up to 500 millimetres (Consolidated report on the state and use of lands of the Republic of Kazakhstan: statistical publication, 2020). The following agro-climatic regions are distinguished within the region: very dry moderately hot, very dry hot, dry hot, very arid foothill and mountainous, moderately arid and moderately hot. In agricultural terms, the most significant are the agro-climatic areas - dry, hot and very arid foothill, where irrigated and rain-fed land is mainly concentrated, used for sowing grain, fodder and vegetable crops, where transhumance is practiced at short distances from settlements (Erdavletov et al., 2008).

The existence of 10486.6 thousand hectares of agricultural land in Zhambyl region dictate the diversity of specializations of agricultural formations, the structure of which is prevailed by farms (8.5% of the number of agricultural formations) and households of the population (91.1%). The primary objective of the region's agriculture is the production of crops, production of feed in the quantities necessary for the development of animal husbandry (About change in agriculture of the Zhambyl region: statistical publication, 2019). The main commodity branches of crop production in the region are grain farming (wheat, oat, barley, millet) (Department of Land Relations of Akimat of Zhambyl region, 2020).

MATERIALS AND METHODS

The study of land resources of Zhambyl region was based on the methods of geographical and agricultural sciences. The theoretical and methodological basis of the study included: setting of a problem, development of an action program for the implementation of the tasks assigned with the definition of the key working hypotheses and priorities, selection and justification of the methodological framework adapted to the tasks assigned, stock and expeditionary collection of materials on the current state of land resources, creation a series of cartographic models (Figure 1) (Mazhitova et al., 2018). Based on the statistical data of the Land Resources Committee of Zhambyl region of the Republic of Kazakhstan and preliminary regional plan, using remote sensing data, a map of the land fund of Zhambyl region was created (Figure 1), which allowed us to assess its structure and territorial distribution of the region's land by categories. The majority of issues associated with the territorial distribution of the land fund of the Zhambyl region require methods that can be integrated in GIS, which are powerful tools designed for managing, transforming and representing referenced data spatially (Dehimi, 2021) Mapping farmlands with different land use categories is important for understanding regional water needs, agricultural production, water resources consumption and vulnerability to climatic extremes (Raei et al., 2022).

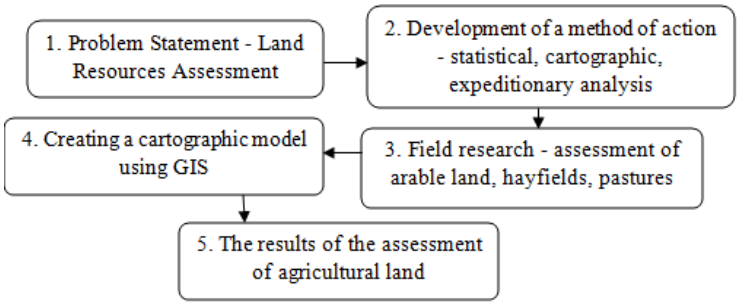

Figure 1. Flowchart of the study of land resources of the Zhambyl region (Source: Prepared by the authors)

In the land fund of the region, which is 14426.3 thousand hectares, prevail agricultural land (30.8% of the land fund area) (Figure 2). Agricultural land is the key category of land used for agriculture (crop production and livestock). In the territory of the region, there are 4448.3 thousand hectares (37% of the territory of the whole land fund) (Consolidated report on the state and use of lands of the Republic of Kazakhstan: statistical publication, 2020).

Reserve land, accounting for 2094.6 thousand hectares (18% of the land fund territory) are the fixed reserves for the resumption of transhumance in the region over long distances. Most of these lands are concentrated in the territory of Moiynkum (608.9 thousand hectares) and Sarysu (1017.2 thousand hectares) districts, however, due to the low watering of pastures (70% of pastures) and poor condition of flooding installations (50% is in good condition), only 60% can be used for pasture (field studies in 2018). The production yield in the spring period on these lands is 1.5-2.5 c/hectare of dry weight, in autumn it is somewhat less (1.1-2.2 c/hectare), in general it ranges from 80 to 104 c/hectare of fodder units.

According to field studies in 2019, agricultural land is mainly concentrated in the southeastern, southwestern and southern parts of the region. Most of them are in T. Ryskulov district (748.1 thousand hectares) (Figure 3).

The development of agriculture in the region (livestock and crop production) depends on the availability of farm land in all categories of land. In the territory of the region, agricultural land in 2017 was 10486.6 thousand hectares or 72.7% of the land area of the region. The structure of agricultural land is represented by arable land (8.0% of the area of agricultural land), pastures (90.0%), hayfields (1.99%) and perennial plants (0.01%). On average, there are 12.6 hectares of agricultural land per resident of the region, and for administrative districts, these values range from 2.3 hectare/person (Zhualy district)

to 58.7 hectare/person (Moyinkum district). In regional terms, the largest areas of these lands are concentrated in Moiynkum (24.5% of the area of agricultural land in the region), Sarysu (22.6%), Shu (10.3%) and Talas (9.9%) administrative districts (Figure 4). Analysis of the dynamics of changes in the area of agricultural land over the past 20 years has shown that there is an increase in their area as a result of development of reserve lands (Consolidated report on the state and use of lands of the Republic of Kazakhstan: statistical publication, 2020). When compared to 2000, the area of agricultural land in all categories of land has increased 1.1 times, excluding hayfields (Figure 5).

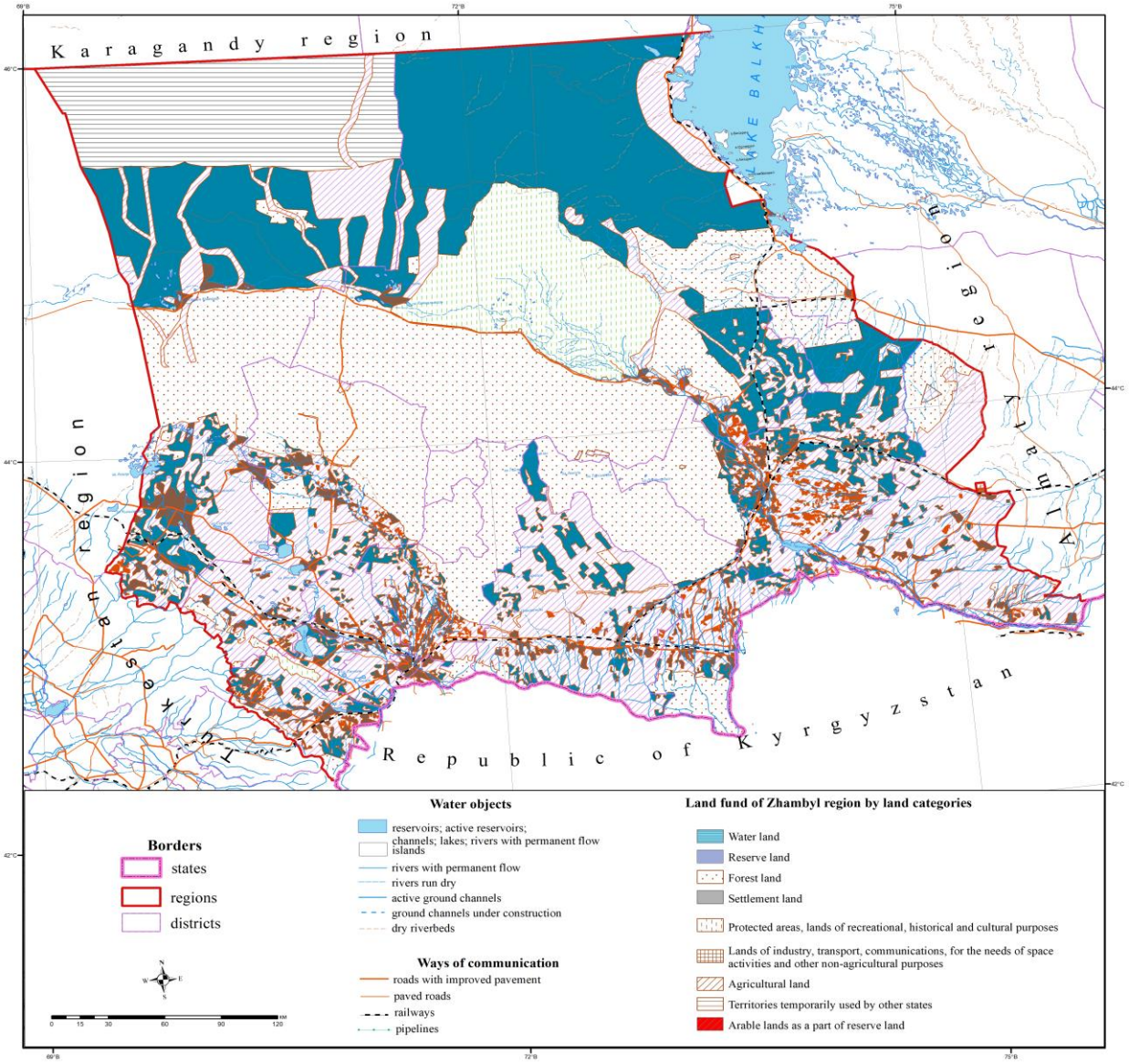

Figure 1. Land fund of the Zhambyl region of the Republic of Kazakhstan
(Source: Prepared by the authors based on Department of Land Relations of Akimat of Zhambyl region, 2020)

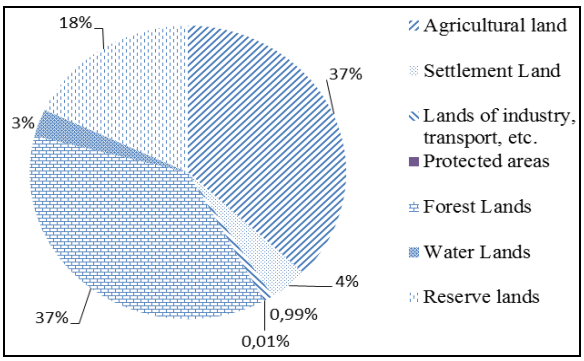

Figure 2. Structure of the land fund of the Zhambyl region (Source: own editing with Microsoft Excel 2010 and on the basis of the Consolidated report on the state and use of lands of the Republic of Kazakhstan: statistical publication about land fund, 2020)

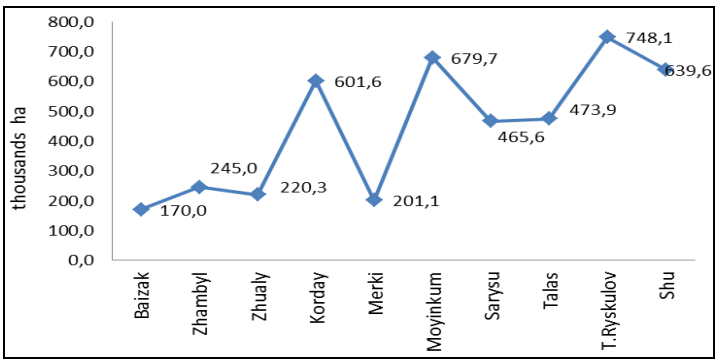

Figure 3. Availability of agricultural land by administrative districts, thousand hectares (Source: own editing with Microsoft Excel 2010 and on the basis of the Consolidated report on the state and use of lands of the Republic of Kazakhstan: statistical publication about agricultural land, 2020)

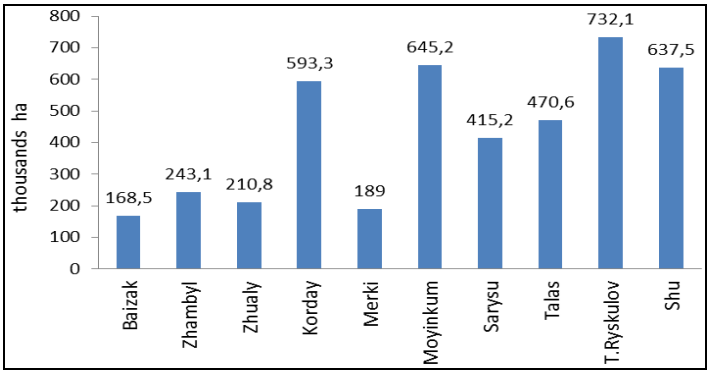

Figure 4. Availability of agricultural land, thousand hectares (Source: own editing with Microsoft Excel 2010 and on the basis of the Consolidated report on the state and use of lands of the Republic of Kazakhstan: statistical publication about agricultural land, 2020)

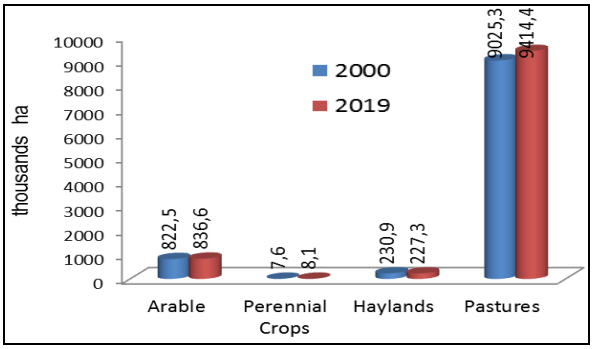

Figure 5. Dynamics of agricultural land, thousand hectares (Source: own editing with Microsoft Excel 2010 and on the basis of the Consolidated report on the state and use of lands of the Republic of Kazakhstan: statistical publication about agricultural land, 2020)

RESULTS AND DISCUSSION

Agricultural lands are composed of three dimensions: the *structure*, which is the visual appearance of the landscapes; the *function*, which refers to the cultural, environmental, and economic benefits that the agricultural land provide to society (e.g., production of food and fiber, recreational services); and the *value*, which refers to the economic assessment of the landscapes, including producers' maintenance and production costs, and society's valuation (Gao et al., 2014).

The territorial distribution of agricultural land in the region directly depends on soil fertility and the availability of water resources. Irrigation systems modulate agricultural productivity, and are associated with significant implications for the soil, water resources, sustainable development and the environment. Efficient irrigation systems lead to a substantial decrease in labor and water needs in comparison with traditional surface irrigation methods (Raei et al., 2022). In the territory of Zhambyl region, all the diversity of soil is distributed by zones - high-mountain, mountain-steppe, low-mountain and foothill, desert. The content of organic matter in the region's soil - humus is one of the conditions for the yield of agricultural crops, and serves as the key criteria for assessing soil fertility. The results of field studies showed that the share of soil area with a high content of humus in the Zhambyl region is 5%, average 26%, low 69%. The main types of soil in the region are gray soil (ordinary, light and dark), brown and gray-brown soil.

1. The high-mountain zone includes the territory of the region with an altitude of 2000 -4600 meters. The soil cover is represented by mountain-meadow alpine and mountain-meadow subalpine soil. Soil features are high humus content (8-20%) and thick sod layer (15-20 cm). Soil varieties are arranged in a vertical sequence. Mountain meadows and meadow-steppes of the high-mountain zone are mainly used as summer pastures.

2. The mountain steppe zone includes the territory of the region with an altitude of 1200 - 2000 meters. The main types of soil are mountain black soil and mountain dark chestnut soil with humus content of 3-9% and up to 1% of gross nitrogen. The soil of the zone is poorly used in agriculture due to the strong ruggedness of relief.

3. Low-mountain and foothill zone (altitude of 700 - 1200 meters). The main types of soil are light chestnut and gray soil (ordinary and northern). The upper layers of light chestnut soil contain up to 2.5% humus. The lands are used for agricultural production (livestock and crop production). Grey soil is characterized by low humus content (less than 2%). Common gray soil produces a good yield with intensive irrigation and the use of organic and mineral fertilizers.

4. The desert zone covers a significant area of the region, and the soil cover is represented by takyr-like, gray-brown soil and sandy massifs. Takyr-like soil is low-humus (0.3-1.0%), carbonate from the surface, saline from a depth of 30-40 cm. Land development is possible with irrigation and full-scale reclamation. Gray-brown soil contains up to 1.5% humus, prevailing in Betpakdala, the degree of salinity is different. Sand within the region covers 20-25% of the total land area and distributed in large massifs throughout the territory, with a great economic importance as autumn-winter pastures and forest land (Krylova et al., 2020).

Arable land

836.5 thousand hectares of arable land are used for agriculture in the Zhambyl region, which is 8% of the agricultural land, of which 210 thousand hectares of land are irrigated (25.1% of the arable land). Most of the arable land is located in Korday (142.1 thousand hectares), Shu (146.8 thousand hectares) and T. Ryskulov (148.1 thousand hectares) districts (Figure 6).

Significant irrigated areas (in terms of land fund) are concentrated in Baizak (32.8 thousand hectares), Korday (47.9 thousand hectares), Zhambyl (44.3 thousand hectares) and Shu (34.5 thousand hectares) districts. Irrigated arable land in the region occupies 25.1% of the area of all arable land, distributed unevenly and confined mainly to the valleys of the Shu, Talas and Assa rivers, as well as to the foothill alluvial-proluvial plains of Talas, Zhualy, Zhambyl, Baizak, Lugovsky, Merken and Korday districts. The productivity of the region's arable land depends mainly on the soil fertility. It has been found that out of 210.0 thousand hectares of irrigated arable land, only 9.2 thousand hectares have the soil ball-bonitet of over 50.

In this area, efficient cultivation of agricultural crops is possible. 170.7 million hectares of irrigated arable land has the soil ball-bonitet of 40 - 50; good crop yield is guaranteed here. On irrigated area of 26.1 thousand hectares, the soil ball-bonitet is less than 40. The highest ball-bonitet of irrigated arable land is observed in Zhualy district, namely 57. As for the average-weighted ball-bonitet of agricultural land in Zhambyl region, then it is worth to highlight Korday, Merken and T. Ryskulov districts, where the ball-bonitet is 20. The distribution of the soil bonitet of irrigated arable land over the territory of the region

has a zonal-provincial nature. The extreme values of bonitet vary from 25 to 57, which naturally determine the different ecological stability of soil and different approaches to farming systems, including fertility maintenance measures. Considering the ratio of soil bonitet of rain-fed arable land and pastures in the region, it can be noted that the most insignificant differences (17-21%) are observed in Zhualy, Korday and Merken districts, distinguished by the most fertile soil. The bulk of crop production comes from irrigated arable land, which accounts for one third of the arable fund of the region (Krylova et al., 2020).

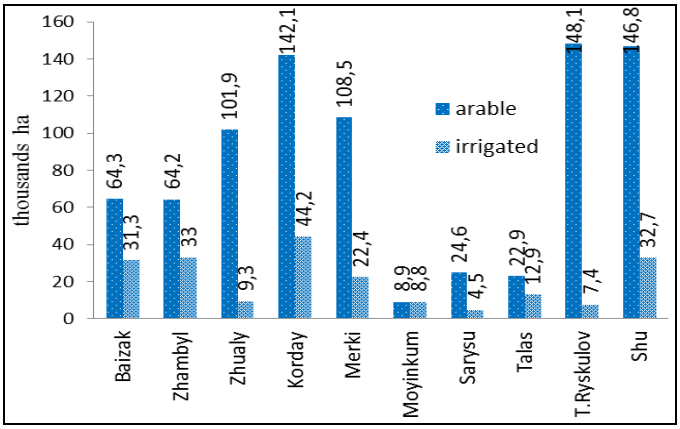

Figure 6. Area of arable land in Zhambyl region, thousand hectares (Source: own editing with Microsoft Excel 2010 and on the basis of the Consolidated report on the state and use of lands of the Republic of Kazakhstan: statistical publication about arable land, 2020)

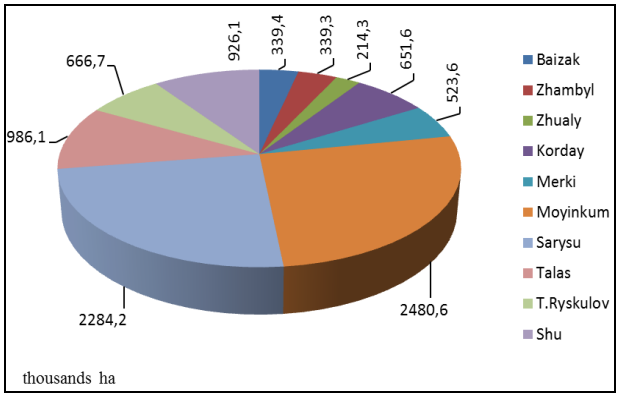

Figure 7. Area of pastures by districts of Zhambyl region, thousand hectares (Source: own editing with Microsoft Excel 2010 and on the basis of the Consolidated report on the state and use of lands of the Republic of Kazakhstan: statistical publication about pastures, 2020)

Pastures

The unique feature of pastures in the Zhambyl region is their diversity. In the structure of the agricultural land of the region in all districts, pastures prevail, accounting for 9414.4 thousand hectares (90% of the area of agricultural land), of which about 72.8% are watered, 13.5% are degraded (Figure 7, Table 1). In general, due to the decrease in the population of farm animals, the load on pastures has been reduced in recent years; however the negative effects of overgrazing continue to manifest themselves. As a result of the difficult economic situation of the population and business entities of the agricultural sector, livestock began to be concentrated near settlements. An increase in the load on near-village and watering pastures for a long period has resulted in a very strong degree of degradation due to failure and irregular grazing. As a result of denationalization and privatization, the unified system of inter-republican, inter-regional and inter-district regulation of animal husbandry has been destroyed, in particular the issues of seasonal transhumance of cattle for the rational use of pastures. This factor negatively affects both the level of livestock development and the state of pastures.

Table 1. Pastures of Zhambyl region
(Source: personal original data, and also Geldyeva et al., 2011, Bassova et al., 2019)

District	Prevailing group of pastures	Yield, c/hectare	Area of degradation, thousand hectare
1. Baizak	absinthic-Kochia prostrata shrub	3.5	116.8
2. Zhambyl	grey absinthic-ephemerous	3.6	134.6
3. Zhualy	cespitose-elac with ephemera	5.8	88.9
4. Korday	cereal-ephemerous	4.7	145.3
5. Merken	absinthic-cereal	4.4	135.8
6. Moyinkum	grey absinthic- thirst-quenching biyurgun	3.5	188.4
7. Talas	absinthic of various grasses	4.2	77.9
8. Sarysu	absinthic -thirst-quenching	3.0	206.4
9. T. Ryskulov	various grass-cereal-absinthic	5.3	90.5
10. Shu	grey absinthic-ephemerous	4.4	82.6

The vegetation of the forage land of the region is distinguished by a peculiar species composition, morphological and biological features of plants, and the nature of plant communities. Its essential features are the absence or a slight abundance of cereals, sparseness of grass and the poor floristic composition of plant aggregations. The complex of natural conditions predetermined the adaptability of desert plants to drought and increased amount of salt in soil. The pasture areas of the region are characterized by the predominance of xerophytic (drought-resistant) and halophytic (salt-tolerant) sub-shrubs and dwarf shrubs. There are few herbage plants of the early summer development cycle, mainly sod grasses - erkek, wheat grass, and rare feather grass. The landscape species in this area are *white-ground sagebrush, Turanian, Salsola arbuscula, and biyurgun* (Bassova et al., 2019). The wide distribution of white-ground *sagebrush* and the diversity of communities in which it prevails are explained by great ecological adaptability and low requirements for soil. The yield of *absinthic-ephemeral* pastures varies significantly in different areas depending on the moisture and temperature conditions. In dry years, the yield can be 1-2.5 c/hectare, and in wet years up to 4-5 c/hectare. The production yield in the spring period is 1.6-3.25 c/hectare of dry weight, in autumn it is somewhat less (1.0-3.4 c/hectare), in general it can range from 83 to 106 c/hectare unit. Turan-absinthic pastures are widespread in Betpakdala, represented by *Turan-absinthic, Turan- absinthic-thirst-quenching, Turan - absinthic-keireuk* and other types of pastures (Kurochkina, 1978; Kirichenko, 1980; Torehanov, 2006). The projective soil cover by plants on *sagebrush* is 40-50%. The average yield for the pasture season ranges from 1.1-2.9 c/hectare unit.

According to field studies of pastures, a significant part is degraded, which entailed decrease in productivity and forage capacity, increase of annual *saltwort and ephemers* in the share of grass that are low-edible by livestock, inedible and poisonous plant species. Within sandy massifs of Moiynkum, covered by *sagebrush-black saksaul-annual saltwort groups* of pastures on arid soil, sometimes with *sagebrush-erkek, astragalus* on the sand, there is a load on 100 hectares of background pastures - 33 units of sheep, degraded - 27 units of sheep. There are about 1.4 million reduced pastures in the

region. The forage base of the region determined the development of animal husbandry. There are 321.0 thousand heads of cattle, 2212.6 thousand heads of sheep, 105.0 thousand heads of horses, 5.7 thousand heads of camels. The dynamics of livestock (of all species) showed that in the region there is a decrease in the sheep population (the main specie of grazing livestock) from 2413.2 thousand heads in 2015 to 2212.6 thousand heads (by 1.1 times).

In general, due to the decrease in the population of farm animals, the load on pastures has been reduced in recent years, but the negative effects of overgrazing continue to manifest themselves. As a result of the difficult economic situation of the population and business entities of the agricultural sector, livestock began to be concentrated near settlements. An increase in the load on near-village and watering pastures for a long period has resulted in a very strong degree of degradation due to failure and irregular grazing. As a result of denationalization and privatization, the unified system of inter-republican, inter-regional and inter-district regulation of animal husbandry has been destroyed, in particular the issues of seasonal transhumance of cattle for the rational use of pastures. This factor negatively affects both the level of livestock development and the state of pastures. The survey showed that in the northwestern part of the region, far from densely populated areas, the process of pasture degradation has been suspended and even their natural restoration is observed.

Hayfields

Hayfields in the region occupy 227.3 thousand hectares, of which the area of basin irrigation is 15.0 thousand hectares. The regulation of the flow of the Talas, Shu, Assa rivers and human business activity worsens the moisture regime of natural hayfields, which entailed reduction in their area. When compared to 2000, the area of hayfields have decreased by 3.6 thousand hectares. Based on the field studies and analysis of statistical data of land resources for 2014-2019, the average yield of hayfields in the region was determined in the context of prevailing groups of pastures by administrative districts (Table 2). On average, the yield of natural hayfields decreased from 6-8 c/hectare to 4 c/hectare. In addition to decrease in productivity, there is reduction in the area of hayfields, the main areas of which are located in the floodplains of the Shu, Assa and Talas rivers. As a result of reduction of surface runoff in the lower reaches of rivers, intensive drying of the territory, salinization and degradation of hayfields with a sharp change in plant communities take place. The importance of vegetation cover as a recreational resource is very great for all other types of natural tourism, as it is associated with the health -improving effect of the landscape, the presence of attractive plants and animal species due to ionization, and phytoncide properties of plants (Mukayev et al., 2022). At the beginning of 1960, the area of natural flooded hayfields of the region were 400 thousand hectares, and in 2019 it was already 60-120 thousand hectares, which affected the forage capacity of lands decreased by 3.5 times. Among the key reasons worsening the condition of hayfields are changes in the hydrological and hydrochemical regime of water bodies; absence of a departmental arm in charge of the protection, regulation, and use of plant resources along riverbeds and other water bodies. The visual quality of the rural scenes largely depends on their natural features mainly in terms of the degree of wilderness, percentage of plant and vegetation cover, availability of water resources, and color contrast. These natural features, in turn, are associated with people's preferences, thus becoming major attractions in the context of nature based tourism and outdoor recreation (Gao et al., 2014). As for the agricultural features, rural tourists are more likely to accept well landscaped farm operations. Specifically, the deliberate incorporation of trees or shrubs in combination with other farming features (e.g., animals in the fields) helps to diversify the visual appearance of agricultural landscapes, enhance opportunities for recreational activities, thereby improving the aesthetics of the farmland. Regarding cultural features, well-preserved man-made structures and buildings (e.g., barns, storage sheds) and farm mechanization features (e.g., tractors, windmills) have been suggested to be important elements associated with the visual quality of rural landscapes and, thus, need to be considered when planning the modernization of rural areas (Tyndall et al., 2007).

Table 2. Current state of hayfields in Zhambyl region
(Source: personal original data, and also Geldyeva et al., 2011, Bassova et al., 2019)

District	Prevailing group of pastures	Area, hectare	Average yield, c/hectare
1. Baizak	wood reed- licorice-various grass	6579	6.4
2. Zhambyl	various grass-ephemerous	9452	5.3
3. Zhualy	cereal-various grass with sagebrush	6640	8.4
4. Korday	cereal-various grass with sagebrush	9568	5.6
5. Merken	reedy- Kochia prostrata-various grass	7606	6.0
6. Moyinkum	wood reed-reedy-various grass	75406	7.9
7. Talas	reedy-sedgy-wood reed	62199	7.2
8. Sarysu	wood reed-reedy-wheat grass	24173	6.8
9. T. Ryskulov	various grass- ephemerous	20211	7.1
10. Shu	reedy-wheat grass with licorice	5486	6.1

CONCLUSION

Assessment of land resources used for agricultural production in the Zhambyl region showed that:

1. 72.7% of the total land fund is used for irrigated and rain-fed agriculture, grassland farming. In the structure of agricultural land in all categories of land, pasture areas prevail, accounting for 90% of the area of agricultural land. The main pastures are concentrated on the sandy massifs of Betpakdala and Moiynkum with an average annual yield of 1.1-2.9 centner per hectare. The natural forage base of the region determined the directions for the development of animal husbandry (cattle breeding, sheep breeding and horse breeding).

2. Reserve land, accounting for 2094.6 thousand hectares are the fixed reserves for the resumption of transhumance in the region, however, due to the low watering of pastures (70%) and poor condition of flooding installations, only 60% can be used for pastures.

3. The most fertile agricultural land is concentrated in Zhualy, Baizak and Merken districts, where the weighted average soil ball-bonitet is 42-53 points for irrigated arable land, and 19-20 points for agricultural land.

4. Over the past five years, the livestock population has decreased by 1.1 times in the region. Due to the decrease in the population of farm animals, the load on pastures has been reduced by 1.2 times; however, the negative effects of overgrazing continue to manifest themselves, especially around settlements.

5. Arable land is 836.5 thousand hectares (8% of agricultural land), of which 210.0 thousand hectares of land is irrigated (25.1% of the arable land). 9.2 thousand hectares of irrigated land have a soil ball-bonitet of over 50 units.

6. The agritourism value of the territory decreases and has the smallest importance with monotonous relief and uncomfortable climate, water deficiency, poorly represented flora and fauna in conditions intensive drying of the territory and expansion of desert landscapes.

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