European Journal of Agricultural and Rural Education (EJARE)
Available Online at: https://www.scholarzest.com
Vol. 7 No. 03 March 2026
ISSN: 2660-5643

SHARE OF RAINFED LANDS IN THE LAND FUND STRUCTURE OF KASHKADARYA REGION

Ne'matov Izzatillo Rahmat O'g'li
ORCID: [0009-0001-4759-4972]
Organization: "O'zdavyerloyiha" State Scientific Design Institute

Article history:

Received: 30th November 2025
Accepted: 28th December 2025

Abstract:

This article analyzes the geographical distribution, relief characteristics, climatic conditions, and land fund structure of rainfed agricultural lands in the Kashkadarya region. The main objective of the study is to identify the spatial distribution patterns of rainfed lands in the area and to assess their agro-ecological potential.

Keywords: *Rainfed land, land fund, hydrometeorology, agrotechnology, climate, category, cadastre, resources, relief.*

INTRODUCTION. Rainfed agriculture plays an important role in ensuring food security and promoting the efficient use of land resources in arid and semi-arid regions of Central Asia. In the Republic of Uzbekistan, particularly in the Kashkadarya region, a significant portion of agricultural lands consists of rainfed areas that depend on natural precipitation.

The limited availability of water resources in the region, uneven distribution of precipitation under the influence of climate change, and high evaporation processes further increase the importance of rainfed farming. Therefore, a comprehensive study of the geographical location of the area, relief characteristics, climatic indicators, and the structure of the land fund is essential for assessing the agro-ecological potential of rainfed lands.

The aim of this study is to analyze the spatial distribution of rainfed lands in the Kashkadarya region, examine their climatic conditions and land resource composition, and determine their significance in agricultural production.

MATERIALS AND METHODS. Rainfed agricultural land areas of the Kashkadarya region were selected as the main object of the study. The region is located in the south-western part of the Republic of Uzbekistan and covers an area of 28.57 thousand km². The territory of the region consists of mountainous areas, foothill адыр (undulating) zones, plains, and desert landscapes.

The research was based on statistical data on the land fund provided by the Cadastre Agency of the Republic of Uzbekistan as of January 1, 2025, as well as climatic indicators obtained from the Shahrisabz hydrometeorological station.

The spatial distribution of rainfed lands at the district level and their relationship with relief and climatic factors were examined using methods of territorial comparison, statistical analysis, and a geographical approach.

RESULTS AND DISCUSSION. According to the data of the Cadastre Agency under the Ministry of Economy and Finance of the Republic of Uzbekistan [1], as of January 1, 2025, the total land area of the Kashkadarya region amounts to 2,856.8 thousand hectares. Information on the distribution of the regional land fund by land categories is presented in Table 1.

Table 1. Distribution of land fund categories as of January 1, 2025

No	Land fund categories	Area (thousand hectares)	Share of total area %
1	Agricultural lands	2 328,8	81,5
2	Settlement lands	12,5	0,4
3	Lands designated for industry, transport, communication, defense and other purposes	70,2	2,5
4	Lands for nature protection, health improvement and recreational purposes	69	2,4

5	Lands of historical and cultural significance	2,6	0,1
6	Forest fund lands	319,6	11,2
7	Water fund lands	53	1,86
8	Reserve lands	1,1	0,04
	Total:	**2 856,8**	**100**

***Source:** Cadastre Agency data.*

The table shows that the largest share of the regional land fund is occupied by agricultural land categories, accounting for 81.5% of the total territory. These lands are allocated for crop production, horticulture, livestock farming, and other agricultural activities, forming the main sector of the regional economy.

Irrigated lands constitute 522,605 hectares of the total land fund of the region, which corresponds to 18.3% of the overall area. Irrigated areas are generally characterized by higher productivity and play a key role in ensuring stable crop production, maintaining food security, and promoting the development of the agricultural sector.

The distribution of the total area of the Kashkadarya region and irrigated lands at the district level is presented in Figure 1 [2].

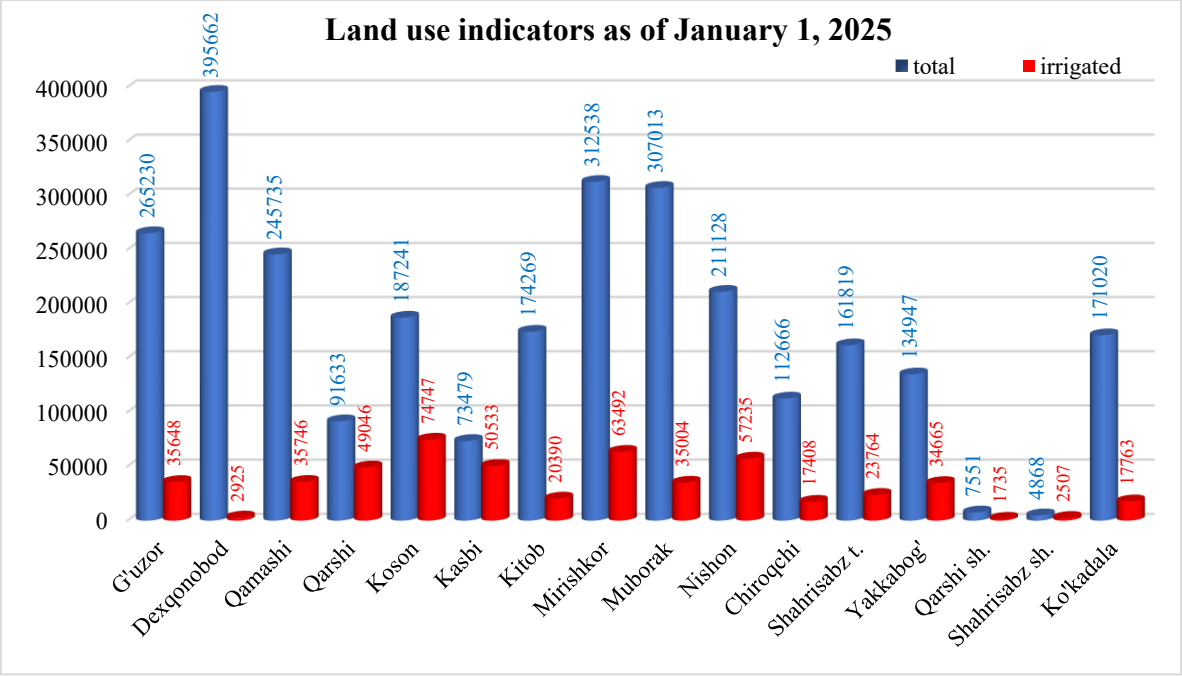

***Figure 1.** District-level distribution of the total land fund of the region.*

As shown in Figure 1, there are significant differences between the total land area and irrigated land indicators across the districts. The results of the analysis indicate that the level of land resource utilization is not uniform throughout the region. In some districts, although the total land area is relatively large (for example, Dehqonobod), the share of irrigated land remains comparatively low. In contrast, districts such as Koson, Mirishkor, and Nishon demonstrate higher proportions of irrigated areas.

In the region, the total area of agricultural land types amounts to 2,140,970 hectares, of which 467,861 hectares are irrigated lands. Agricultural land types occupy a specific and important position within lands designated for agricultural purposes. These lands are classified into arable lands, perennial plantations (orchards, vineyards, mulberry plantations, fruit tree nurseries, and other fruit-bearing areas), fallow lands, hayfields, and pastures [2].

Arable lands include all ploughed areas that are continuously used for the cultivation of agricultural crops. Arable lands are divided into two types: irrigated and rainfed lands. In the region, the total area of arable lands amounts to 677,281 hectares, of which 426,467 hectares are irrigated and 250,814 hectares are rainfed.

Perennial plantations refer to lands occupied by orchards, vineyards, mulberry plantations, and fruit shrubs, covering an area of 38,895 hectares, including 36,692 hectares of irrigated lands.

Fallow lands include irrigated and rainfed arable lands that have been withdrawn from agricultural production due to inefficient use, violations of irrigation practices, deterioration of soil reclamation conditions, erosion processes, severe salinization and gypsum accumulation, as well as the degradation of newly developed lands. The total area of such lands is 21,900 hectares, of which 4,591 hectares are irrigated.

Hayfields and pastures occupy a large portion of the regional territory. These lands serve as the primary fodder base for livestock development and cover an area of 1,402,894 hectares, including only 111 hectares of irrigated lands.

Table 2 presents the distribution of agricultural land types by districts and cities. The data indicate that the largest share of agricultural land belongs to Mirishkor district (277,343 hectares), while the smallest shares are observed in Kasbi district (51,083 hectares) and Shahrisabz city (619 hectares). The extremely low indicator in Shahrisabz city is

associated with its administrative-territorial status, the level of urbanization, and the fact that a significant part of its land fund is occupied by industrial, residential, and social infrastructure facilities.

Arable lands cover 677,281 hectares in total, of which 426,467 hectares are irrigated. This indicator confirms the dominant role of irrigated farming in the regional agricultural production system. In particular, irrigated land areas account for a higher proportion in districts such as Koson, Mirishkor, and Nishon.

Spatial distribution of agricultural land categories across districts of the Kashkadarya region (*table 2*)

Districts	Total agricultural lands		Including:							
			Arable lands		Perennial plantations		Fallow lands		Pastures and hayfields	
	total	irrigated	total	irrigated	total	irrigated	total	irrigated	total	irrigated
Guzor	231 453	33 314	61 673	31 773	1 090	1 090	451	451	168 239	
Dehqonobod	239 664	2 219	44 430	1 868	653	240	3 476		191 105	111
Qamashi	173 459	31 065	62 870	28 931	2 156	2 122	769	12	107 665	
Qarshi	64 891	43 495	44 027	40 935	2 560	2 560	755		17 549	
Koson	143 262	67 100	74 290	62 406	2 231	2 231	2 513	2 464	64 229	
Kasbi	51 083	46 312	44 527	44 527	1 785	1 785			4 771	
Kitob	101 037	16 114	20 196	8 427	8 752	7 687	1 198		70 891	
Mirishkor	277 343	59 386	56 058	56 058	1 664	1 664	1 870	1 664	217 751	
Muborak	260 537	32 137	33 592	31 612	525	525			226 420	
Nishon	154 657	53 466	52 137	52 137	1 329	1 329			101 191	
Chiroqchi	90 061	14 375	37 845	12 550	1 840	1 825	575		49 801	
Shahrisabz t.	101 836	22 190	23 893	17 783	4 928	4 407	425		72 590	
Yakkabog`	98 994	29 544	35 622	21 378	8 271	8 166	2 232		52 870	
Qarshi sh.	1 893	744	534	503	241	241			1 118	
Shahrisabz sh.	619	578	475	475	103	103			40	
Ko`kdala	150 183	15 823	85 116	15 106	768	717	7 636		56 664	
Jami:	**2 140 970**	**467 861**	**677 281**	**426 467**	**38 895**	**36 692**	**21 900**	**4 591**	**1 402 894**	**111**

The structural analysis of arable lands in the Kashkadarya region indicates a specific ratio between irrigated and rainfed areas. The region has a total of 677.3 thousand hectares of arable land, of which 426.5 thousand hectares are irrigated, while the remaining 250.9 thousand hectares are rainfed lands. This means that approximately 37% of the cultivated areas are utilized based on natural precipitation.

Compared to irrigated soils, desert zone soils, rainfed soils, and soils of higher altitudinal zones are more widely distributed in the region. In terms of salinity, slightly and moderately saline irrigated soils are more common, whereas strongly and very strongly saline soils are relatively limited. The total area of saline lands in the region amounts to 205,757.2 hectares [3].

Although the Kashkadarya region possesses high potential for agricultural production, the full utilization of agricultural lands is constrained by water scarcity. The main water demand of the region is met through the use of reservoirs such as Tallimarjon, Pachkamar, Chimqo‘rg‘on, Hisorak, and Qizilsuv, as well as the natural water body Sechanko‘l and groundwater reserves in the Yakkabog‘, Kitob, and Shahrisabz districts. At present, these groundwater reserves are being used beyond sustainable limits for water supply purposes. As a result, the level of fresh groundwater resources has significantly declined [4].

Rainfed arable lands are mainly located in areas with limited water resources, particularly in foothill, hilly, and desert zones. In these areas, productivity levels may be lower compared to irrigated lands; however, they play an important role in grain production and fodder cultivation. Therefore, improving the reclamation condition of rainfed lands, introducing moisture-saving agricultural technologies, and selecting climate-adapted crop varieties are key factors in enhancing the agricultural potential of the region.

Environmental changes caused by human activities are increasingly affecting the region and contributing to the intensification of desertification processes. In particular, climate change, irregular annual precipitation patterns, and global warming phenomena indicate the disruption of natural ecological balance. All these factors are leading to the expansion of arid territories and are significantly influencing the agricultural sector.

As of January 1, 2025

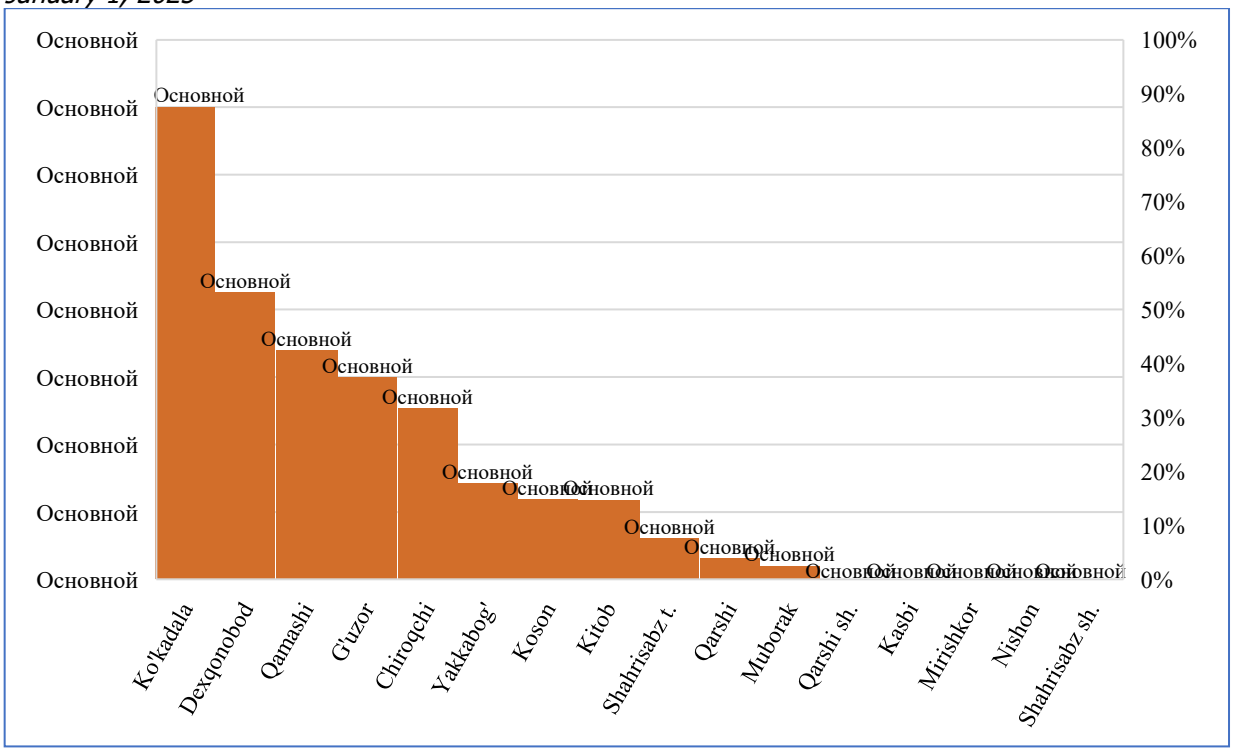

Figure 2. *District-level distribution of rainfed agricultural areas in the region*

Rainfed lands in the region are distributed depending on the geographical location, spatial position, and relief characteristics of the districts (Figure 2). The highest indicator is recorded in Ko‘kdala district, amounting to 70,010 hectares. This is followed by Dehqonobod district (42,562 hectares), Qamashi (33,939 hectares), and G‘uzor district (29,900 hectares). In these areas, rainfed farming is relatively well developed due to natural climatic conditions, land relief features, and the limited availability of irrigation infrastructure.

In order to study the current condition of rainfed lands, Kitob district was selected as a case study area. The district has 11,769 hectares of rainfed land, where crops such as wheat, barley, safflower, flax, sesame, sunflower, chickpea, lentil, as well as orchards, vineyards, and other crop types are cultivated and produced [5]. Rainfed agricultural lands in the district are mainly located in foothill and mountain piedmont zones.

Kitob district is situated in the north-eastern part of the Kashkadarya region and borders the Chiroqchi and Shahrisabz districts of the region, as well as Samarkand region and the Republic of Tajikistan. A significant part of its territory is occupied by the high Hissar and Zarafshan mountain ranges (up to 4000 m), stretching along the northern

and eastern borders. These high mountains act as a natural barrier against cold air masses, resulting in the district having one of the most moderate climatic conditions within the region [6]

Mean monthly climatic data recorded at the Shahrisabz meteorological station

Months	Air temperature			Average monthly air humidity, %	Average monthly precipitation, mm	Average wind speed, m/sek
	Average air temperature	Maximum air temperature	Minimum air temperature			
2023 yil						
X	17,3	32,2	4,3	52	29,7	9
XI	14,2	28,8	4,3	54	37,7	11
XII	7,9	25,0	-1,5	68	35,4	9
2024 yil						
I	7,7	19,9	-0,1	69	83,7	14
II	6,6	24,0	-4,3	64	64,7	17
III	10,5	28,0	-4,5	65	92,2	16
IV	17,0	30,1	6,2	58	70,4	12
V	21,3	36,8	9,4	59	77,9	13
VI	28,8	39,6	17,7	34	6,8	13
VII	30,1	44,2	17,3	31	0	10
VIII	29,6	42,3	15,5	31	0	8
IX	22,6	36,1	12,0	35	1,6	10
X	17,0	35,0	5,0	58	27	11

Based on the data recorded at the Shahrisabz hydrometeorological station, the following indicators were identified: the average annual air temperature amplitude ranges from +6.6°C to +30.1°C, the maximum air temperature varies between +19.9°C and +44.2°C, while the minimum air temperature ranges from −0.1°C to −4.5°C. The average monthly relative humidity fluctuates between 31% and 69%, the average monthly precipitation ranges from 1.6 mm to 83.7 mm, and the average wind speed varies from 8 to 17 m/s. The first frost in 2023 was observed in December, while the last frost occurred in March 2024.

Spring is early and short-term in the region. Air temperature begins to rise significantly in April, and summer conditions start in May, accompanied by a decrease in precipitation. The average relative humidity in April reaches 58%, while the monthly precipitation can reach up to 77.9 mm. The mean air temperature in April is about +17.0°C. The lowest average minimum temperature was recorded in March (−4.5°C), whereas the highest maximum temperature was observed in May (+36.8°C) [4.1].

CONCLUSION. The analysis revealed that 81.5% of the total land fund of the region is allocated to agricultural lands. The total area of arable land amounts to 677.3 thousand hectares, of which 250.8 thousand hectares are rainfed lands. This indicates that nearly 37% of cultivated areas are utilized based on natural precipitation.

Rainfed lands are mainly located in foothill and hilly areas characterized by complex relief conditions. The largest rainfed areas were observed in Ko‘kdala, Dehqonobod, Qamashi, and G‘uzor districts. In these territories, the limited availability of irrigation infrastructure and specific natural climatic conditions have contributed to the development of rainfed farming systems.

According to the climate analysis results, the average monthly precipitation varies from 1.6 mm to 83.7 mm. Precipitation mainly occurs during winter and spring months and is almost absent in summer. The maximum air temperature reaching up to 44.2°C indicates the presence of intensive evaporation processes.

Pastures and hayfields constitute the largest share among agricultural land types, which reflects the significant role of livestock farming in the region. Despite lower productivity levels compared to irrigated lands, rainfed areas play

an important role in grain production, the formation of fodder resources, and ensuring sustainable land use under conditions of limited water resources.

REFERENCES

1. Land Fund of the Republic of Uzbekistan. – Tashkent: State Cadastral Chamber, 2025. – p. 327.
2. National Report on Land Resources of the Republic of Uzbekistan. – Tashkent: Cadastral Agency, 2025. – p. 20.
3. A.R. Babajanov, S.B. Ro‘ziboyev. Modern methods and foreign experience in organizing the use of rainfed lands // Agrochemistry, Plant Protection and Quarantine. – 2021. – No.1. – pp. 73–75.
4. A.R. Babajanov, S.B. Ro‘ziboyev. Problems in organizing the use of non-irrigated (rainfed) lands // Agro Ilm. – 2017. – No.3 (47). – p. 110.
5. R.N. Sharopov. Digital technologies and their advantages in monitoring rainfed lands // “Uzbekistan Zamini” scientific-practical and innovation journal. – Tashkent: “O‘zdavyerloyiha” DILI, 2025. – No.2. – pp. 43–45.
6. Data of the Kashkadarya Regional Hydrometeorological Center.