ECONOMIC GEOGRAPHICAL FEATURES OF THE USE OF WATER RESOURCES IN AGRICULTURE IN THE KASHKADARYO REGION

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Abstract. *This article analyzes the economic geographical features of the use of water resources in agriculture in the Kashkadarya region. The formation and distribution of water resources in the region, the territorial location of irrigated lands, and factors affecting the efficiency of water use are studied. Also, priority areas for sustainable development of agriculture and efficient use of water resources in conditions of water scarcity are based.*

Keywords: *Kashkadarya region, water resources, agriculture, irrigation, water supply, territorial differences, water scarcity.*

ЭКОНОМИКО-ГЕОГРАФИЧЕСКИЕ ОСОБЕННОСТИ ИСПОЛЬЗОВАНИЯ ВОДНЫХ РЕСУРСОВ В СЕЛЬСКОМ ХОЗЯЙСТВЕ КАШКАДАРЬИНСКОЙ ОБЛАСТИ

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Аннотация. *В статье анализируются экономико-географические особенности использования водных ресурсов в сельском хозяйстве Кашкадарьинской области. Исследуются формирование и распределение водных ресурсов региона, территориальное размещение орошаемых земель, а также факторы, влияющие на эффективность использования воды. Кроме того, обоснованы приоритетные направления устойчивого развития сельского хозяйства и эффективного использования водных ресурсов в условиях дефицита воды.*

Ключевые слова: *Кашкадарьинская область, водные ресурсы, сельское хозяйство, орошение, водообеспеченность, территориальные различия, дефицит воды.*

Introduction. In the context of globalization, climate change and population growth, the issue of rational use of water resources is becoming one of the strategic factors in the development of agriculture. The natural and economic foundations of irrigated agriculture, especially in arid and semi-arid regions, are directly related to the quantity, territorial distribution and efficiency of their use of available water resources. The uneven formation of water resources in space and time, the increase in water demand and losses in irrigation systems require an economic and geographical study of water use in agriculture. In this regard, it is of great scientific importance to determine the relationship between the territorial distribution of water resources, the location of irrigated land, the specialization of agricultural production and the level of water supply.

Kashkadarya region is characterized by a variety of natural geographical conditions, a high level of dependence of agriculture on irrigation, and a diverse distribution of water resources across regions. The characteristics of water resource use in the region are closely related to the river and reservoir system, irrigation infrastructure, land-water relations, crop composition, and territorial specialization. Therefore, it is of great scientific and practical importance to determine the economic geographical characteristics of water resource use in agriculture at the regional level, assess regional differences, analyze factors affecting the efficiency of water use, and determine priority areas for rational use of existing resources. This study aims to study these issues based on a regional approach.

Main part. The strategic importance of the transboundary Amu Darya basin in the agricultural water supply of the Kashkadarya region is extremely great. About 70 percent of the water resources used for irrigation of agricultural crops in the region are formed from the waters of the Amu Darya. In this regard, the Amu Darya is the main external source of water ensuring the sustainable operation of the regional agriculture. The fact that the Amu Darya is a transboundary river gives the issue of water resources management not only regional, but also interregional and interstate content. The formation of the river flow in the upper basins, the multifaceted nature of water use, climate change and a sharp increase in demand for irrigation water during the growing season are factors that directly affect the water security of the Kashkadarya region. Therefore, when assessing the natural and economic potential of the region's water resources, it is necessary to comprehensively take into account the water-economic connections formed with the Amu Darya basin, the territorial redistribution of water flows, and the capabilities of the irrigation infrastructure.

The internal water resources of the region, including the Kashkadarya River and its tributaries, reservoirs, canals, and groundwater, are important sources of replenishment of the existing water fund. However, the high dependence of agriculture on irrigation and the arrival of the main irrigation water from the Amu Darya basin significantly link the region's water supply to external water flows.

The distribution of water resources by districts is closely related to the area of irrigated land, the level of development of irrigation networks, the territorial location of water sources, and the specialization of agriculture. As a result, certain differences in water supply and the possibilities of its use are formed in the regions of the region. In determining these differences, it is necessary to take into account, in addition to the volume of water resources, their territorial reach, water losses in irrigation systems, the reclamation status of irrigated lands, and the amount of water consumed per unit of agricultural output. This approach allows us to assess the real economic and geographical efficiency of water resource use in the Kashkadarya region by region.

The territorial structure and specialization of agricultural production in the Kashkadarya region are directly related to the level of water resources. Irrigated lands are one of the main production factors determining the agrarian potential of the region, and the intensity of their use varies depending on natural conditions, the location of water sources, the level of development of irrigation networks and the reclamation state of the lands. The availability and stability of water resources play an important role in the formation of such areas as cotton growing, grain growing, vegetable growing, melon growing and fodder growing in irrigated areas. In this case, the biological characteristics of crops and their need for water during the growing season determine the territorial structure of water consumption. Therefore, the assessment of water use in agriculture should not be limited only to the volume of water consumed, but also be analyzed in terms of its ratio to the unit of irrigated land, the volume of products grown and the economic value created.

There are significant regional differences in the economic geographical efficiency of water resources use between the districts of the region, which are explained by the location of water sources, the technical condition of irrigation systems, the distance of water supply, irrigation methods, crop composition and production specialization. In areas with relatively stable water supply and developed irrigation infrastructure, the intensity of irrigated agriculture and higher productivity indicators can be formed. On the contrary, restrictions on water

supply, filtration and technical losses in canals, deterioration of land reclamation and increased water consumption are manifested as factors reducing the economic efficiency of agricultural production. From this point of view, a comprehensive assessment of the efficiency of water resources use across districts based on indicators such as the level of water supply, the volume of water consumed per hectare of irrigated land, crop productivity, gross agricultural output and the value of the product per unit of water will more clearly reveal regional differences. This approach serves to identify the territorial relationship between water resources and agricultural production and to identify opportunities to increase the economic and geographical efficiency of water use.

The issue of increasing the efficiency of water resources use in the Kashkadarya region is of particular importance in the context of the limited availability of water resources, the high dependence of agriculture on irrigated agriculture, and the territorial differentiation of water supply. The fact that the main part of the agricultural water supply of the region depends on the Amudarya basin requires a territorial, cross-sectoral and long-term approach to water resources management. From this point of view, the modernization of water management infrastructure, reducing water losses in main and inter-farm canals, improving the technical condition of irrigation networks, and developing digital mechanisms for water accounting and monitoring are among the priority areas. In particular, differential management of water resources by district, scientific substantiation of water limits taking into account the level of water supply and territorial specialization of agriculture are important conditions for increasing the efficiency of water use.

In order to increase the economic efficiency of water resources use, it is of strategic importance to introduce water-saving technologies in accordance with the natural and economic characteristics of the regions. The use of drip, sprinkler and other modern irrigation methods, in addition to optimizing water consumption, allows for precise determination of irrigation standards, management of crop water needs by vegetation stages, and increased productivity. In this case, when assessing

water efficiency, it is advisable to use not only the volume of water saved, but also indicators such as the amount of water spent on 1 hectare of irrigated land, the cost of products grown per 1 m³ of water, productivity and gross income. In the future, the formation of agricultural specialization appropriate to water scarcity, territorial optimization of the composition of water-intensive crops, involvement of reusable water resources in economic circulation, and the development of an irrigation system adapted to climate change will serve to improve the water-land-production ratio in the Kashkadarya region. As a result, an economic and geographical basis will be created to increase the territorial efficiency of water resource use, ensure the sustainability of agricultural production, and strengthen the long-term water security of the region.

Conclusion. The results of the study showed that the territorial organization and sustainability of agricultural production in the Kashkadarya region are inextricably linked to the availability, territorial distribution and efficiency of water resources use. The fact that about 70 percent of the water resources used for irrigation in the region's agriculture are taken from the transboundary Amu Darya basin determines the strategic place of external water sources in the agrarian development of the region. At the same time, the territorial and seasonal unevenness of water resources, losses in irrigation networks, the reclamation status of irrigated lands, and the differences in the level of water supply by districts are factors that directly affect the territorial efficiency of agricultural production. Therefore, when assessing the agrarian potential of the region, it is of important methodological importance to comprehensively consider the quantitative and territorial potential of water resources, along with land resources.

In the future, the main direction of increasing the efficiency of water resources use in the Kashkadarya region should be focused on ensuring the balance between “water-land-crops-economic results”. To do this, it is necessary to modernize the irrigation infrastructure, reduce water losses, introduce water-saving technologies in accordance with the natural and economic characteristics of the regions, and manage water resources based on digital monitoring. Also, improving

the specialization of agriculture based on the level of water supply of districts, optimizing the composition of water-intensive crops, and increasing the value of agricultural products per 1 m³ of water should be a priority task. This approach will form the economic and geographical basis for increasing the territorial efficiency of using existing resources in conditions of water scarcity, ensuring the sustainability of agricultural production, and strengthening the long-term water security of the Kashkadarya region.

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