

Economic Efficiency of Irrigation Services and Reclamation Activities

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Abstract: In the article, for the first time, the analysis of the activities of irrigation and melioration subjects in irrigated lands is theoretically. Based on the opinions of scientists, the essence and main directions of irrigation services and reclamation activities were developed. Formulas for econometric assessment of the effect of changes in cultivated areas distributed according to the depth of groundwater on water consumption and changes in cultivated areas distributed according to the salinity of groundwater on water consumption have been developed.

Keywords: Irrigation services, reclamation measures, interdependence, water consumption, groundwater, salinity, correlation-regression method.

Introduction. The success of agrarian reforms carried out on the basis of the Action Strategy for the further development of the Republic of Uzbekistan, the sustainable development of agriculture largely depends on the rational and efficient use of land and water resources in the production of this sector. In this context, special attention should be paid to the interconnected use of land and water resources, irrigation services and reclamation measures related to the efficient use of water resources. In particular, the fact that agriculture is based on irrigation and the irreversible use of most of this water, the need for different amounts of water to grow the same crop per 1 hectare, the direct connection of water sources with transboundary rivers, the natural factors of water supply during the growing season non-guaranteed and the need to use artificial water resources, limited water use, the growing demand for water resources and the lack of available water resources, the constant lack of water to consumers at the end of irrigation networks, the quality of irrigation services on irrigated lands. Circumstances such as adverse impacts require the constant interconnection and development of irrigation services and reclamation measures in the network.

Literature review. It should be noted that the study of any socio-economic reality requires, first of all, its theoretical study. Practice makes the appropriate changes. Therefore, first of all, it is necessary to take a theoretical approach to the analysis of the activities of irrigation and land reclamation entities on irrigated lands. Although much research has been done on irrigation services and reclamation activities in the research work done so far and in the existing scientific literature, the issue of studying and developing the interrelationship of these services has been neglected by researchers. It should be noted that the concepts of "irrigation", "land reclamation", "irrigation services" and "reclamation activities" are interpreted differently by different scientists and experts, there is no single opinion.

In particular, F.M.Rakhimbaev, S.I.Khalikov include a set of measures related to the development of irrigation reclamation and development of irrigated lands in the phrase "irrigation" (Latin irrigation - irrigation). "Amelioration" (Latin mellioratio - improvement) is considered to be the improvement of unfavorable natural (soil, hydrogeological and climatic) conditions for the successful development of agriculture and high and sustainable yields of agricultural crops [5].

According to A.Kadirov, "Irrigation is a set of technical means, technologies, organizational work, practical experience in this field, etc., which serve to achieve this main goal of irrigation, the use of water in the cultivation of crops" [9].

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A.I.Golovanov and others consider the concept of "amelioration" as an integral part of the balance of nature, which includes complex measures [2].

Article 1 of the Law of the Republic of Azerbaijan "On Amelioration and Irrigation" entitled "Basic Concepts": "Irrigation is the supply of water to areas where there is a lack of natural water through engineering and other activities. Land reclamation is the radical improvement of lands through the implementation of hydraulic, and other measures". The law also includes amelioration, irrigation systems and separate hydraulic structures, design, construction, reconstruction and operation of joint reclamation and irrigation activities [12].

X.Shukurlaev, A.Mamataliev, R.Shukurlaeva describe "reclamation" as a means of improving unfavorable soil, hydrogeological and climatic conditions in order to obtain consistently high yields of agricultural crops [8].

Another serious problem with the activities of water consumers' associations is the inability to provide all consumers with water equally during the growing season. It is known that the associations determine the limited amount of water consumption depending on the type and area of crops grown in the area, which provides irrigation services and reclamation activities, based on the data of the District Irrigation Departments. It is worth noting the views of foreign scientists on this situation, showing that the equal supply of water to consumers depends on the natural-climatic and organizational-economic conditions. In particular, Ch.Rollins and D.Raats argue that the development of irrigation services and land reclamation depends on two factors: the degree of soil saturation, which affects the ability to distribute water on their plots and crops, and the cost of soil moisture measures. believe that [6].

K.V.Dolgoplov, E.F.Fyodorova include natural-climatic conditions and water resources as one of the important factors in the specialization of agricultural production [3].

According to R. Nimmer and F. Bubentser, the timeliness and timeliness of irrigation are determined by natural and economic factors [4].

E.P.Ushakov, A.A.Golub, Yu.P.Belichenko: "The study of the problems of rational use and protection of water resources means a comprehensive solution to it, targeting the final socio-economic results, taking into account the long-term prospects, a deep scientific justification of the solutions" [7].

Research methodology. The scientific article used methods of analysis and synthesis, systematic approach, economic analysis, grouping, expert evaluation and comparison.

Analysis and Results. Based on the views of the above scientists and the concepts of foreign law, taking into account the existing legal framework of the country and the activities of water management practices, irrigation and land reclamation measures in terms of the sector serving agricultural production the nature and directions of irrigation services and reclamation measures can be summarized as follows (see Table 1).

Table 1. Irrigation services and reclamation measures essence and main directions [13]

Naming	The essence and direction of services and activities
<p>Irrigation services</p>	<p>A set of measures for the design, construction, maintenance and operation of hydraulic structures, supply of water for agricultural crops, development of irrigated lands.</p> <p>Directions:</p> <ul style="list-style-type: none"> ➤ design, construction and repair of hydraulic structures; ➤ cleaning of irrigation networks from sediments; ➤ planning and organization of irrigation; ➤ development of irrigated lands; ➤ emergency work and so on.
	<p>A set of works on the design, construction, maintenance and operation of reclamation facilities, drainage of irrigated lands and saline leaching.</p> <p>Directions:</p>



Reclamation activities	<ul style="list-style-type: none"> ➤ design, construction and repair of reclamation facilities; ➤ cleaning of collector-drainage networks from sediments; ➤ planning and organization of drainage and saline leaching of irrigated lands; ➤ adjusting the flow and improving the quality of collector-drains; ➤ emergency work and so on.
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In the international experience of providing fair and effective irrigation services and reclamation measures on irrigated lands, it is advisable to base these services on non-profit activities. This is due to the lack of supply and demand criteria for water supply in irrigated agriculture.

There can be no competition in water supply because water is supplied from a single canal or source, where market relations are limited, in other words, it is a natural monopoly. In particular, in 2019, 2756.2 million m³ of water was required for the cultivation of agricultural products in Andijan region, while in reality 2040.4 million m³ or 74% of the planned volume of irrigation was consumed [10]. This represents a lack of supply of water resources on appropriate irrigated lands.

In this current situation, the most appropriate way is to entrust the management of irrigation services and reclamation measures Water Consumers Associations (WCA) to irrigated lands on the rational use of land water and increase their efficiency. It should be noted that regardless of the direction of both domestic and foreign investment in irrigation services and reclamation activities, it is necessary to establish strict control and economic impact measures on water consumption and water use. The current legislation does not provide the WCA administration with the authority to take measures against violations by water consumers, water users in water consumption and water use, affecting land reclamation (these powers are vested only in the water control inspection).

Therefore, the financial provision of WCAs serving on irrigated lands is not at the level of demand. This, in turn, leads to various conflicts in the use of water, contributes to the deterioration of land reclamation, ultimately, it has a negative impact on crop yields and the economic condition of farms.

Due to untimely payment of irrigation services by water consumers and inability of WCAs to take adequate measures against this, the manager in them is causing the employees not to be paid for the month. This is due to the fact that the employees of the irrigation service organization use the land at the expense of secondary crops on cotton and grain farms (often for rice cultivation), it is natural to take interest in wheat, straw, cotton stalks, fruits, honey, firewood from horticultural farms, vegetables from vegetable farms, and so on.

In particular, most farms or landowners use water without a contract with the association. From year to year, their number and the amount of water used is increasing, and the soil and reclamation status of lands is changing.

Based on the opinions of the above scientists and the current situation, we emphasize that irrigation services and reclamation activities are inextricably linked, and that the activities of one have a direct impact on the activities of the other. This is because irrigation services alter or in most cases disrupt the working condition of domestic reclamation networks, the soil-reclamation status of irrigated lands. This requires that irrigation services on irrigated lands be carried out on a regular and systematic basis in conjunction with land reclamation services.

As a result, the work was carried out to clean the network from sediments, saline leaching, construction of new reclamation facilities, adjustment of collector-drainage water flow, improvement of collector-drainage water quality. All the above work has led to the organization of reclamation services and increased the scope of reclamation activities from year to year. In particular, during 2010-2018, reclamation measures carried out in the region increased from 2540.72 million soums to 17840.45 million soums or 720.2% [11].

H.Berkinov, A.Berkinova, B.Sultonov, H.Kholdorov write that one of the most important issues in economic and statistical research is to find a statistical relationship between two random quantities X and U. Economists also point out that mathematical models are constructed and used for three different purposes: to explain, predict, and control [1]. Based on this, we consider it expedient to study the



statistical relationships between irrigation services and reclamation measures using correlation-regression methods.

In particular, as a result of the existing shortcomings in the above-mentioned irrigation, there is a change in the distributed areas depending on the depth of groundwater and the salinity of groundwater. In practice, depending on the type of crop in the hydromodular regions, water consumption is determined based on the irrigation standards of the fields. Hence, the water consumption of the branches depends on the depth of the groundwater location and the areas distributed depending on the salinity level of the groundwater, and it has its own effect. Using the method of correlation-regression analysis of irrigation and soil-reclamation conditions, it is possible to obtain results of real significance.

The formula for the econometric assessment of the effect of changes in crop area on water consumption depending on the depth of groundwater has the following form:

$$Y = C \pm r_1 * X_{CCq1} \pm r_2 * X_{CCq2} \pm r_3 * X_{CCq3} \pm r_4 * X_{CCq4} \pm r_5 * X_{CCq5}$$

$$R^2 = 0 \dots n \dots F = 0 \dots n.$$

U - water consumption,

X_{CCq1} - crop areas with groundwater depth of 0-1.5 meters,

X_{CCq2} - crop areas with groundwater depth of 1.5-2 meters,

X_{CCq3} - crop areas with groundwater depth of 2-3 meters,

X_{CCq4} - crop areas with groundwater depth of 3-5 meters,

X_{CCq5} groundwater crops with a depth of 5 meters and above,

S - is a constant number,

r_1, r_2, r_3, r_4, r_5 - regression coefficients,

R^2 - coefficient of determination,

F - Fisher index.

The formula for the econometric assessment of the effect of changes in the area of crops distributed on the water consumption by the salinity of groundwater consists of the following equations:

$$Y = C \pm r_1 * X_{CCшд1} \pm r_2 * X_{CCшд2} \pm r_3 * X_{CCшд3} \pm r_4 * X_{CCшд4}$$

$$R^2 = 0 \dots n \dots F = 0 \dots n.$$

$X_{CCшд1}$ - crop areas with groundwater salinity 0–1 g/l,

$X_{CCшд2}$ - crop areas with groundwater salinity 1–3 g/l,

$X_{CCшд3}$ - crop areas with groundwater salinity 3–5 g/l,

$X_{CCшд4}$ - crop areas with salinity of groundwater from 5 to 0 g/l.

A negative value of the correlation coefficient indicates an inverse relationship between the above events. In particular, the positive effect of changes in water consumption in the context of irrigation services and reclamation measures on the depth of groundwater and the distribution of areas according to their salinity represents a negative relationship between them, and a negative effect on the correct relationship. That is, the increase in the depth of groundwater to 1.5–2 m and 2–3 m, and the increase in areas with their salinity of 1–3 g / l can lead to water savings, in other cases, the deterioration of land reclamation due to excessive water consumption.

Conclusion and Recommendations. Based on the above, the interdependence of irrigation services and reclamation measures, in our opinion, stems from:



1. The fact that the amount of precipitation is less than the amount of evaporation necessitates the implementation of irrigated agriculture. This leads to the establishment of a limited water use regime in the context of a shortage of used water resources and the introduction of strict austerity measures.
2. The fact that agricultural production is based on irrigation services leads to an increase in groundwater levels and the inflow of degraded water into reclamation networks. This, in turn, increases the scale of reclamation activities
3. As a result of the long or close location of water consumers to the existing irrigation network, water conservation and the reclamation of lands lead to a different formation of the relationship.
4. Effective planning, organization and management of irrigation services and reclamation activities on irrigated lands creates the need for interdependent development of WCAs that have emerged over the past 12-13 years and the state unitary enterprise "Davsuvmaxsuspudrat" established 9 years ago.
5. Introduction of market principles and mechanisms in the activities of economic entities on irrigated lands will further strengthen the relationship between them.
6. Creates a permanent state participation in the regulation and financing of irrigation services and reclamation management.
7. Differences in the technical and financial provision of irrigation services to water consumers and the implementation of reclamation activities by the state unitary enterprise "Davsuvmaxsuspudrat", Amelioration Expedition strengthen the interdependence of their activities.
8. The interdependent development of irrigation services and reclamation measures will increase the efficiency of agricultural production, promote the efficient use of land and water potential, material and technical resources, specialists and financial resources of our country, which has limited natural resources.

Based on the above data, the views of scientists and the current situation in practice, irrigation services and reclamation activities are inextricably linked, as the activities of one directly affect the activities of the other, it makes it necessary to implement them in an interconnected manner. An econometric assessment of the impact of changes in crop area on water consumption depending on the depth of groundwater and their salinity, it is possible to substantiate the interdependence of irrigation services and reclamation measures.

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