A Historical Analysis of Land Development and Irrigation–Reclamation Activities in Uzbekistan

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Abstract. Currently, aluminum alloys are widely used in the production of agricultural machinery parts. This article discusses the technology of increasing the tensile strength of aluminum alloys under the influence of various modifying elements. Samples were cast and tested. The studies were conducted on aluminum-copper and aluminum-magnesium alloys from aluminum alloys. As a result of the tests, the tensile strength of aluminum alloys was increased by 5%-7%. Based on the results obtained, a graph was constructed showing the dependence of the number of modifying elements on the tensile strength. At the end of the article, the authors present their conclusions based on the results of the studies.

Keywords: the total agricultural area, intensive irrigation construction, infrastructural facilities.

1 Introduction

The natural and climatic conditions of Uzbekistan have determined the specific features of agricultural production based on irrigated farming. The issues of irrigation and land reclamation (melioration) have long been among the most urgent problems in the region. During the studied period, intensive irrigation construction continued to develop and was considered one of the main prerequisites for the sharp growth of agriculture. Indeed, it is impossible to disagree with this view, as artificial irrigation in Uzbekistan serves as the material basis for the accelerated development of the agrarian sector and as the most important condition for improving the efficiency of the entire national economic complex.

2 Materials and methods

Research on this issue shows that in the republic, the yield obtained from one hectare of irrigated land is 7.5 times higher than that from rain-fed areas. Agricultural lands located within irrigated farming zones, which constitute only about 11 percent of the total agricultural area, produce nearly 90 percent of all agricultural output. The high

A. M. Bozdoğan et al. (eds.), *Proceedings of the 5th International Conference on Research of Agricultural and Food Technologies (I-CRAFT 2025)*, Atlantis Highlights in Sustainable Development 8,
https://doi.org/10.2991/978-94-6239-666-1_21

productivity of irrigated lands, combined with the vast desert massifs, created the most favorable opportunities for agricultural production. Unfortunately, until recently, these opportunities were not effectively utilized. Under the conditions of the totalitarian communist regime, the water management and irrigation construction sector, like many other progressive industries, was subjected to serious deformation processes. The shortcomings of the system inevitably affected this field as well. All these factors predetermined the inconsistencies observed in the practice of irrigation and land reclamation activities, and as a result, the outcomes turned out to be lower than expected despite significant capital investments. During the studied years, the main direction of irrigation construction was the large-scale reclamation of desert areas with the purpose of creating new lands for cotton cultivation. In March 1971, specific stages for the development of the republic for the years 1971–1975 were determined. At the same time, the task of intensive land reclamation in the Mirzachul and Karshi steppes, the Surkhan–Sherabad valley, the lower reaches of the Amu Darya River, and other regions was advanced as a top priority.

3 Results

However, as time has shown, this large-scale program for irrigating new lands was not sufficiently grounded from scientific and ecological perspectives. In practice, the extensive approach to developing virgin lands and the excessive expansion of cotton cultivation led to a decrease in the water resources of the Amu Darya and Syr Darya rivers, which ultimately caused the drying up of the Aral Sea. The details of these processes will be discussed below. Nevertheless, the reclamation of virgin lands at that time was considered a historical necessity.

It is well known that the initial steps in the reclamation of the Mirzachul steppe were taken in the pre-war years. However, the real breakthrough began in August 1956, after the leadership of the Soviet Union adopted the resolution “On the Irrigation and Reclamation of the Virgin Lands of Mirzachul in the Uzbek SSR and Kazakhstan to Increase Cotton Production”.

The development of the Mirzachul region was envisioned as a comprehensive program in which water management construction was to be carried out simultaneously and in strict proportion with the construction of agricultural and infrastructural facilities. A comprehensive approach to the development of the Mirzachul territories, in general, yielded positive results. Between 1966 and 1975 alone, 181.1 thousand hectares of land in the Syrdarya region were reclaimed and incorporated into agricultural circulation. By the end of 1975, the newly irrigated and drained lands of the Mirzachul steppe, where 44 state farms (sovkhozes) had been established, amounted to nearly 280 thousand hectares. From the perspective of the interests of the Union center, state farms specializing mainly in cotton production were established, which further reinforced cotton monoculture and aggravated the ecological situation in the region. At that time, it was believed that state farms were somewhat more efficient than collective farms (kolkhozes). However, in practice, the creation of state farms on newly reclaimed lands did not justify itself; they, too, proved to be ineffective.

The lands of the Mirzachulqurilish state agricultural enterprises consisted of large tracts, each with 5–6 thousand hectares of cultivated area. In the center of each land plot, there was a single well-maintained estate that included cottages with private garden plots as well as social and cultural facilities. Initially, equal attention was paid to the construction of housing and socio-cultural infrastructure. However, over time, priority was given to housing construction, while clubs, sports complexes, bathhouses, kindergartens, schools, hospitals, and polyclinics were relegated to secondary importance. The reclamation of the Mirzachul lands proceeded gradually. In the mid-1960s to the early 1970s, the main focus of development was on the reliable lands of the Syrdarya region. Beginning in 1974, the reclamation of the Jizzakh massif commenced. It was planned to reclaim nearly 200 thousand hectares of virgin land, which required the reconstruction of the Southern Mirzachul Canal. As a result of large-scale construction and irrigation–melioration works during the most intensive period of Mirzachul's development, about 350 thousand hectares of land were introduced into agricultural use.

Furthermore, approximately 700 km of linear distribution canals, 7,000 km of piped irrigation networks, and 17,000 km of horizontal drainage systems were constructed. In addition, 500 vertical drainage wells were drilled, more than 3,700 km of collector networks and 2,100 km of roads were built [1]. In the newly reclaimed territories such as Paxtakor, Ilyichevsk, Do'stlik, Arnasay, Oktyabr, and Mehnatobod, large cotton-producing districts emerged, along with 66 state farms and six new towns — Yangiyer, Guliston, Paxtakor, Do'stlik, Shirin, and Bakht [2]. Expansion of New Lands in Central Fergana and the Development of Irrigation Systems in Southern Uzbekistan Alongside the development of Mirzachul, the process of reclaiming new lands in Central Fergana was also actively carried out. This was largely facilitated by the commissioning of the Great Andijan and Great Namangan canals, which crossed the centuries-old sands of Central Fergana. At the same time, the farmers of the republic began to master the Surkhan–Sherabad steppes. To implement a complex of water management construction projects in the Surkhan–Sherabad valley, special trusts — "Surkhonsovkhozstroy" and No. II Trust — were established. Through the joint efforts of thousands of builders, workers, irrigators, and mechanizers employed by these organizations, tremendous work was accomplished. The construction of the Southern Surkhan Reservoir was completed ahead of schedule, with a total water capacity of 800,000 cubic meters.

In addition, within a short time, the Uchkizil and Dagerez reservoirs and a hydroelectric complex on the Sherabad River were constructed. The commissioning of the Southern Surkhan Reservoir, which ensured water supply to the northern regions and enabled the reclamation of large new areas in the south, opened up new prospects for the Surkhan–Sherabad valley. The construction of this major hydraulic structure made it possible to reconstruct the ancient Zang Main Canal, 90 kilometers long, and to increase its flow capacity from 50 to 86 cubic meters per second [3].

The development of the Karshi steppe occupies a significant chapter in the history of irrigation. Covering nearly 2 million hectares, bounded by the Zarafshan River in the north and the Amu Darya in the south, it represented one of the vast territories of Uzbekistan. Previously, due to a shortage of water, only a small portion of this vast area was used for agriculture. By the early 1970s, large-scale water management projects were launched in this region. On the Kashkadarya River, the Chimkurgan Reservoir

with a capacity of 500 million m³ was built; on the Guzardarya River, the Kamashin and Pachkamar reservoirs with respective capacities of 26 million m³ and 200 million m³ were constructed. The construction of the Toshmarjon Reservoir was also completed. In addition, dozens of canals — including the Chorshanba, Qorabog‘, Kamashi, and Muminboy canals — were built. More than 300 kilometers of inter-farm roads were laid, and production bases were built at the Qiziloyok and Tolimarjon railway stations. The completion of the main and Ulyanovsk canals, which supplied Amu Darya water to the irrigation zones eight months ahead of schedule, marked a decisive step toward the establishment of the city of Karshi. Thus, the long-standing dream of the Kashkadarya farmers was fulfilled: the 105-kilometer-long Ulyanovsk Canal delivered the waters of the Amu Darya to the arid lands of the Karshi steppe. In the spring of 1974, the Amu Darya’s water began to flow along the 164-kilometer Karshi Main Canal, where a cascade of six pumping stations lifted the water to a height of 132 meters. As a result, the waters of three rivers — the Amu Darya, Kashkadarya, and Zarafshan — were united.

The construction of the Sandal Canal also played an important role. By shortening the Zarafshan River’s flow by 50 kilometers and reducing water losses, it became possible to obtain an additional 150 million cubic meters of water, directing over 100 million cubic meters — which had previously been lost in the sands for centuries — into the Qashqurgan Reservoir. The waters of the Zarafshan River began irrigating the fertile lands of the Chiroqchi, Shahrisabz, Yakkabog‘, and Kamashi districts, and the entire region began receiving its water through the Chimkurgan Reservoir. Important Water Management Developments in the Zarafshan Valley. Significant achievements were made in the field of water management in the Zarafshan Valley. Taking into account that, during the vegetation period, only about 30–35 percent of irrigated lands in the Zarafshan River basin required irrigation water, the government of the republic decided, in the early 1960s, to begin the first phase of construction of the Amu–Qarakul and Amu–Bukhara canals.

During the Ninth Five-Year Plan, the second stages of the Amu–Bukhara, Qarakul, and Sverdlovsk canals were launched. Their commissioning made it possible to lift the waters of the Amu Darya River by 112 meters and direct them to the farmlands of Bukhara and Navoi regions. In the Tenth Five-Year Plan, water supply was improved across 66.6 thousand hectares. Overall, as a result of large-scale irrigation and land reclamation works, the irrigated area in this region expanded to 247.3 thousand hectares. Improved water supply, as well as an effective drainage and collector-drainage network, contributed significantly to the growth of agricultural crops, particularly cotton. If in 1962 cotton was cultivated on 146.3 thousand hectares, yielding 14.6 centners per hectare, then by 1976 the cultivated area had increased to 164.4 thousand hectares, with an average yield of 29.1 centners per hectare [4].

Another major agricultural region was the Khorezm oasis. Alongside irrigation, the development of land reclamation systems ensured the stability of high agricultural yields. However, irrigated lands throughout the region were unevenly distributed, alternating with depressions, saline marshes, and lakes. The abundance of irrigation canals further complicated the configuration of the cultivated areas. Therefore, expanding irrigated lands in Khorezm Province became one of the central problems in improving agricultural culture. The arid and hot climate, low precipitation, and high evaporation rates

made irrigation indispensable. The flat relief, the proximity of mineralized groundwater, the absence of natural drainage, and the high sediment content of the Amu Darya River required constant improvement of the region's reclamation conditions.

By the mid-1970s, the rapid expansion of irrigated lands for cotton and other crops led to a sharpening of the water scarcity problem in the region. During the low-water years of 1974 and 1975, the acute shortage forced the government of Uzbekistan and agricultural organizations to take urgent measures to preserve the harvest: thousands of mobile pumping units were installed, hundreds of wells were urgently drilled to extract groundwater, and nearly all water from reservoirs was diverted to the fields. However, as new lands were developed, the water balance became increasingly strained. All these circumstances sharply raised the issue of increasing water supply for both existing and newly established irrigation systems in the republic [5]. Regulation of Water Resources and Construction of Major Reservoirs in Uzbekistan. The leadership of Uzbekistan directed the activities of all water management organizations toward the rapid completion of works aimed at regulating the flow of the Amu Darya River, the main water artery of the region. At the same time, measures were taken to construct additional irrigation and irrigation-energy reservoirs in order to regulate the seasonal and long-term flow of both the Syr Darya and Amu Darya rivers. To regulate the flow of the Amu Darya, the government of the republic proposed the construction of the Tuyamuyun Hydroelectric Complex (HPP) in the rocky gorge of Tuyamuyun, located 452 kilometers from the river's mouth. The complex was designed to ensure guaranteed water supply for the irrigation systems of Southern Khorezm and the Karakalpak ASSR, as well as Tashauz (Dashoguz) Province in the Turkmen SSR.

This unique hydro-engineering complex, which included a system of reservoirs with a total capacity of 7.8 billion cubic meters, made it possible to improve water supply across 500 thousand hectares and to bring an additional 556 thousand hectares of new lands under irrigation in this part of Central Asia. The first stage of the reservoir was completed in 1979, accumulating nearly 3 billion cubic meters of water. In February 1980, the construction team of Tuyamuyungidrostroy commissioned pumping stations on the Kyzylkum massif and the MK and MK-1 canals. The main challenges of the Tashkent oasis in water management—such as supplying water to residential and industrial facilities, preventing floods, generating electricity, and ensuring stable irrigation for agricultural production—were resolved with the commissioning of the Charvak Hydroelectric Complex in 1977 on the Chirchik River.

The Charvak complex consists of a 163-meter-high dam, a reservoir with a useful capacity of 1.58 billion cubic meters, and a hydroelectric power station with an installed capacity of 600 thousand kilowatts. On the basis of the Charvak reservoir, land development began on 80 thousand hectares in Uzbekistan and 66 thousand hectares in Kazakhstan. Expansion of Melioration and Irrigation Works in the 1980s. The initiative was continued by the builders of the Oqdaryo and Qoraulyubinsk (Koraulyubinsk) reservoirs and other irrigation–melioration facilities. In November 1984, the republic once again redefined the objectives of melioration development and increasing the efficiency of land use on irrigated territories. In general, by the year 2000, it was planned to expand the area of irrigated lands to 5–6.5 million hectares, to improve the meliorative condition of existing irrigated areas, and to carry out the comprehensive development of the Karshi and Jizzakh steppes, as well as the Kara-Uzbazar and Kizilin irrigation systems [6]. From the standpoint of modern realities, the melioration program

implemented during the studied period can be assessed as administratively driven rather than scientifically or economically justified, largely due to the dominance of the command-administrative system. It was based on an economically and socially weak concept of agricultural industrialization. Nevertheless, the program had a significant impact on the expansion of melioration and irrigation works. Artificial irrigation began to occupy an increasingly important role in agriculture. This was facilitated by major measures taken by management and economic bodies, as well as a steady increase in capital investments.

Between 1966 and 1986, 45 billion rubles were allocated to the agriculture of Uzbekistan, of which 17.1 billion rubles were directed specifically to water management. During this period:

- more than 1.5 million hectares of new lands were irrigated and developed;
- about 1.888 million hectares were subject to capital leveling;
- the meliorative condition of over 2.5 million hectares of irrigated lands was improved;
- irrigation networks were reconstructed and water supply increased;

a total of 3.831 million hectares of irrigated land and 6.9 million hectares of pastures were supplied with water [7]. Development of Irrigated Agriculture and Land Reclamation Measures in Uzbekistan. A characteristic feature of the development of irrigated agriculture in Uzbekistan was the comprehensive approach to cultivating large virgin lands and establishing new agricultural areas. Over a period of twenty years, about 160 state farms were created on the former virgin lands of the republic. In total, 7.7 million square meters of housing were constructed, along with preschool institutions for 37,000 children, general education schools for 102,000 students, and numerous other social and cultural facilities. During this period, the newly developed territories produced 10.4 million tons of raw cotton and many other agricultural products [8].

Most of the irrigated lands in the republic were saline or prone to salinization. The newly developed areas were often not naturally favorable for agriculture, with up to 70% of soils affected by salinity. In the old irrigated lands, where drainage systems were insufficiently reconstructed or improperly operated, secondary salinization also occurred. Crops could be cultivated only after excess salts were removed from the soil. This issue could be addressed only through the implementation of a complex of reclamation measures, the main component of which was drainage — the most effective method for preventing salinization of irrigated lands. The key function of drainage in salinity-prone areas was to maintain groundwater at a certain depth, create downward water flows, and discharge excess water and salts beyond the irrigated zones. Insufficient or poorly functioning drainage led to deterioration of soil conditions and consequently to a decline in land productivity. To solve this urgent problem, significant scientific research and organizational work was carried out in Uzbekistan. In particular, a large-scale complex of measures aimed at the widespread use of vertical and closed drainage systems was implemented. By the end of 1991, in the Och Stella regions, 6,692 km of closed horizontal drainage, 1,594.7 km of collector–drainage networks, 317 km of concrete canals, and 2,094.9 km of sewer systems had been constructed [9]. During this period, in the irrigated lands of the Khorezm region and the Tashhovuz group of Turkmenistan, up to forty major reclamation facilities such as the Ghazovat-Daudan,

Central, and Daryolik collectors were put into operation each year. Through these facilities, approximately 460 million cubic meters of saline and drainage water were discharged annually, which contributed significantly to the improvement of the reclamation condition of hundreds of thousands of hectares of irrigated land [10].

By the end of the Tenth Five-Year Plan, the total length of collector–drainage networks in this region amounted to more than 34 linear meters per hectare of irrigated land. Such an extensive network made it possible to lower the groundwater level in the region by an average of 36 cm³ [11]. Despite the notable achievements in water management construction during the 1970s and early 1980s, serious shortcomings and mistakes were also observed in this field. In particular, although the material and technical base of water management construction developed rapidly, large-scale capital investments were utilized with low economic efficiency. Despite the increase in funding, reclamation works were carried out on a large scale, yet the productivity of irrigated lands remained low. As a result, in the Jizzakh, Syrdarya, and Kashkadarya regions, as well as in the Karakalpak ASSR, 66 state farms, on which more than 2.5 billion rubles had been spent, produced only 10–11 centners of raw cotton per hectare, causing annual losses exceeding 45 million rubles [12]. The declining trend in the productivity of irrigated lands was also alarming: if in 1980 the output per hectare amounted to 1,337 rubles, by 1983 it had decreased to only 1,241 rubles [13]. Secondary soil salinization also continued to expand. Between 1975 and 1983, due to the deterioration of the reclamation condition of arable lands, the area of unused lands increased from 4,000 to 67,000 hectares. The total area of secondarily salinized lands reached nearly 2 million hectares.

Another significant drawback was that the pace of reclamation construction lagged behind the rates of irrigation development, housing construction, and the establishment of socio-cultural facilities. In addition, despite the urgent need, no fundamental changes occurred in the strategy of water management development. As a result, Uzbekistan's agriculture, influenced by the combination of the above-mentioned factors, gradually acquired increasingly crisis-like characteristics.

In the field of irrigation and land reclamation, a noticeable regression was also observed. The use of land and water resources remained extremely unsatisfactory. In many irrigated areas, the processes of soil salinization and waterlogging continued, water erosion intensified, and active soil displacement persisted. For instance, studies on salt reserves at a depth of 20 meters in the Sherobod Plain revealed that the accumulation of salts was extremely high—ranging from 1,700 to 4,300 tons per hectare. The maximum concentration was recorded in the central part of the Sherobod alluvial fan, where the mineralization of groundwater reached 49 grams per liter. As a result, non-saline soils, even in areas with relatively deep groundwater levels, turned into moderately and heavily saline soils. The intensification of these negative processes led to a critical situation by 1990: in over 2 million hectares out of more than 4 million hectares of cropland across the republic, the humus content dropped below one percent, whereas it should have been at least two to three percent. During 1986–1990, the problem of water scarcity worsened significantly. Thus, in 1989, the water supply in Namangan region was 79%, while by the end of the five-year period it had fallen to 60–70% in Syrdarya, Jizzakh, and Kashkadarya regions [14].

The period of perestroika also revealed the full extent of the Aral catastrophe. It exposed the fundamental flaws of agricultural policy and the administrative-command

management system. Today, the attention of all humanity is focused on the Aral Sea, which, along with the surrounding region, has turned into a zone of ecological disaster. "The modern history of the Aral Sea," noted Karakalpak national writer Tulebergen Qayipbergenov, "is a tragic outcome of the 'transformer' effect on the environment. Within the lifetime of a single generation, a sea that once covered more than six million hectares with a depth of 69 meters has almost disappeared... In the delta, hundreds of thousands of hectares of lush forests and reed thickets have withered, and numerous species of animals, birds, and fish are disappearing. The most tragic of all is the ecological catastrophe itself" [15]. One of the major shortcomings of irrigation and reclamation during the Soviet period was the overly comprehensive approach to organizing irrigation activities. It was believed that the more water diverted from rivers for the development of new lands, the more reliably "socialist" agricultural production would progress. The completion of large water reservoir projects in the late 1970s and 1980s led many party and agricultural officials, as well as a portion of the rural population, to believe that water resources were inexhaustible. Consequently, specific water consumption per hectare increased to 18.5 thousand cubic meters, and in some regions—such as the Karakalpak ASSR, Khorezm, and Tashhovuz—to as much as 28–30 thousand cubic meters [16].

Moreover, water was used in a distinctly irrational manner. The situation was further aggravated by the low efficiency of irrigation and reclamation networks, which were often constructed without adequate filtration protection. Thus, in 1966, of the total 166,000 km of constructed hard-surface canals, less than 20% were properly sealed. As a result, the operational efficiency of these systems was only about 0.53–0.6. In other words, only half of the water taken from rivers actually reached the plants. To a large extent, the economic and environmental crises in Central Asia, including Uzbekistan, stemmed from the flawed strategy of spatial distribution of productive forces. For decades, the focus remained on developing water-intensive industries and on maintaining the cotton monoculture, which demanded excessive irrigation. When water scarcity became acute, irrigation for other crops was sharply reduced. As the chairman of the "1-May" kolkhoz in the Chust district of Namangan region, A. Qodirov, admitted in an article published in the Namanganskaya Pravda newspaper, "all surplus water usually goes to cotton. The rest—to other crops. But with a semi-starvation-level water ration, you cannot expect much profit". The discharge of saline drainage waters into rivers led to serious ecological consequences. It caused a sharp deterioration in the quality of drinking and irrigation water, which in turn led to an increase in waterborne diseases throughout the republic. Crude miscalculations, errors in the construction of the water management system, and an extensive approach to land reclamation practices predetermined the gradual decline in agricultural productivity and resulted in severe environmental consequences — namely, the catastrophic desiccation of the Aral Sea. A drastic reduction in the inflow of the Amu Darya and Syr Darya rivers into the Aral Sea was primarily caused by the continuous expansion of cotton fields across Central Asia. Apart from Uzbekistan, where the largest water intake occurred, Tajikistan accounted for 50% of water use in the Amu Darya basin, and 28% in the Syr Darya basin was diverted to irrigated lands. Over the following 30 years, the sea level dropped by 13.8 meters, the water volume decreased by 390 cubic kilometers, and the surface area shrank by about 40,000 square kilometers. Meanwhile, water salinity rose to 21 grams per liter. As a result, the quality of water in the lower reaches of the Amu Darya

and Syr Darya deteriorated to an unacceptable degree, rendering it almost unfit for human consumption.

The Aral Sea crisis was not limited to water scarcity alone. Its rapid shrinkage caused irreversible climatic changes, particularly leading to the severe degradation of living conditions in the Khorezm and Bukhara regions, as well as in the Republic of Karakalpakstan. The drying up of the Aral Sea transformed 2.6 million hectares of its former seabed into desert. Each year, 90–100 million tons of toxic salts are carried by winds, contaminating land and air within a radius of 300–500 km [20]. Concrete measures aimed at preserving the Aral Sea within Uzbekistan began to be implemented in the late 1980s and early 1990s. A special commission was established by the Supreme Council to study the ecological and social conditions of the Aral Sea region. The commission took control of the construction of collector-drainage systems and initiated the development of effective water protection strategies. While acknowledging some positive progress in assessing the situation in the Aral region, it is important to note that since 1989 there have been fundamental shifts in the perception of irrigation and land reclamation programs, as well as in the implementation of agrarian policies. Awareness of the need to revise conceptual approaches to water management and agricultural policy has increased. In particular, as early as 1989, the cotton harvest target was reduced by 750,000 tons compared to 1983, with the aim of alleviating ecological stress and improving the efficiency of irrigated lands. However, the persistence of the old totalitarian structures, continued central directives, and the deepening economic crisis hindered the full realization of these progressive initiatives. The situation in the field of irrigation and land reclamation began to change only after Uzbekistan gained state independence. The restoration of the sovereign rights of the Uzbek people created favorable political conditions for addressing numerous long-standing and painful problems. Active efforts were initiated to develop effective measures for water conservation and to improve the system of water resource management. It should be borne in mind that the elimination of the negative consequences cannot be achieved overnight — this is a task that requires several decades. To accomplish it, multibillion-dollar investments, which are currently beyond the republic's capacity, as well as a joint action program involving all Central Asian countries and Kazakhstan, and support from the international community are essential.

4 Conclusion

In conclusion, the low productivity of irrigated lands in use was associated not only with deficiencies in irrigation and reclamation construction but also with deviations from the approved technologies for cotton and other crop cultivation, as well as with the slow development of land resources. By the early 1980s, a number of unresolved issues had accumulated in the field of irrigation and land reclamation. In reclamation activities, in addition to economic incentives, the enhancement of labor and technical progress is of paramount importance. The main directions for improvement include, first, the modernization of the system of reclamation machinery; second, a significant increase in the mechanization level of irrigation and reclamation works; and third, the active introduction of modern technologies.

Following the collapse of the Soviet Union and Uzbekistan's attainment of independence, the country began to draw the attention of the international community to the problems of the Aral Sea.

Disclosure of Interests. The authors have no competing interests to declare that are relevant to the content of this article.

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