Western European Journal of Historical Events and Social Science
Volume 2, Issue 7, July, 2024
https://westerneuropeanstudies.com/index.php/4
ISSN (E): 2942-1926 Open Access| Peer Reviewed

ECOLOGICAL PROBLEMS OF THE KARSHI DESERT: HISTORICAL ANALYSIS

Rakhimov Asror Eshankulovich,
Researcher of the National University of
Uzbekistan named after Mirzo Ulugbek
e-mail: sardormuhammadali94@gmail.com
https://orcid.org/0009-0007-0116-265X

ABSTRACT: In the article, the author examines the discharge of Amu Darya waters into the Karshi Desert and its ecological consequences. The study highlights the environmental issues that arose in the desert as a result of the exploitation of the Karshi Desert during the Soviet period.
Key words: Ecology, Amu Darya, desert, water, cotton, hepatitis, agriculture, poultry.

Relevance: When researching the ecological problems of any geographic region, it is essential to consider the historical processes that have occurred in the area. In particular, analyzing and drawing conclusions about the changes in the region's ecology resulting from the Soviet Union's reclamation of the Karshi Steppe, along with a thorough analysis of desert ecology, highlights the relevance of this topic.

Methods and Degree of Study: In the process of writing this scientific article, the most important methods in historical research have been employed: scientific rigor, an unbiased approach to historical processes, the continuity of events, comparative analysis of facts, and logical reasoning in drawing conclusions.

Research Results: The dramatic decline in the water level of the Aral Sea began to attract global attention in the 1980s. In particular, in 1986, specialists visited from Helsinki to travel across Central Asia, get acquainted with the Soviet Union's water management practices in Central Asia, with the primary goal of observing the ongoing situation with the Aral Sea. They intended to gain a clear impression of the ecological catastrophe related to the Aral Sea [1]. From the 1960s, excessive use of river waters flowing into the Aral Sea led to a reduction of its area by approximately 80% [2].

The most significant ecological crisis in the Central Asian plain is the Aral Sea problem. This issue represents a negative consequence of Soviet-era irrigation agriculture. Starting from the 1950s and 1960s, large-scale irrigation construction began with the aim of reclaiming desert lands. Among the significant objects for water diversion from major rivers to the deserts of Central Asia was the Karshi Steppe [3].

The serious ecological situation in the region began to emerge even during the initial stages of desert reclamation [4], and the irrigation measures for the Karshi Steppe were not excluded from this process.

It is known that from 1973, the Soviet government started using water from the Amu Darya River for irrigating the Karshi Steppe. From this perspective, although the ecological problem of the Karshi Steppe might seem local, it also has a regional aspect with its partial contribution to the Aral Sea crisis.

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Before the start of the reclamation of the Karshi Steppe, specialists noted the lack of precise calculations for using Amu Darya water for irrigating the Karshi Steppe lands, and the government's lower expert commission could not provide a positive opinion on taking water from the Amu Darya. However, they emphasized that "the only significant opportunity to significantly expand irrigated lands in the Karshi Steppe is to take water from the Amu Darya[5]".

In 1974, the Karshi Main Canal took 1 billion 267 million 105 thousand cubic meters of water from the Amu Darya [6], while in 1976 it took 2 billion 772 million 105 thousand cubic meters [7]. In 1978, the task of accumulating 400 million cubic meters of water in the Talimarjan Reservoir during the vegetation period was assigned to the construction organizations[8]. In the third quarter of 1979, the management of the Karshi Main Canal and pump stations supplied a total of 1,687,323,696 m^3 of water to the Ulyanov and Karshi Main Canal (working part). Of this, the Ulyanov Canal received 491,712,720 m^3 and the working part of the Karshi Main Canal received 1,195,610,976 m^3 of water from the Amu Darya [9].

In 1979, 650 million cubic meters [10], in 1982, 775 million cubic meters [11], and in 1983, 1.3 billion cubic meters of water were accumulated in the Talimarjan Reservoir [12]. From the late 1970s and during 1985–1990, the average annual water intake for the Karshi Main Canal (350-375 m^3/s) was not less than 4 km^3 [13]. As a result, in the 1970s and 1980s, a large amount of Amu Darya water was diverted to the Karshi Steppe, which had a negative impact on the ecology of the Karshi Steppe. The groundwater level rose.

It has been noted that all major climate changes in the Karshi Steppe occurred within 3-4 years after the start of irrigation activities in the desert [14]. Changes in the water regime of the Kashkadarya River and the inflow of Amu Darya water into the Karshi Steppe led to an increase in groundwater levels in the Karshi Steppe. The ecological balance in the region began to change.

Despite the use of closed and vertical drainage systems in the Karshi Steppe [15], the technical operation of collector-drainage networks and vertical drainage wells was not well organized, and the construction of the planned wells was not completed by the mid-1980s [16].

Until 1986, irrigation work was prioritized in desert reclamation, and melioration activities were considered auxiliary measures. Secondary melioration work and quality repair of melioration networks did not receive sufficient attention. As a result, some of the reclaimed lands became heavily salinized [17].

By the 1990s, strongly and moderately salinized lands in our republic constituted 1 – 1.3 million hectares, and each year, 5 to 7 million cubic kilometers of water were used to wash away toxic salts from these lands [15, P.4]. In the conditions of the Karshi Steppe, after washing the soil, the amount of salt in the 60 cm working layer decreased [16, P.6].

The government also aimed to increase cotton yield on salinized lands in the Karshi Steppe using chemical fertilizers. Half of the cotton produced in our republic was obtained with the help of mineral fertilizers [18]. Uzbekistan was a leader in the use of mineral fertilizers in the former Soviet Union, and in 1989, 85 thousand tons of toxic substances were used in agriculture in the republic. Every year, up to 50 people in the republic suffered from severe poisoning [15, P.124].

For the slender fiber cotton varieties 5904-I and "Termiz-7" grown in the Karshi Steppe, the fertilizer norm for obtaining a yield of 30-40 centners per hectare is 250-300 kg of nitrogen, 175-200 kg of phosphorus, and 125-150 kg of potassium per hectare [19]. The amount of

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fertilizers applied to the cotton fields for slender fiber cotton is higher compared to fields with medium-type cotton varieties. The use of fertilizers and highly toxic chemicals in cotton cultivation in the Karshi Steppe has contaminated the soil and, in addition, non-compliance with scientific methods and standards in their application has poisoned the local population.

The deterioration of the ecological situation and the negative consequences of cotton cultivation are due to the dominance of cotton production [15, P.127]. In the Karshi Steppe, cotton cultivation and achieving high yields were part of a socialist competition between newly established state farms, with no focus on human health and its value.

Although the use of some toxic chemicals for cotton from 1985 in the Karshi Steppe was discontinued, these chemicals had been used ruthlessly up to that time. Despite the presence of guidelines for handling them, ordinary workers in cotton fields did not use them, and worker safety was not ensured in practice. The toxic chemicals had a detrimental effect on the health of the rural population. In 1988, a one-and-a-half-year-old child Hamraev Amirullo died of hepatitis. Due to the increase in hepatitis cases in the village, a special medical unit was established to combat the disease [20].

Such situations were repeated in many state farms in the desert. For example, in the 33rd state farm in the desert, the most widespread disease, in colloquial terms known as “yellow disease” (hepatitis), affected almost every family, with at least one person in each family suffering from it. K. Eshonkulov son died of the disease at six months of age [21].

Serious attention was not paid to public health in the region. In 1960, the child mortality rate in Uzbekistan (per thousand live births) was 29.3%, which increased to 47.0% by 1980 [22]. Specifically, in Kashkadarya Province, by 1979, there was a high mortality rate among children under one year old due to lung diseases, liver diseases, and congenital defects. That year, a total of 5,156 people died from various diseases in the province, including 230 children under one year old who died from liver diseases (cirrhosis), lung diseases (bronchial asthma, tuberculosis, etc.), and congenital defects, and 744 older individuals [23].

Erosion of the saline soils in reclaimed lands is more severe due to wind effects, and compared to other deserts, it has been noted that establishing shelterbelts is crucial in the Karshi Steppe [15, P.47-51]. However, the establishment of shelterbelts was neglected.

During the reclamation of deserts in Central Asia, hydraulic engineering structures were built, with the largest ones being the Karakum, Amu-Bukhara, and Karshi main canals, which drastically changed the relief forms and caused significant damage to 80–90% of the vegetation cover. Due to the seepage of water from the canal banks, not only drought-resistant but also moisture-loving plants began to develop in the desert [24]. The ecological situation in the Karshi Steppe was also disrupted due to the construction of hydraulic engineering structures.

The Soviet Union's approach of using our republic as a base for providing cheap raw materials had a detrimental effect on the environment. Especially, the reclamation of deserts led to changes in the ecological environment in the reclaimed areas.

One of the extremely rare plant species in the Karshi Steppe, the smooth-flowered Phloemoid, was collected once in 1958 and has not been found again since [25]. Also, the Sogdian tulip [26] from the Karshi Steppe is listed in the Red Book of the Republic of Uzbekistan. Desert plants are an important food source for Karakul sheep [27].

Among the 77 invertebrate species listed in the Red Book of the Republic of Uzbekistan, the reclamation of deserts is noted as a limiting factor for 24 species [28]. Additionally, 25 mammal species from the mammalian world are recorded, with the reclamation of deserts being

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a limiting factor for 8 desert-dwelling species [28, P.180-204]. Historically, the Karshi Steppe was a favored hunting ground [29]. Murkaki Karshi (Karshi Bustard) was abundant [30]. The rare desert animal species, the gazelle, lived there, but its numbers have decreased due to desert reclamation [31].

Of the 47 bird species in our republic, the changes in water regimes limit the habitat of 22 species, and the reclamation of deserts affects 13 species [28, P.162]. For instance, the white-winged blackbird in the Karshi Steppe is one of the recorded species. The Zarafshan reed warbler in the Kashkadarya oasis has been affected by pesticide use [28, P.162]. However, in recent years (1960–2000), the increase in bird species in the Karshi Steppe has also been attributed to the influx of bird species from water bodies into the area [32]. Thus, although the living conditions of desert birds adapted to the climate have decreased due to desert reclamation, the number of hydrophilous bird species has increased. The balance of desert nature has been disrupted.

Among the 16 species of reptiles, reclamation of deserts has been noted as a limiting factor for 14 species, with one species (the Kapcha snake) living in the Karshi Steppe, and another species (Afghan litorin) in the Kashkadarya delta [28, P.114-125]. Reptiles are among the most affected animals due to desert reclamation in the republic.

The actual extent of the ecological damage to the Karshi Steppe has not been quantified [33]. The agrarian policy of the Soviet government in the Karshi Steppe was based on the principle of subordinating nature to human interests. The health and ecology of the Karshi Steppe population have been compromised.

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