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HYDRAULIC STRUCTURES OF MIRZACHUL NATURAL AREA AND ITS IMPACT ON THE ENVIRONMENT

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Abstract: This article examines the morphometric dimensions of hydraulic structures built in the Mirzachul natural region and analyzes its impact on the environment.
Keywords: Mirzachul natural area, Khanbandi dam, hydraulic structure, reservoirs, environment, landscape.

Introduction

In order to improve the water supply of irrigated lands in Mirzachul natural area, a number of warehouses, streams and collectors have been built. It has been 10 centuries since the first hydraulic structure was built in the territory of the natural region. The Khanbandi Dam was built by the Karakhanids at the end of the 10th century on the Khanbandi Mountain of the Nurata system. According to experts, the Khanbandi Dam is the oldest irrigation facility built by the peoples of Central Asia - the ancient Turan. This dam has been preserved to this day.

The Khanbandi Dam is built of prickly granite blocking the entrance to the gorge. The lower part of the Khanbandi Dam is 24.35 meters shorter and the upper part is 51.75 meters. The height of the dam is 15.25 meters, which when filled with water forms a reservoir up to 1.5 km in length.

This hydraulic structure, built by our ancestors in ancient times to collect water, can still be used today. For example, it allows the collection of streams and flood waters that flow uselessly in the spring. To do this, it is necessary to build small dams, similar to the Khanbandi dam, given the volume of runoff.

Published: April 05, 2021 | **Pages:** 90-95

Several reservoirs have been built in the Mirzachul natural area to regulate the flow and provide water to irrigated lands. Examples of such reservoirs are Jizzakh, Qorovultepa, Zaamin, Arnasay, Novka, Sardoba, Khojamushkent and Sarmishsay. About 400,000 hectares of land in the Mirzachul natural region are being irrigated with the help of reservoirs.

The Main Findings and Results

The Jizzakh reservoir, originally built in a natural region, began construction in 1963 and was completed in 1973 on the Yayilmasay cliff, 9 km east and southeast of Jizzak. The Jizzakh Reservoir overlooks the Syrdarya Basin and receives water from the Sangzor River and the Tuyatortar Canal. According to the morphometric parameters of the reservoir, the area is 12.7 km^2, the average depth is 26 m, the width is 5.1 km, the length is 3.3 km, the height of the dam is 22 m and the capacity is 87.5 million m^3. A canal was built to bring 25 m^3 / sec of water to the reservoir (9 km in length) and 10 m3 / sec to discharge water from the reservoir (15 km in length). The Jizzakh Reservoir is located in the Sharof Rashidov district and fully meets the water needs of 15,340 hectares of land and helps to irrigate more than 10,000 hectares of protected lands.

The Karavultepa reservoir was built in 1978 to improve the water supply to the southeast of the country. The Karavultepa reservoir has a capacity of 53 million m^3 and receives water from the Tuyatortar canal on the Zarafshan River. The reservoir supplies water to Gallaorol and Bakhmal districts.

In the lower reaches of the Zaamin River in 1979, the Zaamin reservoir with a capacity of 52.1 million m3 was built. 40% of the water demand of the Zaamin region is provided by the Zaamin reservoir. Therefore, it is possible to develop measures for the rational use of water resources with information on the annual performance of the reservoir (see Table 1).

Table 1

Morphometric indicators of the Zaamin reservoir

№	The size	Indicators
1	Full project size	52,1 mln m^3
2	Scope of use	34,0 mln m^3

Published: April 05, 2021 | **Pages:** 90-95

3	Dead volume	15 mln m^3
4	The size of the reservoir	3,2 km^2
5	The width of the reservoir	Maximum-700 m (average-350 m)
6	The depth of the reservoir	Maximum-73.5 m (average-17.7 m)

Zaamin requires more water than the established limit due to the expansion of irrigated areas in Zaamin, Lilakuye, Chorvador, Beshbulak, Beshkubi and many other farms that receive water from the reservoir. Therefore, the demand for water increases sharply during the summer months, and the problem of water scarcity arises. In order to prevent this problem, it is necessary to reconsider the crop types of farms and switch to planting or drip irrigation of crops that require as little water as possible.

The Arnasay reservoir was built in the eastern part of the Aydar-Arnasay lake system, at the confluence with the Chordara reservoir. The Arnasay reservoir was commissioned in 2003 and has a water capacity of 730 million m^3. Arnasay reservoir supplies water to Mirzachul, Dustlik and Arnasay districts with the help of 3 pumping stations.

Undoubtedly, the largest reservoir built on the plains of Central Asia, that is, in the Mirzachul natural region, is the Sardoba reservoir. Construction of the reservoir began in 2010 at the site of the central branch of the South Mirzachul Canal and was completed in 2018. If we look at the morphometric dimensions of the huge hydraulic structure, the area is 58.7 km^2, water capacity is 922 million m^3, maximum depth is 35 m, length is 33 km, height is 33 m. The Sardoba reservoir is expected to irrigate 146.2 thousand hectares of land in Akaltin and Mirzaabad districts of Syrdarya region, Arnasay, Mirzachul and Dustlik districts of Jizzakh region. Construction of a 15-megawatt mini-hydropower plant has also begun at the Sardoba Reservoir.

On the morning of May 1, 2020, a dam broke in the Sardoba reservoir. As a result of the flood, settlements and crops in Sardoba, Oqoltin and Mirzaabad districts were damaged. Buildings, roads, communications were destroyed. More than 60,000 people were evacuated from 22 villages in three districts.

Published: April 05, 2021 | Pages: 90-95

Such a tragedy in the reservoir, called "Construction of the Century", requires a comprehensive study and analysis of the Sardoba reservoir and its impact on the environment. It is no secret that any large-scale construction takes into account the benefits to the economy in the first place. The impact of construction on the surrounding landscape is often underestimated. As a result, the balance between nature and society is disturbed.

In addition to reservoirs, small settlements such as Novka, Khojamushkent and Sarmishsay have been built in the Mirzachul natural zone (see Table 2).

Table 2

Information about reservoirs and floodplains of the Mirzachul natural region.

т/р	Reservoirs and floodplains	Built year	Source	Area, km^2	project capacity, mln.m3
1	Jizzakh Reservoir	1973	Sangzar, Tuyatortar	12,4	87,5
2	Karavultepa Reservoir	1978	Tuyatortar	8,50	50
3	Zaamin Reservoir	1979	Zominsay	1,4	52,1
4	Arnasay reservoir	2003	Chordara Reservoir	140	730
5	Sardoba Reservoir	2018	South Mirzachul canal	58,7	922
5	Novka downpour room	1980	Rocks and floods	0,60	5
6	Khojamushkent downpour room	1981	Springs and floods	0,58	5
7	Sarmishsoy	1988	Springs and floods	0,56	5

Published: April 05, 2021 | **Pages:** 90-95

Source: Syrdarya-Zarafshan ITXBQ melorative expedition data, 2019

The aforementioned reservoirs have different effects on the surrounding landscapes, as well as on the water supply of irrigated lands. In particular, as a result of water absorption in the reservoir, groundwater levels have risen, soil salinity has increased and in some places there have been swamps.

Conclusion

In short, the study and assessment of changes in the landscapes of the Mirzachul natural region under the influence of the reservoir remains one of the most significant problems in Uzbekistan today. The reservoir is affected by changes in the environmental landscape components (groundwater, microclimate, soil, flora and fauna).

The construction of a reservoir in the Mirzachul natural area has a different effect on the surrounding landscape and agricultural land. The assessment of the impact of the reservoir requires the development and implementation of emergency response to man-made and natural disasters, taking into account the characteristics of the natural environment.

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