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# ESTABLISHMENT OF ANCIENT HYDRAULIC FACILITIES IN CONNECTION WITH THE CLIMATE CONDITIONS AND INLAND WATER OF SAMARKAND REGION

**Abstract:** This article describes the formation of ancient hydraulic structures under the influence of the climate and inland waters of Samarkand region. In addition, the role of natural geographical conditions of Samarkand region in the formation of ancient hydraulic structures, the types of ancient hydraulic structures in the region and their importance are explained.

**Keywords**: Hydraulic structures, Gishtband, Oxchabsoyda, Abdullakhanbandi, Soy, Mastchiopi, Artery.

# УСТАНОВЛЕНИЕ ДРЕВНЕГО ГИДРАВЛИЧЕСКОГО ОБЪЕКТА В СВЯЗИ С КЛИМАТИЧЕСКИМИ УСЛОВИЯМИ И ВНУТРЕННИМИ ВОДАМИ САМАРКАНДСКОЙ ОБЛАСТИ

***Аннотация:*** *В данной статье описывается формирование древних гидротехнических сооружений под влиянием климата и внутренних вод Самаркандской области. Кроме того, объясняется роль природно-географических условий Самаркандской области в формировании древних гидротехнических сооружений, типы древних гидротехнических сооружений в регионе и их значение.*

***Ключевые слова:*** *гидротехнические сооружения, Гишбанд, Оксчабсойда, Абдуллаханбанди, Соя, Мастчиопи, Артерия.*

**Introduction**. The climate of Samarkand region in the plains and in the mountains is slightly different. This situation creates different requirements for the types of ancient hydraulic structures in both parts. In the plains of Samarkand region, summer is hot and dry, winter is cold and rainfall is low.

However, due to the fact that the region is surrounded by mountains on both sides, the weather does not get too cold in winter.

The average January temperature is 0°-1.3°C. Sometimes, when the Arctic air masses enter, the minimum temperature drops to -24°-35°C. As a result, the average temperature in July is around 26°-280°. The maximum temperature reaches 40°-44°C.

Samarkand region sometimes receives air masses in spring and autumn. In such cases, the air cools sharply and the surface layer of the earth freezes, and a cold hitting of crops is observed. The last frosts in the spring are in the third decade of March. It is not cold in the region for 213-215 days a year. In Kattakurgan, the maximum height is l (465 m) 282 mm, in Samarkand, the maximum height (800 m) is 700 mm. Most of the annual rainfall (44-49%) falls in spring and winter. In summer it falls only 2.0-4.0%.

Some of the precipitation falls in the form of snow, but due to the high temperature, the snow cover is on average 7-15 cm thick and can remain unmelted for 15-20 days. Winds from the north, northwest and northeast blow throughout the year in Samarkand region. The average wind speed is 2.0-2.2 m. It increases in spring and summer and decreases in winter. The main reason for this is that the Samarkand region is surrounded by high mountains on the east side and is blocked by the winds blowing from the north and northeast.

**The main part**. The climate of Samarkand region is relatively different in the mountains than the plains with its rainy and cold. In the mountains, summer is cool and short, and winter is a bit cold and continuous. Therefore, the average temperature in January is very low in the plains of the region, down to -11.4 °C, and the lowest temperature drops to -25°-35° C. In summer, the average temperature in July is around 25°-35° C. In the mountainous part of Samarkand region, the last spring frosts occur in the first half of April, and the average duration of the first autumn frosts falls in the second half of October. Therefore, the period without frost is around 100-200 days.

Annual precipitation in the mountainous areas of Samarkand region is 250-400 mm (Omonkotan, Qoratepa), in the reverse 250-300 mm, rainfall occurs in spring (41-48%) and winter (34-43%). ), a small part falls in the summer (2-5%). But as you climb up the slopes, the amount of summer rainfall increases. Because the county is mountainous, some of the rainfall occurs in the form of snow and hail. Therefore, the thickness of the snow cover is 15-30 cm and in some places it can reach up to 1 m.

The main water artery of the region is Zarafshan river. It started from the Zarafshan glacier in the Zarafshan mountains and was originally called Mastchiopi. It was later renamed Zarafshan after its left tributary, the Fandarya, merged with the village of Ayni. The Zarafshan River flows in the mountainous part at a speed of 15-17 m per second. In this part, it has about 200 tributaries. The most important of these tributaries are the Fandaryo and Magiyondarya, which join from the left.

The remaining tributaries are small, and after crossing the Zarafshan River through the city of Panjikent, there are no continuous tributaries in the region. However, there are 120 streams whose water level decreased as a result of irrigation system and that do not flow into the Zarafshan River. Fifty of these streams start from the Nurata-Aktag ridge, and the rest start from the Qoratepa, Zirabulak and Ziyovuddin mountains. The most important of these streams are Urgutsay, Omonkotansay, Ogallisay, Sazagansay, Aksay, Tosinsay, Oqtepasay, Tasmalisay, Langarsay, Koksaroysay and others, starting from the Zarafshan ridge.

The Zarafshan River flows slowly in the Samarkand region. Its width is 3-4km. It flows 8 km from Samarkand and divides into two branches called Aqdarya (130 km long) and Qoradarya (127 km long). They reunite near the village of Khatirchi. The land between the two rivers, Akdarya and Karadarya, is called Miyankol Island. The Zarafshan River is waterful and collects water from the Zarafshan, Turkestan and Gissar mountains. 65% of its water comes

from melting ice and snow, 34% from snow water, and 1% from rainwater. This means that in the current temperature of the Zarafshan River (June-September), it increases during the period when water is needed for agricultural crops. During these months, the Zarafshan River flows 61.1% of the annual flow. The lowest water consumption (30-35 $m^3$ / sec) occurs in winter.

On the contrary water is most abundant in summer. This means that in July it sometimes flows up to 930 $m^3$ per second. The average annual water consumption of the Zarafshan River is 165 $m^3$ per second. Due to the fact that the Zarafshan River is muddy in summer, up to 10-20 tons of mud is deposited on each hectare of irrigated land in the region. The content of phosphorus and potassium in the mud is 1.5-2 times higher than in the Amudarya and Syrdarya waters. The Zarafshan River can freeze in the region from late December to mid-February.

The streams in Samarkand region start in the low mountains and are saturated with melted snow and rainwater in early spring. In summer, their water level is very low and some of them even dry up. In the rivers, 50% of the annual flow often flows in the spring. As a result, there are floods that damage the economy. According to the data, in the middle part of the Zarafshan valley over the past hundred years, about 500 floods have been recorded. When flood occurs, the water level in the streams increases several times and the streams are filled with muddy water. If the annual flow of the Tosinsoy is 1.5 $m^3$ per second, the Kattasay is 0.3 $m^3$ per second. However, when the flood occurs, the Tusinsay discharges up to 200 $m^3$ per second, and the Kattasay even up to 609 $m^3$. Such a large current overflows from the riverbed, destroying villages, fields, bridges, washing away the soil layer and creating a ravine. .

Therefore, the main task is to build pools and small reservoirs for winter and spring floods in order to use these streams wisely, and to use the collected water sparingly in the fields in the summer,. In the pools it is possible to develop poultry farming and fishing.

According to experts, if 50% of those 120 streams in the region are built with pools with an average capacity of 25 million $m^3$ of water, it will be possible to collect 1 billion 600 million $m^3$ of flood water. Such opportunities have been calculated since ancient times.

In the Middle Ages, two ancient reservoirs were built in the Samarkand region. In the 14th century, the ancient reservoirs of Gishtband were built near the village of Jam, and in the 16th century, the reservoirs of Abdullakhanbandi were built in Oxchabsoy. Only a few of them have survived to the present day.

Reservoirs such as Kattakurgan, Aqdarya, Kamongaron, Qoratepa, Tusinsoy have been built in the region for the rational use of flood waters. It receives water from a 28.2 km long canal in Akdarya. 100 $m^3$ of water per second can flow from this canal. The water capacity of the reservoir is 1 billion $m^3$. During the growing season, 140 $m^3$ of water per second flows from the canal to irrigate the fields. As a result, 65,000 hectares of new land will be irrigated, 384,000 hectares of land will have improved water supply, and 240-250 quintals of fish will be caught annually from the reservoir.

In the irrigated part of Samarkand region, there are also mineralized groundwater, partially saturated with various salts. However, it is located on the surface. In most cases it lies at a depth of 5-6m.

**Conclusion**. Favorable natural geographical conditions of Samarkand region have been the basis for the development of irrigated agriculture since ancient times. In particular, based on the geological and geomorphological structure of the region, climate and inland waters, the geographical distribution of the organic world, various irrigation structures, artificial freshwater sources have emerged. According to their segregated functions, blocking, collecting and storing, surfacing, opening, directing, transferring, protecting, separating, dying into groups of sanitary-hygienic importance can be learned. Depending on their functions, they are distributed in different densities throughout the Samarkand region. The ancient dams were located in the foothills of the Nurata Mountains,

where there was a hydrological flow, but a little less. Ancient hydraulic structures, such as pools, ponds, dashkak, sardoba, which are important for collection and storage, and surface drainage canals, which are formed in all regions of Samarkand region, are located in the foothills. The most important hydraulic structures were dug in the form of wells in all areas of the region, and several types of them were formed.

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