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THE INTEGRAL RELATIONSHIP BETWEEN THE RIVERS OF UZBEKISTAN AND GROUPS OF ANCIENT HYDRAULIC STRUCTURES

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Abstract: This article examines and explains in detail the integral relationship between the rivers of Uzbekistan and groups of ancient hydraulic structures on the basis of a number of scientific sources.
Keywords: Amudarya, Khazarasp, Polvonyop, Ghaziabad, Shakhabad, Yormish, Qilich Niyozbosh, Qoraqiz, Mangit, Shobboz, Lovzon, Siponyop, Khonyop, Suvonli, Bekyop, Quvonchyorma, Kegeyli, glacial-snow feeding, canal.

The river network within the territory of Uzbekistan is distributed extremely unevenly. From this point of view, the territory of the republic may be studied by dividing it into two major parts. The first of these comprises the mountainous regions, where rivers and seasonal streams are relatively dense. Therefore, only certain types of ancient hydraulic structures intended for conveying water, protecting settlements and lands, or converting flow velocity into mechanical power, although not numerous, have a specific pattern of geographical distribution.

The second group covers the plains, which occupy 70% of the territory of the republic. River networks here are very sparse: only 0.002 km of river channel corresponds to each square kilometre (N. L. Korzhenevskiy, 1960, p. 14). These include the Amudarya, Syrdarya, Zarafshan, Chirchik, Ahangaran, Kashkadarya, Surkhandarya and Sangzor rivers, as well as short streams originating from the Nurata, Zirabulak-Ziyovuddin and Central Kyzylkum residual mountains, some of which partly dry up during the summer season. The following rivers and streams played an important role in the formation of ancient hydraulic structures.

A m u d a r y a. The lower part of this river flows through the territory of Uzbekistan. Since it belongs to the glacial-snow feeding group, it flooded twice every year, in April-May and June-July, with a discharge reaching up to 6,410 cubic metres per second. During such periods the channel of the Amudarya widened to as much as 5,000 m, and floodwaters covered the surrounding areas (M. Qoriev, 1959, p. 172). To resist floodwater and the intensive process of bank erosion occurring along the shoreline, the local population used ancient hydraulic

structures such as barriers and protective embankments.

Because the banks of the Amudarya, especially in its lower reaches, were flat, it was very convenient to take water from the river through canals for irrigating cultivated fields. For this reason, canal-related types such as kanal and uzak, as well as their subtypes soqa, arna, yop, bodoq, solma, tortma, ariq and yortish, became widely distributed in Khorezm and Karakalpakstan. In the second half of the nineteenth century, canals such as Khazarasp, Polvonyop, Ghaziabad, Shakhabad, Yormish, Qilich Niyozbosh, Qoraqiz, Mangit, Shobboz, Lovzon, Siponyop, Khonyop, Suvonli, Bekyop, Quvonchyorma and Kegeyli existed along the Lower Amudarya (Ya. Ghulomov, 1957, p. 237). At points where these ancient hydraulic structures flowed below cultivated plots, various mechanical devices belonging to the group of ancient hydraulic structures designed for lifting water were used, including kotarma, saqiya, tebratma and chigir.

In the Lower Amudarya region, loamy soils of alluvial origin are widespread. This created serious difficulties in opening water outlets from canals to cultivated plots. If a quloq, or outlet, was opened along a rapidly erodible bank, the strong current could easily wash it away. Therefore, both horizontal and vertical forms of toqurta, belonging to the group of structures designed for diverting and measuring water flow, were highly useful. For this reason, the geography of toqurtas is characteristic of the Lower Amudarya region.

To supply water to fortified towns established along the Amudarya, such as Khazarasp and Qizqal'a, the latter located several kilometres away from the riverbank, obuduzd systems were constructed (Ya. Ghulomov, 1957, pp. 149-169). Such sinnor-obuduzd systems had already increased the military and strategic significance of fortresses in the Middle Ages.

The Z a r a f s h a n River. This river also has a glacial-snow feeding regime; therefore, it entered its high-water period in May and August, when its discharge reached up to 700 cubic metres per second (V. L. Shultz and R. Masharipov, 1969, p. 148). The river has been of great importance for irrigation since ancient times. Accordingly, many types of ancient hydraulic structures associated with guiding and conveying water, diverting water flow and blocking flow developed in connection with the Zarafshan River. Indeed, as the demand for water increased, the measures and structures used for exploiting it also became more numerous.

Four flood periods, known as vaqti furob, and one low-water period, known as vaqti qillat, were observed on the Zarafshan River. The first flood was called Narzob and coincided with the beginning of the month of Hamal, on 20-22 March. This flood was known as kok qamish in the lower Amudarya region and as qalami in the lower Syrdarya region (A. Muhammadjonov, 1972, p. 163). At that time the reedbeds began to sprout and turn green, producing sharp shoots resembling a qalam, since in ancient times pens were made from sharp reeds or goose feathers

(A. N.).

The second flood on the Zarafshan was called loyqa suv, or muddy water, and occurred at the end of the month of Savr and the beginning of Javza, that is, in the second half of May. During this period the river became highly turbid, and its transported alluvial deposits, especially because they contained a large amount of phosphorus and therefore had a greyish colour, brought "life" to the fields. In fact, all fertile cultivated lands on the alluvial plains of the Zarafshan Valley were formed through the silt brought by the river during such flood periods. The average turbidity of the river water in its upper reaches was 0.88 kg per cubic metre, or, on average, the Zarafshan washed down 421 tonnes of sediment annually from each square kilometre of its catchment area (V. L. Shultz and R. Masharipov, 1969, p. 150).

The third flood of the Zarafshan River was called sovuq suv, or cold water. This process coincided with the beginning of the month of Saraton, that is, 20-22 June, and lasted for two weeks.

The fourth flood was issiq suv, or warm water. It began on the seventeenth day of Saraton, corresponding to 9 July, and lasted for 23 days (A. Muhammadjonov, 1972, p. 137). The second popular name of this flood was tarmob, that is, tarma ob. The term tarma ob contains the ancient Turkic word tarma, meaning ice. During this period, glaciers in the upper reaches of the Zarafshan began to melt, causing the river to enter its high-water period. Its third name was obi talash, meaning "disputed water". This period was impatiently awaited by farmers, and the distribution of water among users was almost always accompanied by great difficulties. In many cases, during the final days of garmob, or warm water, disputes over water arose and sometimes turned into serious conflicts (A. Muhammadjonov, 1972, p. 138). To prevent such conflicts, to ensure equitable water distribution among farmers, and to allow the population to cross the river more easily during flood periods, water-distributing bridges were built. Six such structures, designed for both diverting and measuring water flow, were located along the Zarafshan River between the city of Samarkand and Qorakul: the Shayboniykhon water-dividing bridge (1502), Puli Karmana (1582), and the bridges Puli Mekhtar Qosim, Puli Chohorminor, Puli Romiton and Puli Jondor, built in the second half of the sixteenth century. These water-distributing structures also served a measuring function and were important for directing water to the required routes.

The canals taking water from the Zarafshan River represent one of the oldest groups of ancient hydraulic structures in Central Asia designed for guiding and conveying water. For example, the Dargom Canal was dug in the fourth-fifth centuries BCE. Beginning from the Varghsar dam, this structure extended for more than 60 km and supplied water to the Ulus steppes. Its average discharge was 50-

60 m3/s (Uzbek Soviet Encyclopedia, 1972, p. 569). The Tuyatortar Canal was drawn from the right bank of the Zarafshan River near Farmontepa at the beginning of the Common Era, and its channel was extended in the sixteenth century. Over a distance of more than 100 km between Dosmat, Qoratosh, Alamli and Yangikurgon, its channel was laid along uneven foothills and connected to the Sangzor River. A total of 689 vargh-dams were installed on dozens of canals such as Bulungur, Nahripay, Payariq, Vobkent, Shofirkon and Jilvon (A. Muhammadjonov, 1972, p. 133). The muddy waters of the Zarafshan distributed into canals were then regulated with the help of such subtypes as korband, nishband and halqaband.

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