“XORAZM VOHASIDA BRONZA DAVRIDAN BOSHLAB SUG‘ORMA DEHQONCHILIK VA IRRIGATSIYA TIZIMLARINING SHAKLLANISHI: TOZABOG‘YOB VA AMIROBOD MADANIYATLARI MISOLIDA”

«ФОРМИРОВАНИЕ ОРОШАЕМОГО ЗЕМЛЕДЕЛИЯ И ИРРИГАЦИОННЫХ СИСТЕМ В ХОРЕЗМСКОМ ОАЗИСЕ С БРОНЗОВОГО ВЕКА: НА ПРИМЕРЕ ТАЗАБаГЪЯБСКОЙ И АМИРОБОДСКОЙ КУЛЬТУР»

“THE FORMATION OF IRRIGATED AGRICULTURE AND IRRIGATION SYSTEMS IN THE KHOREZM OASIS SINCE THE BRONZE AGE: THE CASE OF THE TOZABOGYAB AND AMIROBOD CULTURES”

Babayazov Umidbek Pulatovich
Urganch State University
Teacher at the Department of History
E-mail: u.babayazov@gmail.com
Phone: 998334219191

Annotatsiya. *Maqolada Xorazm vohasida bronza davridan boshlab sug‘orma dehqonchilikning shakllanishi va irrigatsiya tizimlarining rivojlanishi yoritilgan. Tozabog‘yob, Suvyorgan va Amirobod madaniyatlari aholisi tomonidan qo‘llanilgan qo‘ltiq dehqonchiligi, dastlabki soqa qurilmalari, kanal va ariqlar tarmoqlarining barpo etilishi arxeologik manbalar asosida tahlil qilingan.*

Kalit so‘zlar. *Xorazm vohasi, bronza davri, Tozabog‘yob madaniyati, Amirobod madaniyati, qo‘ltiq dehqonchiligi, sug‘orma dehqonchilik.*

Аннотация. *В статье рассматривается формирование орошаемого земледелия и развитие ирригационных систем в Хорезмском оазисе начиная с бронзового века. На основе археологических данных анализируются земледельческие практики Тазабагъябской, Суёрганской и Амирободской культур: использование карманного (пойменного) земледелия, сооружение первых «сока» для управления водой, строительство каналов и арыков.*

Ключевые слова. *Хорезмский оазис, бронзовый век, Tfзабогъябская культура, Амирободская культура, карманное земледелие.*

Abstract. *This article examines the emergence of irrigated agriculture and the development of irrigation systems in the Khorezm oasis since the Bronze Age. Based on archaeological evidence, it analyzes the agricultural practices of the Tozabogyab, Suvyorgan, and Amirobod cultures, including pocket (floodplain) farming, the construction of early soqa structures to regulate water flow, and the creation of canals and irrigation networks.*

Keywords. *Khorezm oasis, Bronze Age, Tozabogyab culture, Amirobod culture, pocket farming, irrigated agriculture.*

Introduction. Since ancient times, agriculture and irrigation systems in the Khorezm oasis have constituted one of the fundamental factors of socio-economic life. Beginning with the Bronze Age, the formation and expansion of irrigated farming marked an important stage in human history, contributing significantly to the establishment of agrarian foundations in society. Archaeological investigations demonstrate that the earliest irrigation structures were constructed by the populations of the Tozabogyab, Suvyorgan, and later the Amirobod cultures.

Review of the Literature. The history of irrigation systems and agriculture in the Khorezm oasis has been widely examined in scholarly research. Notably, S.P. Tolstov, in his works “Ancient Khorezm” and “In the Footsteps of the Ancient Khorezmian Civilization”, analyzed the archaeological sites of the Tozabogyab, Suvyorgan, and Amirobod cultures, providing a detailed account of their irrigation systems and economic practices.

Methodological Framework**.** This study relies on historical-comparative, archaeological, and source-critical methods. The remains of irrigation systems (soqa structures, canals, and ditches) identified at archaeological sites were studied in situ and compared with descriptions found in scholarly literature. Additionally, ethnographic materials—such as the modern practices of constructing soqa and reed-bundle dams—were employed to demonstrate the continuity of historical traditions.

Analysis. The agricultural fields of the Bronze Age population were located along the river channels. The scholar B.V. Andrianov, who conducted a detailed study of the ancient irrigation systems of the Khorezm oasis, described their structure as follows: water was diverted from the main river into an abandoned riverbed, from which canals (aryks) were dug to deliver water directly to the fields [2, p.108]. Archaeological traces of such irrigation systems have been identified in the vicinity of Bronze Age sites such as Bozorkala and Kokcha-3.

The inhabitants of the Tozabogyab culture constructed regulating devices at the head of canals, directing water into secondary irrigation ditches, and through these installations controlled the distribution of water to the fields. Although no intact structures from this period have survived, two earth mounds measuring 30–50 cm in height and 8–13 m in width have been discovered [1, p.108]. Among the modern Khorezm population, such a headwork is called soka. It was precisely the Tozabogyab farmers, the founders of early agriculture in the Khorezm oasis, who invented this initial form of the soka. Over subsequent centuries, the structure was improved and has continued to be used by farmers up to the present day.

Functionally, the soka represented a simple dam, created by blocking the slowly flowing sections of a river with soil, stones, or bundles made of plant materials. The

bundles—locally called novardi or vardi—were typically composed of reeds packed with straw or stones, tightly bound into cylindrical forms using twisted reed ropes. In addition to reeds, tamarisk branches were also employed. The finished bundles were usually of such a scale that two adults could barely encircle them with outstretched arms, reaching lengths of 4–6 meters, and weighing between 50 and 500 kilograms, sometimes even more. Comparable methods of constructing irrigation headworks were also widespread in other regions of Uzbekistan. For example, while in Khorezm they are known as novardi/vardi, in the Zarafshan oasis they are called navala/novala, in the Fergana Valley uluk, in Surkhan oasis nogala, and in Syrdarya and Tashkent korabura [4, p.225].

The Amirobod population primarily engaged in animal husbandry, but agriculture and handicrafts were also important components of their economy. They pioneered the development of artificial irrigation farming, constructing broad, shallow canals branching from the Amudarya. The best-preserved settlement associated with this culture is Yakka Parson 2, where remnants of irrigation channels, ditches, and agricultural fields have been identified. Excavations revealed about 20 semi-subterranean huts, suggesting the existence of nuclear family structures. Each dwelling had a central hearth.

Archaeological finds from these dwellings include hearth remains, pottery fragments, bronze needles, two-bladed bronze arrowheads, stone molds, single-edged bronze knives, awls, grain storage pits, warehouses, stone grinders, bronze sickles, and animal bones, reflecting a mixed agro-pastoral economy.

The pottery, hand-crafted and relatively limited in form, consisted mainly of bowls, small jars, jar-like vessels, and clay cauldrons. The jars had rounded bellies with flat bases, and their rims were either sharply turned or straightened. The vessels were coated in reddish-brown or light red slip and decorated with geometric motifs and fir-tree-like patterns around the rims. The pottery was thick and fragile due to the abundant admixture of gravel in the clay. Production was carried out communally: the entire group participated in firing the ceramics, which was performed in large open-air bonfires on hilltops or open plains. Owing to the intensity of these bonfires, the vessels were evenly fired without blackened surfaces, giving Amirobod ceramics a distinctive character.

Results. The settlements of the Amirobod culture were located along canals, ancient channels, or irrigation ditches. These communities did not remain permanently in one place; rather, they followed the water, relocating to newly excavated canals or ditches and settling nearby. Due to the turbid and unstable flow of the Amu Darya, many canals constructed by the population became clogged with silt, while soka dams were often washed away by floods. In such cases, the inhabitants built new headworks and excavated new irrigation ditches instead of re-cleaning the old ones. Repeated silt removal had led to the accumulation of sediment on canal banks, raising them considerably, which made maintenance less practical. For this reason, constructing new ditches required less effort than restoring the old ones.

Over time, these new ditches were dug adjacent to the older ones, resulting in a gradual increase in the number of parallel canals. Eventually, the system expanded, becoming broader, longer, and more ramified. By the late 8th century BCE, the canals constructed by the Amirobod population had reached widths of up to 40 meters [6]. Scholars therefore conclude that large-scale artificial irrigation systems were developed during this period. The progressive decline of water flow in the Akchadarya channel from the late 8th century BCE necessitated greater reliance on artificial irrigation. From the 8th–7th centuries BCE onward, the Amirobod population was forced to alter its way of life: the reduction of available water resources rendered agriculture unsustainable in certain areas, leading to migration.

Part of the population abandoned farming and turned exclusively to pastoralism, relocating to the ancient channels along the northern Akchadarya and the lower Syrdarya. Another group, however, moved toward the upper Akchadarya channel and the Sarykamysh basin on the left bank of the Amu Darya, where they practiced a mixed economy combining agriculture with animal husbandry.

The question of how early agriculture first emerged in the Khorezm oasis remains one of the key issues of scholarly debate. First, no wild forms of domesticated plants have been found in the region, suggesting that cereal seeds were introduced from outside. Second, the indigenous Suvyorgan culture, regarded as the earliest local population, was initially engaged exclusively in pastoralism. Archaeological traces of farming activities appear only from the later Bozorkala stage. It was during this period that groups of the Tozabogyab culture—who combined farming with herding—settled in the area alongside the Suvyorgan communities [5, pp.45–47].

Conclusion. Scholars suggest that the skills associated with artificial irrigation may also have been acquired from external sources, since the Khorezm oasis occupied an intermediate position between the agrarian societies of the south and east and the pastoral communities of the Eurasian steppes during the Bronze Age. It is noteworthy that in this very period, two parallel processes occurred: the migration of nomadic pastoral tribes into the Khorezm oasis, and the movement of southern farming communities northward along river systems. The near simultaneity of these events could have had a profound impact on the way of life of the local population.

In the second half of the 2nd millennium BCE, the ancestors of the Tozabog‘yob culture migrated into the region from the northern steppes, introducing the earliest forms of agriculture. At the same time, the pottery-making techniques of the local Suvyorgan culture demonstrate clear influences from southern agrarian communities.

Archaeobotanical findings indicate that Khorezm farmers cultivated cereals such as barley, wheat, and millet. Remains of wheat have been found at the settlements of both the Tozabog‘yob and Amirobod cultures. Regardless of its precise geographical origin, the earliest agriculture developed in accordance with universal natural laws. Cultivation initially emerged along drying river branches, mountain streams, and small tributaries

where water was seasonally available before diminishing into silt. Seeds were sown in these moist, silty soils, which, being soft and easy to till, required relatively little labor and retained sufficient moisture throughout the growing season.

Crops including millet, wheat, barley, oats, and sesame were cultivated in such silty environments. They were able to grow substantially before the soil dried out. This early form of agriculture in the Khorezm oasis—often referred to as floodplain or recessional farming—was based on the use of floodwaters in the tributaries of rivers whose channels periodically dried up within the lowland basins [3, pp.82–85].

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