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THE FORMATION OF MICRO-OASES IN THE CITIES OF CENTRAL ASIA DURING THE IRON AGE

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Abstract: This article analyzes the process of formation of micro-basins in the territory of Central Asia during the Iron Age, their connection with irrigation systems, and their role in the development of ancient cities. The study used historical sources, archaeological data, and geographic analysis methods. The results show that micro-basins were formed on the basis of natural water sources and artificial irrigation systems, and had a significant impact on the economic and social development of cities. This system was one of the main factors in the urbanization process during the Iron Age.

Keywords: Iron Age, Central Asia, micro-oasis, irrigation, urbanization, archaeology.

Аннотация: В данной статье анализируется процесс формирования микрорайонов на территории Центральной Азии в эпоху железного века, их связь с ирригационными системами и роль в развитии древних городов. В исследовании использовались исторические источники, археологические данные и методы географического анализа. Результаты показывают, что микрорайоны были сформированы на основе природных источников воды и систем искусственного орошения и оказали значительное влияние на экономическое и социальное развитие городов. Эта система была одним из основных факторов процесса урбанизации в железном веке.

Ключевые слова: Железный век, Центральная Азия, микроазисы, ирригация, урбанизация, археология.

INTRODUCTION: The Iron Age is characterized by a significant acceleration of economic, social, and cultural processes in the history of Central Asia. During this period, significant changes occurred in population distribution and economic activity as a result of the development of productive forces, the improvement of agricultural culture, and the expansion of irrigation systems. Agricultural production expanded, especially as a result of the development of irrigation farming and the development of new lands, which in turn created the necessary economic basis for the formation and development of cities. Against the background of such historical processes, the formation and development of micro-oasis took an important place in the territorial and economic system of the Society of the Iron Age. In the scientific literature, the concept of "micro-watershed" refers to a complex of agricultural areas that occupy a small area but have an independent irrigation system. Such areas often formed around river valleys, streams, springs, or underground water sources, which were considered important centers of ancient agricultural activity [1]. Micro-regions were often agrarian systems that united several villages or population centers, and their main function was to provide food to nearby settlements and cities through the cultivation of agricultural products. Therefore, micro-farms are considered not only as a territorial form of agricultural production, but also as an important component of the ancient economic system. Irrigated agriculture has been developed in Central Asia since ancient times, and this process was especially closely related to river valleys.

The Amu Darya and Syr Darya basins, as well as the Zarafshan, Kashkadarya, and

Surkhandarya valleys, have long been distinguished as regions with favorable natural conditions for agriculture [2]. As a result, irrigation canals, ditches, and water distribution structures of various views were built by the ancient farmers, and new agricultural areas were appropriated. As a result of the expansion of such irrigation systems during the Iron Age, the number of micro-oasis also increased. These areas became major centers of agricultural production and played an important role in meeting the food needs of the population. At the same time the formation of micro-oasis also had a significant impact on the settlement system. Small villages often formed around irrigation networks, forming a single agrarian region through mutual economic and social ties. Another important feature of the Iron Age is the acceleration of the urbanization process. During this period, cities appeared in many regions of Central Asia, developing as centers of crafts, trade, and administration. Although cities became centers of economic activity for their populations, their sustainable development was directly linked to agricultural production. It was the micro-regions that provided cities with food and ensured their economic stability. For this reason, micro-oasis can be considered as an important element of the territorial economic system, which is interconnected with cities. Archaeological studies also confirm the prevalence of micro-oasis in the Iron Age. Archaeological excavations in the Zarafshan, Kashkadarya, Surkhandarya, and Fergana valleys have revealed ancient irrigation canals, agricultural fields, and settlement remains. These findings serve as an important scientific resource in determining the place of micro-oasis in the life of ancient society. However, the formation of micro-villages and their role in Iron Age urbanization is still one of the issues that has not been fully studied. In particular, the territorial structure of micro-oases, their connection with irrigation systems, and their economic relations with cities require special scientific analysis. Therefore, this study aims to comprehensively study the process of formation of micro-oases in the territory of Central Asia during the Iron Age. The main purpose of this study is to scientifically analyze the process of formation of micro-oasis in the territory of Central Asia during the Iron Age, their relationship with natural and economic factors, and their place in the development of ancient cities.

METHODS: This research was aimed at studying the process of formation of micro-oasis in the territory of Central Asia during the Iron Age, which was carried out on the basis of a comprehensive methodological approach. In the research process, scientific methods were used, which were formed at the intersection of the disciplines of history, archaeology and geography. This multidisciplinary approach allows for a comprehensive analysis of the formation process of micro-watersheds, the identification of their relationship to natural conditions, and a deeper understanding of their role in the economic activities of ancient societies. Therefore, during the research, historical analysis, archaeological methods, and landscape-geographical analysis methods were used in a mutually complementary manner. Historical analysis: One of the important methods used in the study is the historical analysis method. Through this method, written sources, scientific research, historical works, and reports of archaeological expeditions from the Iron Age were analyzed. The process of historical analysis involves comparing existing sources, critically examining them, and drawing scientific conclusions. In particular, the ancient farming system, irrigation structures, and sources that provide information about settlement are important in understanding the process of micro-oasis formation. Analysis of historical sources shows that the Irrigation system was widely developed in Central Asia during the Iron Age, and this process was closely related to the formation of irrigation facilities and water distribution systems [3]. Historical literature also mentions that the ancient population used various irrigation methods to develop new lands and make efficient use of water resources. Therefore, historical analysis helped to determine the socio-economic conditions necessary for the emergence and development of micro-oasis. In addition, through historical analysis, scientific views advanced by various researchers were also studied. This made it possible to assess the issue of micro-oasis

from different scientific perspectives and served to systematically analyze existing scientific opinions.

Archaeological Method: The Archaeological Method also plays an important role in this study. Through archaeological research, various material culture monuments dating back to the Iron Age were identified and their location and structure were studied. In particular, archaeological objects such as ancient irrigation canals, reservoirs, residential remains, agricultural fields and defensive structures serve as an important scientific resource in determining the presence of micro-oasis. Irrigation systems identified through archaeological excavations indicate the development of ancient agricultural activities. The presence of ancient canals and irrigation networks confirms that the formation of micro-basins was directly related to the use of water resources [4]. At the same time, with the help of archaeological finds, important information can also be obtained about the lifestyle, economic activity and the production system of the inhabitants who lived in the territory of the micro-oasis. The information obtained through the Archaeological Method was analyzed by analogy with geographical and historical sources. This helped to determine the territorial location of the micro-oasis, the stages of development and their interaction with the cities.

Landscape-geographical analysis: Since the process of microclimate formation is largely related to natural geographical conditions, the study also extensively used the landscape-geographical analysis method. Through this method, natural factors that influenced the formation and development of micro-oasis were studied. In particular, the climatic conditions of the area, soil composition, Water Resources and relief features were analyzed separately. Climatic conditions played an important role in the development of ancient agricultural activities. The territory of Central Asia has a predominantly arid climate, where the irrigation farming system was important. For this reason, agricultural activities have developed and micro-oasis have formed in areas with water sources. Soil composition is also an important factor in the development of micro-oasis. Alluvial soils, especially in river valleys, were very favorable for agriculture. Agriculture has developed effectively in these areas as a result of the combination of water and Soil Resources.

In addition, the presence of water sources was a decisive factor in the arrangement of micro-oasis. Rivers, streams, springs and areas close to groundwater were actively absorbed by the ancient inhabitants. Relief features have also influenced the process of building irrigation systems. For example, Mountain foothills and river valleys created favorable natural conditions for the construction of irrigation canals. Thus, landscape-geographical analysis served as an important method for determining the relationship of micro-oasis with their natural environment and understanding the patterns of their spatial distribution.

DISCUSSION. The results of this study show that the formation and development of micro-states in Central Asia during the Iron Age played an important role in the economic and social life of ancient society. The data obtained confirm that micro-farms have not only manifested themselves as a territorial form of agricultural production, but also as an important structural element of the urbanization process. Economic changes during the Iron Age, population growth, and the expansion of production activities required the development of new lands. In this process, micro-oasis formed on the basis of irrigation systems have become important centers of settlement and economic activity. First of all, it should be noted that the formation of micro-basins was closely related to the development of the irrigation farming system. The natural and climatic conditions of Central Asia, particularly the arid climate and uneven distribution of water resources, prompted ancient inhabitants to seek ways to use water efficiently. As a result, by the

Iron Age, irrigation systems had become much more sophisticated, with new agricultural areas being developed by diverting water from rivers, digging canals, and creating irrigation networks. Such irrigation facilities, built by ancient farmers, laid the foundation for the emergence of micro-reservoirs. Such areas, often located around river valleys, streams and Mountain foothills, provided favorable conditions for agricultural activities due to their water supply. In addition, the formation of micro-regions has also had a significant impact on the population settlement system. Around irrigation systems, settlements of farmers emerged, which over time developed into small villages and agricultural centers. These settlements formed a single economic system through mutual economic ties. Thus, micro-oasis formed as territorial centers of agricultural production, becoming one of the main points of support for the lifestyle of the population. The second important aspect is that micro-oasis formed the economic basis of cities that emerged during the Iron Age. Archaeological research shows that during this period, cities began to form in many regions of Central Asia, developing as craft, trade, and administrative centers. However, the sustainable operation of cities depended on agricultural areas that provided them with food. It was the micro-regions that performed this economic function, providing cities with the necessary agricultural products. Agricultural products were supplied to urban markets, in return for the villagers being able to obtain handicrafts and other supplies. This process has led to the strengthening of economic ties between the city and the village. The development of micro-oasis also had a significant impact on the social structure of ancient society. The construction, maintenance, and management of irrigation systems required a great deal of collective labor. For the effective operation of irrigation systems, it was necessary to coordinate the water distribution, canal treatment and irrigation process. This in turn led to the formation of a specific organizational system. According to researchers, such processes also influenced the emergence of governing institutions in ancient society [5]. Certain social groups or management systems may have existed to control water resources management and irrigation systems. As a result, micro-regions appear not only as centers of economic production, but also as important territorial units that influenced the formation of the social and administrative systems of ancient society. Therefore, the study of micro-villages is of great scientific importance in understanding the processes of urbanization, agricultural systems, and the development of social organizations that took place in Central Asia during the Iron Age.

CONCLUSION: The results of this study show that the micro-oases that formed in the territory of Central Asia during the Iron Age played an important role in the economic, social, and cultural development of the region. Analysis of archaeological, historical, and geographical sources shows that micro-reservoirs are a complex economic system that arose as a result of the adaptation of ancient societies to their natural environment. They not only served the development of agricultural production, but also served as an important factor in the emergence and development of cities. First of all, the formation of micro-waters was largely due to natural water sources. Since most of Central Asia has a dry climate, ancient populations tried to settle around river valleys, springs, and streams flowing from the mountains. It was in these areas that favorable conditions for agriculture existed. The availability of natural water sources served as the basis for the formation of micro-basins, and the population sought to use these resources effectively. The result was Irrigation Systems based on the use of rivers, streams and groundwater. The development of irrigation systems can be shown as a second important factor. The Iron Age settlement developed a variety of water uses and built complex irrigation systems. Water was delivered to the fields through canals and ditches, which ensured the sustainable development of agricultural production. The development of irrigation systems led to the economic strengthening of micro-watersheds. As a result of the expansion of irrigated land, agricultural production increased, and the process had a positive effect on urban food supply. In

addition, micro-oasis formed the economic basis of the cities. Ancient cities are often located near exactly such agricultural areas. While the city dwellers were engaged in crafts, trade, and various manufacturing activities, the rural population living in micro-villages was mainly engaged in agriculture and animal husbandry. Thus, mutual economic ties were formed between the city and the countryside. Agricultural products provided food to the townspeople, while the town became the center of economic life through handicrafts and trade. The development of micro-waters also had a significant impact on the formation of social structures. The construction and management of irrigation systems required a certain level of collective labor and organization. Therefore, management systems emerged to control the process of water use. This process, in turn, laid the groundwork for the intensification of social stratification in ancient societies and the formation of institutions of management. Micro-oasis also appear as one of the important factors in the urbanization process in the region. The development of agricultural production led to an increase in population, which gave impetus to the emergence of new settlements and cities. Villages formed around micro-oasis have become economic and cultural centers over time. This process was a major contributor to the development of urban culture in Central Asia during the Iron Age. In conclusion, the formation of micro-oases in the territory of Central Asia during the Iron Age was closely related to natural and geographical conditions, the rational use of water resources, and the development of irrigation systems. They not only formed the basis of agricultural production, but also ensured the economic stability of cities and provided an important impetus to the development of the urbanization process in the region. Therefore, the study of micro-oasis is considered to have important scientific value for a deeper understanding of the economic and social development of ancient Central Asian society.

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