



THE IMPACT OF PALEOECOLOGICAL FACTORS AND CLIMATE CHANGE ON BRONZE AGE MIGRATION PROCESSES IN CENTRAL ASIA

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ABSTRACT

The study provides a scientific analysis of the impact of climate changes that occurred during the Middle and Late Holocene periods, particularly the post “Lavlakan humid phase” drought and xerothermic conditions, on migration processes in Central Asia and adjacent regions.

KEYWORDS

Paleoecology, climate change, Lavlakon humid phase, xerothermic period, migration, Bronze Age, Central Asia, Southern Levant, Near East, Chalcolithic period.

INTRODUCTION

The Bronze Age in Central Asian history is marked by sharp ecological and social transformations. The climatic shifts during this period, particularly the aridification processes following the humid phase, had a direct impact not only on natural landscapes but also on human economic activities and settlement patterns. These climatic changes during the Middle and Late Holocene significantly influenced population dispersal, resource utilization systems, and cultural development in Central Asia.

The “Lavlakan humid phase” occurred in the Middle Holocene and the beginning of the Late Holocene, facilitating widespread human habitation in Central Asia. Subsequently, a fundamental climatic phase began, characterized by increasing aridity and a decline in atmospheric humidity [4]. This phenomenon was not limited to Central Asia alone; populations in northern and eastern regions also suffered from increasing aridification.

Researchers suggest that statistical analysis of the sequential collapse of civilizations reveals an interconnection between climate-induced famine, maritime invasions, regional warfare, and the resulting political-economic crises that shaped new civilizations and ideologies [2].

In the Southern Levant, groundwater levels dropped by more than 50 meters by the end of the second millennium BCE. Given the region's geography, such a sharp decline in water levels would have required severe drought conditions in the surrounding mountains [1]. Additionally, climatic aridification coincided with increased seismic activity along tectonic plates.

As established by American and Russian experts, a large-scale xerothermic (dry) period began in the Near East during the second half of the third millennium BCE, triggering mass migrations of tribes. Precipitation, particularly spring floods, sharply declined. Many mountain-fed rivers dried up, leading to a drastic drop in grain crop yields. Abandoned fields and the ruins of ancient settlements across regions from Greece to India bear witness to this crisis [5]. The final years of Naram-Sin's reign (2236–2200 BCE) were further complicated by conflicts with priests and the Gutian invasion of Mesopotamia, which disrupted irrigation networks. This situation forced populations to shift eastward [5].

As previously mentioned, the xerothermic period in the Near East during the second half of the third millennium BCE had effects not only in the east but also in northern latitudes. The period from 2500 to 500 BCE, known as the "Subboreal," was marked by slight cooling. Tundra retreated toward the taiga, while taiga zones shifted closer to broadleaf forests and steppes. Glaciation intensified at higher latitudes, and lake levels dropped in arid regions [6].

These processes created a deep crisis during the Bronze Age, leading to uneven resource distribution and mass migrations across various territories. Central Asia was no exception to these migration waves.

U. Abdullayev proposed dividing the migration processes in Central Asia during the Chalcolithic and Early Bronze Ages into four main phases:

First phase (mid-4th to mid-3rd millennium BCE): Settlement of the oases along the left bank of the Panj River, linked to migrants from Balochistan and the Indus Valley;

Second phase (second half of the 4th millennium BCE): Occupation of the Upper Zeravshan oasis by populations from Balochistan and Southern Turkmenistan;

Third phase (mid-3rd millennium BCE): Another migration wave into the left-bank Panj River basin, involving people from the Harappan civilization and the Indus Valley;

Fourth phase (late 3rd to early 2nd millennium BCE): Settlement of the Margiana and Bactria oases by migrants from Iran, the interfluvial regions, and Southern Turkmenistan [3].

Each of these migration phases had distinct geographic directions and origins.

Paleoecological studies confirm that such climatic shifts altered not only local water balances but also the functionality of entire ecosystems. The sharp decline in water sources led to vegetation degradation, reduced soil fertility, and ultimately, economic and cultural crises in human societies.

The scarcity of water and food resources forced local populations to migrate, resettle in new areas, and intensified socio-political conflicts among different cultures and groups. Thus, paleoecological analysis clearly demonstrates that ancient climate changes were a key driver of human migration and demographic shifts.

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