

GEO-ARCHEOLOGY IN KAZAKHSTAN

paleo-geography, paleoclimate, location of monuments

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In the present times a high scientific level in the study of archeological objects cannot be attained without complex geological-geomorphological-paleontological analyses. This approach defines a new scientific field called '*geo-archaeology*'.

Fifty years after the first pioneering work of archaeologists such as Tolstov and geologists such as Andrianov and Medoev, a wave of geo-archeological studies has been resumed during the last 10 years in **Kazakhstan** by an interdisciplinary team of scientists grouped as the "Laboratory of Geo-archaeology", mainly with the financial support of INTAS (EU Commission) and UNESCO.

Research has been carried out on monuments of the Paleolithic, Neolithic, Bronze, Early Iron, Medieval and Ethnographic periods, of which location and patterns have been studied together with the paleo-geography and paleoclimate of the region.

1 - Paleo-geography and paleoclimate

Dealing with a monument or with a cluster of monuments, the geo-archaeologist will apply his methods to the study of the environmental and ecological conditions that supported the human community who built them and that inspired their material and non-material culture. He will also study the archaeological matrix of sediments that enclose and preserve the monument by documenting not only gross elements (architectural constructions, hardened surfaces, ceramics, metals, big bones) but also some subtle elements such as weak surfaces and micro-facies, distribution of chemical elements, phytoliths, pollen and microfauna.

For this purpose the landscape surrounding the monument and the sedimentary body (archaeological matrix) that bury and preserve it are both submitted to complex analyses: geomorphological, stratigraphic, physico-chemical, lithological, pedological and micro-morphological, paleontological (palinological, paleo-zoological); analyses for the definition of absolute age (radiocarbon and ESR); reconstruction of paleo-geographical and paleoclimatic changes.

Particular attention is dedicated to the reconstruction of the evolution during the Holocene of the regional climate, atmospheric circulation and environment, because these are the factors that determine the paleo-ecological features of the habitat and the processes that brought about the sedimentation and conservation of the monumental structures. In KZ these paleodata are collected and elaborated by specialists of the "Laboratory of Geo-archaeology", who have already provided some paleo-climatic and environmental reconstructions that constitute the basic reference for the calibration of archaeological data in KZ:

- a general reconstruction of the development of regional climate and atmospheric circulation in the mountain and in the plain zones of Kazakhstan for the quaternary period
- a reconstruction with 150-200 year resolution of the climatic and environmental changes in Semirechie and South Kazakhstan for the last 3500 years
- a model with yearly and seasonal resolution of the evolution of the climatic and hydrological regimes in Semirechie and South Kazakhstan for the last 100–120 years

2 - Location of cultural monuments

In the case of Kazakhstan, different and often opposite responses to climatic changes are documented in mountains and plains environments, a fact that all along history compelled human adaptations by

large vertical and horizontal displacements. So the territory constitutes an excellent study-object for the application of the geoarchaeological paradigm to the analysis of the correlation between development of environmental features and changes of location patterns of archaeological monuments throughout the history of KZ.

The location of monuments in KZ has 3 main aspects that can provide its classification: ecological, geomorphological and topographical. The ecological aspect refers to the presence of economical and ecological determinant factors in the immediate environment, within a meso-scale range of 1-10 km; the geomorphological aspect consists of the meso and micro-scale specific relief features surrounding and directly supporting the monument; the topographical aspect refers to the geographical coordinates of the monument.

- When classified on the basis of ecological factors, the development of the location of monuments in Kazakhstan shows the complex role of 6 factors: raw materials, water resources, climate, relief, strategic economical opportunities, socio-political control.
- When analyzed from the point of view of the micro-scale geomorphological aspect, the development of monument location shows on one side very homogeneous traits, being that monuments of every epoch privilege geomorphological rises characterized by high drainage and visibility; and on the other side shows secondary but remarkable geomorphological differences provoked by climatic changes alternating dry and wet phases and affecting the drainage rates of specific landforms.
- The topographical location of monuments refers to the coordinates of their distribution on the territory and is the only one considered by traditional archaeological reports. It can give information on clusters and concentrations of monuments but becomes really significant only when correlated with environmental and ecological features.

By far the most important classifiers of settlement location in KZ are the 6 ecological factors. Their complex interaction and different weight during history suggests the succession of 4 periods: Stone age, Bronze and Early Iron, Middle ages, Modern period. Geomorphological features and topographic location are sometimes quite significant and in that case will distinguish phases inside the main 4 periods.

2.1 - Stone Age (Paleolithic, Neolithic)

The Stone Age (Paleolithic and Neolithic) of KZ spans from one million yrs BC until the Bronze age period (2nd millennium BC).

Paleolithic remains, in West and South Kazakhstan where silicon raw material is provided, are found from the early Pleistocene period; in the central and southwestern Kazakhstan regions consisting of effusive-sedimentary materials, they are present starting from the Middle Paleolithic across the Upper Paleolithic and Epi-Paleolithic (Mesolithic) periods.

Paleolithic monuments consist of camps of open ground type. In general they are located on outcrops of alluvial fans; and, along the Caspian sea, they lie on the surface of sea terraces.

Neolithic monuments consist of camps and cemeteries. They are located near springs and wells, buried under the colluvium or alluvium of small valleys.

We can summarize saying that in KZ the Stone Age monuments, as expression of hunting and collecting communities, are *located in proximity to sources of raw materials and water*.

2.2 - Bronze and Early Iron age

The Bronze and Early Iron ages in KZ cover the 2nd and 1st millennium BC, characterized by mix-farming pastoralist communities.

Their monuments consist of settlements, camps, cemeteries and landscape marks, located in various climatic and environmental zones and geomorphological positions.

The climatic-environmental zones are mountains, canyons, piedmonts, and desert oases.

Concerning their geomorphological position, settlements are distributed: in the mountain zone (Tianshan, Jungarian range, Altai) in valley terraces and moraines remains; in the piedmonts on alluvial

fans; in hilly semi-desertic areas (Karatau, Chu-Ili mountains, Central Kazakhstan) on foothill deposits, alluvial fans and valley terraces; in plains around active streams, ponds and springs. Necropolises and barrows are always located in dry positive forms of the relief like inter-river areas and relict elevations. The location patterns of both the Bronze and Early Iron ages monuments show a basic similarity by being *not any more dependent on the proximity of raw materials*. Now their location bears witnesses to the existence of improved transport capacities and of an efficient system of exchanges; and, as expression of pastoralist communities, *is determined in a complex way by water, climatic conditions and relief*.

Climatic changes in KZ deeply affect the distribution of humidity and of seasonal stockbreeding opportunities and by that strongly condition the distribution of vegetal zones and, with them, the altitude and geographical location of human and in particular pastoralist habitats. A deep change of climatic conditions at the turn of the 1st millennium BC determined relevant switches of vegetal zones and with them the topographical location of monuments, so that the period of the 2nd-1st millennium BC, together with a basic homogeneity of settlement patterns from the point of view of ecological location factors, shows by geographical considerations, a further subdivision in 2 phases: Bronze and Early Iron.

That major climatic change happened at the transition between the hot-dry late sub-boreal (2nd millennium BC) and cold-wet early subatlantic period (700-200 BC). Natural resources are reduced in the mountains where meadows disappear and are increased in the plains which are converted into steppes. This fact, among mix-farming shepherd communities, promoted new living strategies, mainly the switch of economical areas and the introduction of nomadic habits. Settlements changed localization, deserting the mountain meadows and populating piedmonts and plains; and, as a consequence of higher human mobility, saw the introduction of new types of dwellings: during the first phase (middle-late-final Bronze) entirely made of stones, clay and wood; during the second (Early Iron) made of light transportable elements and tents.

So, these relevant climatic, environmental and cultural transformations of the turn of the 1st millennium BC allow us to distinguish, within the 2nd-1st millennium, 2 phases of settlement location, respectively pertaining to the Bronze and Early Iron epochs.

2.3 - Middle ages

The Middle Ages period in KZ (early, middle, late) spans from the beginning of the 1st millennium AD to the 18th century. The life is economically based on agricultural, commercial, pastoralist practices and urbanization; and politically on tribal chiefdom and primitive forms of statehood.

The Medieval monuments consist of large towns (tobe), villages, water devices and roads, cemeteries, ritual enclosures and landscape marks. The most significant among them are located at the mouth of mountain valleys or at the head of river deltas and irrigation schemes.

Their location becomes independent from the natural location of raw materials and progressively more independent on the natural location of water facilities, from climate and from relief features. In fact the medieval urban enterprise could ensure such conditions through other ways, such as the use of large collective works and of advanced technical expedients (transports, canals, walls).

Instead, the main eco-economical feature of the geographical location of Medieval monuments, as expression of large agricultural and commercial societies, is their *concentration in proximity to strategic economical opportunities: radially around irrigation schemes (Otrar, Talas, Chu) and longitudinally along transport ways (Northern Silk Road)*.

2.4 - Modern period

The advent of the Russian and Soviet periods has as a main characteristic the introduction of new advanced hydrological techniques (deep wells, artesian wells, long canals) which definitely freed the settlement location patterns from hydrological dependence, and favoured their larger concentration.

The new trend sees the displacement of all the pastoralist housings from valley streams to large kolkhozes around piedmont wells, the concentration of a very large population on ancient towns and new ones located in piedmont and plains, and the building of big mining centres in remote areas.

The new settlement patterns, from the geomorphological point of view, definitely privilege large concentrations on wide flat areas of piedmonts and plains; and the *eco-economical factors of their geographical location are not only the proximity of strategic economical opportunities like productive and commercial structures but also clear political plans of administrative and territorial control.*

3 – Conclusions

The historical development of the location of human settlements in Kazakhstan, when classified on the basis of ecological factors, happens across 4 successive periods that show the respective importance of different factors: during the first period (Stone Age) the main factors are the provision of raw materials and water; during the second (Bronze and Early Iron) they are water, climate and relief; during the third (Middle ages) agro-productive and commercial facilities; during the fourth (Modern period) high hydrological technology, political control and mining activities.

Also geomorphological features and climatic environmental changes constitute important aspects for further defining secondary characteristics of the locations of monuments.

As a whole the historical changes of settlements location in KZ shows 2 general trends, persistent across climatic fluctuations:

- a *progressive independence* from natural factors thanks to growing human mobility, transport capability, productive capacities and market economy;
- a *progressive dependence* on socio-economical factors, i.e. the location of artificial constructions such as large productive plants and roads and the administrative needs of societies integrated by politics, commerce and money.