Landscape and historical research of ancient natural resource management on the Taman Peninsula

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Abstract. Taman Peninsula was selected as a key area for detailed landscape and nature studies. In the antique period, it was a part of the Bosporus state. Over a long period of uninterrupted economic use the landscape structure has changed significantly – the majority of local landscape complexes have been anthropogenically transformed. According to paleogeographic reconstructions, the Taman Peninsula was a group of islands that were split by the river arms of the Kuban-Antikit. The elements of the antique settlement system were city-states (Phanagoria, Hermonassa, Kepoi, Patrei), rural settlements, roads, as well as plots of land. Rural district (khora) filled natural geographical boundaries – territorial and economic local microzones and occupied the whole islands: Cimmerida, Phanagoria and Sindika with one dominant city each. Around the settlements, along with vineyards, crops and vegetables occupied the main area of plains characterized with the steppe and dry-steppe landscape complexes. The most developed ones were landscape complexes of low-sloped plains and valleys of synclinal origin. Boundary fences of land plots fit into the terrain, which contributed to snow and water retention and prevented rain flows. At that time, a developed reclamation system existed. Perhaps this was the first experience of managing land plots in the territory of our country. As a result of the research conducted, a common set of anthropogenically transformed landscape complexes of the Taman Peninsula was identified, and a fundamental diagram of the landscape-economic system of the Khora of Phanagoria was made. Detailed landscape and historical studies with historical reconstructions of landscapes and nature and economic systems have allowed to trace distinct dependance of the development of cities, villages and farm lands of antique period on the landscape structure of the territory.

1. Introduction
In ancient times, from 2500 to 1500 BP (VI century B.C. – V century A.D.) the Taman Peninsula was part of the Bosporan state, formed by Greek colonists. Starting with the first centuries of the Greek colonization (VI – V centuries B.C.), large polis cities (Phanagoria, Germonassa, Kepoi, etc.) and a whole network of rural settlements, formed by both Greek and local tribes, arose in this territory [1]. Already at the beginning of the VI century B.C. a peculiar system "polis (city) – khora (rural district)" with its specific settlement structure and specific nature of borders is formed on the Bosporus [2]. The fact is that the entire economy of the Greek colonists was based on agriculture, which was the main occupation of the townspeople, therefore, the polis of the early Bosporus in fact corresponds to cities as a habitable (settlement) structure. Their rural areas (khora), as suggested by S.N. Prokopenko [2],
through their development gradually filled the natural geographical environmental boundaries – local territorial and economic micro-zones occupied entire islands: Kimmeridou, Phanagoria and Sindika, with one dominant city each.

This settlement structure was not fortuitous; thus, in respect to its natural features, in ancient times Taman was an archipelago of islands that were separated either by narrow or wide ancient distributaries of the Kuban-Antikites. The main islands were: Cimmerian Island (the northwestern part of the Taman Peninsula – the modern Phontalovsky Peninsula), Phanagoria Island, Sindika Island and the small islands of Golubitsky and Kandaur [3, 4]. Later on, the major water artery of this territory, the Pra-Kuban, connected the islands into one peninsula with the drift of its channels and riverbeds. During this period, the dominant motley-grass and wormwood-goosefoot steppe landscapes in phases of a more humid climate were replaced by forest-steppe landscapes with significant presence of broad-leaved forests [5].

2. Materials and methods

Despite the abundant historiography of the ancient period of the Taman Peninsula, which dates back to the period of the Bosporan kingdom, and a number of historical reconstructions of settlements and even the road network, there is no single consolidating work that included an accurate geographical reference of the archaeological sites of the period in question. Among the high number of works devoted to the life and history of the Greek settlers in Taman, one can distinguish the works of Ya.M. Paromov [3, 6, 7], which provide an analysis of the settlement structure, land use systems, land surveying, etc. Nevertheless, among archaeologists there is no consensus concerning not only the characteristics of this territory development, but also the location of historical cities in ancient Taman. Thus, for example, S.A. Bratashova [8, 9] almost completely changed the "generally recognized" locations of the main cities of the Asian part of the Bosporan kingdom, on the basis of a detailed analysis of ancient primary sources, including the oldest navigational directions.

Oddly enough, over the past 50 years neither comprehensive physical-geographical, nor component-wise natural research has been carried out in the peninsula, with the exception of the state-run geological survey at a scale of 1:200000, carried out in 2001. Aside from the student research work by N.V. Shchepak on the landscape zoning of the peninsula, supervised by V.B. Mikhno [10], there is not a single landscape description. However, in the last 20 years a whole series of works on the paleogeographic study of the coastline and the Holocene history of the peninsula has appeared. Some of the works that stand out are the works of paleogeographers and geomorphologists performed with the most active participation of A.V. Porotova, Yu.V. Gorlova, N.S. Bolikhovskaya et al. [4, 5, 11, 12], often in collaboration with foreign scientists. Noteworthy is the map, compiled by a team of authors led by D. Kelterbaum [4], which shows the reconstruction of the borders of the Taman archipelago, covering the period of 500 years B.C. It should be noted that to a certain extent this map does not match the reconstructions by the historian V.G. Zubarev, made on the basis of the original methodology for the interpretation of ancient geographical representations [11]. It is also slightly different from a similar reconstruction by the archaeologist Ya.M. Paromov [3].

Complex historical landscape research on the Taman Peninsula consisted of three stages: 1) the analysis of the source base (historical, archaeological, landscape and component-wise natural), 2) the mapping of the landscape and analysis of the modern landscape structure, and 3) retrospective reconstructions of the landscape structure and of the features of the ancient settlement structure.

3. Results and Discussion

The formation of Taman landscapes and their morphological structure is due primarily to the development of a lithogenic (geological and geomorphological) basis. Constant marine transgressions and regressions, active neotectonic movements, and manifestations of mud volcanism are reflected in the structure and dynamics of both modern landscapes and the landscapes of ancient times. Their structural basis consists of gently sloping plains and valleys of synclinal origin, oriented in the latitudinal direction, and also softly outlined and low (up to 100–150 m) anticlinal ridges obstructed by
hills and mud volcanoes, separating those plains and valleys. According to the morphogenetic
structure, taking into account the lithological and land-cover features within the Taman Peninsula, five
main types of terrain are distinguished: coastal hilly ridged, floodplain, estuarine-flooded, coastal
slope and beach-aquatic [10]. This structure seems to be very stable and, apparently, existed in ancient
times. The paleoreconstruction of the landscape structure, performed on a scale of 1:200000, made it
possible to identify the main indigenous landscape complexes of the given territory with the rank of a
group of natural boundaries. In an abridged version of the characteristics, they are represented by the
following types: 1. Hilly-ridge elevations (denudation-structural ridges and hills with mud salses and
mud volcanic fields) with a relative height of 100 to 160 m. 2. The bottom of the denudation basins.
3. Gently undulating abrasion low plains with a thick cover of eluvo-deluvium. 4. Marine reservoir
plains with a thin cover of deluvium, relatively elevated (30–100 m above the sea water level). 5. The
alluvial-deluvial flat plains are relatively low (20–25 m above the sea level). 6. Deluvial gently
sloping plains are relatively low (20–25 m). 7. Estuary and lagoon lowland plains (0–1 m). 8. Seaside
sand bars, bay bars and beaches. 9. Abrasion coasts and surfaces [13].

Over the course of its long-term, almost continuous and intensive economic use, the landscape
structure has been greatly changed – most landscape complexes of the local level have been absolutely
anthropogenically transformed. There is no natural dry-herb-steppe vegetation – the territory is
occupied by vineyards, arable or pasture agrophytocenoses. Natural vegetation can be found only on
the steep slopes of hills, on the bottoms of steeply entrenched erosion forms, salt marshes and steep
seaside coasts [14].

The economic development and exploitation of Taman in the ancient period affected almost the
entire territory of the islands – land plots alone occupied more than a half of the entire territory – about
60 thousand hectares. At the same time, the formation of the settlement structure (cities and rural
settlements), road network and farming plots (land allotment) occurred almost simultaneously as a
single integrated system [7].

The main industry of the Greek settlers and neighboring tribes was agriculture, i.e. arable farming.
The main crops were cereals: wheat, barley, millet, as well as lentils, vetch and grain legumes. The
land was plowed with a wooden ploughshare with an iron tine point, the soil was additionally hoed
with hoes and fertilized with manure. Oxen were used for draft power. Crops were harvested with iron
sickles and scythes. Gardening and especially viticulture played a significant role in the life of the
settlers. It is known that the colonists named one of the cities Kepy, which means "gardens" [15].
Perhaps already then there existed a two-field and even three-field system of agriculture [16]. Cattle
breeding was also quite developed – mainly small cattle, as well as cattle and horses were bred [15].

During this period, almost all arable, cultivable land was delimited. Thus, a system of land
demarcation developed that consisted of fields that were small in size [7, 17, 18]. Numerous frontier
fences often fit into the local terrain, harmonizing with its nature, which contributed to snow and water
retention and prevented torrential flows. Already at that time, there was a developed melioration
system [17]. That is, it was not just an example of adaptive nature management, but, apparently, the
first experience in landscape (contour) farming on the territory of our country. The ramified gully-
ravine system along with the slopes of hilly-rise higher grounds served as grazing areas. The slopes
of high seashores overgrown with shrubs, steep slopes of ridges and peaks of mud volcanoes remained
free from agricultural use [14].

Large-scale landscape and historical research of ancient land use was carried out in the key area in
the vicinity of the village Sennaya (an area of the ancient cities of Phanagoria and Kepy). There is a
clear determinism of the economic use and development of the settlement structure of ancient times
from the local landscape conditions. Most of the settlements, including port centers, were located in
the landscape conditions, which made it possible to engage in mixed farming that provided its own
needs for the required amount of food. The majority of marketable grain came from the adjacent
territories of the Phanagoria khora. Along with vineyards, orchards and vegetable crops were
cultivated around the settlements.
The main areas of the plain steppe and dry-steppe landscape complexes were occupied by cereals, legumes and grain legumes. The most developed were the landscape complexes of gently sloping plains and valleys of synclinal origin, elongated in the latitudinal direction. They are characterized by the proximity of aquifers and the presence of ground-water discharge, or by the possibility of building man-made reservoirs and, of course, by the presence of fertile chernozem soils. As well as security from adverse weather conditions. It was precisely those valleys in ancient times that were most populated and cultivated. In one of these valleys, a network of 12 settlements was located [14].

On the gentle slopes of the ridges and in the inter-ridge saddles and valleys, various crops were cultivated with a predominance of cereals. For example, south of Phanagoria there was a rather vast plain territory, which is called Sennaya Balka. Of course, such sites primarily attracted the first settlers. There were practically no settlements on the low anticlinal hills and soft-contoured ridges separating those valleys. They were apparently used for grazing small cattle.

Significant sections of the Phanagorian terrace in early ancient times were occupied by the remnants of oak forests and woodlands, which were also used as pasture land. Recent studies of A.L. Alexandrovsky [8] show the possible presence of oak forests in the landscape structure. To some extent, the character of the forests that grew here in ancient times can be judged by the surviving oak-grove “Dubovy Rynok” [Oak Market] (in the Temryuk region between Akhtanizovsky and Starotitarovsky estuaries). This oak forest occupies a hill 76 m high – this is a typical for the Taman Peninsula brachyanticline hill with gentle slopes and a wide crest without a distinct peak. The hill reaches about 1.5 km in diameter; it is composed of clays, earth marl and loam. The uniqueness of the hill is its oak forest, so unusual for the landscapes of the dry steppes of Taman. The forest is shunted wood, very dense; it covers the upper part of the slopes and its wide crest. The forest is represented by pedunculate and curly oaks, with an insignificant presence of field elm and Tatar maple. As for bushes and shrubs, wild rose, hawthorn, European spindle (Euonymus europaeus), common privet, blackberry, etc. are common. On the slope adjacent to the Kozachiy Erik (narrow duct) there is a lot of acacia (Robinia pseudoacacia).

An interesting man-made landscape complex of the peninsula is the so-called “Cimmerian wall” (rampart). A rampart about 40 km long stretches from the center of the Taman Bay along its floor for about 20 km to the northeast and, in the form of its surface part, it stretches 20 km further northeast to the village of Peresyp. Archaeologist V.V. Veselov [19] suggested that it had been a navigable canal for reaching the port of Phanagoria (for ships in the conditions of the shallowing Taman Bay and estuaries. According to some versions, the Cimmerian rampart was built by the Cimmerians to protect their state from invasions by other nomads in at the very beginning of the Iron Age. According to another version, this rampart was built later by the ancient Greek colonists in ancient times (IV–III centuries B.C.) and became the most important defensive structure of the Bosporan kingdom [19].

The general set of anthropogenically transformed landscape complexes of the Taman Peninsula is as follows (Figure 1).

![Figure 1](image.png)

**Figure 1.** Schematic diagram of the landscape-economic system of the Phanagoria khora.
4. Conclusion

Thus, in ancient times, the economic development and exploitation of Taman affected almost the entire territory of the islands – land plots alone occupied a little more than a half of the entire territory. During this period, almost all arable, cultivable lands were delimited. The slopes of the high seashores overgrown with shrubs, steep slopes of ridges and peaks of mud volcanoes remained free from cultivation. Extensive gully-ravine terrain served as pastures and hunting grounds. Cities, villages and farmland were organically integrated into the landscape structure.

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