The anthropogenization of the middle Protva basin landscapes during the medieval period

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Abstract. For many decades, studying the historical dynamics of environmental management and development of natural- anthropogenic landscapes in the central regions of the European part of Russia has remained a topical issue within the retrospective analysis of the human-environment interaction. The main research methods are field landscape mapping, retrospective reconstructions of natural resource management, and archaeological and historical data consolidation. The environmental management processes within the Middle Protva basin during the medieval period were periodized. A direct correlation between different forms of the management of natural resources and specific landscape conditions was revealed.

1 Introduction

Present-day landscapes of the Middle Protva basin are characterized by a complex, polydominant internal structure and unique evolutionary paths. This is due both to the natural features of the territory (primarily its position in the marginal zone of the Moscow glaciation), and to the peculiarities of its economic development and exploitation. As a result of long-standing and intense human activities, many landscape properties have changed, and the landscape structure has become more complex. Within many landscapes, natural tracts and areas have been replaced by anthropogenic-natural ones. And with regard to the areas where anthropogenic-natural complexes constitute the background for landscapes and determine their structure, one can also speak of the development of the anthropogenic-natural landscape.

The degree of anthropogenic alteration of landscapes within the stated region varies widely, which is primarily due to the differences in the duration and intensity of anthropogenic impact on them. It should be noted that even at the time when these landscapes were formed, their precursors displayed essential features of anthropogenic alteration, many of which were ‘inherited’ by the present-day landscapes. [1-14]
2 Materials and methods

The study area is located within the basin of the middle Protva River, in the vicinity of the Satinskaya educational research station of Moscow State University and the city of Borovsk (Kaluga and Moscow regions). The landscape features of the area are determined by its border position at the junction of several physicogeographical regions in the marginal zone of the Moscow glaciation and near the southern border of coniferous broad-leaved forests. Therefore, almost all the main types of landscape complexes common in Central Russia are found here within a relatively small area [5]. The chronological framework of the study is from the beginning of the Slavic colonization of the region (VIII century AD) until the Time of Troubles in the Russian state (the beginning of the XVII century). The research objects are landscape complexes of the local (morphological) level, both indigenous and anthropogenically transformed to varying degrees. Within the Satinsky test site, the areas of the interfluve plains possess a polydominant type of morphological structure, within which the complementary tracts of dells and erosional pattern for an articulated arborescent mosaic spatial pattern, complicated by fine patchiness of kame hills, waterlogged depressions, and palaeolake depressions. Undulating and gently sloping planes, as well as flat secondary morainic, morainic fluvioglacial, and lacustrine-fluvioglacial plains serve as dominant tracts. The described structure of out-of-valley areas is primarily due to the uneven accumulative activity of the glacier and the subsequent processing of morainic interfluve plains by glacial waters, and later by gully erosion (Figure 1) [5].

The research is based on the conjoint use of large-scale field landscape mapping materials, the results of retrospective reconstructions and archaeological and historical data consolidation.

Fig. 1. Landscape Map of indigenous (conditionally restored) landscape complexes. Level of tract. Scale of 1:5000 (abridged version).
3 Results and Discussion

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A group (three burial mounds), located on the first terrace rising above the floodplain on the left bank of the Protva River near the Ryzhkovsky cemetery [7]. These mounds testify that this section of the terrace above the floodplain was arable land at that time, since the Vyatichi, according to the custom of their time, set up their cemetery at the far end of the arable field, at the edge of the forest. Possibly, this was the cemetery of the settlement located higher on the slope of the altiplanation terrace.

The Slavs conducted varied economic activities and practices and engaged in agriculture, cattle breeding, hunting, fishing, beekeeping, and crafts: woodworking, pottery, blacksmithing, and even metals practice based on local raw materials. However, their main occupation was arable farming, the cultivation of grain varieties (winter and spring rye, wheat, barley, millet), legumes (peas, lentils), and fiber crops [10]. Productive capabilities increased sharply: the use of the ax (the main tool for the farmer in the forest zone) became widespread, the plow came to replace the hoe and the wooden harrow, and horses began to be used as draft power, along with bullocks. The introduction of winter rye cultivation and the widespread use of draft power made it possible to introduce a three-shift crop rotation (spring-fallow-winter) in agriculture. Lands, where the soil was ready for planting at later dates and possessed increased fertility, began to be cultivated. It is fair to assume that arable land during that period was mostly developed both in river valleys (on terraces above the floodplain, including altiplanation terraces) and in well-drained riverine areas of morainic, morainic-fluvioglacial, and lacustrine-fluvioglacial interfluvial plains with loamy soils of increased trophicity. The settlers engaged in slash-and-burn agriculture as well, but it was mainly used for the expansion of arable fields and the development of new plots of land.

Plow farming freed the ancient Russian settlers from their ‘attachment’ to river valleys and made it possible for them to develop interfluvial landscapes which possessed a more diverse resource base. Deforestation was also spreading, forested areas first being cleared for settlements, and later for arable land.

The cattle breeding of the Old Russian settlers differed little from that of the previous settlers of the Iron Age. Predominantly, home-based cattle breeding (with the use of stall barn housing and substantial fodder conservation for the winter) was developed. Analyzing the peculiarities of the possible use of various landscape complexes for animal husbandry, one can assume that permanent pasture-type agrogeosystems emerged and consequently existed for a long time. These are, first of all, river floodplains, which are characterized by accessibility and potential ample forage resources. The agricultural development of floodplains was limited by the moisture regime characterized by prolonged flooding or groundwater flooding of riverside soils. Here, hay and pasture meadows with pastoral-type thin willow groves formed, many of which still thrive today. Pasture (upland) meadows with open broad-leaved forests emerged at different times in different parts of the steep-sloping and sloping primary valley sides, above-floodplain terraces, and outwash valleys. They were used as grazing land mainly for small cattle, as well as for great cattle driving. An example of an oak grove of the described pastoral type is the present-day tract Dubki, which occupies a section of the indigenous slope of the Protva valley between the villages of Dedyuevka and Ryzhkovo. In the past, these habitats were occupied by broad-leaved forests, admixed with coniferous species, and coniferous broad-leaved forests with a rich grass layer. However, the significant steepness of the slopes, often over 20°, limited their economic (primarily agricultural) development. In spring, the south-facing slopes were used most intensively for grazing as many habitats were still covered by snow at that time. The difference in the beginning of the growing season for slopes of different exposure, especially herbaceous slopes, reached 3-4 or more weeks.

Alder, oak, and elm forests of the gentle slopes of the first terrace rising above the floodplain and deluvial-proluvial trains superimposed on the floodplain or terraces could be optimal for pigs grazing. These are some of the richest habitats in the given region in terms
of sole trophic
ity due to the constant supply of nutrients from the slopes and minor erosional
forms, which, combined with increased moisture of the sinter type and fueled by sheet
like groundwater runoff, contributed to the widespread development of megatrophic plants in
the ground cover and, consequently, created an abundance of feed for pigs. Thus, with the
development of arable farming and fallow land, permanent centers of
depth on the NTCs localized around the settlements. The NTCs underwent
irreversible chan
es, including changes in soil and lithogenous sediment. It was around that
time that, along with pasture floodplain meadow-agrogeosystems that have
continuously existed and survived to this day, residential anthropogenic
natural landscape complexes and arable agrogeosystems began to develop. Permanent arable agrogeosystems
(at the level of tracts and sub-tracts) were strictly localized around settlements and were
always located in their nearest proximity. Vast areas were occupied by forest landscape
complexes with slash-and-burn agriculture (Figures 2 and 3).

In the X – XII centuries, an intensive colonization of the described region by the Slavic tribes of the Vyatichi and the Baltic tribes of the Golyad occurred [4]. For several centuries, the Protva became a border river between the Smolensk, Chernigov, Ryazan and Rostov-Suzdal principalities.

In the XII century, the northern part of the Protva basin, including the territory of the Satinsky test site, belonged to the Smolensk principality, and the southern part belonged to the Chernigov principality. The Slavs mainly engaged in arable farming, and the Golyad mainly engaged in cattle breeding and hunting. For their settlements, Golyad settlers chose areas closer to the floodplain, which serves as the main pasture for their livestock. After the devastating Mongol-Tatar invasion in the middle of the XIV century, Borovsk lands, as well as Maloyaroslavets, became part of the Serpukhov domain and formed the Serpukhov-Borovsk principality, which existed until 1456, when Borovsk and its lands ultimately became part of the Moscow principality [2].

In the XIV century, the region under discussion experienced rapid population growth, which continued until the middle of the XVI century. This period can be considered a turning point in the economic development of the region. Several cities arose in the region: Borovsk, Luzha (modern Maloyaroslavets), Vyshgorod, Vereya, Borisov, Mozhaisk, Berestov, Tushkov, Plesn, etc. [2]. The emergence and initial functions of these cities were determined by their role as centers of agricultural regions. However, later on, many of them became essential border fortress cities, since the western border of the Moscow principality, and subsequently of the Russian state, passed there. The physical-geographical (landscape) position of the ancient Russian cities also deserves attention. Almost all of them are located along the borders (or literally near) of two or more landscapes. Moreover, with rare exceptions, these boundaries are also the boundaries of larger physical-geographical units, i.e., provinces.

According to archaeological data [1], in the XIV-XVII centuries the following settlements existed in the Borovsk district: Borovsk, Gorodnya, Yermolino, Krasnoye, Krivskoye, Lapshinka, Mashkovo, Otyakovo, Roshcha, Ryabushki, Sovyaki, Uvarovka, Khitrovo, etc.
And as for the territory of the Satinsky test site, we can mention the following settlements: Satino (an unfortified settlement near a Neolithic settlement), Benitsy, Malamakhovo and Berdovka. Finds of pottery at the geographical station itself, in Dedyuevka and at the Ryzhkovsky settlement, make it possible to state unequivocally that these villages also existed at that time. In the records of the 1613 patrol [3] (which are the earliest surviving cadastres of the Borovsk district), Satino, Ryzhkovo, and Berdovka are all mentioned. Thus, it is safe to say that by the XVII century a complex of villages, similar to the present-day one, had developed in the region.

There is a close correlation between the allocation of residential lands and economic lands and the local landscape structure, which is best manifested at the local level. This is due to the historically developed adaptability of human economic activities and practices to local environmental conditions. The majority of settlements are located on the sloping sides of loamy-sandy sandurs, or (less often) on low floodplain terraces, which is associated, first of all, with their use as arable land.

The village was the dominant type of settlement in this area until the middle of the XVII century, although the term ‘village’ itself is only found in written sources of a relatively later period (starting from the XIV century). The term ‘village’ itself is associated with the verb ‘to pull’, i.e., to pull land from the forest. Originally villages were founded by one peasant and were quite small: a village consisted of 1-3, rarely 5 households. In the XVI-XVII centuries, villages started becoming larger throughout the whole region under study: up to 10-15 or more households [9]. Thus, there wasn’t enough for all the households of a given village, so a new small settlement was formed: ‘pochinok’ (the root of the word, ‘pochin’ means ‘the beginning’). The new small settlements already had a permanent homestead: a peasant, and less often a landlord homestead, with all the customary buildings. Thus, more and more new small settlements appeared around villages; some of them disappeared later on, thus giving way to ‘empty spaces’, which were then called barrens. Starting from the XVIII century, settlements became typical large rural settlements. Settlements were larger than villages and were the centers of feudal secular or clerical land tenure. Later on, along with the landlord’s homestead, there appeared church (limes) (pogosts, from the Russian ‘gost’ meaning ‘guest’). Market places (pogosts, from the Russian ‘gost’ meaning ‘guest’). Market places (pogosts, from the Russian ‘gost’ meaning ‘guest’). Pogosts emerged where the market took place and where the ‘guests’ of the village traded.

In the XVI century, the settlement of Benitsy (Satino’s neighbor) was donated by its owner I.I. Kolychev to the St. Paphnutius of Borovsk Monastery [2]. Later, a beautiful road, lined with birch trees and connecting the village and the monastery, was built. In some areas, including the Birch Alley tract at the Satinsky test site, this natural-anthropogenic complex is well preserved, representing the remains of a unique of historical cultural landscape.

With the existence of different types of land management, agricultural production had the most impact on the landscapes of the Middle Protva basin. In terms of agriculture, the three-field system spread widely (along with the fallow) and became dominant by the middle of the XVI century. It consists in the restoration of soil fertility by periodically loosening and fertilizing a one-year fallow. As the number of arable fields increased, the area of plowed land tended to increase as well. At the same time, the peasants had to till the already more fertile soil (which, however, possessed less favorable air and water properties) of the morainic and morainic fluvioglacial plains. Thus, within a vast area, the formation of continuous cultivated soils with mixed upper soil layers began. Continuous plowing of the same lands (terraces above the floodplain and outwash valleys with prevailing slopes of over 27°) led to the development of intense processes of sheet and linear erosion. This was facilitated by the nature of summer precipitation (frequent heavy rains) and the peculiarities of the terrain and climate.
of other people’s ownership of that land [6]. As a result, timber became a rarity, and over
is indicated by the settlements’ names associated with beekeeping: SatINO, BORTNIKI,
and 1980s, one could still find centuries-old linden trees with loggum hives.

The destruction of forests led to the decline of some forest industries. First of all, it
affected fur hunting, the most valuable fur-bearing animal in the area being the beaver.

The end of the XVI century was marked by devastation in the Muscovite state. It was the
so-called Time of Troubles, followed by an economic crisis which lasted until the 1620s.
During that time, most economic activities were neglected. Due to
the invasion of the
Principality of Lithuania, an outflow of the population to the Zaoksky districts began. As to
agricultural practices, people returned to tillage, and plowing was mainly carried out with
a single-furrow plough. Changes in soil morphology caused by these peculiarities of plowing
were insignificant. A significant part of the arable land gradually got overgrown with forest
(Figures 4 and 5).

Fig. 4. Landscape and economic systems. Late Middle Ages – XVI-XVII centuries. I – Residential; II – Croplands. Arable land: permanent plots of arable land (three-course rotation system); III – Pasture / cropland / forest. Abandoned fields (short-term, medium-term). Small forests, cattle grazing; IV – E3S Web of Conferences 462, 03033 (2023) AFE-2023 https://doi.org/10.1051/e3sconf/202346203033
Conclusion

In the medieval period, the environmental management of the Middle Protva basin landscape underwent a radical change, associated with the development of agriculture. The progressive economic development and exploitation of the territory led to its significant deforestation, the replacement of primary forests with secondary ones, and major anthropogenic transformation of the valley and adjacent interfluve landscape complexes. By the end of the XVII century, a settlement structure similar to the modern one had developed.

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