Quantitative parameters of the composition of the tracts of landscape area Lesostepnoye Privolzhye of the Nizhny Novgorod region

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Abstract: The article presents the results of landscape studies on the territory of the landscape area of Lesostepnoye Privolzhye located within the elevated right-bank part of the river the Volga. The studies were carried out in October 2015 with the goal of creating a scheme of landscape zoning at the level of landscapes and tracts. As a basis, the authors used the scheme of landscape zoning of the Nizhny Novgorod region, developed by F.M. Bakanina with co-authors (2003) at the level of landscape areas. The authors relied on the structural-genetic approach, as a result of research 17 types of tracts were identified, their spatial distribution was revealed. The developed scheme of landscape zoning can be used for the purposes of territorial planning. Keywords: geoinformation systems, quantitative parameters, landscape area, Lesostepnoye Privolzhye, Nizhny Novgorod region, tract.

To date, the Nizhny Novgorod region has developed a number of schemes of landscape zoning at the level of landscape regions [1-4], but there is also the issue of detailed landscape differentiation of the Nizhny Novgorod region in order to ensure the most effective territory management, use of its resources and preservation of the environmental potential of the region. More detailed landscape zoning – at the level of landscapes and confines cover only local territories [5-8]. Work on detailed scheme of landscape zoning is conducted by staff and students of the Department of geography, geographical and geo-ecological education of Minin University and The Nizhny Novgorod regional branch of all-Russian organization "Russian geographical society" for the past 12 years.

The use of geographic information systems (GIS) is seen as extremely effective, as inventory and spatial analysis of the composition of confines and patterns of their spread necessitate the receipt, storage and simultaneous processing of a wide range of quantitative data, as well as visualization of spatial data [9].

The landscape area Lesostepnoye Privolzhye is located in the Central part of the region along the Volga river (figure 1). The area of the landscape region is 2767.72 km2. The boundaries of the district are determine to the landscape attraction to the Volga. In the South-East and the West boundary held at the border of the erosion-accumulative plain within which is located the district; on the East border of the district held on the border of the Nizhny Novgorod region, in the North – along the Volga [3, 11]. The district is located within a gently undulating upland plain, covered by loess-like coarse and pulverized loams of fluvioglacial and deluvial genesis on the Demyanskaya ridge [11, 12]. Elevation differences within the landscape area of more than 150 m, so that its territory is well drained and has a
high density of gully-beam network - up to 2 km/km2. The slopes of the river valleys are characterized by steepness and wide spread of landslides, the largest in the Nizhny Novgorod region, as well as powerful ravines [12, 13].

Figure 1. The position of the landscape area Lesostepnoye Privolzhye.

During allocation of structure of confines in the territory of the landscape area Lesostepnoye Privolzhye the field method of research was used. Identification, mapping, analysis of inter-component relationships of landscape complexes – is a range of tasks, solved by physical geographers in the field. Map confines allows to study the internal structure of complexes, to establish the relationship between the components of the landscape and between the landscapes themselves, to identify the complexity, diversity, contrast, dissection of borders. The mapping reveals a natural "table of contents" of the study area.

Types of confines identified in the result of field research:

- Pond.
- Lowland swamp on the floodplain.
- Lowland swamp on watersheds.
- Low floodplain of a large river.
- High floodplain of a large river.
- Low floodplain of small and medium rivers.
- High floodplain of small and medium rivers.
- The root slope of the valley of the small and medium rivers.
- The root slope of the valley of a large river.
- Above-flood terrace of a large river.
- Landslide terrace.
- Deluvial loop.
- Stream valley.
- Gorge.
- Ravine/
- Gully.
- Flat watershed – plakor on gray forest soils.
- Flat watershed – plakor on light gray forest soils.
- Flat watershed – plakor on dark gray forest soils.
- Dividing slope on gray forest soils.
- Dividing slope on light gray forest soils.
- Dividing slope on dark gray forest soils.
- Birch woods on watersheds.
- Birch-aspen woods on watersheds.

Types of confines are divided into many subtypes, determined by a combination of geomorphological characteristics (for example, the top, middle or mouth of a ravine or beam), the mechanical composition of soils, moisture regime, soil types, the nature of biocenosis, etc. [14-16] According to the results of the research, the largest area is occupied by flat watersheds and watershed slopes (figure 2).

![Map legend](image)

**Figure 2.** Composition of confines on the territory of the landscape area Lesostepnoye Privolzhye.

It explains by the location of the landscape area on the elevated right Bank of the Volga within the North-Western part of the Volga upland. Due to the wide variety of the hydrographic network of the territory allocated the valleys of the streams, low and high floodplains of small and medium rivers, the root slopes of small and medium rivers, the low and high floodplains of major rivers (Sura river, Volga river), the root slopes of the valley of a large river with high, steep right Bank and, accordingly, presence of such characteristic confines as landslip terraces and deluvial plumes (mantle-looking cover on the lower parts of slopes and their bases, consisting of washed away by thawed and rain waters material – deluvia). In this area there are also spread gorges, ravines and gullies, due to the extremely high degree of erosion dismemberment of the region and intensive agricultural human activity. The latter factor determined a large number of ponds.

Sustainable and cost-effective planning and management of any territory requires accurate and complete evaluation of existing conditions and natural resources. We obtained the following results: the scheme zoning on the level of confines of the landscape area Lesostepnoye Privolzhye, identified
the spatial patterns of their distribution. The results of the research can be used as a basis for the organization of management of the territory, for planning of its economic development and environmental activities, performing complex and private assessments of the territory, drawing up schemes of functional zoning and other studies.

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