

SPATIAL AND TIME ANALYSIS OF ANTHROPOGENIC TRANSFORMATION OF THE TERRITORY OF A LANDSCAPE AREA

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Abstract: *The article presents the results of spatial and temporal analysis of anthropogenic transformation of the territory of Volgo-Meshinsky upland landscape area, located in the west of the Republic of Tatarstan. It is shown that for the past 85 years, there was a significant increase in the area of residential areas and the density of the road network in the area. The increase of anthropogenic load on natural complexes of the area will lead to an increase in the area of anthropogenically transformed landscapes.*

Keywords: *anthropogenic impact, residential areas, natural complexes, Volgo-Meshinsky upland landscape area, Republic of Tatarstan.*

The Volgo-Meshinsky upland landscape area is located in the east of the Russian Plain, on the territory of the Republic of Tatarstan (Fig. 1). According to the physiographic zoning of the Republic, the area belongs to the Western Predkamie [3,4]. The area of the district is 835 km². The length from north to south - 56 km, from east to west - 30 km. The district stretches along the left bank of the Volga River from Kazan in the north to the village of Atabaevo in the south to the confluence with the Kama River. In the west the border is the bank of the Volga River, in the east - the valley of the Mesh River [2]. Administratively, the region includes 16 rural settlements within the Laishevskiy and Pestrechinskiy municipal districts of the Republic of Tatarstan.

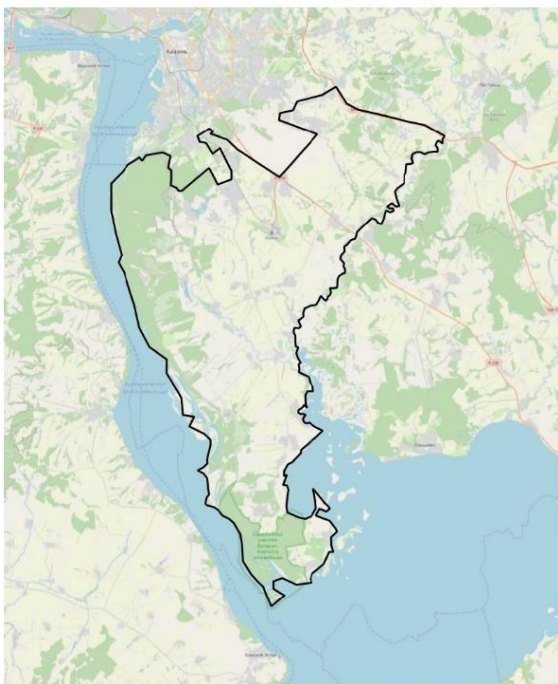


Fig.1. Geographical location of the Volgo-Meshinskiy landscape area (the scale on a map is 1:200 000)

Anthropogenic impact on natural systems is provided primarily by settlement and agricultural activities. The main factor of anthropogenic load on the lakes of the study area is the active development of the territory. In the suburbs of the Kazan city, Laishevsky and Pestrechinsky municipal districts the infrastructure is well developed, a large number of apartment and private housing is being built. Almost 20% of the territory of the region is occupied by residential areas, the area of which varies from 8.4% in the south to 35% in the north. Strong residential loads are also

associated with the suburbs of Kazan located in the north. Almost half of the territory of the landscape area is plowed, 44.3% of the territory is under arable land. The main types of anthropogenic load on the natural complexes of the area also include the extraction of minerals, primarily quarry sand and brick clays, which are widely used in construction, including the production of bricks and silicate products. One of the main factors of anthropogenic change of natural complexes of the district is the creation of the Kuibyshev water reservoir in 1957, as a result of which the water level rose significantly, leading to flooding of adjacent territories. The waters of the "Kuibyshev Sea" flooded the fertile floodplain of the Volga and Kama rivers, including hayfields and numerous old lakes (Fig. 2).

Anthropogenic impact on natural-territorial complexes in the landscape area is assessed as average, in some places increasing to very strong, or vice versa, to very weak. Very strong impact is characteristic of the northern areas, where the city of Kazan and its suburbs are located. Relatively weak impact is characteristic of the southern areas, where the Saralinsky section of the Volga-Kama Biosphere Reserve is located [1].



Fig. 2. Volga River floodplain in 1939 (a) and 2022 (b)

Over the last 80 years, the natural landscapes of the Volga-Meshinsky interfluvium have undergone significant changes due to the increase in anthropogenic impact. In the region, the area occupied by human settlements has increased more than 7 times, and the total forest cover of the territories has increased by 3%. The spatial unevenness of the changes that occurred should be noted for the indicator of forest cover in the landscape area: forest cover increased for most rural settlements, and for some of them significantly. Only five rural settlements are characterized by a

decrease in forest cover. At the same time, the area of residential territories increased in all rural settlements of the region without exception, as well as the density of road network increased (tab. 1).

In 1939, 178 lakes (with a total area of 1157.7 ha) are decoded on the territory of the landscape area, in 2022 225 lakes (with a total area of 633.6 ha) are already noted.

Table 1

Dynamics of forest cover, rural area, road network density and population of rural settlements of the Volgo-Meshinsky interfluve from 1939 to 2022

Rural settlements	Forests, %		Settled areas, %		Density of road network		Population, persons	
	1939	2022	1939	2022	1939	2022	1949	2022
Atabaevskoe	31,50	24,00	1,50	1,60	–	0,033	911	504
Makarovskoye	16,50	15,40	2,17	2,50	–	0,145	1055	601
Tatara-Salarovskoye	15,44	8,75	1,80	1,93	–	0,096	1371	299
Rozhdestvenskoye	1,11	6,92	1,56	10,89	0,095	0,152	2425	1249
Narmonskoe	2,30	6,55	1,22	8,90	0,067	0,165	3519	2529
Nikolskoye	6,88	14,05	2,64	18,83	0,026	0,182	4411	1640
Orlovskoe	48,00	44,40	0,83	11,40	–	0,228	503	1125
Kirbinskoye	1	2,36	2,73	7,06	0,196	0,235	1583	867
Matyushinskoye	51,20	49,90	0,47	1,70	–	0,302	350	141
Gabishevskoe	-	5,70	-	35,40	–	0,784	–*	3300
Peschano-Kovalinskoye	1,70	16,60	2,02	20,40	–	0,331	1003	2 139
Stolbishchenskoe	1,95	16,80	3,63	21,00	0,153	0,709	1804	15817
Bolshekabanskoe	2,22	3,15	2,99	17,45	–	0,162	1724	2550
Sokurovskoye	2,87	8,90	3,03	51,00	0,161	0,563	1152	2084
Bogorodskoye	1,70	6,80	6,58	25,89	0,037	0,250	758	3952
Kulaevskoe	7,50	11,88	1,10	5,47	0,113	0,244	1580	619

* Gabishevskoye rural settlement was established only in 1978

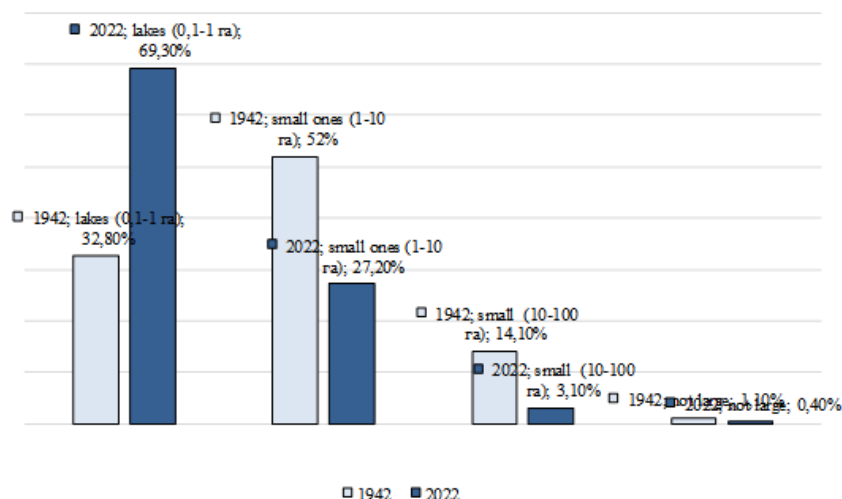


Fig.3. Dynamics of lake changes in the Volgo-Meshinsky landscape area, %

Thus, the analysis of the dynamics of the lake area showed that the number of lakes increased by 21%. However, at the same time, the total water area of lakes has decreased by more than 524 ha. As can be seen from Figure 3, the number of "lakes" with water surface area from 0.1 to 1 hectare

increased. On the contrary, the number of larger lakes with the water surface area from 1 to more than 100 ha decreased.

Thus, we can summarize that the territory of the Volgo-Meshinsky landscape area has been subjected in the past and is currently subjected to significant anthropogenic impact due to intensive residential development. As the area of anthropogenically transformed landscapes increases, further degradation of the natural complexes of the area can be predicted.

Literature used

1. Dedkov A.P., Boiko F.F., Mozzherin V.I., Chasovnikova E.A. Anthropogenic changes in the system of exogenous relief formation processes in the Middle Volga Region // Relief and economic activity. M., 1982. С.20-28
2. Landscapes of the Republic of Tatarstan. Regional landscape-ecological analysis // Edited by Prof. O.P. Ermolaev. Kazan: "Slovo", 2007. С. 113-125.
3. Milkov F.N. Middle Volga Region. - M.: Izd. of the Academy of Sciences of the USSR, 1953. С. 200.
4. Physico-geographical zoning of the Middle Volga region / edited by A.V. Stupishin. Kazan: Izd. of Kazan University, 1964. С. 45-46.

ЛАНДШАФТШУНОСЛИК НАЗАРИЯСИ: ЛАНДШАФТ ВА ЛАНДШАФТ КОМПЛЕКСИ ҲАҚИДА МУЛОҲАЗАЛАР

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Ландшафт тушунчаси географик адабиётларда энг кўп тарқалган атамалардан бири бўлиб, у манбаларга немис тили сўзлигидан кириб келган. К.Бюргернинг (K.Burger, 1935) таъкидлашича, ландшафт атамаси географик манбаларга 1805 йилда А.Гоммейер (A.Gommeier) томонидан киритилган. Ландшафт (die Landschaft) атамаси ланд-ер сўз ўзагидан ва шафт-сўз ясовчи суффиксдан ташкил топган. Ландшафт сўзининг маъноси ўлка, ҳудуд, жой, урочиша, манзара деган маъноларни англатади. А.Гоммейер ландшафт деб кўз ўнгида намоён бўлиб турган барча жойларнинг умумий йиғиндисини (die Gegend) тушунган.

Ландшафт тўғрисидаги таълимот XIX асрнинг охири ва XX асрнинг бошларида вужудга келди. Ландшафт ҳақидаги таълимотнинг вужудга келиши В.В.Докучаевнинг географик (ландшафт) комплекс ва табиат зоналари тўғрисида илгари сурилган ғояларини ривожлантиришда қўйилган илк қадамлардан бири булди.

У ўзининг илмий мақолаларида географик муҳитнинг бир бутун ва ажралмас қонунига таяниб, табиатда табиий – тарихий зоналарнинг мавжудлигини асослаб берди. Докучаев томонидан баён этилган табиат зоналари ҳақидаги таълимот ана шу махсус фаннинг (ландшафтшunoslikнинг) бошланиши ва мукқаддимаси бўлди. Ҳар бир табиат табиий – тарихий зона қонуний шаклланган табиий географик комплекс бўлиб, уни ташкил этувчи компонентлар ўзаро узвий боғланган ва бир-бирига таъсир этиб туради. В.В.Докучаев кашф этган янги фан(ландшафтшunoslik) ўша пайтда ўз номи билан айтилмаган бўлсада, унинг шогирдлари бу фан географиянинг ҳақиқий моҳиятини ташкил этишини тушуниб етган. Л.С.Берг буларнинг барчасини таҳлил ва синтез қилиб, Докучаевнинг табиий – тарихий зоналари аслида ландшафт зоналари эканлигини, у асослаб бермоқчи бўлган фан эса ландшафтлар географияси эканлигини эътироф этган. Л.С.Берг шу таълимотга асосланиб ўзининг “Географические зоны Советского Союза” номли 2 жилдлик монографиясини яратган. Л.С.Берг 1913 йилда ландшафт тушунчасини биринчи бўлиб география фанига киритиб, у географиянинг предмети ландшафт бўлиши керак деган ғояни олға сурди. Шу билан бирга Л.С.Берг ландшафт тушунчасининг моҳиятини очиб бериш учун унинг таърифини ҳам асослаб берди.