

Antropogenesis of Natural Territorial Systems of Tatarstan Republik and their Bio-Ecological Peculiarities (On the Example of Birds)

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Abstract: An assessment of ecological and economic state of municipal and natural areas of the Republic of Tatarstan. Based on the ratios of different dimensions geosystems their function, form and space habitats differ in their quality characteristic. Kama, assessed the state of geo-environmental geosystems regional level. It is proposed ornithological characteristic natural complexes allocated on the basis of the nature of the settlement of the bird population and in terms of the severity of human situation.

Key words: Geosystem, anthropogenic transformations, ecological and economic status, natural protection, avifauna, environmental systems

INTRODUCTION

Location on the border of the territory of Tatarstan subtaiga and steppe zones determines the diversity of nature republic and the long development of a man determines the strong anthropogenic transformation of the territory (Yermolaev *et al.*, 2007). The term "territory" is used in many different disciplines (physical geography, economic geography, environment, etc.) and have different meanings (Yermolaev and Selivanov, 2014). The objects of the study was to territory of different dimensions, combining regional geosystems. The product features areas of the region reflects the extreme and pronounced features of the changing landscape, depending on their anthropogenic transformation and offers an assessment of anthropogenic impact is the system of evaluation points in terms of environmental and economic situation of the territory. The aim is to assess the status of ecological and economic areas, environmental systems Republic of Tatarstan and the biological and ecological (for example, avifauna) characteristic.

MATERIALS AND METHODS

Questions environmental site assessment methods are widely reported in the literature. In search of geographical assessment methods anthropogenic transformation of geosystems research addressed to geosystems of different dimensions (field quarry pond, etc). They form a spatial ranges and are distinguished by their quality characteristics. Research and assessment of their anthropogenic transformation of one part of the

environmental diagnostics area (Urazmetov and Smirnova, 2014). The environmental situation of each region is determined by the overall stability of natural systems and the degree of exposure to anthropogenic factors. One approach the study of the environmental situation is to compare the level of anthropogenic load into the current state of landscapes and their components. The level of anthropogenic impacts expressed by a system of evaluation points in terms of Ecological and Economic Status (EES) territory. EES assessment area includes the definition of all types and degree of Anthropogenic Transformation (AT), Natural Protection (NP) territory and land environment facility. Grouping of land according to the degree AT allows to estimate anthropogenic transformation of the territory in comparable terms. They are the absolute Coefficients (Ca) and relative (Cr) tension Ecological Economic Status (EES) territory, i.e., the ratio of the area of land with high AT to the area with lower AT. On the basis of this method was determined by the degree of anthropogenic transformation of the Republic of Tatarstan, comprising 49 municipalities districts. When habitats were selected and determined arithmetic average error of the arithmetic mean, the accuracy difference according to the student category:

$$td = M1 - M2 / \sqrt{m1^2 + m2^2} \geq t_{St} \{ \nu d = n1 + n2 - 2 \}$$

RESULTS AND DISCUSSION

The peculiarity of the environmental conditions of the Republic of Tatarstan is a combination of a fully transformed areas experiencing strong anthropogenic pressure with the natural habitat. The product features areas of the region reflects the extreme and pronounced

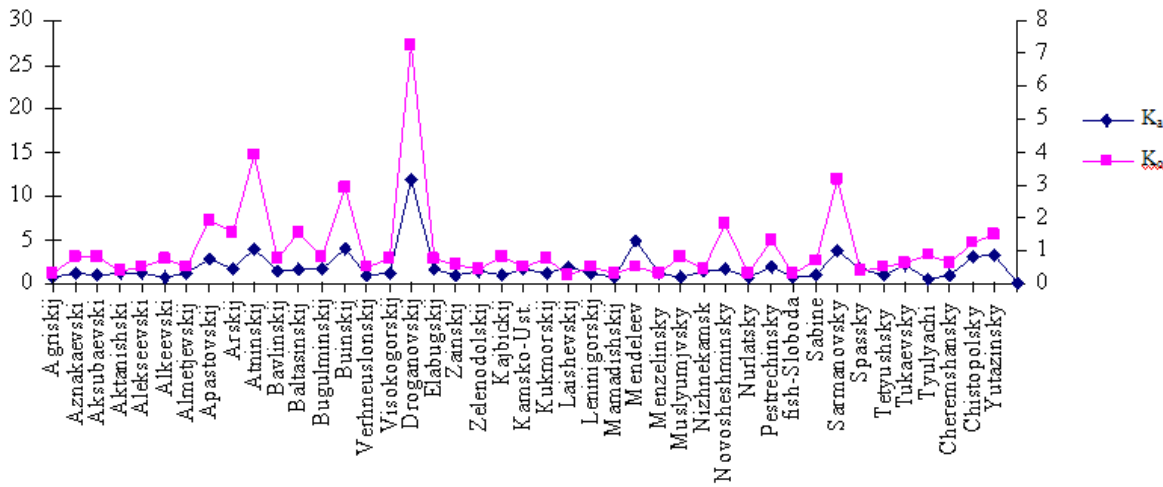


Fig. 1: Combined graph of the coefficients of absolute and relative intensity of EES areas RT

features of the changing landscape, depending on their anthropogenic transformation and of course, involves a combination of different options of different types of geosystems regional level (Galeeva *et al.*, 2014).

The absolute intensity is the ratio of the area of highly disturbed buildings, industry and transport to the area of land a little touched or untouched areas. In general, ecological and economic condition of the territory to the greatest extent characterized by the coefficient of relative strength as thus, covered the entire territory.

The maximum coefficient of absolute intensity (C_a) is observed in Drozhzhanovskij area (3.16) as high tension Atninskij (1.08), Buinskij (1.04), Mendeleev (1.3), Apastovskij (0.75), Sarmanovskij (0.97), Chistopol (0.8) and Yutazinskij (0.89) areas. Coefficients of relative strength are maximum values the same areas where there was a high rate of absolute tension coefficient above. This is due to the fact that covered a large area in the calculation of C_r .

For the same reasons that some areas having a low coefficient of absolute intensity, high gain coefficient of relative intensity: Aznakaevskij (3), Aksubaevskij (3), Alkeevskij (2.78), Muslumovskij (3.09), Tyulyachi (3.32), Baltasinskij (5.8), Kaybitskij (3.02). There is a reverse pattern. Areas with high absolute strength have a relatively low coefficient of relative intensity. The correlation between these two indicators is positive and is 0.88. The accuracy of the correlation at the level of the third threshold (Fig. 1).

A comparison with other regions. By the maximum rate in Tatarstan is 27 (Drozhzhanovskij district) and in Mordovia it is only 10.39. Minimum tension in RT is 0.86 (Laishevskij district) and in Mordovia figure is 0.38.

Averages very widely. In the Republic of Mordovia, it is equal to 2.62 in the RT is 2.27 in the Moscow region is about 6.5.

In Tatarstan tension EES balanced by the degree of anthropogenic transformation and potential sustainability of nature only Laishevo District (0.86). Close to balance Nurlatskij (1.06), Mamadyshskij (1.2), Menzelinskij (1.21), fish-Sloboda (1.25), Agryz (1.27) areas. In the territory of the Moscow region are virtually absent and in the Kirov region EES balanced or close to it most (Fig. 2).

The coefficient of natural protection in the Republic of Tatarstan varies from 0.11- 0.14 and Buinskij District in Drozhzhanovskij area to 0.48 and 0.49 in Laishevskij in Nurlatskij areas. The average value for the republic equals to 0.33. This indicates a low level of natural protection area.

By analyzing the state of biodiversity of the types of territories, taking into account geographic and natural-climatic features, character development and modern farming can identify a number of smaller regional isolated or environmental systems (Fig. 3).

Prikazanskij natural complexes (III): Covers the most densely populated part of the country (the fourth level of density). Tensions EES territory by C_r is 1.57, C_e is 0.39. Species composition of avifauna extensive due inhabitants incoming geographically to the region of the Volga-Kama State Nature Biosphere Reserve. Over the entire period of observation in the area marked Prikazanskij 201 species, representing 65.9% of the species of birds of Tatarstan and is an indicator of high abundance of avifauna. The population density of birds of different habitats ranging from 400-1000 ind./km². In a

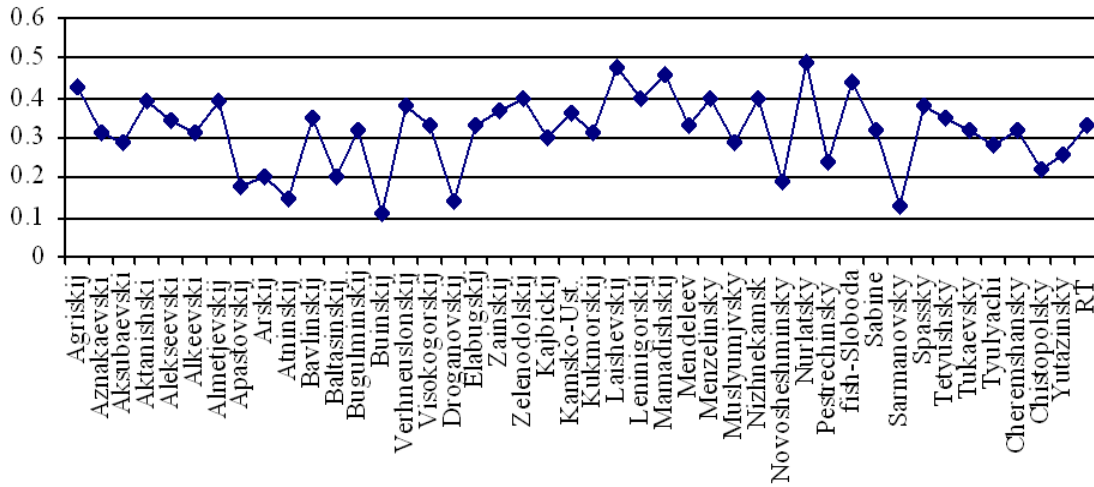


Fig. 2: Indicators of the coefficient of natural protection in the municipal areas of the RT

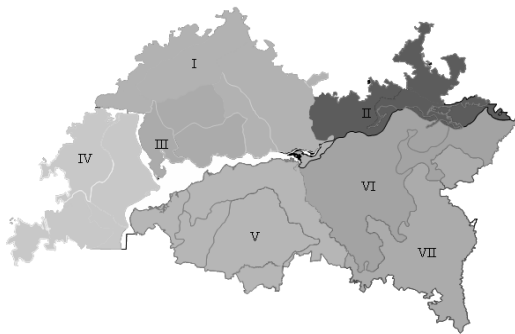


Fig. 3: Environmental systems Tatarstan

slightly modified landscapes density is 700-800 ind./km² in the settlements 1000-1200 ind./km². The average population density of the territorial complex of 700 ind./km². Significant nesting observed for 144 species which constitute 71.6% of the avifauna Prikazansky complex. dominated Palaeartic translongitudinal and Palearctic-paleogeysky temperate-subtropical species (Kochurov, 2003).

Western Predkame (I): Tensions EES territory by Cr is 2.59, Cez is 0.36. Total avifauna includes 175 species, the abundance ratio of which is 57.3% of the fauna of Tatarstan. Of these nesting set to 120 species which constitute 68.5% of the registered species. The population density of birds is 300 ind./km². In this area, the main focus of the republic Rooks colony with thousands of nests largest rook has a significant presence in the population of birds of this territorial complex (9%). Dominated by the West Palaeartic temperate-subtropical species.

Eastern Predkame (II): Tensions EHS territory by KO is 1.71, Kez is 0.46. Registered 177 species of birds, representing 58% of the avifauna of Tatarstan. Nesting noted for 102 species (57.6%). The population density of birds is 400-800 ind./km². Fauna, as a whole, "forest", although, a small percentage of forest area (18.2%). Trophic groups among the most important are insectivores (43.7%) and granivorous (31.2%) birds. Among the breeding avifauna is dominated kromniki, birds shrub layer and the birds of open landscapes. Dominated by the Western Palaeartic temperate-subtropical species.

Sviazhsky region (IV): Tensions EHS territory by KO is 3.22, Kez is 0.28. In this region, noted 118 species of birds, 85 species of which (72%) breeding. Factor abundance of fauna is 38.6%. The average density of the bird population in the district is 400 ind./km². Dominated by the Western Palaeartic and Palaeartic translongitudinal temperate-subtropical and temperate species.

Western Zakamye (V): Tensions EES territory by KO is 2.08, Kez is 0.34. Preserved in the river valleys natural biogeocoenoses define high species diversity of birds. Are of great importance and the banks of the Volga and Kama rivers where it also includes the areas untouched by man. Over the entire period of observation was recorded 181 species of birds. Factor abundance is 59.3%. Nesting is set for 80 species, constituting 44.1% of the avifauna. The average population density of birds is 250-450 ind./km². The avifauna is represented by various ecological complexes of which prevails the edge of the forest is 50.9%. The presence in the area of various water bodies (reservoirs, rivers, wetlands) determines

Table 1: The accuracy of the correlation between the indicators ornithological and ecological economic status areas

Factors	The coefficient of species composition	The population density of birds
The coefficient of natural protection	0.63	0.34
The coefficient of relative intensity	-0.79 (d)	0.44

the abundance of representatives of near-water complex is 11.7%. Breeding avifauna is represented by various groups but is dominated by kromniki and nesting in various shelters (28%). The leaders of Western Palaearctic and Holarctic temperate-subtropical species.

Eastern Zakamye (VII): Tensions EES territory by Cr is 3.3, Cez is 0.29. In East Zakamye noted stay 162 species including nesting reliably established for 82 species. This is 50.6% of the avifauna of environmental systems. The coefficient of species diversity of avifauna of the region is 53.1%. The density of birds in East Zakamye is 300-450 ind./km². The density of birds for most open habitats around 200 ind./km². The maximum population density of birds observed in the cities where it is up to 800 ind./km². Dominated by the Western Palaearctic and Palaearctic translongitudinal temperate-subtropical and temperate species.

Nizhnekamsk region (VI): Tensions EES territory by KO is 2.12, Kez is 0.35. Geographically in the region include National Park "Lower Kama". The avifauna includes 184 species, representing 60.3% of the bird fauna of Tatarstan. Nesting is set to 132 species of birds, i.e., 71.7% of the avifauna of the territorial complex (Table 1).

CONCLUSION

Dominated by the Western Palaearctic and Palaearctic translongitudinal temperate-subtropical and temperate species. As one of the approaches to identify

depending nesting, their species diversity on the degree of preservation of natural areas can offer a comparison of data on avifauna environmental systems Republic of Tatarstan and data on their stress ratio EES and natural protection factor.

Thus, the observed decrease in the overall density of birds and many species of birds in the field habitats of Tatarstan in moving from West to East and South-East. The overall density of the bird population is directly dependent on the landscape mosaic, the total forest cover, tilled area. The higher the mosaic landscape and the percentage of tilled area, the higher species richness and density of birds. Reverse pattern is observed when comparing the total forest cover areas with an overall density of bird communities in the fields where the higher forest cover, the lower the total density of birds.

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