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The structure of aesthetic and consumer parameters of the environment of settlements by the case of the Belgorod agglomeration, the European part of Russia

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Abstract. The issues of studying the structure of aesthetic and consumer parameters of the environment of settlements located within the boundaries of the emerging and dynamically developing Belgorod agglomeration in the southwestern part of the country are discussed. The specific characteristics of the studied settlements and the reasons for differences in environmental assessments are determined, depending on the geographical location, including the distance from the core of the agglomeration (the city of Belgorod), and the rate of change of integral social, economic and geo-ecological processes and conditions, which is reflected in the selected clusters. The implementation of the principles and methodology for evaluating the aesthetic and consumer parameters of the environment developed by the author made it possible to calculate the coefficients of representation of the particular elements of the environment and the total coefficients for three spatiotemporal forms. The prospectiveness and the necessity of application of the research results in the development of management mechanisms for modern urban ecosystems are shown, aimed at providing and creating favorable living conditions, in accordance with the complex of ecological and aesthetic demands of the population.

1. Introduction

A scientific direction associated with the study and evaluation of the aesthetic resources of the territory, the aesthetic potential, is being actively developed in geographical science. Research within this area is mainly characterized by multidisciplinary approach due to the use of the theory and methodology of geo ecology, physical, social and recreational geography, as well as applied disciplines (territorial planning and design, aesthetics and landscape design, landscape planning).

Recently, many works have been published on the theory and practice of evaluating aesthetic resources, that can be totally divided into several groups: 1) related to the problems of the assessment methodology of aesthetic resources; 2) the assessment of individual components of the landscape (most of the research is devoted to the aesthetic assessment of forest plantations and relief); 3) aesthetic assessment of recreational areas, complexes and specially protected natural areas; 4) integrated assessment of vast territories, usually at the level of cities or subjects (4) [1-13]. [1-13].

The Belgorod region, which has been the subject of years of research by the author, is characterized by intensive economic development, which provoked the emergence of environmental problems when using natural resources [14, 15]. The maximum concentration and aggravation of these problems is found, first of all, within the urbanized territories of the region. The foregoing emphasizes the importance of conducting research on the study of the structure of aesthetic and consumer parameters



of the environment, the results of which are one of the elements in the development of mechanisms for managing modern urban ecosystems aimed at providing and creating favorable living conditions, considering the complex of ecological and aesthetic demands of the population

2. Materials and Methods

For more than 15 years, the author has been conducting initiative research on the study of the structure of aesthetic and consumer parameters of the environment. Over the years, significant theoretical and factual material has been accumulated (materials of expeditionary research and the results of a sociological survey of the population). Taking into account the significant experience gained by researchers in this field, the author has developed an author's methodology that combines a qualitative description and a sociological survey, which allows establishing a certain set of representative images of the studied settlements.

According to the author's methodology, the assessment of the aesthetic and consumer parameters of the environment combines not only particular natural, natural-anthropogenic complexes or landscapes, but the whole living environment of individuals, that is, spaces that include a settlement and adjacent territories within the radius of nature management of a large part of the population. The long period of the study allowed accumulating data on the study of aesthetic and consumer parameters in more than 60 settlements.

During such a significant period of research, the number of studied settlements and their geography has significantly increased; the structure of the aesthetic and consumer parameters of the environment of settlements belonging to special groups was studied. In addition, studies were conducted in selected settlements in order to identify the dynamics and transformation of the aesthetic and consumer parameters of the environment [16, 17].

To calculate the representation coefficients, the results of a sociological survey of the population and the author's methodology were used. The approach described in the methodology is in demand from the point of view of the need to establish primary aesthetic needs, preferences for the subsequent use of the resulting database as management mechanisms for modern urban ecosystems.

3. Results and Discussion

Further we will consider the results of studying the structure of the aesthetic and consumer parameters of the environment of settlements located within the Belgorod agglomeration, which is understood as a territory covering the territories of cities and nearby settlements and large rural settlements, united in order to strengthen economic, social, cultural and other ties, as well as to increase the comfort of the environment and the quality of life.

The population of the agglomeration is 600 thousand people and it increases annually by 8-10 thousand people.

Researchers of the spatiotemporal dynamics of the suburban development of Belgorod, which is the core of the Belgorod agglomeration, point out that the key feature of the suburbanization of the administrative center in the post-Soviet period is the formation of sprawl-type building zones, that is, a unique type of suburban settlement. The main factor that forms such a unique configuration is access to utilities and a well-developed transport infrastructure.

At a distance of 30-35 kilometers from Belgorod there are large plots occupied by private housing construction. Thus, the suburbs and parts of the municipal territories adjacent to Belgorod became its residential areas. However, the population that moved to the suburbs still remains active participants in the economic and cultural life of the city [18, 19].

One of the results of the study was the calculated coefficients of representation of the elements of the environment (table 1-3) obtained on the basis of statistical processing of data from a sociological survey of residents.

Representation is understood as a process of selecting elements of perceived reality, the result of which is the formation of an image of the territory. It is especially worth noting that the image of a settlement or any other territory (area) is complex in nature, being both a product of understanding the

surrounding space of an individual and a collective product. Based on the theory of social representations, it can be concluded that the structure of the image of the space created by the group is a system of ideas about the space in which it lives.

Table 1. Coefficients of representation of the elements of the environment observed in childhood.

Settlements	Coefficient of representation of elements of the environment									
	Yard areas	Field/meadow	Forest area	park	garden	Solitary plants	river	Pond/lake	Forms of relief	The other
Borisovka	0.0	0.04	0.18	0.06	0.07	0.0	0.51	0.07	0.01	0.01
Dubovoye	0.03	0.13	0.24	0.01	0.04	0.13	0.04	0.03	0.01	0.15
Mayskiy	0.02	0.11	0.20	0.04	0.09	0.11	0.11	0.06	0.04	0.07
Razumnoye	0.0	0.19	0.22	0.0	0.07	0.04	0.33	0.07	0.04	0.04
Severnoy	0.02	0.17	0.24	0.02	0.04	0.07	0.13	0.10	0.04	0.03
Tomarovka	0.0	0.16	0.22	0.02	0.03	0.03	0.17	0.08	0.02	0.09
All urban-type settlements	0.01	0.14	0.25	0.03	0.06	0.05	0.19	0.09	0.03	0.06
All settlements	0.01	0.17	0.24	0.02	0.06	0.04	0.17	0.10	0.04	0.06

Table 2. Coefficients of representation of elements of the observed environment.

Settlements	Coefficient of representation of elements of the environment									
	Yard areas	Field/meadow	Forest area	park	garden	Solitary plants	river	Pond/lake	Forms of relief	The other
Borisovka	0.16	0.02	0.03	0.02	0.02	0.03	0.03	0.0	0.03	0.01
Dubovoye	0.10	0.01	0.09	0.0	0.03	0.09	0.0	0.0	0.0	0.04
Mayskiy	0.09	0.03	0.05	0.02	0.10	0.13	0.0	0.02	0.03	0.03
Razumnoye	0.09	0.04	0.04	0.08	0.21	0.13	0.0	0.04	0.0	0.0
Severnoy	0.15	0.04	0.0	0.0	0.0	0.07	0.0	0.0	0.01	0.05
Tomarovka	0.06	0.05	0.03	0.01	0.05	0.09	0.02	0.03	0	0.09
All urban-type settlements	0.08	0.04	0.05	0.02	0.09	0.08	0.01	0.02	0.01	0.04
All settlements	0.05	0.10	0.07	0.01	0.11	0.09	0.03	0.02	0.02	0.04

The coefficients of representation of an object or their combinations according to the established spatiotemporal forms are defined as the ratio of the frequency of occurrence of representations of a particular object to the total number of representations identified in a settlement.

The calculated coefficients of representation make it possible to assess the environment in three spatiotemporal directions: the first form of the environment refers to the initial formation of aesthetic preferences (the respondent names the elements of the environment that formed his childhood aesthetic

preferences); the second forms aesthetic demands and allows them to be fulfilled at the present time; the third spatiotemporal form is presented as a reference standard, preferable for living and implementation of aesthetic and recreational demands. In some cases, the boundaries of the selected forms of the environment can completely and partially overlap. Numerous works of scientists in the field of behavioral geography can serve as confirmation that the image formed in people in the process of perceiving the environment, both during the period of the psychological formation of the personality and during long-term residence, affects further aesthetic preferences [20].

Table 3. Coefficients of representation of preferred combinations of environmental elements.

Settlements	Number	Coefficient of representation of elements of the environment					
		Total	Water/ forest	Field/ forest	Water/ field	Water/field/ forest	Water/veget ation/relief
Borisovka	1.19	0.16	0.63	0.0	0.0	0.0	0.37
Dubovoye	1.48	0.19	0.43	0.14	0.0	0.14	0.29
Mayskiy	1.22	0.14	0.59	0.18	0.12	0.12	0.0
Razumnoye	1.78	0.20	0.60	0.20	0.0	0.0	0.20
Severnyy	1.36	0.18	0.58	0.17	0.08	0.08	0.08
Tomarovka	1.29	0.14	0.42	0.02	0.32	0.11	0.0
All urban-type settlements	1.32	0.17	11.65	0.12	0.13	0.05	0.18
All settlements	1.31	0.17	2.48	0.18	0.14	0.06	0.15

Analysis of these tables (tables 1-3) represents the difference between the settlements of the Belgorod agglomeration from those located outside it and compares them with the average values calculated for the entire Belgorod region. There are some obvious differences within the studied group of settlements.

The total coefficients of representation of the elements of the environment were calculated similarly to the method described above (figure 1). The analysis of the figure makes it possible to compare the representation coefficients in the settlements of the Belgorod agglomeration with those calculated for urban-type settlements and, in general, for all the studied settlements of the region.

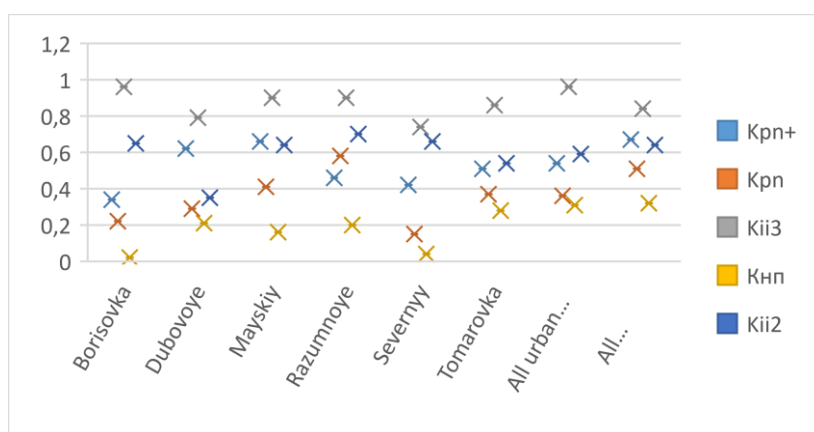


Figure 1. The total coefficients of representation of the environmental elements of the settlements of the Belgorod agglomeration and their comparison with the coefficients throughout the region.

Kpn+ is the coefficient of positive representation of the observed objects; Kpn is the total coefficient of representation of natural objects; Knn is the coefficient of preference for using the elements of the observed spatial range; Kii2 - coefficient of recreational use of a natural object; Kii3 is the coefficient of prospective use of the object.

The dendrogram below (figure 2) was obtained after analyzing a significant array of the studied settlements of the Belgorod region, which differ in the structure of aesthetic and consumer parameters and, accordingly, in the representation coefficients (see figure 1). Six clusters were identified on the dendrogram at a pooling distance of 0.75.

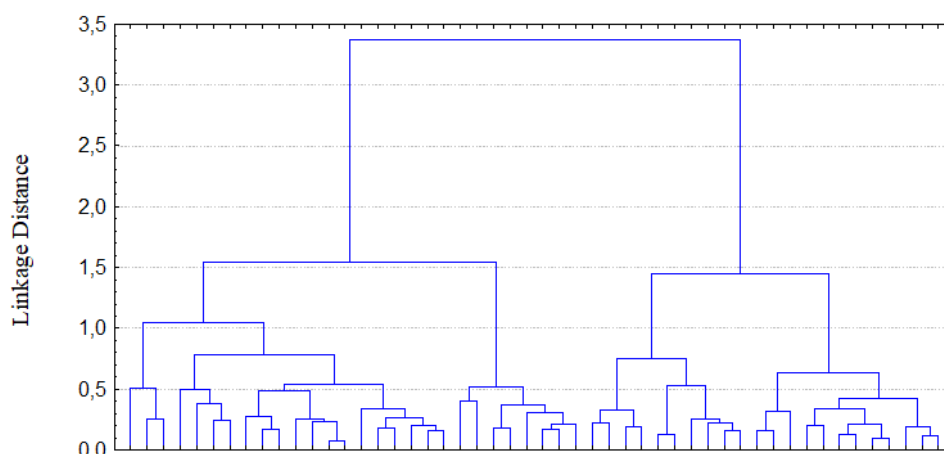


Figure 2. Dendrogram of the classification of settlements (Ward's method. Euclid's metric).

All the studied settlements of the Belgorod agglomeration fell into two of the six selected clusters. The first cluster includes Razumnoye, Maisky; the second has got all the rest. In addition to the studied settlements, these two clusters included other towns, urban-type settlements of the region and large rural settlements located within the radius of the Belgorod agglomeration.

Obviously, the processes determining the development of the Belgorod agglomeration provide many opportunities to improve the efficiency of using the economic potential and the quality of life of the population. However, the results of the research prove that the established lifestyle, characterized by a unique rhythm and characteristics, does not meet residents' demands in creating aesthetically attractive environment. The coefficient of positive representation in the settlements of the Belgorod agglomeration is below the average values both for the region as a whole and separately for the group of urban-type settlements.

The reasons for the identified differences are linked, on the one hand, to the transformation of the living environment, and on the other hand, to the social processes, in recent years including the growing differentiation of citizens into social groups depending on material well-being, each group having its own distinctive ideas about the comfort of the living environment.

Thus, it is obvious how acute is the task of developing management mechanisms for modern urban ecosystems, considering the assessment of the provision with ecological, aesthetic and consumer parameters.

4. Conclusion

The results of a long-term study indicate that there are differences in the assessments of environmental parameters depending on the geographical conditions of residence, the quantitative characteristics of settlements, and the rate of change in socio-economic and geo-ecological conditions.

The modern settlement system in the Belgorod region and the settlement model of the Belgorod agglomeration affect aesthetic assessments and the possibility of satisfying aesthetic demands.

Belgorod agglomeration will undoubtedly continue its intensive development due to the expansion of the territory and the complexities of the structure, which will definitely affect the assessment under consideration.

In addition to the theoretical component, it is evident that the study is aimed at solving a scientific and practical problem related to the necessity of developing mechanisms for managing modern urban ecosystems aimed at providing optimal living conditions, considering environmental, recreational, aesthetic demands. The results of the research are one of the components of the assessment of the potential for the development of recreation and its limitations, the development of solutions for the organization of recreation.

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