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Architectural-Typological Innovations as a Key Factor for Sustainable Development of Specially Protected Natural Areas

T Vavilova¹, Y Bakhareva¹

¹Professor, Department of the Architecture of Residential and Public Buildings, Academy of Civil Engineering and Architecture, Samara State Technical University, 194 Molodogvardeyskaya Str, Samara, 443001, Russia

E-mail: vatatyan63@yandex.ru

Abstract. The issues of improving the architectural solutions of the objects of infrastructure for specially protected natural areas of the Russian Federation considered from the point of view of tourist activity activation. Extensive international experience analyzed. The relationship investigated between the typological diversity of buildings and structures and the categories of territories, which is determined depending on the landscape value and the mode of operation (reserves, national parks, natural parks, nature sanctuary, natural monuments, arboretums and botanical gardens). The conclusions were that the development of scientific research and educational activities in natural areas and settlements with active tourist traffic should be associated with the design and construction of multifunctional buildings, saturation of areas with municipal and engineering facilities contributes for the safety of operation, the use of resource-saving technologies increases the comfort of people's stay.

1. Introduction

In accordance with the reports from Federal State Statistics Service, in Russia the total area of specially protected natural areas (SPNA) amounted to 202.3 million hectares in 2014, and it exceeded 208.6 million hectares in 2015. 13.2 % of these territories belong to Federal objects, 28.8 % are objects of regional significance and 58% are objects of local significance [1, p. 87]. The progressive increasing in the number and area of SPNA is due to the implementation of the state policy in the field of ecology, which provides for the strengthening of the protection and development of the system of specially protected natural areas in strict accordance with their intended purpose. The interrelated task is to ensure their sustainable functioning.

There is a close relation between the environmental objectives of protected areas and their activation. On the one hand, the high natural potential of these areas is the basis for the promotion of recreational services, educational and ecological tourism. This is one of the promising areas of the economy. In accordance with the Federal law "About the specially protected natural areas" (14.03.1995, N33-FL) recreational activities and tourism development are included as parts the tasks of state nature reserves, national parks and natural parks. Natural monuments, arboretums and botanical gardens also contain objects of special educational value. On the other hand, the nature protection status of these territories is responsible by strict regulation of anthropogenic load.

Currently, high economic viability of cognitive and ecological tourism in Russia confirmed by dissertation researches in economy, which established framework for the management of tourist-recreational activity destinations (D. A. Kovalev, 2006, E. S. Bogomolova, 2008, N. P. Kazakov,



2009, A. M. Chililov, 2009, S. A. Stepanova, 2010, M. M. Ordzhonikidze, 2011, T. B. Bardakhanova, 2013, L. B.-J. Maksanova, 2017, etc.). In several papers the problems of tourism development in protected areas were considered (I. M. Moroz, 2004, E. A. Yekhanurova, 2005, G. T. Shkiperova, 2006, L. V. Salova, 2009, I. I. Maximova, 2010, K. S. Sitkina, 2011, S. V. Lupacheva, 2013, L. I. Starkova, 2013, S. S. Khlebnikov, 2013, G. A. Sobolev, 2015, N. B. Karpov, 2016, etc.). At the same time, various aspects of infrastructure improvement studied in fragmentary ways. Some scientific works are noteworthy. These are theses in the field of economy (A. S. Levizov, 2008, M. V. Shedlovskaya, 2013), geography (S. A. Shabalina, 2009, A. S. Ermolina, 2011, A. B. Voronina, 2016), sociology (S. V. Dusenko, 2000, 2014, E. S. Zvyagina, 2015), art history and cultural studies (M. V. Yamashkina, 2005, Z. B. Chimitov, 2006, A. A. Nikiforova, 2011, F. S. Pomorov, 2017).

Essentially a holistic concept of architectural design of buildings and structures for SPNA not formed in the Russian architectural science. At present, there are only a few theses, in which the problems of urban planning and architectural-typological development of tourist infrastructure in protected areas (A. S. Sultangalieva, 1997, A. A. Gonchar, 2000, N. A. Kureneva, 2004, P. V. Skryabin, 2013, O. A. Antyufeeva, 2014). In this regard, this review is devoted to clarifying some of the issues of strategy and tactics of formation and development of construction facilities infrastructure in the necessary conditions for tourism activity.

2. Methods

While work is in progress, the modern theoretical concepts of the formation of tourist infrastructure and organization of activities on protected areas summarized. Monographs and papers coming from Russian and foreign authors, which were published in the 21st century, were considered.

Analysis of the existing tourist infrastructure of protected areas in the Russian Federation, as well as extensive foreign practice of architectural design of objects for reserves, national parks, natural parks, wildlife reserves, natural monuments, arboretum parks and Botanical gardens conducted. To obtain the results, we used in-situ observations, collection and systematization of Internet materials, including sites of international organizations, sites of specially protected natural areas, architectural portals and sites of architectural bureaus. Special attention of our study was concentrated on the modern approaches to minimizing the impact on natural complexes, ensuring safety, functional completeness and quality of solutions.

3. Results

It is known that the concept of municipal and social infrastructure is used in the dictionary of the Urban-planning code of the Russian Federation. However, many Russian scientists believe that the term "tourist infrastructure" has a special meaning and needs further careful study and detailed. One of the first interpretations proposed by I. V. Zorin and V. A. Kvartalnov in 2001. These authors considered the tourist infrastructure as a complex of existing facilities and networks of industrial, social and recreational purposes, which be used to ensure the life of tourists [2]. In 2005, for the first time V. F. Arkhipova and A. S. Levizov analyzed the complex of objects of the tourist sphere from the standpoint of the market economy. Considering the tourism industry, they proposed to separate hospitality (accommodation and food) from the infrastructure. In compliance with their opinion, the infrastructure includes three levels – 1) productive sector, 2) institutions that expand their activities through tourism, 3) institutions, which established specifically for the service of tourists [3]. In the course of studying the factors causing tourist activity, M. V. Vinogradova and P. I. Soldatov (2009) came to the conclusion about the content of the infrastructure of the tourist complex. This system include transport services, hotel services, catering, entertainment and entertainment sector and sports and fitness service, safe deposit services, financial services, information and support, facilities and communication systems, the production of souvenirs and handicrafts, production of tourist and sports products, retail trade and objects of consumer services. These scientists concluded that infrastructure is an activator of tourism activities. As a result of factors analysis, it appeared that the best scenario of development infrastructure is using incremental increase in the number of facilities on balance with

specific environmental and authority conditions of the territory [4]. In recent times, several attempts to systematize and integrate views had made. In particular, M. S. Oborin [5], T. A. Volkova [6], L. B.-J. Maksanova and S. J. Dagdanowa [7] paid attention to this issue.

The number of studies devoted to the analysis of problems and the theoretical basis of the formation of tourism infrastructure in the SPNA is increasing every year. A number of Russian and foreign scientists (G. S. Feraru, A. A. Fleck, N. A. Mosilevich) agree that the main centers of development of ecological tourism are national parks [8-10]. Special attention paid to the analysis of the reasons of low efficiency of tourist activity. Thus, for example, A. N. Barmin, S. B. Glagolev, D. S. Grachev, M. M. Iolin draws attention to the existence of a gap between the concept of "route" and "infrastructure" [11], and D. A. Chakhova concludes that in Russia the level of requirements to achieve comfort for tourists is lower than in foreign countries [12].

The study of the real situation in Russia shows that the insufficient branching of the route network and the limited range of objects do not allow to fully use the tourist potential of the SPNA. These facts evidenced by official statistics on the activities of nature reserves and national parks (table 1).

Table 1. Tourist activity on the territory of the State nature reserves and National parks of Russia [1, p. 89]

Indicator	State nature reserves			National parks		
	2005	2010	2015	2005	2010	2015
Number of museums	60	66	69	27	48	60
Number of Museum visitors, thousand people	343,8	391,2	526,4	44,9	104,4	170,7
The number of visitor centres	74	108	165	48	95	143
The number of visitors to visitor centres	159,0	404,9	497,6	101,0	176,8	592,7
Number of ecological trails and routes ^a – total, from them:	487	409	449	393	736	817
water	74	67	70	69	69	64
horse	15	8	18	30	45	60
pedestrian	337	277	288	196	277	511
The number of visitors to the trails and routes, thousand people	397,7	617,2	1179,9	403,1	1302,7	1906,0

^a Including ecological trails and routes in the protected zones of SPNA

Currently, Russia is seeing a dynamic increase in the number of infrastructure facilities of protected areas. However, we must recognize that the predominant part of the new SPNA's facilities don't meet the requirements the international level. This conclusion relates to the conditions of the organization of activities, to the variety, safety and comfort of services provided to tourists. Standards of improvement of areas of movement and accommodation of tourists, regulations for the design of functional structure, requirements for morphogenesis and structural solutions of buildings in places of scientific, educational and recreational activities, as well as the principles of placement of engineering structures and technological requirements for them were in need of some adjustment. Improvement of consumer properties of buildings and structures, as well as elements of environmental design available on the routes and in the places of tourist accommodation, the use of resource-saving technologies in the projects are necessary conditions for reducing the anthropogenic load.

Familiarization with progressive foreign experience of formation of infrastructure for various types of SPNA allowed to reveal that increase of efficiency of their functioning is connected with design and construction of residential buildings, administrative (office) buildings, research (including, laboratory) buildings and constructions, educational, cultural and entertaining, sports and health centers and development of a network of service points (trade, food). At the same time, special attention is concentrate on the multifunctional buildings, security systems upgrading, improving the quality of transport and engineering infrastructure, including real estate facilities [13]. Some examples of

ecotourism infrastructure you can see in figures 1-6. They clearly reflect not only the approaches to the expansion of the typological diversity of infrastructure elements, but also the qualitative characteristics of these buildings and structures. It should be emphasized that the most popular type of objects for protected areas are visit centers at this time [14]. It is important to design and visit centers, and other buildings, development of improvement projects carried out by reputable designers who take into account modern trends in architecture and design, implement innovative technologies to reduce the impact on the environment and resource saving.



Figure 1. Kemenes Volcanopark Visitor Center. Hungary. 2013 [15].



Figure 2. Visit center in Hebei province. Inner Mongolia, China. 2017 [16].



Figure 3. Fire station in reserve "Ballon des Vosges ". France. 2017 [17].



Figure 4. Ornithological Observatory, Logroño. Spain. 2009 [18].



Figure 5. Viewpoint in Scotland. Great Britain. 2015 [19].



Figure 6. Ecological trail in Rio Paiva. Portugal. 2015 [20].

4. Discussion

The need to comply with the environmental regime of use the SPNA is the most important factor that regulates the organization and development of tourism. Therefore, there is not objectionable the conclusions of many scientists that a certain category of territories should correspond to such types of objects and methods of improvement that do not violate the landscape value of the sites and do not contradict the goals and objectives of the protected areas [15-18]. The following table presents the results of the analysis of such compliance based on the regulations of the legislation of the Russian Federation on specially protected natural areas.

In the conditions of growth of recreational loads the importance of planning and architectural solutions increases, which allow to minimize the impact on the environment, as well as the role of multifunctional objects is actualized.

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Table 2. The accordance of types of tourist activities and purpose of protected areas opportunities for development of infrastructure

	Architectural-typological group of facilities	SPNA Category					
		Reserve	National Park	Natural Park	Nature Sanctuar	Natural Monument	Arboretum / Botanical Garden
1	Residential		+				
2	Administrative	+	+	+	+		+
3	Research	+	+	+	+	+	+
4	Educational		+	+		+	+
5	Cultural-entertaining		+	+			
6	Sports and recreation		+	+			
7	Service		+	+		+	+
8	Transport		+	+	+		+
9	Engineering		+	+	+		+

In the process of territorial and architectural-spatial evolution of educational and tourist activities in the SPNA the following aspects should be taken into account:

- the need to regulation of the recreational load;
- the consideration of zones with special conditions to use of territories for their sustainable development;
- the identification and preservation of valuable natural and cultural heritage as an environmental and compositional components subject to change;
- the priority of using the innovative principles of sustainable development and techniques of green architecture that help to improve the ecological conditions of the environment and to create a positive image of facilities.

The most important innovative architectural and typological approach is the construction of multifunctional facilities. Let's consider this possibility on the example of visit centers (VC). The main functional and structural elements of VC are the entrance area, service area and engineering zone. In order to improve the efficiency of work and optimize cross-functional relations, the following functions can be included in the structure of the VC: administrative, research, educational, educational, cultural, entertainment and transport. They expand the scope of services and can be used in different combinations. The basic types of visit centers can be designed by profile, namely research, educational or excursion and educational. Complex visit centers, which combine two basic functions, it is advisable to place in important sizes of protected areas. In the most popular places of protected areas, where there are high recreational loads, universal visit centers with a full range of functions should be created.

5. Conclusions

In the Russian Federation, the network of tourist infrastructure facilities of SPNA are of prime concern. To increase the consumer attractiveness of routes in specially protected natural areas, it is necessary to develop and use a strategy for the development of a network of high-quality facilities that will contribute to both environmental education of people and the protection of natural complexes. For its implementation a diversified range of comfortable and eco-friendly buildings and structures must be developed. It will meet the needs of different categories of visitors. This approach allows not only to redistribute and regulate the flow of tourists arriving for educational purposes and for leisure, but also to expand the range of places of employment of the local population.

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