Geo-ecological aspects of the territorial organization of tourist and recreational activities

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Abstract. Various types of tourist and recreational activities have been developed, implemented, and pilot-tested in the regions for a long while. These activities translate into particular actions aimed at the improvement of the regional system of the government regulation and support of recreational activities. The need to preserve the unique ecosystem of Lake Baikal and to focus the socioeconomic development of the Baikal natural area on its environmental aspects have boosted the academic and practical interest in the geo-ecological aspects of the territorial organization of the tourist and recreational activities there. In the course of the research, the co-authors have identified and listed the local recreational areas and made a predictive assessment of the maximal acceptable recreational load value. The co-authors have assessed the potential adverse impact that may be produced on the environment components by the recreational facilities. On the basis of the research, the co-authors have issued their recommendations concerning the recreational zoning of lake areas against the present-day ecological and socio-economic background of the Central ecological zone of the Baikal natural area.

1 Introduction

The objectives of providing tourist access to Lake Baikal and keeping it safe from any environmental damage or excessive pressure on the local socio-economic, cultural, historic and ecological inter-relations, including the local flora, fauna and cultural legacy, are not new; they have been the subject of proactive research projects and applied analyses since the day when Lake Baikal was awarded the status of the UNESCO Natural Heritage site (1996) [1-3]. In the days of state-planned and market-driven economies development of tourism in the Baikal natural area was considered a top-priority activity that complied with the environmental protection and ecological requirements. The territorial organization of tourist activities means the identification of a limited number of recreational areas that will accommodate a unified construction project with account for the environmental regulations governing any economic activities in the Lake Baikal basin [4]. Towards this end, the government has developed several solutions, consisting (1) in the implementation of such

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progressive instruments, as a special economic zone of the recreational type, travel clusters, and (2) in the development of the infrastructure for ecological tourism on the protected areas. At the regional level, the expertise accumulated by Buryatia has proven that the republic has spent much effort to implement these projects: it runs special economic zones of the recreational type and public leisure areas. These zones and areas, representing potential spots for recreation, are governed by special regulatory, economic, and organizational procedures that apply to their establishment, operation, and management. The main prerequisite is that the present spatial structure of the recreational activity in the Baikal natural area features low integrity, heterogeneous architectural and construction solutions, insufficiently developed infrastructure, intensifying environmental problems; therefore, the investment allure of the area goes down. To a significant extent, this problem is explained by the unavailability of the comprehensive cross-regional concept or a unified plan for the accommodation and development of the travel infrastructure in the Baikal natural area with account for maximal recreational loads.

At the meeting on the environmental development of the Baikal natural area, President Putin set the strategy for the liquidation of the consequences of irrational and irresponsible economic and travel activities in the Baikal natural area [5]. At the President's instruction, the inspection of illegal and ecologically destructive activities was initiated there [6]. It is noteworthy that another President's message was discussed at the meeting: the need to stimulate the environmental responsibility of the business community. We believe that these "target oriented" sovereign solutions will make it possible to resolve a number of problems in the short term, whereas the long-term trend for the sustainable and ecological development of tourism requires the environmental substantiation of any land planning solution at the stage of setting land plot borders, when maximal loads are set and the ecological assessment of sites accommodating travel facilities are performed in order to apply "green building" standards and the best available technologies.

The attainment of the above objective requires the "design" of a well-balanced territorial structure (a) based on the principles of sustainable tourism, (b) ensuring the spatial differentiation and diversity of tourist products offered by each potential recreational zone and designated to supplement one another; (c) with account for the current and future economic, social, and environmental impacts.

Against this background, the objective of this article is to study the territorial organization and structure of the travel activities in the Baikal natural area, particularly, in its Central ecological zone with account for the regulatory restrictions applied to any travel activities there. The attainment of this major objective breaks down into the following sub-objectives: (1) the identification of potential recreational areas; (2) the predictive assessment of maximal acceptable tourist loads; (3) the assessment of any potential adverse impact that may be produced by the travel facilities on the environment; (4) the development of recommendations concerning the siting of travel facilities.

2 Overview of literature

V.S. Preobrazhensky [7], Yu.A. Vedenin [8], L.Yu. Mazhar [9], A.N. Dounts [10], M.A. Dybal [11] and other researchers made their contributions into the theory of the territorial organization of travel activities. In their works, they developed the core notions of the Russian travel industry; they developed the model travel system, the recreational breakdown of territories; they designed the spatial forms of territorial development (the cluster-based approach), and developed several basic approaches towards the identification of the key elements of the territorial organization of travel activities.

Having analyzed the theoretical works and practical aspects of the territorial organization of travel and recreational activities, performed in the Central ecological zone of the Baikal

natural area (the Republic of Buryatia) [12], we find it noteworthy that the Russian research works and legislation have discrepancies the terminology of travel and recreational activities, which are sometimes considered as practical issues. In this article, we will use the notion of the “recreational area” to identify the areas accommodating travel and recreational activities, including the territories that have a recreational potential, the territories that accommodate the elements of the travel infrastructure. Potential recreational areas represent land plots of different categories, including lands of inhabited localities, forest lands, areas and facilities of special protection.

Foreign research projects draw particular attention to the zoning of travel destinations [13, 14] and coastal areas [15-17]. We find it interesting to study the experience accumulated by the Royal Town Planning Institute (UK), that studies interrelations between tourism and spatial planning aimed at the identification and prevention of conflicts [18]; the experience accumulated by China that assesses the impact produced by tourism on the natural environment at the stages of planning and construction of travel facilities [19, 20], etc.

Let's address the works on the Baikal natural area, including those on the planning of the Central ecological zone of the Baikal natural area [2], and works on water protection zoning as a landscape planning technique. The works that we have selected cover the geo-ecological fundamentals of territorial organization and area planning techniques that determine the essence of the geographical approach towards the study of heterogeneous objects and phenomena developing in spatial and temporal systems. We also stick to the ecological approach that helps us to study the links between the systems [21] and we also consider numerous works by the Russian researchers covering the spatial planning of the Baikal natural area. Indeed, the most complex environmental situations, economic problems and conflicts, concerning land/water use and recreational activities, arise in protected water areas [23]. According to various sources, intensive introduction of geo-ecological principles into urban planning is possible, if accompanied by the methodology of landscape planning, integrated into spatial planning and aimed at the resolution of problems of spatial design aimed at the maintenance of environmental sustainability. It is noteworthy that the ecological zoning of the Baikal natural area, based on the RF Law “On the Protection of Lake Baikal” is based on the methodology of landscape planning.

3 Materials and research methods

According to the effective legislation, any spatial planning documentation and law enforcement/administrative practice, that apply to the territorial organization of tourism and recreational activities in the Central ecological zone (the Republic of Buryatia), contemplates the availability of versatile travel areas that translate into nine recreational zones (Table 1).

The following characteristics of the forms of territorial organization of tourism in the Central ecological zone of the Baikal natural area (the Republic of Buryatia) were identified on the basis of the research projects, had been implemented earlier.

1. Tourist and recreational activities are performed in 33 of 72 inhabited localities within the Central ecological zone of the Baikal natural area. The majority of accommodation facilities are concentrated in the above 33 localities.
2. The area, exposed to our research, has five specially protected natural areas of Federal significance, including Baikalsky and Barguzinsky reserves, Zabaikalsky national park, Frolikhinsky and Kabansky refuges and three specially protected natural areas of regional significance, and recreational activity is not the main type of activity performed there. Recreational area “Poberezhye Baikala” was established in Pribaikalsky and Kabansky districts to streamline the inflow of tourists and to regulate environmental actions there.
3. Special economic zone “Baikal Harbour” in the Pribaikalsky district of the Republic of Buryatia, established in accordance with the RF Government Regulation N 68 of

- February 03, 2007, represents a major integrated investment project implemented in the local travel industry.
4. Another consolidated investment project, or the Podlemorye travel cluster, is being implemented within the framework of the Federal target programme entitled “Development of domestic and international tourism in the Russian Federation (2011 – 2018)”.
 5. Regional favourable economic zones were established in Severobaikalsky, Kabansky districts (in the Podlemorye travel cluster), and in Severobaikalsk under the Law of the Republic of Buryatia № 2073-III issued on March 14, 2007.
 6. In accordance with the rules governing the organization of public leisure spots, approved by the Regulation of the Government of the Republic of Buryatia № 475 of October 15, 2008, leisure spots (having catering facilities, rental services, and guided tours) are established in Barguzinsky, Kabansky, Pribaikalsky, Severobaikalsky districts and in the town of Severobaikalsk.

Table 1. The Spatial Structure of Tourist and Recreational Activities in the Central Ecological Zone of the Baikal Natural Area in the Republic of Buryatia in 2015 (The source: [12]).

Types of areas	Number	Broken down by municipal settlements				
		Barguzinsky	Kabansky	Pribaikalsky	Severo-Baikalsky	Severo-Baikalsk
Inhabited localities, where tourist and recreational activities are performed	33	5	15	7	5	1
Leaseholders of forest lands used for recreational purposes	89	15	30	16	28	-
Specially protected natural areas of federal significance	5	1	2	-	2	-
Specially protected natural areas of regional significance	4	-	2	1	1	-
Specially protected natural areas of local significance (areas of recreation)	4	1	2	1	-	-
Special economic zone “Baikal Harbour”	1	-	-	1	-	-
Travel clusters	1	-	1	-	-	-
Favourable economic zone of tourist and recreational types	3	-	1	-	1	1
Places of public leisure	14	1	4	5	4	-

The territorial organization of the tourist and recreational industry in the Central ecological zone of the Baikal natural area (the Republic of Buryatia) are provided in Figure 1.

The comparative characteristics of regulatory, organizational, infrastructural and administrative environments of the recreational activity, performed in the Central ecological zone of the Baikal natural area, provided in Table 2, have proven that:

- travel and recreational activities concentrate on the land plots featuring different categories of lands, including lands of inhabited localities, forest lands, specially protected areas and facilities;
- legal requirements, governing the establishment and operation of different vehicles accommodating travel and recreational activities in the Baikal natural area, are issued on the Federal and regional levels; they are stipulated by the ecological regulations, governing any economic activities in accordance with the Law “On the Protection of Lake Baikal”.

- the territorial structure of travel and recreational activities in the Central ecological zone of the Baikal natural area is implemented in the network of land use documents issued by the RF subject [28];
- recreational areas vary in terms of their origin and seasonality of their operation; their infrastructures and management styles, the intensity, quality and composition of services provided there also vary;
- according to the RF legislation, construction of permanent buildings and structures in the Central ecological zone of the Baikal natural area is allowed in inhabited localities and special economic zones.
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Fig. 1. The territorial organization of the travel and recreational industry in the Central ecological zone of the Baikal natural area (the Republic of Buryatia) (The source: [12]).

Against the background of the ever-growing demand for the travel destinations in the region, the territorial organization of the recreational systems, developed for long-term vacations, must take account of the ecological restrictions, aimed at the preservation of the biogenocenosis and the natural landscape of Lake Baikal. In [27], the co-authors performed an ecological assessment of the expediency of the accommodation of travel facilities in order to substantiate the development of tourism in the area. The diverse nature of ecological restrictions, driven by the categories of land plots, serves as the pre-condition for a combination of several methodological approaches to the assessment of the acceptability of recreational facilities in the area [28].

The following values are employed to assess the anticipated number of tourists in the recreation areas offering package holidays: the load factor applicable to accommodation facilities (hotels and residential houses), the average duration of stays, the average annual number of trips. The calculations are based on the formula:

$$K_t = K_m * K_z * Z_{ksr} \quad (1)$$

where K_t is the number of leisure travelers in a year/during the high season, K_m is the number of accommodation places, K_z is the average annual number of arrivals, Z_{ksr} is the average annual occupied capacity of accommodation facilities.

The following data are employed to assess the anticipated number of travelers in the recreational areas, offering rough travel services:

- the total area of forests (in hectares), to be used for recreational purposes in the Central ecological zone (the Republic of Buryatia), including the area of forests, broken down by the municipal entities, located in the Central ecological zone, in compliance with the Forest Plan of the Republic of Buryatia and with the Computerized Information System "Land and Real Property of the Republic of Buryatia";
- maximal load exposure (in person/hectare) of the local ecological systems of the Central ecological zone of the Baikal natural area in case of continuous stays of travelers during the vegetation period, broken down by different types of local ecosystems in pursuance of Order № 63 issued by the Ministry of Natural Resources of the Russian Federation on March 05, 2010, applicable to the forest areas of the Central ecological zone (the Republic of Buryatia).
- the average duration of recreational stays reaches three days (for forest areas). The total number of days available for forest recreation in a year reaches 60 days. As a rule, the load is maximal during summer seasons;
- the average annual number of arrivals is identified by dividing the total number of days available for forest recreation in a year by the average duration of stay.

The acceptable annual load (DRN) is calculated according to the formula (2)

$$DRN = S * DN_n * K_z, \quad (2)$$

where: S – the area (hectares); DN_n – the maximal load; K_z – the average annual number of arrivals.

Table 2. Comparative Characteristics of Recreational Areas in the Central Ecological Zone of the Baikal Natural Area (the Republic of Buryatia), broken down by regulatory requirements, land categories, seasonality, and infrastructural development.

Recreational Area	Regulatory Requirements	Land Category	Seasonality of Recreational Activity	Land Use Planning Documents	Infrastructure	Management Procedure
Special economic zone	Federal Law № 116-FL of July 22, 2005 “On Special Economic Zones in the Russian Federation”	Lands of specially protected territories and facilities	Package tours/ 12 months a year	Land use planning scheme of the Republic of Buryatia, land use planning scheme of a rural municipal entity, master plan of a rural municipal entity, planning design of a special economic zone	Travel infrastructure	Management company
Travel cluster	RF Government Regulation № 644 of March 02, 2011 “On the Federal Target Programme “Development of Domestic and International Tourism in the Russian Federation (2011-2018)”	Lands of inhabited localities	Package tours/ 12 months a year	Land use planning scheme of the Republic of Buryatia, land use planning scheme of a rural municipal entity, master plan of a rural municipal entity, planning design of TRK	Travel infrastructure	Administration of the inhabited locality
Travel destinations	Federal Law № 131-FL of October 06, 2003 “ON General Principles of Local Self-government in the Russian Federation”	Lands of inhabited localities	Package tours/12 months a year	Land use planning scheme of the Republic of Buryatia, land use planning scheme of a rural municipal entity, master plan of a rural municipal entity,	Travel infrastructure	Administration of the inhabited locality
Specially protected natural area of Federal significance	Federal Law №33-FL of March 14, 1995 “On Specially Protected Natural Areas”	Lands of specially protected territories	Package tours/12 months a year	Land use planning scheme of a specially protected natural area, Land use planning scheme of the Republic of Buryatia, land use planning scheme of a rural municipal entity	Paths, campsites, parking lots,	Directorate of the specially protected natural area
Specially protected natural area of regional significance	Federal Law №33-FL of March 14, 1995 “On Specially Protected Natural Areas”	Lands of specially protected	Rough travel services/seasona	Land use planning scheme of the Republic of Buryatia, land use planning scheme of a rural municipal entity	Paths, camping sites	

Specially protected natural area. Recreational area.	- Law of the Republic of Buryatia №559-I “On Health Improvement areas, Resorts and Natural Treatment Resources in the Republic of Buryatia” - Regulation issued by the government of the republic of Buryatia № 342 of June 9, 2012 “On the Establishment of the Specially Protected Natural Area, the Baikal Coastline”	Lands of specially protected territories and facilities; forest lands	Rough travel services/seasonal	The Forest Plan of the Republic of Buryatia, the forest exploitation plan, land use planning scheme of a rural municipal entity		Directorate of the specially protected natural area
Favourable economic zone	The Law of the Republic of Buryatia № 2073-III of March 14, 2007 “On Favorable Economic Zones in the Republic of Buryatia”	Lands of inhabited localities; forest lands	Package tours/ 12 months a year	The Forest Plan of the Republic of Buryatia, the Forest Plan of the Republic of Buryatia, land use planning scheme of a rural municipal entity, master plan of a rural municipal entity	Travel infrastructure	Administration of the inhabited locality
Forests employed for recreation purposes	The Forest Code of the Russian Federation N 200-FL of December 04, 2006	Forest lands	Rough travel services/seasonal	The Forest Plan of the Republic of Buryatia, the forest exploitation plan,	Sites, parking lots	Lessee of the forest plot
Leisure areas	RF Government Regulation № 475 of October 15, 2008 “On Approval of Rules for the Organization of Leisure Areas in the Central Ecological Zone of the Baikal natural Area, the Republic of Buryatia”	Lands of inhabited localities; forest lands	Rough travel services/seasonal	The Forest Plan of the Republic of Buryatia, the forest exploitation plan		Land plot tenant

4 Results

The consolidated data on the anticipated number of travelers in the leisure areas of the Central ecological zone of the Baikal Natural Area (the Republic of Buryatia), broken down by the municipal entities, are provided in Table 3.

Table 3. The anticipated number of travelers in the leisure areas of the Central ecological zone of the Baikal Natural Area (the Republic of Buryatia) (The source: [27]).

Municipal entity	Anticipated number of travelers, person/year		
	In recreational areas offering package travel services	In recreational areas offering rough travel services	In terms of the specially protected natural area
Barguzinsky district, including	102.748	101.286	
State enterprise Ust-Barguzin	102.748	101.286	60.000
The district total			60.000
Kabansky district including:	486.559	350.586	9.000
State enterprise Babushkinskoye	83.128		
Joint venture Vydrinskoye	136.254		
Joint venture Oimurskoye	8.408		
Joint venture Bolsherechenskoye	110.029	46.300	
Joint venture Posolskoye	11.785	6.150	
Joint venture Tvorogovskoye			1.125
Joint venture Ranzhurovskoye	1.911		
Joint venture Sukhinskoye	131.859	298.136	
Joint venture Tankhoiskoye	3.185		7.875
Pribaikalsky district including:	574.219	441.674	
Joint venture Gremaychinskoye	45.609	351.900	
Joint venture Nesterovskoye	191.000		
Joint venture Turkinskoye	337.610	101.454	
Severobaikalsky district including:	8.981	149.720	
Joint venture Baikalskoye evenkiyskoye	2.548	101.720	
Joint venture Kholodnoye evenkiyskoye	3.185		
State enterprise Nizhneangarsk	3.248		
Joint venture Verkhnezaimskoye	-	48.000	
Severobaikalsk	42.042	69.600	
TOTAL	1.214.549	1.059.812	69.000

The above data may be employed not only to assess the acceptable inflow of travelers, but also to identify the actions aimed at the improvement of the capacity/efficiency of land use without any damage to the environment. As a result of the assessment of the potential adverse impact, that may be produced by the travel facilities on the environment (discharges, emissions and waste generation), the following conclusions can be derived.

1. The maximal anthropogenic (travel/recreational) load is projected to concentrate in the recreational areas, located in the Middle hollow of Lake Baikal (Figure 2). Therefore, discharged water treatment plant is to be constructed and commissioned here. Besides, any local economic entities must not exceed the maximal limits, restricting the pressure, exerted on the ecological system of Lake Baikal in the course of design, construction, and operation of travel facilities.

Fig. 2. The correlation between potential discharges of nitrogen and phosphorus and their pre-set regulatory values broken down by the recreational areas in the Central ecological zone of the Baikal natural area (the Republic of Buryatia) (The source: [27, 29]).

2. The anticipated travel rate growth will cause higher nitrogen and phosphorus emissions/discharges (in kg/year) in Turkinsky, Nesterovsky, Vydrinsky, Soukhinsky, and Bolsherechensky settlements of the Republic of Buryatia. Maximal emissions/discharges of nitrogen and phosphorus will be generated by the “package tour” and “rough” travelers in the municipal entities of Pribaikalsky district (52% and 41%, respectively) and Kabansky district (34% and 31%, respectively). The rise in the emissions will be caused by the implementation of major investment projects consisting in the establishment of Special economic zone “Baikal Harbour”, and travel clusters to be established as public and private partnerships. The minimal amount of biogenic elements will be discharged in Severobaikalsky district’s leisure/recreational areas, offering package tours (1%). The minimal amount of biogenic elements, discharged in rough traveling areas, will reach 6%, and maximal discharges will be concentrated in Severobaikalsk. The maximal pressure will be exerted on the specially protected natural area in Barguzinsky district, and the pressure value will reach 87%, while the minimal pressure value will be concentrated in Kabansky district (Figure 3).

Fig. 3. Biogenic emissions in recreational areas (The source: [27]).

3. The top priority environmental problem consists in the recycling of household waste, generated by rough travelers. Forest areas popular among those tourists who travel by themselves, are located in Ust-Barguzinsky, Babushkinsky, Vydrinsky, Sukhinsky, Turkinsky, and Nizhneangarsky settlements. They feature maximal amounts of household waste. The majority of accommodation facilities, located in the Central ecological zone of the Baikal natural area (the Republic of Buryatia), maintain dump wells, and they have entered into contracts for the delivery of the liquid household waste to water treatment plants located at the distance of 20 – 82 kilometers. For example, liquid waste is delivered from Maksimikha to Ust-Barguzin (33 km) in Barguzinsky district; in Kabansky district liquid waste is delivered from Soukhaya and Enkhaluk to Selenginsk treatment plant (70 – 82 km); liquid waste, generated in Kultushnaya recreation area, is delivered to the treatment plant, located in Babushkin (25 km); liquid waste generated in Baikalsky priboi recreation area is delivered to Selenginsk (40km).

As for Pribaikalsky district, liquid waste is delivered from Goryachinsk, Turka, Gremyachinsk to the absorption fields owned by Baikalsky Bor sanatorium (the average distance is equal to 20 km). The cost of delivery of solid and liquid waste to the landfills and treatment plants reach up to 5% of the cost of services. Therefore, these entities must timely collect and deliver their waste. Towards this end, waste delivery rates should be reduced.

4. Acceptable atmospheric emissions in the Central ecological zone are specified in the Regulations governing the maximal acceptable impact on the unique ecological system of Lake Baikal, approved by Order № 63 [29]. Table 4 has present and anticipated values of emissions broken down by the hollows of Lake Baikal, as well as their maximal acceptable values. Neither recreational area, except for Severobaikalsk and Goryachinsk resort, has central heating facilities. They have independent boiler houses, electric boilers and heaters.

Table 4. Present, anticipated and maximal acceptable emissions broken down by Lake Baikal hollows (tons/year) (The source: [27]).

Lake Baikal hollows	SO ₂			NO _x		
	Maximal acceptable emissions (according to effective regulations)	Present-day emissions (2014)	Anticipated emissions	Maximal acceptable emissions (according to effective regulations)	Present-day emissions (2014)	Anticipated emissions
Northern hollow	1200	571,4	655,4	540	237,2	283,1
Middle hollow	1000,0	33,2	43,7	500,0	39,2	58,9
Southern hollow	2500	104,1	108,1	1200	62,9	75,0

5 Discussion of results

Numerous researches have proven that various forms of recreational activities are being identified, introduced, pilot-tested and transformed in the Baikal natural area. Therefore, these actions influence the scope and method of improvement of the local system of state regulation and support provided to the travel industry.

The anticipated numbers of future travelers to visit the Central ecological zone of the Baikal natural area (the Republic of Buryatia), broken down by the municipal entities, may be used not only to assess the maximal acceptable number of travelers, but also to identify the actions, that will help to rise the capacity and efficiency of these areas without any damage to the environment.

Present-day recreational loads, typical for rough traveling areas (the forest lands of the Central ecological zone of the Baikal natural area) do not exceed the acceptable values. Therefore, the maximal values, set by Order № 63 [29] are well-grounded. According to the opinion, expressed by the experts, as a result of the improvement of the living standards, emergence of new high-quality services in the travel market, and implementation of the programs aimed at the regulation of the inflow of travelers, the share of rough traveling will go down. The conclusions and recommendations, developed by the co-authors, will impact the recreational zoning of lake areas in the present-day ecological and socio-economic environment. Given the geographical and socio-economic regularities, there is a need to analyze each hollow of Lake Baikal and its shoreline within the borders of the Central ecological zone of the Baikal natural area and to apply the eco-systemic approach that takes account of the interlinks between the processes underway in the ecosystem of the Baikal natural area. The approach to be applied must be based on the top priority prevention of any environmental damage.

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