Geoecological aspects in assessing the recreational potential of the Osetr river basin as the basis for the development of ecological tourism

V A Shirokova1,2, Y D Yurova1, A O Khutorova1

1 State University of Land Use Planning, 15, Kazakova Str., Moscow, 105064, Russia
2 S.I. Vavilov Institute for the History of Science and Technology of the Russian Academy of Sciences, Baltiyskaya Str., 14, Moscow, 125315, Russia

E-mail: Yuliya.yurova.1996@mail.ru

Abstract. The active development of the tourism industry is accompanied by an increase in the anthropogenic burden on the environment. In this regard, the organization of tourist activities attracts even more recreational resources, which leads to the transformation of unique natural and historical-cultural landscapes and the loss of their pristine beauty. The work considers the most important geoecological approaches to the study of the tourist and recreational potential of the territory on the example of the Osetr river basin with subsequent assessment of the recreational load and capacity of the natural tourist complex. The results of the assessment of tourism and recreational potential for the development of environmental tourism based on the methods and approaches proposed in the study for the processing and analysis of obtained data will form the basis for the creation of a geoecological passport of the catchment area of the Osetr river basin.

1. Introduction

In most cases, irreversible changes in the natural environment are caused by the development of mass tourism. An alternative type of tourism that corresponds to the concept of “sustainable tourism” may be distinguished by ecotourism, which potential is still underutilized.

Due to the fact that major international instruments are now focusing on “sustainable tourism”, the principles of “sustainable tourism” adopted by the international community may be applied to all forms of tourism.

The assessment of the potential of environmental tourism is necessary not only for the development of ecotourism in regions with all the necessary prerequisites, but is also a necessary condition for the formation and consolidation of sustainable tourism principles in the ecotourism sector of the regions.

A detailed historical overview of environmental tourism in the world and in Russia is given in the monograph of A V Drozdov [1]. According to the national standard of the Russian Federation GOST R 56642-2015 Tourist services. Ecotourism. General requirements, “the forms of ecotourism may include a wide range of journeys of various lengths – from long-term scientific expeditions to short-term holidays in nature on weekends, which is classified according to various criteria: type of activity, main objects of visit, degree of impact on the environment, groups of travelers, length of stay, etc.”.

According to article 45 of the Urban Planning Code of the Russian Federation, recreational areas are allocated “for mass recreation of the population, improvement of the microclimate of settlements..."
and include parks, gardens, urban forests, forest parks, beaches, reservoirs and other objects used for recreational purposes and forming a system of open spaces in cities and other settlements. The recreational areas may include landscaped public areas, mass recreation areas and resorts, specially protected natural areas and objects”.

Since many protected natural areas have significant recreational resources, it is recommended to combine different measures with recreational activities.

The studies by G.S. Alieva [2] are aimed at organizing ecotourism in the economic and geographical area of Gornaya Shirvani and conducting a SWOT analysis in specially protected areas. It especially focuses on the fact that the development of ecotourism in the regions will foster excursions and increase the ecological culture of the local population; and the need for a strategic planning approach to identify the internal and external environment and its division into four categories of assessment to protect ecosystems for further study of the environmental status and significance of protected areas.

A comprehensive geoecological assessment of the natural and recreational potential of the region is the scientific basis of most programs for the development of environmental tourism and recreation. The development of methodological approaches and tools for assessing the tourist and recreational potential of the Russian regions and regions of Northern, Central and Eastern Kazakhstan are covered in the works of L.I. Kulakova, V.A. Osipov [3], D.G. Mamraeva, L.V. Tashenova [4]. It is noted that in most cases, the methods are subjective and based on the method of balance of D.L. Armand [5] because they contain a limited set of factors that do not make it possible to conduct a fairly comprehensive assessment of the tourist and recreational potential of the specified destinations.

In their studies on geoecological assessment of recreational and resource potential of urbanized territories V.V. Kyrov, S.A. Kyrova [6] presented the results of analysis of recreational and resource potential and ecological and recreational capacity of the territory of Abakan. According to the authors, the assessment of tourism and recreational potential is the basis for determining the level of competitiveness of the tourism industry. In this regard, the relevance of the issues of in-depth study of the theoretical and methodological basis in the field of assessing tourist and recreational potential is increasing.

The study and assessment of the region’s recreational potential is a prerequisite for the successful development of environmental tourism. It is natural resources that form the basis for the recreational use of a particular area. The study of various problems related to the assessment of water tourism and resource potential is reflected in the work on the assessment of the recreational potential of water bodies in the Burla river basin [7], geoecological assessment and rational use of the recreational potential of coastal zones of reservoirs [8], lakes of the Chuya river basin (Altai mountain) [9], creation of recreational zones near water bodies on the example of Krasnoyarsk [10], recreational assessment of water bodies of Kabardino-Balkaria [11].

Yu.V. Kokina [12] in her comprehensive assessment of the recreational potential of the Volga waterway for the development of cruise tourism notes that due to the lack of a unified methodology for assessing the recreational potential of the country’s natural complexes, its development is currently an urgent problem of geography.

Thus, when studying the water resource potential for recreational water use it was noted in the work of I.V. Andreeva and S.V. Tsilikina [13] that at present there is no clear definition of “water resource potential for recreational water use”. The prerequisites of this problem are an insufficiently developed theoretical assessment base and, as a result, the topic is rarely considered by researchers. The existing methodological provisions are based on component criteria that allow assessing the water body or its catchment area, but it is not possible to determine the relationship between territorial regularity, distribution characteristics and the state of water recreational resources.

The Osetr basin is one of the most promising areas for the development of environmental tourism. The territory combines many advantages: favorable environmental and hygienic indicators, various landscapes, climatic conditions, etc. The paper considers the key geoecological approaches to the study of tourism and recreational potential of the territory using the example of the Osetr river basin,
according to which the assessment of this potential was accompanied by the determination of the permissible recreational load and recreational capacity of the natural-territorial complex.

2. Materials and methods

A modern comprehensive geocological assessment of the recreational potential of the Osetr river basin was based on the materials on the geocological assessment of anthropogenic impact on the river basin [14], the results of scientific and educational significance of unique natural objects of Gornoye research and academic base, the results of natural-historical monitoring of the natural monument “Zalesenny ravine near the village of Vlasyevo” (Moscow region, Lukhovitsy city district) [15], as well as the methodological foundations of integral indicators of the ecological state of water bodies [16], the integral assessment of recreational zones, scientific concepts on the assessment of tourist and recreational potential [17-18].

The studies on the identification and geocological assessment of recreational areas were carried out in 2015-2017 in the middle flows of the Osetr river basin – at the screening site from the Spas-Doschaty village to Vlasyevo village; according to the assessment of the recreational potential of the Osetr river basin – from 2018-2020 (throughout the territory of the Osetr river basin).

The assessment of the geocological state of water bodies used for recreation is based on the assessment of anthropogenic impact on the ecological condition of the identified recreational zones using the example of the Osetr river in Moscow Region, ecological assessment of the suitability of the Osetr river for recreation [19], hygienic requirements for the protection of surface waters (SanPiN 2.1.5.980-00) and groundwater from pollution (SP 2.1.5.1059-01) to the quality of water bodies used for recreation according to GOST 17.1.5.02-80, drinking and cultural water use – GN 2.1.5.1315-03 and non-centralized water supply, including sanitary protection of water sources – SanPiN 2.1.4.1175-02.

The area suitability for recreation was assessed in accordance with the requirements of GOST 17.1.5.02-80 taking into account certain factors: comfortable and hygienic conditions, aesthetic factors.

According to the criteria of the above methods, an integral assessment of anthropogenic impact on recreational zones was developed thus identifying low, medium and high load zones and an assessment scale ranging from 0 to 14 points.

The research conducted in 2019-2020 was aimed to study and evaluate the tourist and recreational potential of the recreational zones of the Osetr river basin. The method of M.V. Gudkovsky [18], which is based on the method of balance quantifying the dynamic specifics of the territorial tourist and recreational system, was used to assess the tourist and recreational potential of the Osetr river basin. This method is reflected in the monograph of L.D. Armand “Landscape Science” [5]. The method of M.V. Gudkovsky is based on a comprehensive approach to statistical analysis of the recreational zone parameters taking into account natural-environmental and socio-economic factors by dividing it into 5 blocks, including a number of criteria: natural-resource, historical-cultural, socio-economic, tourist blocks and a block of adverse factors.

The integral assessment of the identified recreational zones of the Osetr river basin was calculated on the basis of the methodology for assessing the tourist potential by E.Yu. Kolbovsky [18]. According to this method, the studied territory for recreation needs to have cultural, historical sights, natural resources, attractive landscape, unique natural objects (lakes, reservoirs and valleys, sacred sources, springs), operating and abandoned hydraulic engineering constructions, historical waterways, water-mills, unique architectural complexes, etc.; recreational and tourist zones – picturesque shores of river valleys and basin systems, tourist towns, lakes, ponds, bays and other reservoirs.; river systems – facilities for tours on kayaks, rafts; forest and wetlands – facilities for traditional forms of nature management – gathering; objects of ecological tourism – ecological trails [19].

In accordance with the proposed methods, the estimated scores for each of the identified recreational zones were summed up depending on 5 blocks for further comprehensive assessment of the recreational zones of the Osetr river basin.
3. Results and discussion

Natural resources form the basis for the successful development of the tourist and recreational industry, which should be carefully studied and assessed. There are several methods to assess the recreational resources. The most common recreational assessment of the components of nature is based on the degree of favorability of certain parameters in accordance with the developed assessment scale. When studying natural geosystems for ecotourism and recreation, the degree of comfort is assessed and only those that have the most favorable features for recreation are identified.

Based on the main provisions of the proposed methodology, a comprehensive assessment of the recreational zones of the Osetr river basin gives a general idea of the tourist and recreational potential of the studied territories and possible ways to organize the forms of ecotourism in these territories. A comprehensive assessment of the identified recreational areas in the Osetr river basin was carried out taking into account the totality of natural and anthropogenic parameters.

Thus, a comprehensive assessment of the recreational potential of the Osetr river basin is formed from a component-by-component assessment of the territory for each identified criterion in three stages: 1 – analysis of natural conditions according to certain geosystem components with their recreational purpose. The following criteria are separately identified: diversity of landscapes and natural resources, bioclimatic characteristics of the region; 2 – analysis of environmental geoecological characteristics. For example, criteria for various impacts and restrictions imposed by the human body on natural conditions were developed based on the normative documents presented in the section “Research methods and techniques” for assessing the sanitary and hygienic well-being of water bodies and recreational areas; 3 – analysis of historical and cultural recreational resources, which takes into account unique cultural and historical monuments and sights, as well as transport accessibility of recreational zones and objects [19].

According to H.G. Solpina [20], the main document for the planned research is a landscape map, on the basis of which applied landscape maps (recreational and engineering-construction capabilities of the analyzed territory) are compiled, which allows correctly orienting institutions when arranging recreation areas.

The Osetr river basin is a unique territory combining many cultural, historical, natural and spiritual monuments within its borders. Rich historical heritage contributes to the effective development of tourist and recreational, cultural and educational components of ecological tourism in the Osetr river basin.

According to the studies conducted in 2015-2017 on the basis of criteria and scale for assessing the conformity of the recreational zones, according to the requirements for the improvement of recreation zones, three recreational zones were assessed: beach in Spas-Doshchhaty villages and the right bank of the Osetr river in Vlasyevo village are rated “satisfactory” and Saturn tourist base in Lukhovitsy village – “good”. According to the requirements for the quality of water bodies used for recreation, a high level of anthropogenic load is noted in the Lukhovitsy village, average – beach in the Spass-Ploshchhaty villages and, accordingly, low – right bank of the river (beach) in Vlasyevo village [21].

The integrated environmental monitoring of the Osetr river [22] identifies an additional recreation object – a dam on the Osetr river in Zaraysky District. The hydraulic dam and its adjacent coastal territory are located 368 m from the territory of the Zaraysky Kremlin and serve to support the upper bay in order to create recreational zones in Zaraysky District. The main aspects of the dam’s impact on the state of the water body and the geosystem components as a whole are noted in the work on the need for geoecological screening of the state of basins of small and medium-sized rivers to assess the impact of measures for the operation of hydraulic structures [23].

In 2018, the following were added to the list of recreational areas of the territory under study: Elling boat station section, Radushny Ossetrik tent camp. The assessment of the suitability of recreational zones was carried out in accordance with hygienic requirements for the protection of surface waters (SanPiN 2.1.5.980-00), requirements for the quality of water bodies used for fisheries according to the Order of the Ministry of Agriculture of Russia No. 552 dated 13.12.2016, recreation (GOST 17.1.5.02-80) and drinking and cultural and domestic water use. The results served the basis
for the geocological assessment of anthropogenic impact on the Osetr river basin [14]. The work noted that, like many other small and medium-sized rivers in the region, the Osetr river is strongly sensitive to anthropogenic effects.

The methodology for the integrated assessment of recreational zones of the Osetr river basin was developed in 2019-2020 based on the methods of water balance by L.D. Armand [5], calculation of tourist and recreational potential by M.V. Gudkovsky [17] and assessment of tourist potential by E.Yu Kolbovsky [18], results of environmental assessment of water bodies for recreation [19]. In accordance with the main provisions of the developed methodology, the recreational suitability of the catchment of the Osetr river was estimated according to five blocks according to the criteria of the E.Yu. Kolbovsky and M.V. Gudkovsky’s methodology – natural, cultural, historical, socio-economic, tourist and a block of adverse factors: historical attractions in the Osetr river basin were monitored and compliance of recreation sites with environmental protection requirements were analyzed; unique climatic features of the Osetr river basin were highlighted; inventory of infrastructure facilities for active lifestyle and health-improving measures was carried out; possible adverse geo-environmental factors were considered.

4. Conclusion
From the point of view of recreation, the Osetr river basin has wide potential and opportunities for the realization of different forms of ecological tourism. According to preliminary estimates, the quality of water bodies meets the requirements for recreation facilities.

The Osetr river basin is a unique territory combining many cultural, historical, natural and spiritual monuments within its borders. Rich historical heritage contributes to the effective development of tourist and recreational, cultural and educational components of ecological tourism in the Osetr river basin. The results of the assessment of tourism and recreational potential for the development of environmental tourism based on the proposed methods and approaches for processing and analyzing the obtained data will form the basis for the geo-ecological passport of the catchment area of the Osetr river basin.

The conducted study will serve the basis for further lecture course for undergraduate and graduate students of the State University for Land Management in the field of ecology and nature management – ecology of protected areas, environmental tourism, international cooperation in the field of environmental protection, conducted by the Department of Soil Science, Ecology and Nature Management.

Acknowledgments
The reported study was funded by RFBR, project number 20-35-90019

References
[1] Drozdov A V 1998 Ecological tourism in Russia: state, general and regulatory problems, some prospects, in: Tourism and environmental protection in the Russian Arctic Proceedings of the international seminar pp 17-21
[2] Alieva G S 2020 Organization of ecotourism in the economic and geographical area of Gornaya Shirvani and SWOT analysis in specially protected areas Bulletin of Science and Practice 12 61-67
[3] Kulakova L I, Osipov V A 2017 Methodological approaches to assessing the tourist and recreational potential of Russian regions Russian entrepreneurship 24 4261-4272
[4] Mamraeva D G, Tashenova L V 2020 Methodological tools for assessing the tourism and recreational potential of the region Economics of the region 1 127-140
[5] Armand D L 1975 Landscape Science. Fundamentals of theory and logic-mathematical methods (Moscow: Mysl’) 287 p
[6] Kyrov V V, Kyrova S A 2008 Geoeconomic assessment of the recreational and resource potential of urbanized territories (using the example of Abakan) Bulletin of Tomsk State University 315 220-225

[7] Stoyascheva N V, Golovin A V 2020 Assessment of the recreational potential of water bodies in the Burla River Basin Bulletin of Voronezh State University. Series: Geography. Geocology 2 14-21

[8] Lantsova I V 2009 Geoeconomic assessment and rational use of recreational potential of coastal zones of reservoirs: dissertation abstract (Moscow) 54 p

[9] Akhmatov S V 2012 Geoeconomic assessment of the recreational potential of the lakes of the Chuya River basin: dissertation abstract (Tomsk) 23 p

[10] Karelina A A, Samoilov N E 2018 Creation of recreational zones near water bodies on the example of Krasnoyarsk, in: Modern science: theoretical and practical view (Moscow: Pero Publishing House) pp 153-156

[11] Uzdenova A B, Kanametova F E, Galachieva L A 2015 Recreational assessment of water bodies of Kabardino-Balkaria Modern problems of science and education 1 1836-1842

[12] Kokina Yu V 2012 Comprehensive assessment of the recreational potential of the Volga waterway for the development of cruise tourism: dissertation abstract (Moscow) 27 p

[13] Andreeva I V, Tsilikina S V 2017 Water resource potential for the purposes of recreational water use: Introduction to the concept and spatial assessment Water and environmental problems of Siberia and Central Asia: works of the III All-Russian Scientific Conference with international participation, vol 3 pp 3-15

[14] Yurova Y, Shirokova V 2020 Geoeconomic Assessment of Anthropogenic Impacts on the Osetr River Basin Geosciences 10(4) 121-133

[15] Ozerova N A, Kuklina A G 2019 Natural-historical monitoring of the natural monument “Zalesny ravine near the village of Vlasyevo” (Moscow region, Lukhovitsy urban district), in: Geology, geocology, evolutionary. Collective monograph (St. Petersburg: Russian State Pedagogical University named by A.I. Herzen) XVIII pp 262-266

[16] Gelashvili D B, Zinchenko T D, Vykhristyuk L A, Karandashova A A 2002 Integral assessment of the ecological state of water bodies according to hydrochemical and hydrobiological indicators Bulletin of Samara Scientific Center RAS 2 270-275

[17] Gudkovsky M V 2017 Methodology of integrated assessment of tourist and recreational potential Geographical newspaper 1(40) 102-116

[18] Kolbovsky E Yu 2011 Ecological tourism and ecology of tourism (Moscow: Academy) 256 p

[19] Golovatyuk S A, Shirokova V A 2019 Ecological assessment of the suitability of the Osetr River for recreation Natural Resource Management, GIS & Remote Sensing 1 (2) 1-8

[20] Solpina N G 2017 Mapping of the recreational potential of the territory Bulletin of Irkutsk State University. Series: Earth Sciences 22 124-134

[21] Shirokova V A, Shirokov R S, Khutorova A O, Gurov A F, Yurova Y D 2018 Environmental assessment of anthropogenic effects on recreation zones: Osetr river in the Moscow region Proceedings - 2018 Baltic Geodetic Congress, BGC-Geomatics 8453689 181-185

[22] Yurova Yu D 2019 Comprehensive ecological monitoring of the Osetr River, in: Problems of geology and subsoil development (Tomsk: National Research Tomsk Polytechnic University) pp 544-546

[23] Yurova Y D, Shirokova V A 2021 Geoeconomic screening of the state of small and medium-sized river basins to assess the impact of measures for the operation of hydraulic structures IOP Conference Series: Materials Science and Engineering 1103 (1) 012031-012036