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POLE OF INACCESSIBILITY AS POLYGONS FOR THE DEVELOPMENT OF A NATURE-ORIENTED RECREATION SYSTEM IN RUSSIA

Abstract: The concept of the pole of inaccessibility is defined as the point which is situated as far as possible from the boundary objects, which are: operating settlements, year-round roads or railways, the coastline of navigable water bodies, as well as areas with ongoing economic activity with a change in landscape type. The structure of non-populated areas, which can be heterogeneous and have a focus and a periphery, has been studied. 4 levels of uninhabited areas have been identified: local, regional, national-continental and planetary. Uninhabited areas are the testing ground for the development of nature-oriented recreational system (NRS). NRS is a variant of the classical territorial recreational system (TRS) on uninhabited territories, consisting of four subsystems: uninhabited areas, tourists, regulatory authorities and service personnel. In most cases the development of the NRS is carried out without its transformation into the TRS, and it is necessary so that tourists can plan their routes logically and safely, in the most interesting and attractive places.

Key words: pole of inaccessibility, uninhabited area, nature-oriented recreational system, tourism, recreation, natural areas

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Introduction

Uninhabited territories of Russia make up two-thirds of the total territory of the country (Bocharnikov, 2016). There are most suitable for organizing nature-oriented tourism, which is one of the most environmentally friendly forms of nature management. At the same time, the category of tourists who prefers to travel in places with a slightly modified natural environment is increasing and it shows that pristine nature and beautiful views are more important than the comfort that is present in mass tourist travel.

It becomes especially important now, when it is difficult to visit other countries and contributes to an increase in domestic tourism and the development of its nature-oriented forms. At the same time, it is necessary to use geographical approaches in solving the issues of tourism's technology and organization.

In connection with the foregoing, the purpose of the study is determined - to characterize the features of the functioning of tourism processes in uninhabited territories, namely, to study the structure of a nature-oriented recreational system (NRS). It is necessary to solve the following tasks for achieving the goal:

1. Define the term pole of inaccessibility, in terms of the maximum distance from boundary objects.
2. To study the structure and scale of uninhabited areas.
3. Explore the manifestation of the development of a nature-oriented recreational system.

Literature Review

To carry out the study, it is necessary to study the work of authors previously dealing with similar issues. In general, uninhabited territories from the point of view of social geography were studied by a small number of scientists. K.P. Kosmachev explored the possibilities of developing natural areas of the taiga zone (Kosmashov, 1974). S.E. Myshlyavtseva studies the features of the zoning of uninhabited territories for the purpose of active tourism (Myshlyavceva, 2006, 2007). A.I. Zyryanov studies areas of nature-oriented tourism in mountainous areas and the territorial organization of active tourism in the Urals (Zyryanov et al., 2017, Zyryanov & Korolev, 2009). A.A. Safaryan explores tourism processes in mountainous areas (Safaryan, 2015). E.V. Konyshev analyzes the possibilities of scientific expedition tourism (Konyshev & Gerasimov, 2021). D.J. Weiss (Weiss, 2018), A. Nelson (Nelson, 2008), P.L. Ibisch (Ibisch, 2016), M.C. Hansen (Hansen, 2013), J.R. Allan, (Allan, 2017), N. Gorelick (Gorelick, 2017), A.E. Gaughan (Gaughan, 2015), and others study territories unaffected by human influence and determine the accessibility of settlements using GIS technologies.

The study of recreational systems, the concepts of which are now several dozen, is engaged in a larger number of scientists. The concept of a recreational system was developed by V.S. Preobrazhensky, with Yu.A. Vedenin, I.V. Zorin, L.I. Mukhina and other authors (Preobrazhenskiy, 1974) in the 70s of the XX century and was central to all scientific research of recreation.

N.S. Mironenko and I.T. Tverdokhlebov developed the concept of a recreational area (Mironenko & Tverdokhlebov, 1981). Also N.S. Mironenko, together with E.M. Eldarov

developed a geographical adaptation model of the recreational system (Mironenko & Eldarov). L.Yu. Mazhar highlights the tourist and recreational system, in which properties, goals and structure are determined (Mazhar, 2008). C.A. Gunn, in 1979, proposed a "fundamental tourism system" consisting of five subsystems: tourists, transport, attractions, facilities and information management (Gunn, 1979). N. Leiper, justified the tourism system, with four geographical elements: the sending region, the receiving region, the transit territory and the environment (Leiper, 1979). A few decades later, C.M. Hall added tourists and the tourism industry to such a system (Hall, 2005). A. Holden in his model takes into account changes in the environment due to tourism activities (Holden, 2006). R. Butler created a life cycle model of a tourist destination (Butler, 1980). Later, together with T. Hinch, in his new model, he considers in more detail the links between the sending and receiving regions, consisting of tourist flows, information and various resources (Butler & Hinch, 2007). R.C. Mill and A.M. Morrison, in 1985 developed their own model, consisting of 4 subsystems, the most important is the destination subsystem, which includes: attractions, hospitality resources; services, infrastructure and transport (Mill & Morrison, 2009). S.K. Plog refers to one of the main factors in the development of tourist destinations - the psychological characteristics of a larger number of tourists visiting this destination. (Plog, 1991). C.R. Goeldner and J.R.B. Ritchie believe that the main element of the tourism system is the tourist, whose needs are met by the development of tourism services, infrastructure, attractions, etc. (Goeldner & Ritchie, 2009).

Materials and Methods

Until now, the term pole of inaccessibility has meant several points which are the Arctic and Antarctica which are located at the maximum distance from the nearest land or ocean coast. (Stefansson, 1922). In addition, the poles of inaccessibility marked points in the middle of the continents, as far as possible from the coastline. (Garcia-Castellanos & Lombardo, 2007). At the same time, they were not always inaccessible, and sometimes they were located near settlements.

We want to fill this term with a new meaning, namely, to indicate that the pole of inaccessibility is a point located at the maximum distance from boundary objects in a specific geographical area. At the same time, this concept can be used for territories of different scales, and not only for continents.

Boundary objects are: active settlements, year-round roads or railways, the coastline of navigable water bodies, as well as areas with ongoing economic activity with a change in landscape type (agricultural land, industrial zones, landfills, military facilities, etc.) We can say that the pole of inaccessibility as a "geographical centre" is a point equidistant from the borders of the territory under consideration.

This does not mean that the pole of inaccessibility cannot be reached. Most of them have already been visited by people and more than once, even the most remote ones. The term "pole" can be considered in two senses:

1. Pole - as a mathematical concept - a point with geographical coordinates - the centre of the area of unpopulated area, limited by boundary objects.

2. Pole - as a concept of social geography, which may imply the focus of the range and be opposed to the periphery. In this paper, the term "pole" will be used in both senses.

Around the poles of inaccessibility are uninhabited territories. Since they are areal, they can be defined as an area, zone, district or polygon. After analyzing these terms, with the help of the works of E.B. Alaeva (Alaev, 1983), B.B. Rodoman (2002), M.D. Sharygin and V.A. Stolbov (Sharigin & Stolbov, 2007), and a dictionary edited by A.P. Gorkin (Gorkin, 2013), it turns out that most of all, these territories fall under the definition of area.

Inside the uninhabited area there should be no settlements and roads leading to them, agricultural land, etc. The area is determined by the absence of these objects that surround and limit it from different sides.

There may be some infrastructure facilities, incl. reserve cordons, abandoned mines, logging sites, tourist camps, non-residential settlements and roads leading to them, tourist trails, shelters, hunting huts, etc on the territory of uninhabited areas.

Thus, new concept has been defined: an uninhabited area is a territory surrounding the pole of inaccessibility and limited by existing settlements, regularly used transport routes connecting them and areas with ongoing economic activity with a change in landscape type.

The areas of uninhabited are local, regional, national-continental and planetary (Korolev, 2020).

Some areas of uninhabited areas will be structurally heterogeneous or focal. The focus will contain a site with minimal or no signs of economic activity for the area. The focus is a centre that spreads its signs to the surrounding territory, then usually in the pole of inaccessibility there will be their maximum concentration and the centrifugal direction of movement of signs of the absence, or the minimum amount of anthropogenic impact on the natural environment (Korolev, 2022).

The following objects can be distinguished on the territory of uninhabited areas: the pole of inaccessibility, the focus and the periphery. The periphery is the part of the range between the focus and the borders. There are more signs of economic activity and there may be more infrastructure. Usually this area is less attractive in terms of recreation, because the greatest amount of anthropogenic impact occurs here.

The study was made with the help of general scientific and geographical methods and approaches. The general scientific methods include the following:

1. Expeditionary and field research. Initially, many areas of uninhibitedness and poles of inaccessibility, of all scales and on all continents, were passed by the author, and as a result patterns were identified and a holistic picture of the totality of areas of uninhabited Earth was formed. After many years of expeditionary research, desk studies had begun. At the same time the expeditionary method continued to be used to empirically confirm the results of deskwork, clarify patterns and check the summing theoretical calculations and practical developments.
2. A systematic approach helped to study the structure of a nature-oriented recreational system, as an integral complex of interrelated elements.

3. The comparative typological method was used to classify the types of nature-oriented tourism, the levels of uninhabited areas, to study their morphological structure and the variety of nature-oriented tourism routes, etc.

Geographical methods include the following:

1. Centrographic - with its help, the location of the poles of inaccessibility was determined using GIS technologies, while the distance from the boundary objects to the estimated point of the pole of inaccessibility was calculated in the programs SAS-planet, Google Earthe, etc.
2. Geoinformation method. To determine the boundaries of uninhabited areas, satellite images of different territories were studied, with an average spatial resolution (30 m, landsat) from open mapping services.
3. For the study of tourist development, climate, relief, economic activity, boundaries and forms of areas of uninhabited areas, the method of analysing geographical maps was used.

Results and Discussion

Uninhabited areas are a testing ground, where a special type of recreational system is formed, which can be designated as follows - a nature-oriented recreational system (NRS).

In fact, the NRS is a kind of territorial recreational system (TRS) (Preobrazhenskiy, 1974), formed in uninhabited territories. The NRS is a simplified form of the TRS, with a smaller number of subsystems in its composition, with less pronounced relationships, less manageable and with much fewer economic factors of influence and interaction. Thus, the NRS fits into the system of modern concepts of recreational systems, as a simplified scheme of the classical concept of the TRS.

The NRS may have no infrastructure, or minimal infrastructure, in the form of hiking trails or helipads. The name of this system does not contain the term tourism, due to the fact that recreation is a broader concept, and if we take into account micro-level areas, then only one-day activities will be carried out on their territory, which cannot be attributed to tourism, but can be recreation. Also, it does not contain the term territory, due to the fact that in areas of uninhibitedness there may be water bodies where tourist and recreational processes are organized.

The NRS consists of four interconnected subsystems: uninhabited areas, tourists, regulatory authorities and service personnel.

The first subsystem consists of a set of uninhabited areas with different levels, and, accordingly, different types of travel and active recreation carried out on their territory (table 1).

For micro-level areas of uninhabited, this range of distances was chosen because in many regions of the world the length of sections of uninhabited spaces falls exactly within these limits, and there are no more remote and difficult points.

For areas of the mesolevel, such distances are taken because, on the territory of most regions of Russia, there are uninhabited territories along the length with just such a range.

Tab. 1. Levels of poles of inaccessibility and areas of uninhabited and features of their use

	Micro	Meso	Macro	Mega
Scale	Municipal	Regional	National-continental	Planetary
Distance from the pole to boundary objects, km	1-10	10-100	100-500	More 500
Features of activity in the area	Recreation	Active and sports tourism	Sports tourism, expeditions	Expeditions
Approximate duration of recreational activities	1 day, no overnight stay	2 days - several weeks	Several weeks - several months	Several weeks - several months
Frequency of visiting the area	Daily	Holidays and during the best climatic conditions	Rarely	Almost never visited
Visiting area	All over the area	The most attractive places	Outlying and most attractive places	Expedition routes only

Areas of non-population at the macro level are not found in all countries, but are present on all continents. If we study the largest uninhabited areas on all continents, and in some of the largest countries (Russia, Canada, USA, China, Brazil, Australia, etc.), it turns out that from the most remote point to the nearest boundary object there are from 100 up to 500 km. It is this range of sizes of uninhabited territories for macro-level areas that is confirmed by the works of V.N. Bocharnikova (Bocharnikov, 2016).

The largest areas of uninhabited - mega-level, are present only in Greenland and Antarctica. The range of distances from the pole to the boundary objects is more than 500 km. It corresponds to distances from specific poles of inaccessibility.

These conclusions are made on the basis of the study of satellite images of the territory of the Russian Federation and other countries, and the use of GIS technologies.

In some territories, there may be local single areas of uninhabited areas, which will be the first subsystem of the NRS formed in this territory. In less developed and infrastructurally undeveloped territories, there may be several areas of uninhabited nearby, separated by boundary objects and developed spaces (farmlands, settlements, industrial zones, etc.). At the same time, the boundary objects for different neighbouring areas of uninhabited areas can be the same objects, both point, linear and areal. Also, often the entry points to the uninhabited areas (travel area) can be the same settlements, roads or navigable water bodies. In this case, we can talk about a network (complex) of uninhabited areas, which will be a subsystem in the formed of the NRS in a given territory.

Figure 1 shows the structure of the subsystem of uninhabited areas. At the same time, they can be border on each other, but be separated by roads, navigable water bodies and settlements. Farmlands or industrial zones can be located between separated areas of uninhabited areas. Connections between individual areas of uninhabited areas can be carried out both through linear and through point boundary objects. At the same time, being in the same subsystem, their mutual influence is also possible, manifested in the fact that tourist routes usually start from some settlement, and if this settlement is a boundary object for several areas of uninhabited, then we can say that each of them may be a separate tourist microdistrict, because of in active and sports tourism, it is desirable that travel routes are not interrupted by settlements and transport routes.

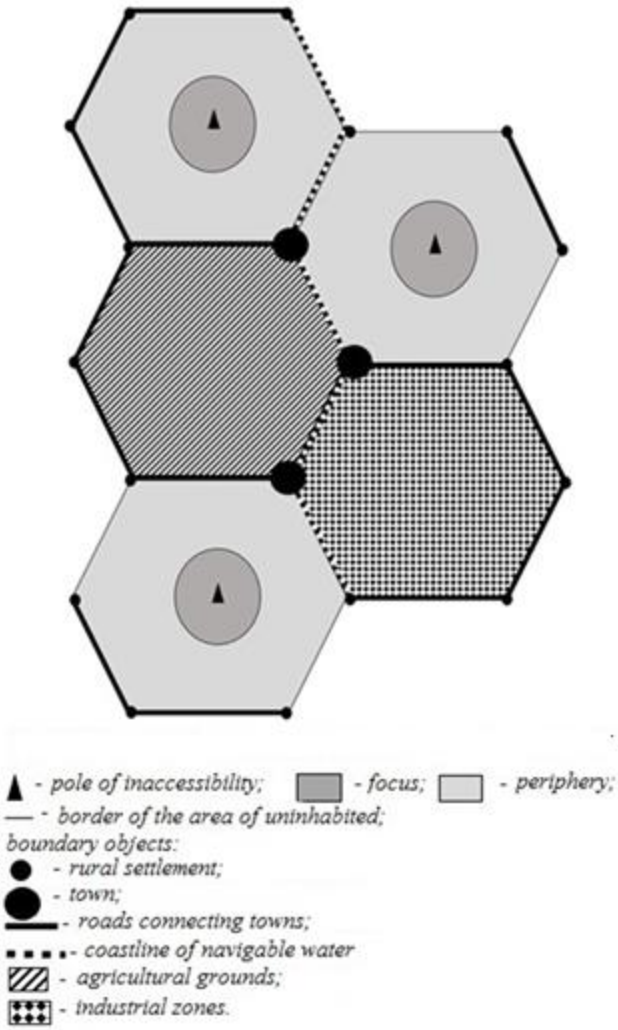

Fig. 1. Scheme of the structure of the subsystem of uninhabited

Therefore, each route will end on the territory of a separated area of uninhabited areas. At the same time, it will be interesting for tourists to visit neighbouring areas of unoccupied areas, during one trip, but on different routes, or over several trips.

The second subsystem includes tourists and recreants. According to the form of organization, they can be independent (they develop a trip on their own, not belonging to any organization), amateur (travel under the auspices of a public organization, and not on a commercial basis) and organized (travel on a commercial basis, along some planned route, developed by the tour operator).

Also, tourists can differ in types of tourism (Fig. 2). We give the author's definition of these types of tourism, in most cases: 1) nature-oriented tourism – includes all types of tourist activities lasting more than one day, carried out in the natural environment; 2) active tourism – is the passage of the route by active means of movement in a slightly

modified natural environment (Myshlyavtseva,2006); 3) sports tourism – is overcoming obstacles in the natural environment with the maximum level of safety, with the organization of competitions and the assignment of sports categories and titles; 4) ecological tourism – is tourism in a slightly modified natural environment with a minimal negative impact on nature; 5) extreme tourism – is a type of tourism in which there is a perceived danger to life and health.

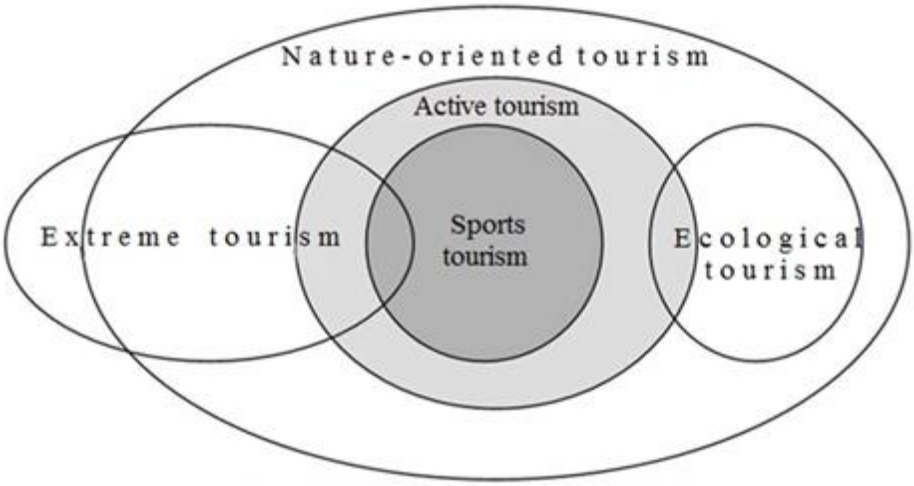

Fig. 2. The ratio of types of nature-oriented tourism

The subsystem of tourists is the main one among the 4 subsystems of the NRS. We can say that the rest of the subsystems are engaged in its "maintenance".

The third subsystem of the RRS includes regulatory authorities: route qualification commissions, search and rescue services, the ministry of emergency situations and sometimes insurance companies. At the same time, regulatory authorities are rarely present directly on the territory of the uninhabited area. They are mainly based in the places of residence of tourists (insurance companies), in the regional centres of the region where the trip is carried out (ministry of emergency situations) or in the regional centres of the uninhabited areas closest to the given area (search and rescue service). Also, search and rescue service units can be based in border settlements - on the outskirts of uninhabited areas. Sometimes in areas with mass tourist visits, and during the high season, search and rescue teams can be temporarily based in the area, in the most popular places for tourists, where travel routes intersect.

The fourth subsystem, which is present in the NRS only in some cases, is the personnel serving tourists, and sometimes the tourist infrastructure.

These are guides, instructors for various types of extreme tourism, employees of protected areas, workers of tourist bases, etc. Tourist infrastructure is present in some cases, when tourists travel through the territory of protected areas or visit tourist camps built on the territory of uninhabited areas.

This subsystem is not mandatory and is not present in all types of nature-oriented tourism. It may not be at all in sports, active and extreme tourism, if tourists organize their trip on their own and not on the territory of protected areas, and do not use the services of

tourist camps. In ecological tourism, it will be mandatory, because this type is carried out on the territory of protected areas, most often with equipped ecological trails.

Figure 3 shows the interaction of four subsystems of the NRS. It is not uncommon for cases when only 2 subsystems participate in recreational activities on the territory of uninhabited areas: the first and second. This occurs when tourists go on a trip on their own, without informing any regulatory authorities, that is, subsystem 3. Accordingly, this trip cannot be carried out on the territory of a protected area equipped with a tourist infrastructure, but only in wild places where the 4th subsystem is not presented.

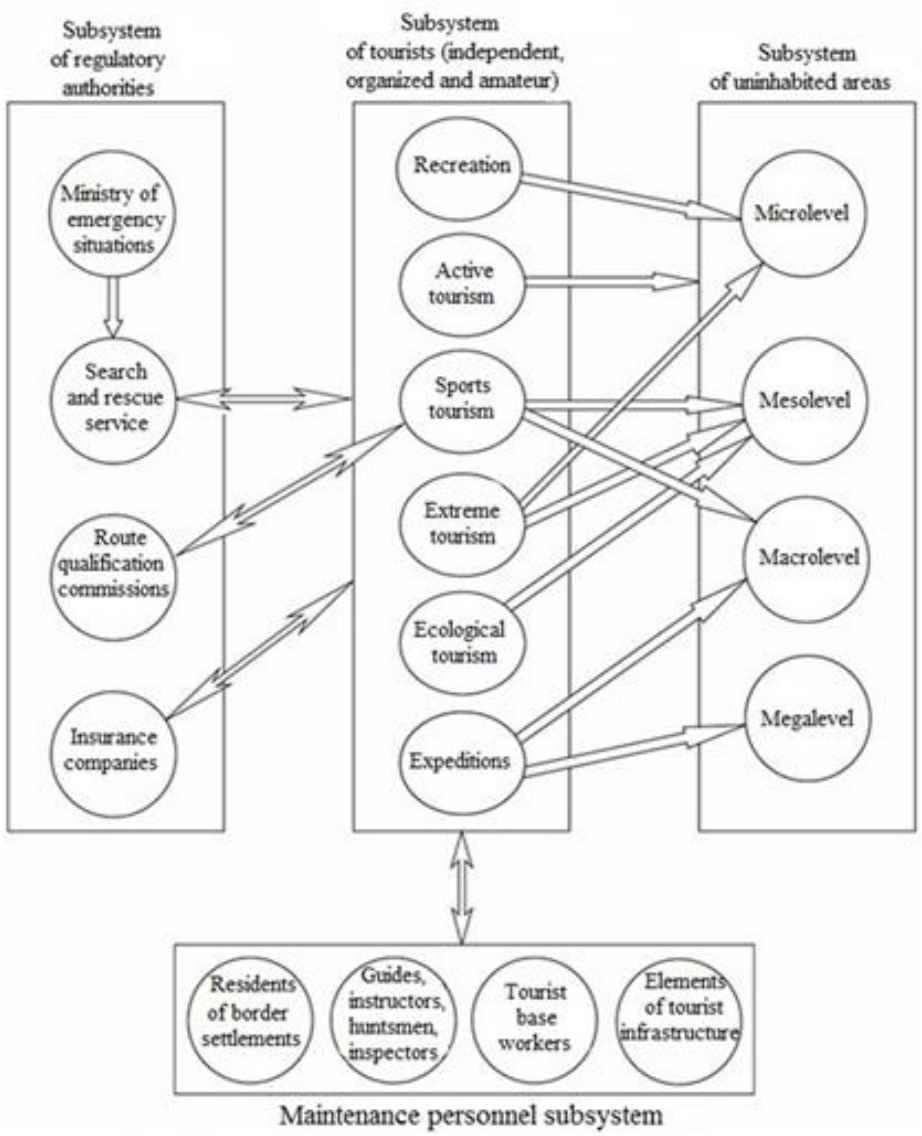

Fig. 3. Interaction of 4 subsystems of a nature-oriented recreational

Conclusion

In some cases, the NRS can eventually transform into a classic TRS if an integrated infrastructure is created on its territory, with a single management and tourism industry enterprises, similar to Yellowstone Park. In most cases, the development of tourism in the NRS will be carried out without its transformation into the TRS.

Development is necessary so that tourists can plan their routes logically and safely, in the most interesting and attractive places. The development of the NRS is manifested as follows:

1. Travel routes through the territory of uninhabited areas are entered into electronic devices and become available to a wide range of tourists.
2. Travel reports are written, especially in sports tourism, which are freely available in various electronic libraries.
3. Separate insignificant elements of tourist infrastructure are being created that allow traveling with greater comfort and safety (spontaneous and organized tourist trails, parking lots, signs, etc.).
4. Classification of local and extended obstacles on tourist routes is carried out, which allows more adequate and safe travel planning.
5. The advisory and controlling function of the route-qualification commission is being strengthened, which also contributes to a safety increase and the organization of more interesting and attractive routes.
6. The breadth and depth of coverage of natural areas by active tourism tour operators is increasing.

With the functioning of the NRS, the negative impact on the natural environment will be minimal with a large positive social effect.

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References

Alaev, E. B. (1983). *Socio-economic geography. Conceptual-terminological dictionary*. Moscow: Thought.

Allan, J. R., Venter, O., Maxwell, S., Bertzky, B., Jones, K., Shi, Y., & Watson, J. (2017). Recent increases in human pressure and forest loss threaten many Natural World Heritage Sites. *Biological Conservation, 206*, 47–55. https://doi.org/10.1016/j.biocon.2016.12.011

Butler, R., & Hinch, T. (2007). *Tourism and Indigenous Peoples: Issues and Implications*. Routledge.

Butler, R. W. (1980). The concept of a tourist area cycle of evolution. *Canadian Geographer, 24*(1), 5-12.

Bocharnikov, V. N. (2016). Wildlife and anthropogenic landscape: integrated experience of geoinformation mapping of the territory of Russia. *Geographical Bulletin, 2*(37), 161-173.

Ellis, E., Goldewijk, K., Siebert, S., Lightman, D., & Ramankutty, N. (2010). Anthropogenic transformation of the biomes, 1700 to 2000. *Global Ecology and Biogeography, 19*, 589-606. https://doi.org/10.1111/j.1466-8238.2010.00540.x

Garcia-Castellanos, D., & Lombardo U. (2007). Poles of inaccessibility: A calculation algorithm for the remotest places on earth. *Scottish Geographical Journal, 3*, 227-233. https://doi.org/10.1080/14702540801897809

Gaughan, A. E., Stevens, F. R., Linard, C., & Jia, P. (2013). High-resolution population distribution maps for Southeast Asia in 2010 and 2015. *PLoS ONE, 8*. https://doi.org/10.1371/journal.pone.0055882

Goeldner, C. R., & Ritchie, J. R. B. (2009). *Tourism: principles, practices, philosophies*. John Wiley & Sons, Inc.

Gorelick, N., Hancher, M., Dixon, M., Ilyshchenko, S., Thau, D., & Moore, R. (2017). Google Earth Engine: planetary-scale geospatial analysis for everyone. *Remote Sensing of Environment, 202*(1), 18–27. https://doi.org/10.1016/j.rse.2017.06.031

Gorkin, A. P. (2013). *Socio-economic geography: concepts and terms*. Oikumena.

Gunn, C. A. (1979). *Tourism Planning*. Crane Russack.

Hall, C. M. (2005). *Tourism, rethinking the social science of mobility*. Prentice-Hall.

Hansen, M. C., Potarov, P. V., Moore, R., Hancher, M., Turbanova, S. A., Tyukavina, A., Thau, D., Stehman, S. V., Goetz, S. J., Loveland, T. R., Kommareddy, A., Egorov, A., Chini, L., Justice, C. O., & Townshend, J. R. G. (2013). High-resolution global maps of 21st-century forest cover change. *Science, 342*(6160), 850–853. 10.1126/science.1244693

Holden, A. (2006). *Tourism Studies and the Social Sciences*. Routledge.

Ibisch, P. L., Hoffmann, M., Kreft, S., Pe'er, G., Kati, V., Biber-Freudenberger, L., Dellasala, D., Vale, M., Hobson, P., & Selva, N. (2016). A global map of roadless areas and their conservation status. *Science, 354*(6318), 1423–1427. 10.1126/science.aaf7166

Konyshev, E.V., & Gerasimov S.V. (2021). Development of scientific expeditionary tourism on the Putorana Plateau. *Uchenyye zapiski Krymskogo federal'nogo universiteta imeni V.I. Vernadskogo. Geography. Geology*, *7*(2), 106-117.

Korolev, A. Yu. (2022). Areas of non-population: structure and functional zoning on the example of the Northern Urals. *Geographic Bulletin, 2*(61), 153-165. https://doi.org/10.17072/2079-7877-2022-2-153-165

Korolev, A. Yu. (2020). Assessment of the natural recreational system in areas of inaccessibility. *News of the Russian Academy of Sciences. Series geographical, 84*(3), 369-383. https://doi.org/10.31857/S2587556620030085

Kosmachev, K.P. (1974). *Pioneer exploration of the taiga*. Institute of Geography of Siberia and the Far East.

Leiper, N. (1979). The framework of tourism: towards a definition of tourism, tourist, and the tourist Industry. *Annals of Tourism Research, 6*(4), 390–407.

Mazhar, L. Yu. (2008). *Territorial tourist and recreational systems*. Universum.

Mill, R. C., & Morrison A. M. (2009). *The Tourism System*. Kendall Hunt Publication.

Mironenko, N. S., & Eldarov, E. M. (1998). Humanitarian aspects of the study of recreational systems. *Bulletin of Moscow University, 5*(1), 22-27.

Mironenko, N. S., & Tverdokhlebov, I. T. (1981). *Recreational geography*. Moscow University.

Myshlyavtseva, S. E. (2007). The network of tourist routes and protected natural areas in the regions of the Urals. *Geographical Bulletin, 2*(1), 193-197.

Myshlyavtseva, S. (2006). Tourist zoning for the purposes of active tourism in the Ural regions. *Geography and tourism, 4*, 178-187.

Nefedova, T. G., & Medvedev, A. A. (2020). Shrinkage of developed space in Central Russia: Population dynamics and land use in rural areas. *News of the Russian Academy of Sciences. Series geographical, 84*(5), 645-659. https://doi.org/10.31857/S258755662005012X

Nelson, A. (2008). *Travel time to major cities: A global map of accessibility*. Global Environment Monitoring Unit-Joint Research Centre of the European Commission.

Preobrazhensky, V. S., Vedenin, Yu. A., Zorin, I. V., & Mukhina, L. I. (1974) Territorial recreational system as an object of studying of geographical sciences. *News of the Russian Academy of Sciences. Series geographical, 2*, 34-42.

Plog, S. C. (1991). *Leisure Travel: Making It a Growth Market … Again!* Wiley, New York.

Rodoman, B. B. (2002). *Polarized biosphere*. Oikumena.

Safaryan, A. A. (2015). Peculiarities of tourist research in the mountainous regions of the world. *Geographic Bulletin, 2*(33), 110–116.

Sharygin, M. D., & Stolbov V. A. (2007). *Introduction to economic and social geography*. Drofa.

Stefansson, V. (1992). The Northward Course of Empire. In L. Robbin, S. Sörlin, & P. Warde (Eds.), *The Future of Nature*. Yale University. https://doi.org/10.12987/9780300188479

Weiss, D. J., Nelson, A., Gibson, H. S., Temperley, W., Peedell, S., Lieber, A., Hancher, M., Poyart, E., Belchior, S., Fullman, N., Mappin, B., Dalrymple, U., Rozier, J., Lucas, T. C. D., Howes, R. E., Tusting, L. S., Kang, S. Y., Cameron, E., Bisanzio, D, Battle, K. E., Bhatt, S., & Gething, P. W. (2015). A global map of travel time to cities to assess inequalities in accessibility in 2015. *Nature, 553,* 333–336. https://doi.org/10.1038/nature25181

Zyryanov, A. I., Korolev, A. Yu., Myshlyavtseva, S. E., & Safaryan, A. A. (2017). Organization of active tourism territories in the Urals. *Modern problems of service and tourism, 3*, 130-141. https://doi.org/10.22412/1995-0411-2017-11-3-130-141

Zyryanov, A. I., & Korolev A. Yu. (2009). Tourist zoning of mountain territories. *Journal of Moscow State University, 6*, 19-25.