GEOECOLOGY

Review article
EDN: PFDPVE
DOI: 10.21285/2686-9993-2025-48-2-146-159

Comparison of geopark management systems and development strategies in China and Russia

Svetlana A. Gantimurova[a]✉, Angelina K. Karaeva[b], Efim A. Slyadnev[c], Yongzhan Zhang[d], Yulan Yan[e], Kailin Wu[f]

[a–c]*Irkutsk National Research Technical University, Irkutsk, Russia*
[d–f]*Nanjing University, Nanjing, China*

Abstract. Geoparks are special areas combining geological and geomorphological features with cultural and environmental components such as geotourism, scientific and educational activities, and local economic development. This research adopts a comparative case study methodology to analyze the management structures, geotourism strategies and conservation outcomes of geoparks in China and Russia, two countries with contrasting political, cultural and environmental contexts. By examining historical trajectories, policy architectures and socio-economic dynamics, the paper identifies systemic similarities, such as the integration of geoparks into UNESCO Global Geopark networks, and key differences, including the centralized, state-led management model in China compared to the decentralized, regionally adaptive approach in Russia. While China's top-down management system delivers rapid infrastructure development and standardized conservation practices, it faces challenges of over-commercialization and environmental fragmentation. In contrast, Russian geoparks benefit from local decision-making but face funding inconsistencies. Comparing the geotourism and geopark systems in China and Russia the paper describes best practices and lessons learned that can be applied to enhance geotourism and conservation efforts in both countries.

Keywords: geotourism, geopark, conservation, Russia, China

For citation: Gantimurova S.A., Karaeva A.K., Slyadnev E.A., Zhang Y., Yan Y., Wu K. Comparison of geopark management systems and development strategies in China and Russia. *Earth sciences and subsoil use.* 2025;48(2):146-159. https://doi.org/10.21285/2686-9993-2025-48-2-146-159. EDN: PFDPVE.

ГЕОЭКОЛОГИЯ

Обзорная статья
УДК 502.4

Сравнение систем управления и стратегий развития геопарков в Китае и России

С.А. Гантимурова[a]✉, А.К. Караева[b], Е.А. Сляднев[c], Ю. Чжан[d], Ю. Янь[e], К. У[f]

[a–c]*Иркутский национальный исследовательский технический университет, Иркутск, Россия*
[d–f]*Нанкинский университет, Нанкин, Китай*

Резюме. Геопарки представляют собой особые территории, на которых геологические и геоморфологические объекты сочетаются с культурными и экологическими компонентами: геотуризмом, научно-просветительской деятельностью и развитием местной экономики. В ходе проведенного исследования был применен метод сравнительного анализа структур управления, стратегий геотуризма и результатов создания геопарков в Китае и России – двух странах с контрастными политическими, культурными и экологическими контекстами. На основе изучения исторических траекторий, политической и социально-экономической динамики в статье определены системные сходства, такие как интеграция геопарков в глобальные сети геопарков ЮНЕСКО, и ключевые различия, включающие централизованную государственную модель управления Китая по сравнению с децентрализованным регионально-адаптивным подходом России. Хотя нисходящая система управления Китая обеспечивает быстрое развитие инфраструктуры и стандартизацию природоохранных методов, она подразумевает наличие таких проблем, как чрезмерная коммерциализация и интенсивная антропогенная нагрузка на окружающую среду. Локализованное принятие решений в России, напротив, подразумевает выгоду в отношении развития геопарков, но в то же время влечет за собой непоследовательность финансирования. В представленной работе на примере сравнения геотуризма и системы геопарков в Китае и России освещен передовой опыт и извлеченные уроки, которые могут быть применены для развития геотуризма и природоохранных систем в обеих странах.

Ключевые слова: геотуризм, геопарк, охрана окружающей среды, Россия, Китай

Для цитирования: Гантимурова С.А., Караваева А.К., Сляднев Е.А., Чжан Ю., Янь Ю., У К. Сравнение систем управления и стратегий развития геопарков в Китае и России // Науки о Земле и недропользование. 2025. Т. 48. № 2. С. 146–159. https://doi.org/10.21285/2686-9993-2025-48-2-146-159. EDN: PFDPVE.

Introduction

Geological and geomorphological features have historically been viewed as less fragile than other environmental values, receiving less attention from conservationists compared to cultural and biological heritage [1]. Geological tourism (geotourism) is a relatively young branch of research. However, with increasing awareness of the importance of preserving geological sites, there is growing interest in promoting geotourism as a sustainable form of tourism that benefits both local communities and the environment.

In some regions, Earth's dynamic processes are so well represented that they function as natural "temples" or open-air museums. These sites are termed geoheritage. The preservation of geoheritage, coupled with its use for scientific education and public engagement, is the core mission of geoparks. The late 20th century saw the emergence of geoparks as a response to the need for integrated conservation strategies that extend beyond traditional protected areas. Unlike national parks or UNESCO World Heritage Sites, geoparks adopt a bottom-up approach, involving local communities in decision-making and emphasizing the interconnectedness of geological, ecological, and cultural assets [2].

The development of geoparks represents a transformative approach to safeguarding geological heritage while fostering sustainable socio-economic growth [3]. For years, people loved visiting geological features such as mountains and caves but did not think they needed saving like forests or historic sites. After all, how fragile can a mountain be? Modern geoparks changed the game. UNESCO stepped in with a simple idea: save these places, teach people about them, and use tourism to boost local economies. Imagine a park where you hike through a canyon and learn how it formed millions of years ago – that is a geopark. Scientists now see that "geodiversity" – the variety of landscapes and rocks – is as vital as biodiversity. Think of it like this: without unique geology, we would not have the ecosystems or cultures we cherish today [1]. Geoparks are designated areas that use geoconservation, education and sustainable tourism to protect geological heritage, raise public awareness of the Earth's history and support local economies through responsible geotourism[1].

There are a number of research concerning the establishment and the maintenance of geoparks in China, as well as some papers describing the concepts of planning and development geoparks on the territory of Russia. However, comparative case studies between the two countries remain scarce. The authors argue that such analyses could yield valuable insights into understanding geotourism and conservation practices on an international scale.

China commences ground-breaking initiatives to incorporate sustainable development with geological conservation in response to UNESCO's establishment of the Global Geoparks Network in the early 2000s [4]. First national geopark in China – Zhangjiajie Sandstone Peak Forest Geopark, was established in 2001 in response to the global movement towards geoconservation and the country's recognition of its exceptional geological heritage [5]. Over the years, the geopark concept gained momentum, supported by government policies that linked geological conservation to regional economic growth [6]. By 2020, China had established more than 200 national geoparks and 41 UNESCO Global Geoparks, cementing its position as a global leader in this field[1] [7].

In Russia, the history of the emergence of geoparks began with the development of environmental protection activities and geology. However, Russia followed the path of creating national parks and specially protected natural areas, as in the United States, where geoparks still do not exist. With the creation of the Geological Committee in 1882, a systematic study of the geological structure of the country's territory began. During the work of the committee, discoveries of unique geological objects were made, geological maps

[1] UNESCO global geoparks. *En.unesco.org.* Available from: https://en.unesco.org/global-geoparks [Accessed 22th April 2025].

were created, and geological surveys were conducted to detect mineral deposits. However, in Soviet times, priority was given to the economic development of the state, geological exploration and mining prevailed over environmental protection. It was only in the second half of the 20th century, with the growth of environmental awareness and the development of international programs such as the UNESCO Geoparks network, that ideas about the creation of protected geological areas began to take shape in Russia. The turning point was the post-Soviet period, when in the 1990s Russia faced the need to rethink approaches to natural resource management. In the 2000s, the country began to integrate into international initiatives. The first significant step was the inclusion of the Yangan-Tau Geopark in Bashkortostan in the UNESCO Global Geoparks Network in 2017. This event was the result of many years of work by local authorities, scientists, and the Russian Geographical Society, who have been promoting the idea of preserving geological heritage since the late 1990s[2].

The organisation of geoparks in Russia took place in stages and depended on the interaction of the state, the scientific community, and local initiatives. The process began with the identification of unique geological objects. The All-Russian Research Geological Institute played a key role by systematising data on almost 3,000 geological natural monuments. For example, in Bashkortostan, the Yangan-Tau Geopark was established around such sites as the Mechetlino open-pit mine and Mount Yangan-Tau, which are of international significance. The establishment of a geopark required not only a scientific justification but also a sustainable development plan. In the case of Yangan-Tau, the regional branch of the Russian Geographical Society was actively involved in defining the boundaries and preparing the application to UNESCO.

However, in Russia this process has its own characteristics, historical background and challenges. Based on the analysis of available information, key moments in the history of the creation of geoparks in Russia, as well as problems associated with their organization and regulation, are highlighted. The purpose of given research is to analyse and synthesize similarities and differences across the two countries geological tourism and conservation systems.

Materials and methods

Data were analysed through two primary sources: policy documents (national and regional legislation, UNESCO reports, and geopark management plans) and field observations collected during site visits to UNESCO-designated geoparks in South China, focusing on infrastructure and conservation practices.

This study uses a comparative case study design [8] to analyse the development and management of geoparks in China and Russia. A qualitative comparative analysis approach is particularly suited to systematically explore the contextual factors and sociocultural dynamics that influence geopark management, allow researchers to identify similarities and differences in institutional structures, stakeholder engagement, and conservation strategies across the two countries.

Comparative analysis is to highlight that distinctions in cultural and historical values, public engagement and policy implementation among studied countries affect nature conservation approaches and geopark system development. For instance, China's emphasis on harmony between humans and nature contrasts with Russia's focus on scientific rigor inherited from Soviet-era practices [9]. Cases were selected based on their designation as UNESCO Global Geoparks, ensuring alignment with international standards.

Results and discussion

Authors examined geoparks of southeastern China that were visited during the field trip in November 2024.

Changxing Geopark. Changxing Geopark in China contains sections that have been designated as Global Stratotype Section and Point. This location is of particular significance because it marks the global boundary between the Permian and Triassic periods, also known as the "Great Dying", which occurred about 252 million years ago [10]. Visitors can see the Permian zone, composed of dolomites and mudstones, and the Triassic zone, composed of limestones (Fig. 1). This boundary not only marks the transition between two geological periods, but also separates

[2] Russian National Committee for International Geoscience Programme (IGCP). *Igcpc.ru.* Available from: http://igcpc.ru [Accessed 22th April 2025] / Российский комитет Международной программы ЮНЕСКО по геонаукам и геопаркам. Часть 4. Международная программа по геонаукам (МПГК) // Igcpc.ru. Режим доступа: http://igcpc.ru (дата обращения: 22 апреля 2025).

Fig. 1. Permian-Triassic boundary on the territory of the Changxing Geopark (photo by authors)
Рис. 1. Граница перми и триаса на территории геопарка Чансин (фото авторов)

the Paleozoic from the Mesozoic. This region contains well-preserved stratigraphic layers that contain critical information about the climate and environmental conditions of the ancient Earth[3]. The geopark serves as a research base for geologists and paleontologists. Various studies are conducted here, aimed at studying paleoclimatic changes, ancient ecosystems and extinction dynamics. The territory is represented by a park zone, which allows for the effective demonstration of unique geological features. It includes information stands (Fig. 2), exhibition spaces that help to study and improve the understanding of the significance of geological processes of the population to increase public awareness and interest.

Qiyun Mountains National Geological Park. The Qiyun Mountains National Geological Park, located in Huangshan City, Anhui Province, is a natural and cultural heritage site.

This park is famous for its unique Danxia geomorphology type found in China (Fig. 3). Red sandstones and conglomerates mainly of Cretaceous age form the Danxia relief. The relief is very similar to karst relief, which is formed in areas underlain by limestone, but since the rocks that form Danxia are sandstones and conglomer-

Fig. 2. Information stand on the territory of the Changxing Geopark (photo by authors)
Рис. 2. Информационный стенд на территории геопарка Чансин (фото авторов)

[3] China has received two more “Golden nails”. *Ammonit.ru.* Available from: https://www.ammonit.ru/new/686.htm [Accessed 22th April 2025] / Китай получил еще два «золотых гвоздя» // Ammonit.ru. Режим доступа: https://www.ammonit.ru/new/686.htm (дата обращения: 22 апреля 2025).

ates, they are called “pseudokarst” reliefs. They were formed by endogenous (including uplift) and exogenous forces (including weathering and erosion). The geopark has developed infrastructure for tourists, including trails, observation platforms and information stands. The park is of particular interest for the study of geology.

Huangshan World Geopark. Huangshan World Geopark is located in Huangshan City, Anhui Province, China. The park is famous for its granite terrain with sharp peaks. In 1990, this area was included in the list of UNESCO natural sites. The main geological characteristic of this area is granite formations formed from magma solidified underground millions of years ago [11]. The Huangshan Mountains show the effects of tectonic movements that contribute to the formation of the mountain range and pronounced fault structures (Fig. 4).

The relief of Huangshan was formed largely under the influence of erosion and weathering processes acting on granite formations. In addition, the main geomorphological characteristics were formed in the Pleistocene and are due to the action of glaciers. These processes contribute to the formation of characteristic geological structures. The study of these processes is of considerable scientific interest. Despite the remoteness of the territory, the geopark has a well-developed infrastructure. There are designed walking trails with recreation areas, as well as lifts, which makes tourism in this area easy and accessible (Fig. 5).

Luhe Geological Park. Luhe Geological Park, located in Luhe County of Guangdong Province, China, is a significant geological and natural heritage site.

The volcanic group in the Luhe area of Nanjing is very dense, there are as many as 25 large and small volcanoes, and the ancient Guizishan volcano is one of them, and the eruption time is the Pliocene of the Neogene (5 million years ago),

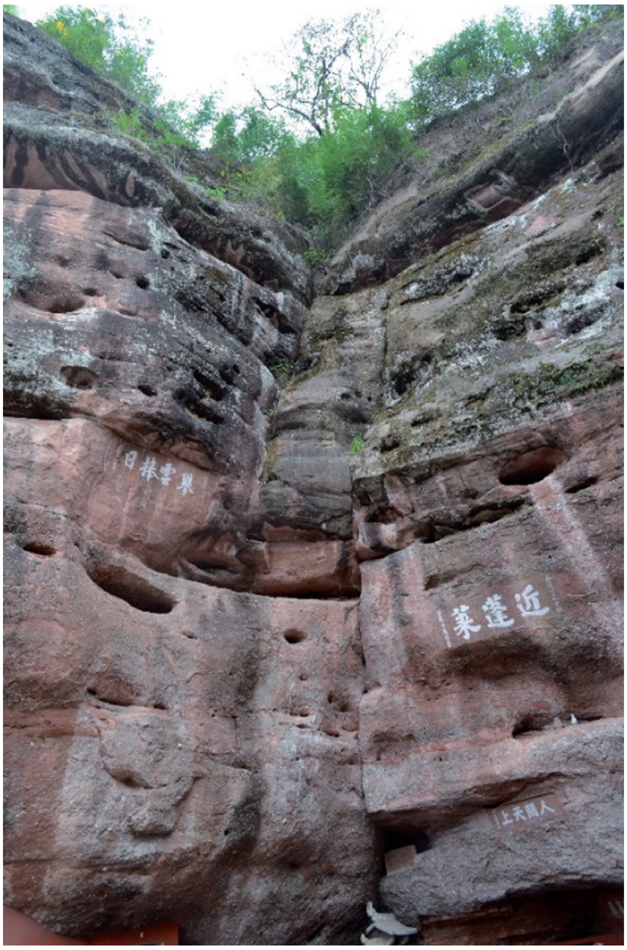

Fig. 3. Danxia relief of the Qiyun Mountains National Geological Park (photo by authors)
Рис. 3. Рельеф Данься в геопарке Горы Циюнь (фото авторов)

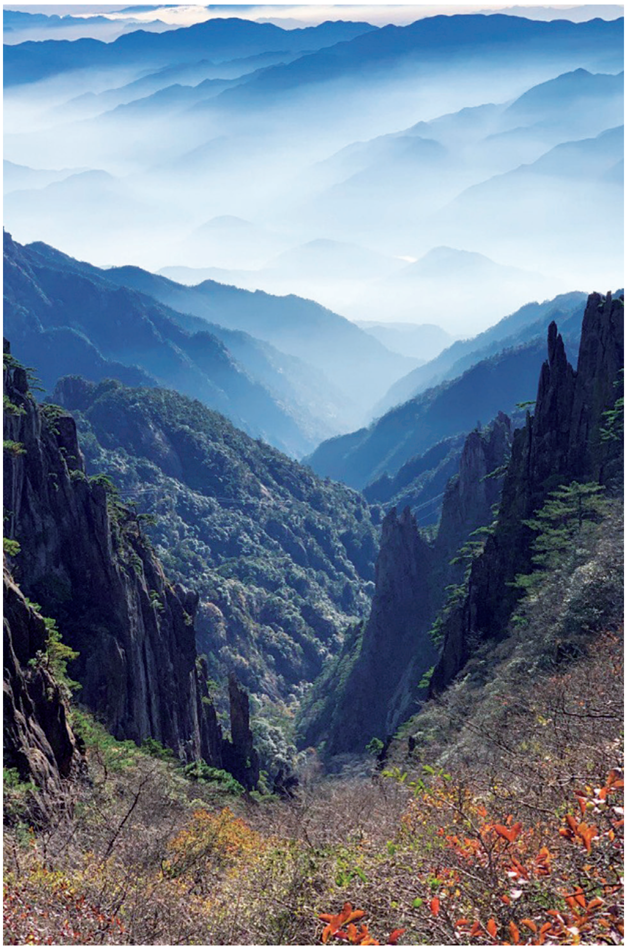

Fig. 4. Fault structures of the Huangshan UNESCO Global Geopark (photo by authors)
Рис. 4. Структуры разломов в геопарке Хуаншань (фото авторов)

Fig. 5. Hiking trail to the peak of the Huangshan UNESCO Global Geopark (photo by authors)
Рис. 5. Пешеходная тропа к вершине в геопарке Хуаншань (фото авторов)

at the same time, the most powerful subduction movements occurred. The heat release during the eruption was uneven, so the structure was formed columnar and fan-shaped; the basalt columns have regular pentagonal and hexagonal shapes (Fig. 6). The park is equipped with trails and observation decks.

In the Russian Federation, the development of geotourism lags behind global trends, being, like ecotourism, at the initial stage of development. There are five geoparks on the territory of Russia: "Altai", "Baltic-Ladoga Clint", "Toratau", "Undoria" and UNESCO Global Geopark "Yangan-Tau".

Toratau Geopark. The Toratau Geopark is located at the junction of the southern Ural Mountains and the eastern edge of the East European Platform, in the Republic of Bashkortostan. The territory is rich in unique geological objects. It is a candidate for inclusion in the UNESCO Global Geoparks network. The territory of the Geopark includes the Usolka and Dalniy Tyulkas geological sections, the only "Golden nails" in Russia. These sections serve as an international standard for describing similar sections in other countries.

In 2019, the International Commission officially recognized the Usolka section on Stratigraphy as the first "Golden nail" of the International Stratigraphic Chart in Russia. The standard of the Sakmarian stage of the Permian system of the ISS, an additional standard (paralimitotype) of the Asselian stage of the Permian, a candidate for the "Golden nails" of the Gzhelian stage and one of the best sections of the lower boundary of the Kasimov stage of the Carboniferous in the world. Scientists have proven that these rocks were formed 294 million years ago, and can now serve as a standard when describing similar objects in other regions and countries. The Usolka geological section is composed of terrigenous-carbonate rocks with interlayers of volcanic tuffs and numerous skeletal remains of various animals[4].

The Dalniy Tyulkas section is represented by a powerful series of terrigenous-carbonate rocks (siltstones, sandstones, limestones) of the Sakmarian and Artinskian stages of the Permian with interlayers of volcanic tuffs (Fig. 7)[5].

Yangan-Tau Geopark. Yangan-Tau Geopark, the first UNESCO Global Geopark in Russia

[4] Tourist guide to Bashkortostan. *Visit-bashkortostan.ru.* Available from: https://visit-bashkortostan.ru [Accessed 22th April 2025] / Туристический путеводитель по Башкортостану // Visit-bashkortostan.ru. Режим доступа: https://visit-bashkortostan.ru (дата обращения: 22 апреля 2025).

[5] Geopark "Toratau". *Geopark-toratau.ru.* Available from: https://geopark-toratau.ru [Accessed 22th April 2025] / Геопарк «Торатау» // Geopark-toratau.ru. Режим доступа: https://geopark-toratau.ru (дата обращения: 22 апреля 2025).

Fig. 6. Luhe Geopark columnar fault formed as a result of a volcanic eruption (photo by authors)
Рис. 6. Столбчатый разлом в геопарке Лухэ, образовавшийся в результате извержения вулкана (фото авторов)

(designated in 2017), is renowned for its extraordinary geological and cultural heritage (Fig. 8). At its heart lies Mount Yangan-Tau, a rare "warm mountain" where natural thermal vents release steam and gases up to 150 °C, caused by exothermic reactions in Permian-era bituminous limestone – a phenomenon unique to Eurasia [12]. The park also preserves Devonian fossilized coral reefs (380 million years old) and the globally significant Mechetlino Section, which

Fig. 7. Dalniy Tyulkas geological section in the Toratau Geopark as a standard ("golden nail") of the lower boundary of the Artinskian stage of the Permian system of the International Stratigraphic Chart[6]
Рис. 7. Геологический разрез Дальний Тюлькас в геопарке Торатау – эталон ("золотой гвоздь") нижней границы артинского яруса пермской системы Международной стратиграфической карты[6]

[6] Usolka geological section. *Visit-bashkortostan.ru.* Available from: https://visit-bashkortostan.ru/geologicheskiy-razrez-usolka [Accessed 22th April 2025] / Геологический разрез Усолка // Visit-bashkortostan.ru. Режим доступа: https://visit-bashkortostan.ru/geologicheskiy-razrez-usolka (дата обращения: 22 апреля 2025).

reveals critical layers from the Permian-Triassic mass extinction. Culturally, the mountain holds sacred status for the indigenous Bashkir people, who associate its warmth with spiritual forces, while nearby Bronze Age burial mounds and medieval settlements reflect millennia of human-nature interaction. The geopark pioneers sustainable geotourism through educational trails (e. g., "Path of Ancient Seas") and collaborates with local Bashkir communities, who lead tours sharing traditional ecological knowledge[7].

Main advantages of geopark governance in China are centralized coordination and strategic integration. China's geopark governance framework is distinguished by its top-down model, which has facilitated rapid institutionalization and standardized conservation practices [13]. "The top tier is the National Forestry and Grassland Administration, the second is the provincial Department of Forestry and Grassland, the third is the municipal people's government of Forestry and Grassland, the fourth is the geopark administrative committee, and the fifth is the geopark management bureau, which is responsible for geoparks. The government has a crucial role in decision-making and management of the geoparks, which is most likely, the main difference between Chinese geoparks and any other geopark in the world" [14]. The integration of geoparks into national ecological civilization policies and UNESCO Global Geopark networks has enabled cohesive resource allocation and regulatory enforcement. For instance, the Zhangjiajie UNESCO Global Geopark exemplifies China's success in leveraging centralized governance to balance tourism development with geological preservation, supported by strict zoning regulations and state-funded infrastructure [14]. The government's emphasis on "ecological red lines" – legally binding boundaries to protect critical habitats – has further strengthened conservation outcomes [15]. Additionally, China's ability to synergize geoparks with cultural heritage, such as the Huangshan Geopark, which intertwines geological wonders with UNESCO World Heritage status, underscores its holistic approach to geotourism. Stakeholder collaboration between central ministries, local governments, and academic institutions has also fostered innovation in geo-education and community engagement.

Fig. 8. Yangan-Tau Geopark scenic area[8]
Рис. 8. Живописный район геопарка Янган-Тау[8]

[7] Yangan-Tau UNESCO Global Geopark. *Globalgeopark.org.* Available from: http://www.globalgeopark.org/GeoparkMap/geoparks/Russian [Accessed 22th April 2025].

[8] 7th BSEC month of culture. *Icbss.org.* Available from: https://icbss.org/event/monuments-russia-2023 [Accessed 22th April 2025].

The main challenge in geopark development is balancing growth and sustainability. That means ensuring that geoparks not only thrive economically but also preserve their unique geological and cultural heritage [13]. Despite progress, China's geoparks face persistent issues, including over-commercialization, environmental degradation, and uneven regional development. Early phases of geopark expansion prioritised economic gains, leading to issues like overcrowding and habitat fragmentation in sites such as the Shilin Stone Forest Geopark, where unregulated tourism imperils karst ecosystems [16]. Furthermore, overlapping administrative jurisdictions – such as conflicts between forestry, tourism, and environmental agencies – have occasionally resulted in fragmented governance. As a result, overall progress in environmental conservation may be significantly hampered [17].

Russian geoparks creation was associated with the global UNESCO initiative to develop a network of geoparks, launched in 1998. However, in Russia this process has its own characteristics and historical background. Initially, Russia followed the path of creating national parks, like the United States, where geoparks do not exist to this day. The UNESCO International Geosciences and Geoparks Programme was adopted at the 38th session of the UNESCO General Conference in November 2015. To coordinate Russia's activities in creating geoparks, by order of the Minister of Foreign Affairs of the Russian Federation S.V. Lavrov on April 25, 2018 approved the Russian Committee of the UNESCO International Geosciences and Geoparks Programme under the Commission of the Russian Federation for UNESCO, under the Earth Sciences Department of the Russian Academy of Sciences[2]. Then, in parallel with the policy of national parks, geoparks began to be created.

Russia faced numerous challenges, beginning with financial constraints. At the initial stages, projects relied heavily on state support, but post-Soviet budgetary cuts to geology – such as reductions of 5–6 times in Yakutia – severely limited opportunities for development. Compounding this was the lack of a clear legislative framework: geoparks lacked a defined legal status as protected areas, unlike national parks or nature reserves, which hindered effective management and protection. Competition with subsoil use further complicated efforts, as geologically valuable areas often overlapped with resource extraction sites. For instance, in 2010, the Ministry of Economic Development raised concerns that establishing entities like Rosgeology could disrupt competition in the subsoil sector. Additionally, Russia lagged behind China in expertise and awareness, lacking specialists in geotourism and sustainable development, which had been actively cultivated elsewhere since the 2000s.

After geoparks were established, new challenges emerged. Management and control became fragmented due to the absence of a centralized governing body, forcing responsibility onto local authorities with limited resources – unlike centralized systems in China. Financial self-sufficiency also proved difficult, as transitioning from state funding to tourism-driven revenue was hampered by underdeveloped geotourism and ineffective marketing strategies, leaving many geoparks financially unsustainable. Balancing preservation and use remained contentious, with excessive tourism posing risks to fragile geological sites, a problem noted globally. Finally, despite participation in UNESCO programs, Russia's limited integration into international networks hindered knowledge and resource exchange, restricting the growth of new geoparks.

According to the article by E.V. Luneva, there are four ways of geoparks organization in Russia [18]. The first way is its recognition as a tourist and recreational zone, within the boundaries of which specially protected natural areas (SPNA) are located with the preservation of their legal regime, as well as other natural, cultural and recreational objects. According to this type, the Altai Geopark was created in 2015. The second way of geopark organization is a geopark without the legal regime of a tourist and recreational zone and without the legal regime of a SPNA, when SPNA, geological and other natural objects, cultural heritage objects, etc. are located within its boundaries. The Yangan-Tau Geopark was created according to this model based on the order of the Government of the Republic of Bashkortostan on July 10, 2020, at the 209th session of the UNESCO Executive Board, the Yangan-Tau Geopark received the status of a UNESCO Global Geopark[7]. The third way is a geopark with the legal status of a protected area in the form of a state paleontological, mineralogical or geological reserve. This is currently the case with the Undoria regional geopark, which was created in 2018 [19].

The fourth type of organization of geopark, possible within the framework of the current legislation, is a geopark as an independent category of protected area, introduced by regional regulatory legal acts. In order to eliminate legal uncertainty, to normatively consolidate the legal regime of such a category of protected area as a geopark, on September 22, 2022, the State Assembly of the Republic of Bashkortostan adopted the Law of the Republic of Bashkortostan "On Geoparks in the Republic of Bashkortostan". The draft Law of the Republic of Bashkortostan on Geoparks establishes the concept of "geopark", regulates the procedure for creating geoparks in the Republic of Bashkortostan and approving their boundaries, defines the main tasks and areas of activity for the development of geoparks, and also provides for the implementation of state support for the development of geoparks and their management.

In many countries, geoparks are part of protected areas and are their structural units. The Russian law on protected areas does not provide for such a category as a geopark, but allows for the organization of "other" nature conservation categories. In order to expand the network of geoparks in Russia, changes are needed in the regulatory framework in terms of defining the concept of a "geopark" as a special territory [20].

The notable gap in geopark numbers between China and Russia arises from a mix of factors, including geological resources, government approaches, economic conditions, and cultural perspectives. By tying geoparks to national economic plans, China has funded infrastructure, marketing, and local training, transforming sites into popular destinations that balance tourism revenue with heritage preservation. Russia, despite its vast landscapes and unique features like Yangan-Tau's thermal mountain or critical fossil sites, faces hurdles. Remote areas like Siberia deal with extreme climates and limited access, making large-scale tourism difficult to sustain.

Policy priorities further widen this gap. China's centralized strategy integrates geoparks into broader goals for sustainable growth, backed by UNESCO partnerships that boost global recognition and funding. Russia, however, has traditionally focused on strict nature reserves, prioritizing ecological protection over geotourism. Bureaucratic challenges and fragmented governance – holdovers from the Soviet era – often side-line local communities, clashing with UNESCO's emphasis on grassroots involvement. Culturally, China's philosophical traditions, which emphasize harmony with nature, align neatly with geopark ideals, fuelling public interest through schools and media. Russia's conservation efforts, while scientifically rigorous, tend to overlook public engagement, leaving initiatives like Yangan-Tau's thermal tours niche and academic.

Economically, China's targeted investments in rural tourism – roads, visitor centres, digital campaigns – draw millions of visitors to its geoparks, creating jobs for local citizens and revitalizing regions. Russia's underfunded tourism sector, especially in remote areas, faces challenges due to seasonal closures and sparse infrastructure. Limited accessibility and a lack of touristic facilities allow only small groups of people to visit some nature sites, mostly for scientific purposes.

Conclusion

The main goal of the Global Geoparks program is to create a model of sustainable economic development of the territory based on the use of geological objects of international significance in their direct connection with nature, culture and other aspects of people's lives.

With a balanced combination of conservation, community engagement, and education, China's creative approach to geotourism and geopark development offers valuable insights. The primary goal is to preserve distinctive geological and geographical features, such as fossil sites and karst landscapes, which are explored and proven to attract geotourists. This strategy is strengthened by active community involvement, especially locals, in decision-making and economic activities development. By combining science, tradition and innovation, China's model demonstrates how geoparks can thrive as dynamic spaces.

Russian geoparks have deep historical roots dating back to the early days of geological science, but their development as organized entities are relatively recent, driven by international trends. The main challenges – lack of funding, weak legislation, conflict with subsoil use, and management difficulties – are holding back the process. However, the success of Yangan-Tau and interest in new projects such as Toratau demonstrate Russia's potential in this area. Overcoming these challenges requires a unified government policy, active involvement of the scientific community, and the development of geotourism as an economically sustainable model. Today Russia is at an early stage of forming its geopark network, and the future depends on how these challenges are addressed.

References

1. Farsani N.T., Coelho C.O.A., Costa C.M.M., Amrikazemi A. Geo-knowledge management and geoconservation via geoparks and geotourism. *Geoheritage*. 2014;6:185-192. https://doi.org/10.1007/s12371-014-0099-7 .

2. Mc Keever P.J., Zouros N., Patzak M., Weber J. The UNESCO global network of national geoparks. In: Newsome D., Dowling R.K. (eds). *Geotourism: the tourism of geology and landscape*. Oxford: Goodfellow Publishers; 2010, p. 221-230. https://doi.org/10.23912/978-1-906884-09-3-1071.

3. Ha P.V., Van T.T., Tin Q.D., Hieu H.H., Tuan N.D., Hung N.Q. Geoheritage values of the Dong Van Karst Plateau Geopark: a quantitative geomorphological and topographic analysis. *Bulletin of the Geological Society of Malaysia*. 2013;59:13-17. https://doi.org/10.7186/bgsm59201303.

4. Zouros N. The European geoparks network. Geological heritage protection and local development. *Episodes*. 2004;27(3):165-171. https://doi.org/10.18814/epiiugs/2004/v27i3/002.

5. Chen A., Lu Y., Ng Y.C.Y. *The principles of geotourism*. Berlin: Springer; 2015, 264 p. https://doi.org/10.1007/978-3-662-46697-1.

6. Wang L., Tian M., Wang L. Geodiversity, geoconservation and geotourism in Hong Kong Global Geopark of China. *Proceedings of the Geologists' Association*. 2015;126(3):426-437. https://doi.org/10.1016/j.pgeola.2015.02.006.

7. Gou G.R., Fang W., Cheung L.T.O., Fok L., Chow A.S.Y., Zhang K. Understanding the determinants of geologically responsible behaviour among geotourists: a multi-destination analysis. *Tourism and Hospitality*. 2024;5(1):1-15. https://doi.org/10.3390/tourhosp5010001.

8. George A.L., Bennett A. Case studies and theory development in the social sciences. In: Arjona A., Pearlman W. (eds). *Perspectives on politics*. American Political Science Association; 2007, vol. 5, iss. 1, p. 187-188. https://doi.org/10.1017/S1537592707070491.

9. Fassoulas C., Mouriki D., Dimitriou-Nikolakis P., Iliopoulos G. Quantitative assessment of geotopes as an effective tool for geoheritage management. *Geoheritage*. 2012;4:177-193. https://doi.org/10.1007/s12371-011-0046-9.

10. Yin H., Zhang K., Tong J., Yang Z., Wu S. The global stratotype section and point (GSSP) of the Permian-Triassic boundary. *Episodes.* 2001;24(2):102-114. https://doi.org/10.18814/epiiugs/2001/v24i2/004.

11. Chu Y. Utilization and protection of the world heritage – mixed property in Huangshan mount. *Applied and Computational Engineering*. 2023;3(1):356-361. https://doi.org/10.54254/2755-2721/3/20230548.

12. Farkhutdinov I.M., Farkhutdinov A.M., Ismagilov R.A. Geological structure of the Yangan-Tau geopark. *Vestnik Bashkirskogo universiteta*. 2018;23(4):1128-1138. (In Russ.). EDN: YUXOJN.

13. Zhuang A., Stoffelen A., Meijles E., Groote P. The complex governance of protected areas: insights from geoheritage and geopark management in China. *Environmental Policy and Governance*. 2024;34(6):679-690. https://doi.org/10.1002/eet.2118.

14. Xu K., Wu W. Geoparks and geotourism in China: a sustainable approach to geoheritage conservation and local development – a review. *Land*. 2022;11(9):1493. https://doi.org/10.3390/land11091493.

15. Xu X., Tan Y., Yang G., Barnett J. China's ambitious ecological red lines. *Land Use Policy*. 2018;79:447-451. https://doi.org/10.1016/j.landusepol.2018.08.037.

16. Wu L., Zhang Y., Wang P., Li B., Ye Q., Peng W., et al. Karst geoheritage of the red stone forest in the Xiangxi UNESCO Global Geopark: chromogenic factors, microgeomorphology and dissolution behaviour. *Geoheritage*. 2024;16:18. https://doi.org/10.1007/s12371-024-00917-1.

17. He S. The role of communities in the governance of China's national parks and the consolidation and development of their role. *Journal of Natural Resources.* 2024;39:2310. https://doi.org/10.31497/zrzyxb.20241004.

18. Luneva E.V. Organization of geoparks in Russia and peculiarities of their legal regime. *Lex Russica*. 2021;74(9):32-43. (In Russ.). https://doi.org/10.17803/1729-5920.2021.178.9.032-043. EDN: JQMKUX.

19. Semiletkin S.A. UNESCO global geoparks as a driver of tourism development in the mountain territories of the CIS countries. *Dialogue: politics, law, economics*. 2024;1:112-116. (In Russ.). EDN: QOZJGJ.

20. Arutyunyan M.S., Kurbanov D.A., Samigullin R.M. To the issue of normative regulation of the legal regime of geoparks in Russia. *The Rule of Law State: Theory and Practice*. 2023;19(3):120-130. (In Russ.). https://doi.org/10.33184/pravgos-2023.3.13. EDN: SHBRTE.

Список источников

1. Farsani N.T., Coelho C.O.A., Costa C.M.M., Amrikazemi A. Geo-knowledge management and geoconservation via geoparks and geotourism // Geoheritage. 2014. Vol. 6. P. 185–192. https://doi.org/10.1007/s12371-014-0099-7.

2. Mc Keever P.J., Zouros N., Patzak M., Weber J. The UNESCO global network of national geoparks // Geotourism: the tourism of geology and landscape / eds D. Newsome, R.K. Dowling. Oxford: Goodfellow Publishers, 2010. P. 221–230. https://doi.org/10.23912/978-1-906884-09-3-1071.

3. Ha P.V., Van T.T., Tin Q.D., Hieu H.H., Tuan N.D., Hung N.Q. Geoheritage values of the Dong Van Karst Plateau Geopark: a quantitative geomorphological and topographic analysis // Bulletin of the Geological Society of Malaysia. 2013. Vol. 59. P. 13–17. https://doi.org/10.7186/bgsm59201303.

4. Zouros N. The European geoparks network. Geological heritage protection and local development // Episodes. 2004. Vol. 27. Iss. 3. P. 165–171. https://doi.org/10.18814/epiiugs/2004/v27i3/002.

5. Chen A., Lu Y., Ng Y.C.Y. The principles of geotourism. Berlin: Springer, 2015. 264 p. https://doi.org/10.1007/978-3-662-46697-1.

6. Wang L., Tian M., Wang L. Geodiversity, geoconservation and geotourism in Hong Kong Global Geopark of China // Proceedings of the Geologists' Association. 2015. Vol. 126. Iss. 3. P. 426–437. https://doi.org/10.1016/j.pgeola.2015.02.006.

7. Gou G.R., Fang W., Cheung L.T.O., Fok L., Chow A.S.Y., Zhang K. Understanding the determinants of geologically responsible behaviour among geotourists: a multi-destination analysis // Tourism and Hospitality. 2024. Vol. 5. Iss. 1. P. 1–15. https://doi.org/10.3390/tourhosp5010001.

8. George A.L., Bennett A. Case studies and theory development in the social sciences // Perspectives on politics / eds A. Arjona, W. Pearlman. American Political Science Association, 2007. Vol. 5. Iss. 1. P. 187–188. https://doi.org/10.1017/S1537592707070491.

9. Fassoulas C., Mouriki D., Dimitriou-Nikolakis P., Iliopoulos G. Quantitative assessment of geotopes as an effective tool for geoheritage management // Geoheritage. 2012. Vol. 4. P. 177–193. https://doi.org/10.1007/s12371-011-0046-9.

10. Yin H., Zhang K., Tong J., Yang Z., Wu S. The global stratotype section and point (GSSP) of the Permian-Triassic boundary // Episodes. 2001. Vol. 24. Iss. 2. P. 102–114. https://doi.org/10.18814/epiiugs/2001/v24i2/004.

11. Chu Y. Utilization and protection of the world heritage – mixed property in Huangshan mount // Applied and Computational Engineering. 2023. Vol. 3. Iss. 1. P. 356–361. https://doi.org/10.54254/2755-2721/3/20230548.

12. Фархутдинов И.М., Фархутдинов А.М., Исмагилов Р.А. Геологическое строение геопарка Янган-Тау // Вестник Башкирского университета. 2018. Т. 23. № 4. С. 1128–1138. EDN: YUXOJN.

13. Zhuang A., Stoffelen A., Meijles E., Groote P. The complex governance of protected areas: insights from geoheritage and geopark management in China // Environmental Policy and Governance. 2024. Vol. 34. Iss. 6. P. 679–690. https://doi.org/10.1002/eet.2118.

14. Xu K., Wu W. Geoparks and geotourism in China: a sustainable approach to geoheritage conservation and local development – a review // Land. 2022. Vol. 11. Iss. 9. P. 1493. https://doi.org/10.3390/land11091493.

15. Xu X., Tan Y., Yang G., Barnett J. China's ambitious ecological red lines // Land Use Policy. 2018. Vol. 79. P. 447–451. https://doi.org/10.1016/j.landusepol.2018.08.037.

16. Wu L., Zhang Y., Wang P., Li B., Ye Q., Peng W., et al. Karst geoheritage of the red stone forest in the Xiangxi UNESCO Global Geopark: chromogenic factors, microgeomorphology and dissolution behaviour // Geoheritage. 2024. Vol. 16. P. 18. https://doi.org/10.1007/s12371-024-00917-1.

17. He S. The role of communities in the governance of China's national parks and the consolidation and development of their role // Journal of Natural Resources. 2024. Vol. 39. P. 2310. https://doi.org/10.31497/zrzyxb.20241004.

18. Лунева Е.В. Организация геопарков в России и особенности их правового режима // Lex Russica. 2021. Т. 74. № 9. С. 32–43. https://doi.org/10.17803/1729-5920.2021.178.9.032-043. EDN: JQMKUX.

19. Семилеткин С.А. Глобальные геопарки ЮНЕСКО как драйвер развития туризма на горных территориях стран СНГ // Диалог: политика, право, экономика. 2024. № 1. С. 112–116. EDN: QOZJGJ.

20. Арутюнян М.С., Курбанов Д.А., Самигуллин Р.С. К вопросу о нормативном закреплении правового режима геопарков в России // Правовое государство: теория и практика. 2023. Т. 19. № 3. С. 120–130. https://doi.org/10.33184/pravgos-2023.3.13. EDN: SHBRTE.

Information about the authors / Информация об авторах

Svetlana A. Gantimurova,
Junior Researcher of the Geoinformatics Department,
Siberian School of Geosciences,
Irkutsk National Research Technical University,
Irkutsk, Russia,
✉ lanagant@geo.istu.edu
https://orcid.org/0009-0005-5978-7869
Гантимурова Светлана Анатольевна,
младший научный сотрудник департамента геоинформатики,
институт «Сибирская школа геонаук»,
Иркутский национальный исследовательский технический университет,
г. Иркутск, Россия,
✉ lanagant@geo.istu.edu
https://orcid.org/0009-0005-5978-7869

Angelina K. Karaeva,
Student,
Siberian School of Geosciences,
Irkutsk National Research Technical University,
Irkutsk, Russia,
linakaraeva@mail.ru
https://orcid.org/0009-0005-0944-2723

Караева Ангелина Константиновна,
студент,
институт «Сибирская школа геонаук»,
Иркутский национальный исследовательский технический университет,
г. Иркутск, Россия,
linakaraeva@mail.ru
https://orcid.org/0009-0005-0944-2723

Efim A. Slyadnev,
Student,
Siberian School of Geosciences,
Irkutsk National Research Technical University,
Irkutsk, Russia,
effm228550@mail.ru
https://orcid.org/0009-0006-8809-8277
Сляднев Ефим Артемович,
студент,
институт «Сибирская школа геонаук»,
Иркутский национальный исследовательский технический университет,
г. Иркутск, Россия,
effm228550@mail.ru
https://orcid.org/0009-0006-8809-8277

Yongzhan Zhang,
Ph.D., Professor,
School of Geography & Ocean Science,
Nanjing University,
Nanjing, China,
zhangyzh@nju.edu.cn
https://orcid.org/0000-0003-1118-8697
Чжан Юнчжань,
доктор наук, профессор,
Школа географии и океанологии,
Нанкинский университет,
г. Нанкин, Китай,
zhangyzh@nju.edu.cn
https://orcid.org/0000-0003-1118-8697

Yulan Yan,
Student,
School of Geography & Ocean Science,
Nanjing University,
Nanjing, China.
Янь Юйлань,
студент,
Школа географии и океанологии,
Нанкинский университет,
г. Нанкин, Китай.

Kailin Wu,
Student,
School of Geography & Ocean Science,
Nanjing University,
Nanjing, China.
У Кайлинь,
студент,
Школа географии и океанологии,
Нанкинский университет,
г. Нанкин, Китай.

Contribution of the authors / Вклад авторов

Svetlana A. Gantimurova – conceptualization, methodology, investigation, writing – original draft, writing – editing.
Angelina K. Karaeva – investigation, writing – original draft, visualization.
Efim A. Slyadnev – investigation, writing – original draft.
Yongzhan Zhang – data curation, project administration, resources.
Yulan Yan – investigation.
Kailin Wu – investigation.
С.А. Гантимурова – разработка концепции, разработка методологии, проведение исследования, написание черновика рукописи, редактирование рукописи.
А.К. Караева – проведение исследования, написание черновика рукописи, визуализация.
Е.А. Сляднев – проведение исследования, написание черновика рукописи.
Ю. Чжан – курирование данных, административное руководство исследовательским проектом, предоставление ресурсов.
Ю. Янь – проведение исследования.
К. У – проведение исследования.

Conflict of interests / Конфликт интересов

The authors declare no conflicts of interests.
Авторы заявляют об отсутствии конфликта интересов.

The final manuscript has been read and approved by all the co-authors.
Все авторы прочитали и одобрили окончательный вариант рукописи.

Information about the article / Информация о статье

The article was submitted 30.04.2025; approved after reviewing 30.05.2025; accepted for publication 19.06.2025.
Статья поступила в редакцию 30.04.2025; одобрена после рецензирования 30.05.2025; принята к публикации 19.06.2025.