INNOVATIVE TECHNOLOGIES TO IMPROVE TOURISM EXPERIENCE IN NATIONAL PARKS: DEVELOPMENT OF GIS MAPS AND THEIR VALUE

Aigerim AMANGELDI[*]
L.N. Gumilyov Eurasian National University, Tourism Department, Astana, Kazakhstan, e-mail: aig.amangeldi@gmail.com

Darken SEIDUALIN
L.N. Gumilyov Eurasian National University, Tourism Department, Astana, Kazakhstan, e-mail: darken68@mail.ru

Aidar MUKANOV
L.N. Gumilyov Eurasian National University, Tourism Department, Astana, Kazakhstan, e-mail: aidar81hamzauli@mail.ru

Rabiga MUKATOVA
Maqsut Narikbayev University, School of Liberal Arts, Astana, Kazakhstan, e-mail: rabigushka@gmail.com

Temirlan BILISBEKOV
Institute of Geography and Water Safety, Laboratory of Geotourism and Geomorphology, Almaty, Kazakhstan,
e-mail: blisbekovtemirlan@gmail.com

Yerzhan SAGATBAYEV
Astana International University, Higher School of Natural Sciences; L.N. Gumilyov Eurasian National University,
Faculty of Natural Sciences, Astana, Kazakhstan, e-mail: sagatbaeve@mail.ru

Abstract: This article describes Ulytau National Park, its natural features, and unique attractions. The goal of this study is to create a favorable environment for using innovative technologies to discover historical sites and improve the tourism experience. It is necessary to focus on creating more sustainable and innovative solutions by considering the changing demands and expectations of tourists. This helps to improve the quality of services, develop more efficient tourist routes, meet the needs of eco-friendly tourism, and promote sustainable development in this sphere. In this case, GIS methodology provides a useful and systematic approach to work with geodata for decision-making, analysis, and visualization of spatial information. Using GIS maps in ecotourism contributes to creating more optimal and exciting routes, improving infrastructure, and providing more informative services for tourists. The integration of GIS technologies in tourism management not only enhances visitor experiences but also supports effective resource planning and environmental conservation within the national park. The study analysis provides recommendations for public and private organizations and travel agencies on using GIS technologies to achieve sustainable development in ecotourism. Constructed GIS maps give information about the park's territory, the location of main objects and routes, which improves the awareness and orientation of tourists. The study highlights the importance of integrating GIS technologies with strategic planning, infrastructure development, and continuous monitoring to enhance the effectiveness of tourist routes and promote sustainable regional tourism. By applying cluster analysis, the study identified optimal routes and facilitated more efficient management of tourist flows. Additionally, GIS maps created during the study contribute to improved accessibility, providing tourists with up-to-date information on attractions, routes, and services. The findings demonstrate that GIS-based solutions can optimize the overall tourism experience, leading to more sustainable tourism practices and better resource management. The research showed that integrating data from multiple sources, including GPS devices and satellite images, allows for accurate mapping and route planning. This experience reveals new perspectives in tourist navigation, discovery, and obtaining information about historical sites and main tourist attractions.

Keywords: specially protected natural parks, tourist routes, GIS-map, cultural and historical objects, Ulytau, interactive technologies

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INTRODUCTION

Nowadays tourism is considered as one of the dynamically developed spheres of economy, which contributes to create new working areas, attract investments, and improve quality of local citizens' lives. The tourism industry growth requires constant improvement and innovations, moreover, sets new challenges for countries and recreational areas (Khan et al., 2020, Zharkenova et al., 2023). The use of modern technologies in the field of geoinformation systems (GIS) is considered as one of the key aspects of innovative tourism development. Particularly, the creation of GIS maps plays a vital role in improving the tourist experience and integrating national parks into world tourism (Johnson, 1990). Geoinformation systems are powerful tools for analyzing, presenting, and processing spatial data. This article uses GIS to monitor and develop tourist routes in Ulytau National Park. Exploring the area and its attractions is crucial. GIS

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[*] Corresponding author

played a decisive role in the spatial analysis and development of the proposed maps. By analyzing spatial data, these maps can be used to develop different types of tourism, including ecological tourism.

Ecotourism focuses on sustainability, minimizing the negative impacts on the environment and creating positive interactions between tourism, nature, and culture. Additionally, ecotourism strives to maintain a balance between meeting the needs of tourists and preserving valuable natural resources for future generations (Björk, 2000). In the future, separate ecological maps will be developed using GIS. In this case, sustainable and environmentally responsible tourism, which is based on the use of innovative technologies and GIS maps development, can contribute to the conservation of natural and cultural resources of the region and helps to create favorable conditions for tourism experiences.

Because of that, a new state national natural park named "Ulytau" was opened in Ulytau region in 2021. All lands of the state forest fund of the Ulytau district included in the State Administration were transferred to the category of lands of specially protected natural areas: Ulytau's land (20.911 thousand hectares), Arganat's land (33.358 thousand hectares) and three forest blocks located in south of the existing reserve with a total area of about 4.647 thousand hectares. Thus, the area of the national park is about 58.912 thousand hectares. The main goal of this study is to attract tourists to Ulytau region by creating strategic development programs for tourism in the Ulytau Natural Park, design tourist routes maps and navigation applications, as well as cooperation between government agencies, local authorities and communities, ecological organizations, and commercial structures to create a sustainable tourism industry.

On the territory of Ulytau district there are more than 700 historical monuments, 282 of them are included in the historical and cultural map of the Ulytau museum fund. Such historical monuments as Zhoshy Khan (XII century), Alasha Khan, Dombauyl, Baskamyr, Ayakkamyr, dating back to the VIII-XIII centuries BC, Altynshoky (XII century), Khan Ordasy (XV century), Erden, Edyge, Khan Ordasy, mausoleum of Sandybay have global significance. Every year, more than 30 thousand people with tourism and pilgrimage purposes visit Ulytau's main historical and holy places.

Nowadays historical and cultural sites of the region are under the management and protection of the national historical-cultural and natural reserve-museum "Ulytau," which practically coordinates all types of tourism activities in the territory of the Ulytau natural park. Furthermore, the strategic program for the development of ecotourism with an emphasis on unique sacred, natural, and cultural sites is gradually beginning to be implemented in Ulytau Nature Reserve. For the further development of ecotourism in the analyzed region, there was specially opened the Ulytau Visit Center, which provides information about tourist services, individual and group tours, expeditions, excursions, and organizes cultural and entertainment programs. Ulytau Visit Center is a complex facility that includes an administrative building with an area of 926.5 m2 and a dormitory with a gallery of 570.9 m2. The administrative building design includes two floors, including various functional areas: foyer, information rooms, conference room, lecture hall, catering equipment, and laundry. The dormitory has living rooms with a bathroom and shower. In addition, there have been created a guide and map-scheme based on Google Maps with a description of sacred places for Ulytau region. The Google Earth system has been supplemented with the first time photographed from the air 3D models of Ulytau historical and cultural monuments. Mount Akmeshit in Ulytau was included in the list of 100 national sacred sites in Kazakhstan (Shuptar, 2016). Mapping plays a significant role in the development and promotion of ecotourism routes in modern conditions (Thecla & Odum, 2014). This allows to facilitate the work of travel agencies, which provide services and organize tours in open nature, also significantly increases the awareness of tourists about the travel area. In this study, the authors attempt to answer the following questions:

- what is the role of GIS technology and mapping in designing ecotourism routes?
- what elements of the territory can be mapped for ecotourism development?
- how is it possible to build ecotourism routes in the locality by considering the algorithm of tourist behavior and the features of existing objects on the ground?

To answer the questions above, the main characteristics of the Ulytau State National Natural Park and features of attractive objects within the park's boundaries were studied from ecotourism point of view.

Analysis of literary sources shows the possibilities of using GIS technology, especially when compiling thematic maps of various natures. The purpose of this work is to develop a tourist route using the GIS program, taking into account the features of the natural national park. The main characteristics of the Ulytau State National Natural Park, as well as the features of attractive objects within the park for the development of ecological tourism, are necessary to develop ecological routes. During the study, four routes were created, and all routes were tested taking into account the passage and time and historical and cultural sites were indicated. The route was developed using the ArcGIS program to develop tourist routes in the studied territory, we applied the methodology of using map compilation.

LITERATURE REVIEW

Ecotourism and nature conservation are closely related and are considered as the important concepts in the field of environmental protection. The development of tourism in the region, especially of the ecotourism, has a good perspective (Sagatbayev et al., 2019). Ecotourism is represented itself by the visit to natural areas with the aim of not only enjoying their beauty, but also of bringing benefits to the population and the environment. The interconnection between ecotourism and the nature is dynamic and one of the relevant subjects of debates in theory and practice. Ecotourism contributes to education and culture in nature conservation, attracts ecotourists and stimulates local economic development (Ghoddousi, et al., 2018). It can change people's attitudes and behavior towards nature protection and can help countries to reduce their dependence on natural resources. In some countries it is assumed that ecotourism is one neoliberal conservation tools, which provides opportunities for local participation in decision-making and benefit-sharing process. Local communities can develop businesses to preserve the environment and develop a green economy.

Tourism is considered to be one of the most active and important industry in many countries and plays a vital role by contributing to the economy of many developing countries (Akbar et al., 2020). Tourism is a socio-economic activity associated with a specific space where tourism events and activities are provided. In this context, maps become a valuable tool for various stakeholders, including tourists, managers, route planners, economic indicators analysts and others. Maps play a key role in navigation, planning and providing information related to various purposes of tourism.

Literary research sources of lakes of Western, Northern, and Central Kazakhstan are analyzed. The study area has excellent opportunities for the development of certain types of tourism (Azbantayeva et al., 2022).

Travelers often rely on maps to navigate their travels and plan routes. GIS plays a significant role in satisfaction increasing needs for reliable and accurate data for transportation models and forecast. Due to the constant expansion and intensive dynamic development of cities, the ability of a person to control changes in the environment has decreased (Issakov et al., 2022). GIS allows tourists to create and display spatial data on a map, integrate different layers of information and provide convenient tools in analyzing and decision-making processes. Because of that travelers receive up-to-date information about main tourist attractions, geographic features, accommodation, and other crucial factors needed in planning routes and trips. Mobile GIS applications help, which allow you to quickly navigate and navigate the terrain of unfamiliar places, and contain complete, accurate, geo – information about geographical, tourist and local lore objects (Issakov et al., 2022). Thus, GIS plays a key role in ensuring the accuracy and efficiency of navigation and travel planning.

Google Earth Map and Flash version are the most popular tools with elevated level of interactivity, which gives users the opportunity to cooperate with geographic information. Google Earth provides a 3D model of the Earth with access to satellite imagery, maps, and 3D city models. The Flash version allows users to create and view animated and interactive maps. These tools help tourists to better understand and comprehend geographic information more effectively, providing more vivid and visual representations of places and objects (Hanyoung & Ulrike, 2010). They play a vital role in creating more interactive and memorable visual images for a deeper understanding of location and space.

Nowadays tourists are mostly relying on interactive technologies in the process of planning the trips. Interactive interaction is a key moment in tourism, and information technology plays a key role in the development of this industry. Technologies make it possible to meet the needs of tourists and service providers, demonstrate the high quality of tourism products (Bilgihan et al., 2014). Using information technology simplifies the interaction between tourist attractions managers and tourists, create convenient opportunities for exchanging information and satisfy the needs of tourists.

Brokou et al. (2021) considered GIS as an interactive platform that meets the information needs of tourists. Tourists widely use online GIS maps to find the location of tourist sites, calculate distances, and navigation. GIS plays a key role in tourism management by providing data collection, storage, processing, and spatial analysis functions [Wei, 2012]. Using the functionality of contemporary instrumental GIS and interpretation algorithms, the indicators of productivity of geosystems and anthropogenic transformation are determined (Sagatbayev et al., 2019). As an integral means of transformation, spatial information maps help destination managers to provide detailed information and map-based guides based on cartographic objects (Eboy, 2017). Creating informative and meaningful tourist maps is challenging for cartographers. Salomão Graça & Fiori (2015) emphasized that, planning maps are developed by tourism management organizations, while guide maps are used for tourist navigation. One of the relevant problems is the static nature of the maps, their absence of reflection on the local characteristics and potential of tourist destinations. Tourists do not have enough information about the local community, cultural heritage protection and tourism development. Maps of remote regions do not provide sufficient information about landscapes and natural objects. According to Ghorbanzadeh et al. (2019), mapping should be informative, accessible, and understandable to ensure better interaction and understanding among tourists. Tourist maps are often created without the input of cartographers and are based on subjective preferences. Furthermore, many tourist maps are not critically evaluated and evaluated based on cartographic principles. The lack of a professional view of cartographers can affect the content and quality of the map (Boers & Cottrell, 2007).

Finally, maps can be useful tools for tourists. Tourist geo sites are landscapes or places on Earth that have historical, natural, or cultural significance and becoming increasingly interesting for tourists (Achmad et al., 2020). Geo sites may include geological formations, archaeological finds, natural landmarks, cultural monuments, or architectural sites. Tourists visit geo sites to explore unique natural and cultural aspects, gain educational or aesthetic satisfaction, and deepen connections with local traditions and history (Krishna et al., 2016). The development of special geo sites for tourists usually involves creating information panels, tourist routes and conducting excursions for educational and entertaining experiences.

Geo-data and GIS in tourism can be used to create interactive maps of tourist destinations, route planning, analyze tourism infrastructure, forecast demand for tourism services and manage tourism resources.

Wulung et al. (2020) identified that due to GIS and geodata, it is possible to create intelligent solutions and information systems that ensure effective management and development of tourism. Geological and geomorphological sites stimulate the development of ecological and cultural tourism, attract tourists from different countries and contribute to the development of local communities. One potential tourist attraction that has not been effectively managed is the Benteng Alla in Enrekang District, South Sulawesi. Bulan (2021) considers that the area has not been responsibly managed, and the local community is unable to provide sufficient information about its history and geological aspects. In this regard visitors cannot fully understand or interpret the features of the landscape.

The development of the Benteng Alla geosite as a tourist destination is conducted by visualizing the landscape of the area and describing its socio-cultural objects (Parent, 2020). Ethnographic mapping is used in the geosite designing process, which allows to collect spatial (maps) and textual (descriptions) information. Ethnographic mapping represents the places where the activities and locations of individuals or groups are located (Wainwright & Bryan, 2009).

According to Tripathi et al. (2010), it plays a key role in the study of geographical areas and provides current information about changes in social structure, networks, and social demography. Ethnographic mapping is important for studying geographic areas and providing the latest information about social change and the society demographics (Oliver-Velez et al., 2002). Conversely, it has been found that millennials tend to prefer travel with cultural experiences (Xu et al., 2022). Millennials represent a massive portion of the business travel. They are mostly interested in authenticity, self-development, and sustainability (Sofronov, 2018). In compliance with Pramono et al. (2020), millennials were born into the digital age and always rely on internal technology in every aspect of their lives. Travel enhancement comes from visiting various local attractions. Millennials seek cultural immersion and want to experience local features with specific information about available tourist attractions (Ershad & Ali, 2020). Regarding this, there are needed visualization and deeper information support for travel planning. The main emphasis in researching the Ulytau Natural Park was on developing tourist routes maps of cultural, historical, natural sites, mining, and metallurgical sites of the 5th century BC, when metallurgical production began to develop in Kazakhstan. The study of geographical and ethnographic objects made it possible to imagine the space and specify tourist destinations more clearly. Jovanovic & Njeguš (2008) presented GIS in their article as a management and marketing planning system in tourism and examined the benefits and potential of using GIS to improve tourism operations and decision making. Additionally, the article describes the collection and analysis of spatial data, visualization techniques, and tools used to manage and optimize tourism resources.

Considering the economic, social, and environmental requirements of sustainable development, decision-making in tourism development and planning is becoming an increasingly complex study. GIS can be used as a powerful tool to achieve this sustainability. GIS allows to explore spatial data, assess impacts, and model different scenarios. They help to analyze conflicts, make decisions, and integrate sustainable development principles into planning tourism projects. More accurate environmental impact assessments and access to integrated data tools improve the planning process. The process of using GIS in tourism continues to evolve, particularly in the UK, where tourism organizations are making considerable progress in integrating GIS and sustainable development (Bahaire et al., 1999). One of the directions for developing GIS capabilities in decision support is the integration of maps with multi-criteria decision models.

Jankowski et al. (2001) proposed new prototype spatial decision support tools that highlight the role of maps as a source of structure in multi-criteria spatial decision problems. In these tools, the role of the map goes beyond simply displaying the geographic decision space and the results of multi-criteria assessment. Maps become a "visual index" through which the user organizes decision options, assigns priorities to decision criteria, and enriches the criterion result space with heuristic knowledge derived from the map. As an additional means of structuring multi-criteria spatial decision problems, an experimental use of intelligent data analysis can be presented to reduce problem dimensionality in integrated form with dynamic maps and multi-criteria decision models. It is necessary to outline the future research directions that focus on supporting map-based group decision making.

Chu et al. (2011) presented a study describing the process of development and implementation of this system. They provided information in creating a convenient and efficient platform which allows tourists to access information about sites and services through mobile devices using GIS and GPS technologies. Furthermore, their article gave details of developed system, as well as the results of its application and an assessment of its effectiveness in providing tourism services.

Today, the development of a green economy - a new form of economy that considers the needs of the market, and is based on traditional industry and strives to achieve harmony between economic goals and environmental protection, has become an important challenge for society. Green economy development is a key factor to achieve sustainable and ecologically responsible development and ensure well-being for a long-term period.

Chen (2023) discussed various aspects of tourism impact on residents, who live in natural parks areas, and possibilities of improving their quality of life. However, the author notes that issues of tourism quality are rarely discussed, and ecotourism in these areas does not receive sufficient attention due to the lack of ways to develop and protect the environment. Finally, the author calls for further research and development of ecotourism in these areas in accordance with the principles of green economy to achieve sustainable development and environmental protection.

Clifton & Benson (2006) identified the challenges of planning sustainable ecotourism in developing countries. In this case limited industry development, the impact of political events, matching ecotourism with the local environment, and the motivations of exploratory ecotourists were considered as main aspects of the study. These results have important implications for planning and management in the tourism industry. Fatemeh et al. (2020) explored the assessment of ecotourism development using the FUZZY-OWA scenario approach and combined methods such as renewable linguistic quantifier (RLQ), fuzzy logic and environmental factors. They investigated applying an integrated approach to determine optimal ecotourism development strategies and make informed decisions that promote sustainable development and ecotourism benefits. Based on the findings, it can be concluded that the OWA method has enormous potential for modeling complex decision-making problems due to a new concept in this method called "order weights."

Sintayehu & Raminder (2020) examined the relationship between ecotourism and biodiversity conservation in Bale Gebele National Park, Ethiopia. The results showed that while ecotourism development and conservation may be conceptually positively linked, in practice conflicts arise due to issues such as lack of awareness and education, limited community participation, uneven distribution of benefits and costs, lack of sustainable financing and ecological concerns. Urgent policy intervention is required to address these issues and realize sustainable development of ecotourism and nature conservation.

Fadillah et al. (2021) reviewed ecotourism literature over the last five years (2015-2020) from the Scopus database by using the PRISMA report framework to explain the selection process. The study identified that ecotourism promotes environmental protection, generates economic growth, and conserves natural resources without harming flora and fauna.

Additionally, it was described a growing trend of ecotourism, which can be effectively promoted through social networks and innovative technologies to achieve environmental sustainability. Aldi & Heidi (2021) concluded that the question of whether sustainable tourism is necessary for the local community raises a variety of views in the context of a study in the Koomodo Nature Reserve in Indonesia. This indicates the complexity and multifaceted nature of the problem in this region. A critical analysis of the transition to an ecotourism-based economy has identified several failures in achieving sustainable development goals. However, further research and collaboration among various stakeholders are key aspects in addressing this issue positively and developing effective tourism policies that consider multiple views and interests.

Roque et al. (2021) noted that there is a lack of researchers and managers who participate in the integration of tourism and ecosystem services into the environmental planning process in Brasilia. This limitation leads to insufficient development of this theme. In addition, the lack of adequate ecological planning poses a risk to developing countries, which are subject to severe environmental and demographic pressures. Incorporating an ecosystem services perspective into planning is particularly important because it highlights the importance of natural resource conservation for local economic development, which is an integral part of sustainable development.

Oh et al. (2019) demonstrated the importance of developing tourist routes and identified three main factors influencing visitor satisfaction and behavior: the quality of the proposed tourist routes, the provision of information and landmarks, and the availability of services such as campsites, cottages, and picnic areas. The development of tourist routes requires costs for their creation and maintenance, information support, management, and land resources.

Aliyeva et al. (2019) applied the approaches of arithmetic (calculated) and multivariate regression modeling of the integral efficiency of tourism, the results showed that allow the approach to be transferred and applied to other regions of Kazakhstan. In the article, GIS technology was used in the development of maps for compiling a tourist cluster.

Duan et al. (2024) found that the critical areas of ecosystem service functioning, ecological vulnerability, and ecosystem integrity exhibited cross-border contiguity characteristics. In addition, the spatial distribution pattern of priority conservation areas in the Altai Mountains was revealed through weighted overlap analysis. Zhensikbayeva et al. (2024) conducted that the results of the study propose specialized and multi-thematic routes connecting the main natural and cultural attractions of the main recreation areas for international and domestic tourists, as well as for educational and educational field programs and research trips. The study of the territorial and recreational potential of a mountainous region has its characteristics, since, compared with plain territories, its knowledge is insufficient. Analysis of literary sources shows the possibilities of using GIS technology, especially when compiling thematic maps of various natures. When developing tourist routes in the studied territory, we applied the methodology of using map compilation.

METHODOLOGY

The research group sets the following objectives:

- creation and development of geospatial maps that contain information about the territory, location of attractions, routes, infrastructure. GIS maps can be presented in various scales and formats, their goal is to provide accessible and visual information for tourists and specialists;

- determining the most suitable routes for travelers, considering several factors such as nature, attractions, level of difficulty and accessibility. Creating routes that satisfy the needs and preferences of tourists in the best way, as well as control and manage tourist flows;

- using GIS tools to analyze data on tourist flow, their activity and behavior, identify trends, forecast demand, determine popular destinations, and discover factors influencing tourism activity;

- GIS application and study tourist routes to implement sustainable tourism planning and development. Assessing the environmental impact of tourism, addressing community needs, managing, and allocating resources, and taking measures for sustainable development of tourism industry.

Calderón-Puerta & Arcila-Garrido (2020) noted the importance of developing tourist routes according to tourists' preferences, providing information about attractions, helping and orientation in the area, as well as creating opportunities for participation in active recreation and living close to nature. Within the framework of this work, the issues of developing tourist routes and creating GIS maps in Ulytau Natural Park ecotourism development were studied in accordance with the field research work. Field research involved first source data collection such as observations, interviews with residents and experts, questionnaires, and collecting geographic information on site. In the process of exploring difficult routes, researchers used geolocation devices (GPS), trackers or mobile devices with applications to record routes, measure distances and take notes about cultural and historical sites and attractions.

These studies provided an in-depth understanding of location, natural resources, cultural and historical sites and attractions, potential barriers to develop tourist routes. In the process of designing GIS maps and tourist routes, programs, and applications for processing geographic data, which provide the ability to create detailed maps, spatial analysis, and modeling were used (GIS applications ArcGIS, QGIS, Google Earth). Detailed maps with tourist routes, information about attractions and other principal factors to help develop tourism in the analyzed area were created (Barchukov, 2008).

The database of Ulytau Natural Park's tourism activities monitoring system was structured and it represents a systematic set of tourist routes (Figure 1). A cluster analysis algorithm was used to determine the optimal location of interest points on the map tourist routes on a GIS map, helped easier navigation and provided useful information for tourists in the Ulytau Natural Park. Satellite images, topographic maps, GIS data, photo materials, field research data, archival materials, and resident information were used to determine data sources. Data was entered into the GIS system, and coordinates were entered for subsequent processing and visualization of the tourist route.

Thus, the basis for maps was created using the GIS system and ready-made topographic maps. In the future, they will be used to create complex tourist maps of the national park's territory.
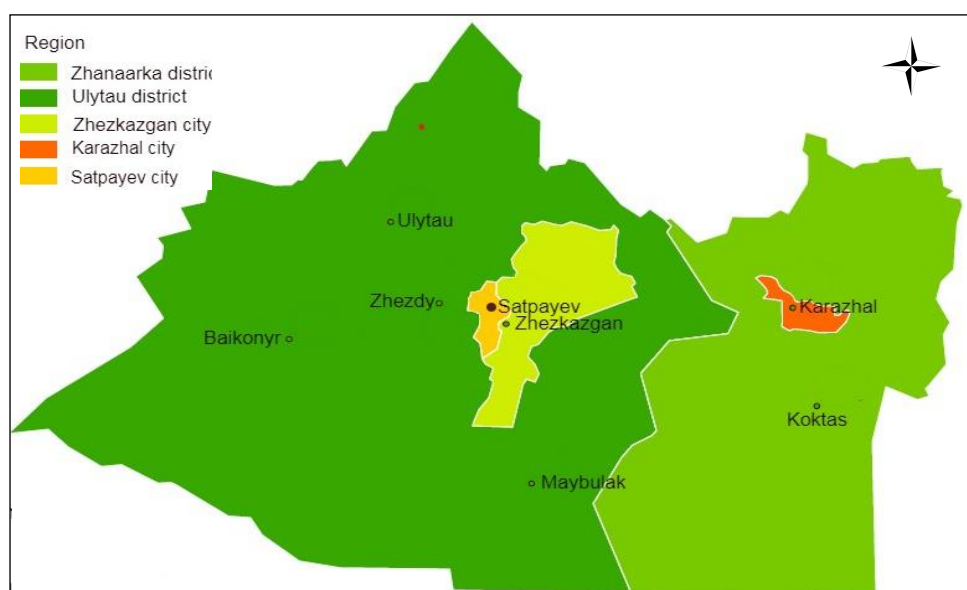

Figure 1. Ulytau region (Source: The figure was constructed by authors based on the ARGIS program)

RESULTS AND DISCUSSION
1. Case State National Natural Park "Ulytau"

Nowadays, protected natural areas in Kazakhstan are represented by 122 objects. The data is given in Table 1. It can be seen from the Table 1 that the largest number of protected areas are natural reserves (zoological -32). They are followed by state national natural parks (14) and state nature reserves (10). The smallest number of objects in the table are natural reserves (complex - 7) and state protected areas (7). The total area of protected natural areas is 12,782.7 thousand hectares. The largest territory is occupied by state protected areas (4392.5 thousand hectares) and regional natural parks (8217.13 thousand hectares), natural reserves (zoological - 4362.8 thousand hectares) and state national natural parks (2667.37 thousand hectares). Natural reserves (botanical - 155.7 thousand hectares) and natural monuments (6.5 thousand hectares) have the smallest area. There is a considerable number and territory of protected natural areas in Kazakhstan, which shows a high attention to the conservation of country's biodiversity and natural resources. These areas play a vital role in maintaining environmental sustainability and providing habitats for many species of flora and fauna. Additionally, they play a crucial role in the development of ecotourism and environmental education and turning Kazakhstan to an attractive country for tourists and nature researchers.

Table 1. Areas of Specially Protected Natural Areas and their number

The name of Specially Protected Natural Areas	Number	Area, thousand hectares
State nature reserves	10	1613.7
State national natural parks	14	2667.37
Nature reserves (zoological)	32	4362.8
Nature reserves (complex)	7	1713.7
Natural reserves (botanical)	10	155.7
Natural Monuments	27	6.5
State protected areas	5	4392.5
Reserves	7	3122.1
Regional natural parks	10	8217.13
Total	**122**	**12782.7**
Note - Specially protected natural areas (Tourism Map of the Republic of Kazakhstan, 2021)		

The creation of a new integrated reserve made it possible to ensure the protection of wild ungulate pastures, the preservation of unique plant communities, nesting sites of predator birds' rare species, as well as the connection and integrity of all protected areas (including natural park clusters) and, as a result, a sufficient size of the protected area to preserve ecosystems. In the future it could be possible to restore the argali population in Ulytau.

Ulytau region has an immense potential to develop ethno-tourism (Mukatova et al., 2022). Ulytau offers many amazing attractions that reflect its rich history: Zhoshy Khan mausoleum (12th century), Alasha Khan, Dombaul, Baskamyr, Ayakkamyr, dating back to the 8th -13th centuries B.C., Altynshoky (XII century), Khan Ordasy (15th century), Erden, Edyge, Khan Ordasy, Bolgan Ana, and all of them have their own unique history and importance for Kazakh culture. These monuments are witnesses of regional rich history and offer fascinating opportunities to study and understand the past. The most popular historical sites of Ulytau are given in Figure 2.

Figure 2. Historical and cultural objects in the State national natural park "Ulytau" a - Zhoshy Khan mausoleum, b – Alasha Khan mausoleum, c – Dombauyl mausoleum, d – Edyge peak Note: photo based on the results from field research (Source: The authors)

Ulytau Nature Park offers unique opportunities to explore historical monuments, such as fortification structures, mausoleums and cities that were left as a legacy of powerful empire of the Golden Horde. Examples of such sites include the mausoleum of Zhoshy Khan and the site of Baskamyr. These cultural and historical sites are significant places that allow tourists to immerse themselves in the history and culture of the Golden Horde. In addition, Ulytau Nature Park has natural attractions and scenic spots to offer, including unique landscapes that can create a variety of experiences for tourists. Nowadays new for ecotourism strategy, which connected to natural and cultural features is developing in Ulytau and is actively involving researchers and experts from various organizations.

A recreational structure with analysis of recreational load on tourist routes and determination of various tourism types of optimal placement is considered as one of the main development goals. Regulating tourist flow and determining their accommodation are becoming key factors in ensuring the sustainable development of tourism activity. It is important to provide protective measures for sensitive areas and identify the optimal number of visitors for each location.

Due to these, a special Visit Center, which provides information services, organizes excursions and entertainment programs, was opened in Ulytau. It is necessary to develop tourism infrastructure, routes and centers considering environmental sustainability and maximum use of renewable resources. Furthermore, the involvement of the locals in ecotourism development, offering trainings and opportunities for cultural, gastronomic, and agricultural activities are important. This process of ecotourism development will contribute to the conservation of biodiversity and cultural values and will provide new economic opportunities for the residents. Additionally, the principles of waste minimization and the use of environmentally friendly technologies are vital. Mukatova et al. (2024) analyzed residents' attitude towards ethno-tourism development in Ulytau, and identified positive connection between locals' innovativeness, economic, social, and environmental conditions to sustainable development of ethno-tourism.

Ulytau Nature Park has enormous potential for tourism development, especially its cultural and historical types. Cultural and historical sites associated with the Golden Horde attract the attention of tourists interested in history and archeology, as well as those who want to immerse themselves in the rich cultural heritage of the past. Tour routes developed by researchers provide an opportunity to get acquainted with the cultural and historical sights of the Golden Horde, including mausoleums, fortifications, and cities. The development of tourism in the Ulytau Nature Park has some problems. Some sites are in remote areas without access to the Internet or paved roads, which makes travel difficult for tourists. An infusion of investment to create and develop the necessary infrastructure, cooperation between government agencies, local authorities, environmental organizations, and commercial enterprises are required for the successful tourism development in Ulytau Nature Park. It is also important to consider the target audience who strives for extreme tourism and create conditions for a comfortable and safe trip. The developed map of tourist routes, combining geographic information and mobile navigation, will help visitors easily orient and navigate in the park territory. One of the main aspects of ecotourism development in Ulytau Nature Park is the creation and development of infrastructure that allows visitors to fully enjoy natural and cultural attractions. This includes the creation of well-marked hiking trails and routes, the placement of

information signs, the creation of observation platforms and other facilities that ensure safety and comfort for tourists. At the same time, it is necessary to pay attention on the upbringing and education of local communities and tourists. It is important to develop ecological awareness and eco-ethical behavior to ensure the conservation of park's unique natural resources for many years. Additionally, it is important to conduct marketing research and promote Ulytau Nature Park as a tourist destination. This includes creating a website with information about the park, using social networks and other online platforms, participating in tourism exhibitions, and collaborating with tour operators and agencies.

2. GIS technology and mapping the area

Geoinformation mapping is based on the use of geoinformation technologies and databases with geographical knowledge, such as geological, environmental, socio-economic and others. It consists of an automated process for compiling maps and using modern geographic information tools and methods. One of the main tasks of geographic information mapping is the creation of digital map models to use for practical and scientific reasons. Digital models created at the stage of geoinformation mapping are a crucial tool for research in the field of geoinformatics. The geographic information system was used in the process of developing tourist routes maps, which support the following types of work:

1. Type of Geodatabase: GIS is a spatial database containing datasets that represent geographic information in the context of the overall GIS data model (vector features, rasters, topology, networks, etc.)

2. Type of geovisualization: GIS is a set of smart and other types of maps that show spatial features and relationships between objects on the earth's surface. Based on that, several types of maps can be constructed, and they can be used as "windows into a database" to support queries, analysis, and information editing.

3. Type of Geoprocessing: GIS is a set of tools for obtaining new geographic data sets from existing data sets. Spatial data processing (geoprocessing) functions extract information from existing datasets, apply analytical functions to them, and write the results into new derived datasets. In ArcGIS software, these three types of GIS are represented by a catalog (GIS as a collection of geodata sets), a map (GIS as a smart map view), and a toolbox (GIS as a set of tools for processing spatial data). All of them are integral components of a complete GIS and are used to a greater or lesser extent in all GIS applications (Wei, 2012). The study of Ulytau Natural Park emphasized the tourist routes developing maps in connection to cultural, historical, and natural sites (Figure 3). Nowadays, the Ulytau Nature Park is represented by cultural and historical sites of the Golden Horde. The great empire's heritage attracts the attention of tourists interested in history and archeology, as well as those who want to get acquainted with the rich cultural traditions and legacy of this time.
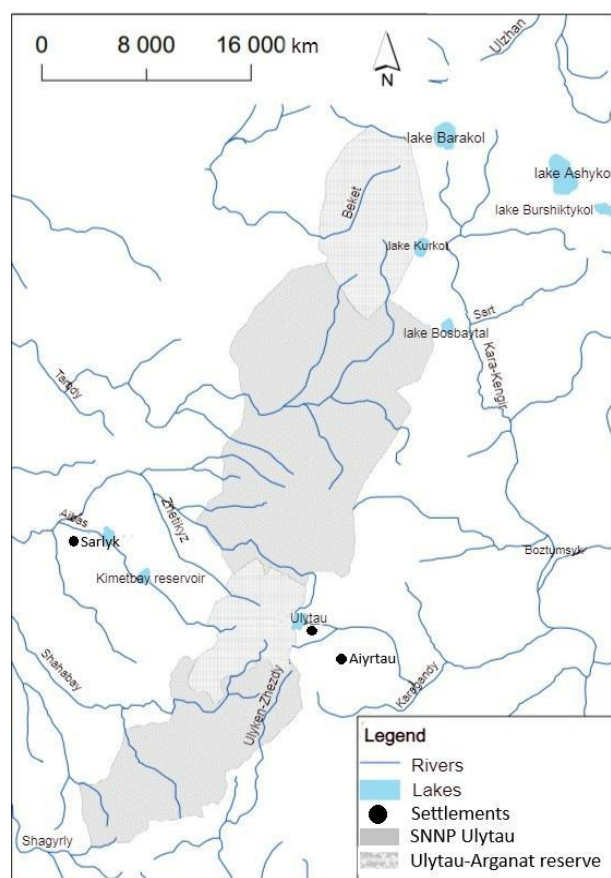

Figure 3. Map of the State National Natural Park "Ulytau" (Source: The figure was constructed by authors based on the ARGIS program)

To facilitate access to information for tourists about the cultural and historical sites of the Golden Horde and their movement within the park, a group of scientists undertook research work to study tourist routes of natural and historical significance. During the field research, photo fixation of cultural, historical, and natural objects was taken.

Based on the studied territory of more than 1000 km, there have been compiled 4 tourist routes, which can be economically beneficial for local community and territorial authorities. Field research shows that the analyzed objects are mostly located in hard-to-reach areas where there is no Internet connection and paved roads. In creating strategy for the development of the Ulytau Natural Park, it is necessary to consider the target audience that strives for extreme tourism and can travel to places of cultural and historical significance by jeep. The developed map of tourist routes using the ArcGIS, special GIS application, will allow tourists to access mobile navigation and use the developed map to explore and freely move between various cultural and historical attractions. During the study of Ulytau village territory, natural and historical objects that can be attractive for the tourist community were identified. Ulytau is an administrative district, which has basic infrastructure, including hotels, visitor center, communications, post office, Internet connection, road, cultural and historical attractions. Cultural and historical objects located in distinct parts of Ulytau Natural Park and are presented in the village of Ulytau as monuments associated with spiritual shrines, batyrs (knights in Kazakh) and ethnic villages. The map of attractions in Ulytau village developed by the research group is presented in Figure 4.
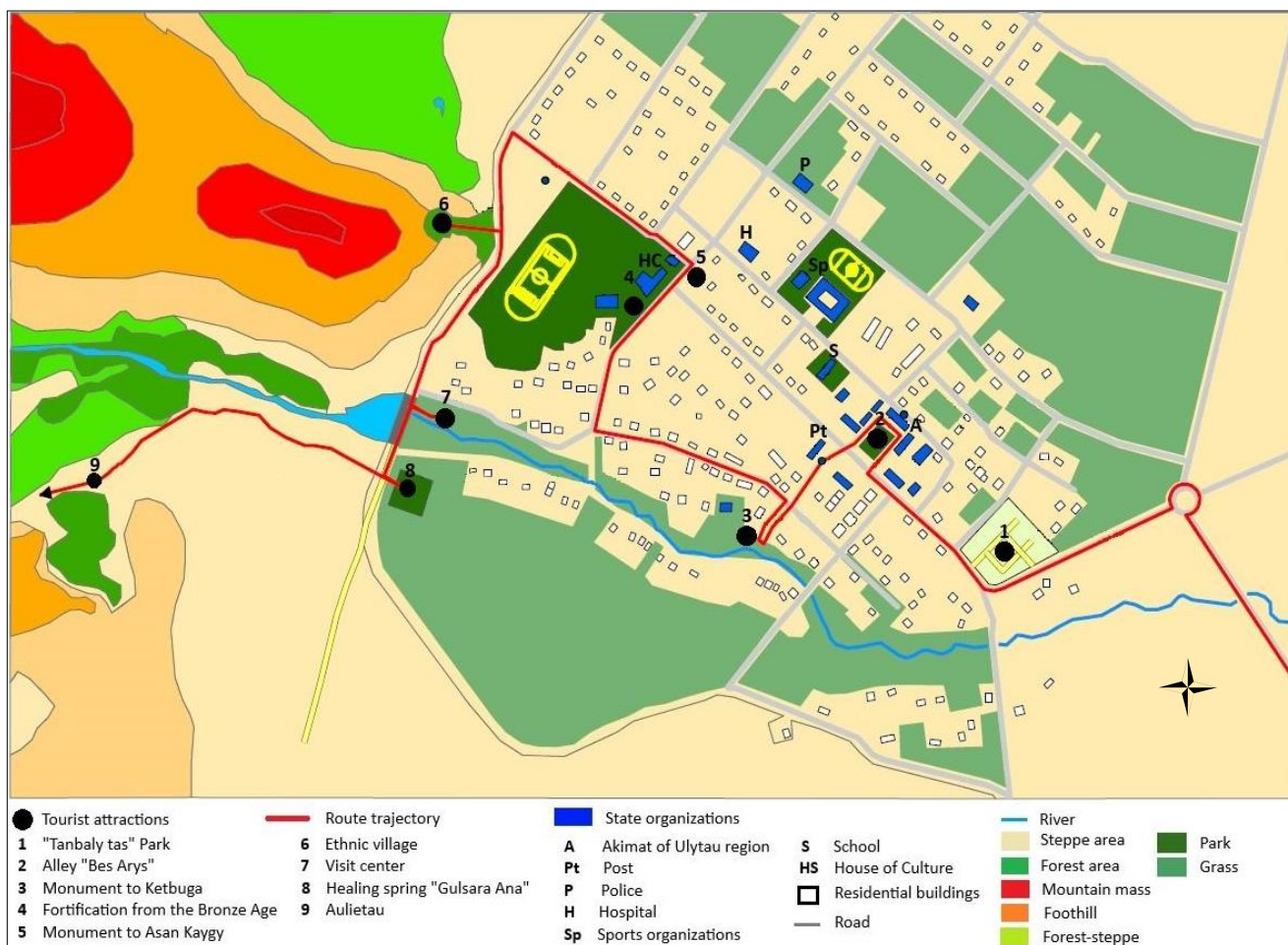

Figure 4. Ulytau village. Sightseeing objects (Source: The figure was constructed by authors based on the ARGIS program)

The development of tourism in this region can contribute to the creation of new working areas and economic development of locals. It can also contribute to the preservation of historical monuments, since increased tourist flows gives more opportunities for monuments' conservation and restoration, as well as for their protection from destructive factors (Baipakov, 1998). Consequently, the Golden Horde heritage sites play a significant role in world tourism development, offering a unique combination of historical heritage, cultural wealth, and natural beauty. Their importance in tourism sector connected to attracting the interest of tourists and creating opportunities for excursion routes development, additionally, museums, hotels, and other enterprises can contribute to ecotourism and cultural tourism development.

3. Mapping ecotourism routes

In the process of field research, the research group developed GIS maps of 4 tourist routes based on the ARGIS program.

Route 1: Zhezkazgan city -mausoleum of Zhoshy Khan – Dombauyl - mausoleum of Alasha Khan - Baskamyr settlement - Ulytau village.

Route 2: Ulytau village - Aulie tau mountain - Khan Ordasy – Altynshoky - peak Edyge - Toktamys.Khan.

Route 3: Ulytau village - Zhezdy village - Karsakpay village - Baikonyr village (Battle of Bulanty).

Route 4: Zhezkazgan city - Terekti Aulie, Zhezkazgan city - Bolgan ana, Kulan ana.

In creating tourist route, documents from Ulytau National Natural Park and other important sources of information were analyzed: data from the Historical and Industrial Museum named after K.I. Satpayev of "Kazakhmys" corporation (Zhezkazgan), Historical and Archaeological Museum with the exhibition hall "History of the Development of Cosmonautics" (Zhezkazgan), Museum of the History of Mining and Smelting named after M. Toregeldin (Zhezdy), House-Museum of Kanysh Satpayev (Karsakpay), Museum of Secondary School No. 17 (Baikonyr).

3.1. Route 1: Zhezkazgan city -mausoleum of Zhoshy Khan – Dombauyl - mausoleum of Alasha Khan - Baskamyr settlement - Ulytau village

The mausoleum of Zhoshy Khan was mentioned firstly in the notes of Hafiz Tanysh (16th century). An archaeological expedition led by A. Margulan discovered two burials in the mausoleum in 1946. According to the assumption of scientists, one of them belongs to Zhoshy Khan, the other to his eldest wife Bektumysh. Mausoleum of the Hunnic period Dombauyl (5 km). One of the largest stone structures in Kazakhstan, built in the pre-Islamic period (8th – 9th centuries). The mausoleum is a tall cone-shaped structure on a base which looks like a square. The Mausoleum of Alasha Khan (15 km), erected in the first half of the 13th century, built from baked square bricks, and has a portal-dome structure. According to popular legend, Alasha Khan was a fair, brave, and courageous leader of the Kazakh tribes. The mausoleum of Duzen Sandybayuly was built in the mid of 19th century (1863 – 1866) by the Kazakh master Seraly Elamanuly, ordered by major feudal lord Erdyn over the grave of his brother Zhuzden. It is a poor copy of the Alasha Khan mausoleum. The mausoleum was constructed from baked bricks on clay-adobe mortar. According to the stories, sheep's milk was added to bricks to make them stronger in the process of constructing. This mausoleum has a cubic structure with a hemispherical dome (Figure 5).
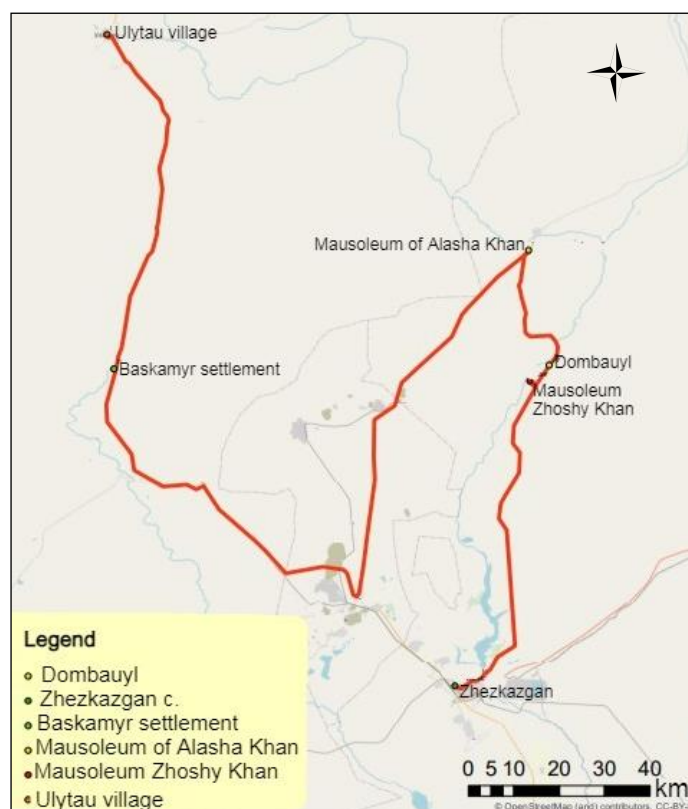

Figure 5. Route 1 (Source: The figure was constructed by authors based on the ARGIS program, 2023)

3.2. Route 2: Ulytau village - Aulie tau mountain - Khan Ordasy – Altynshoky - peak Edyge - Toktamys.Khan

Aulietau is a high peak located 2 kilometers west of Ulytau village. The height of this peak is 1133 meters above sea level. It may take from 1 to 3 hours to reach the top and descend. According to legend, Aulietau has spiritual significance, and the heaven and earth meet each other at this peak. Khan Ordasy is a reconstruction of camp from the Golden Horde, which was designed and created to reflect the atmosphere and architectural style of that time. Khan Ordasy is a group of buildings, including tents, yurts, and wooden buildings, made in the traditional style, which allows visitors to immerse themselves in the spirit of historical period. Khan Ordasy also hosts various demonstrations and performances to showcase the old occupations, crafts, and traditions of the Golden Horde. This place attracts both domestic and foreign tourists who are interested in the history, architecture, and culture of this time. The mountainous upland of Altyn-shoky has historic and natural significance and attracts the attention of tourists and researchers. It is known that Tamerlane (Amir Timur) ordered the erection of a monument at the top of the hill during his military expedition. According to historical data, about 200 thousand soldiers were involved in this task, each of whom brought one stone to the top of the mountain (Bakytova & Medeuova, 2023). The words of Tamerlane were immortalized on one of these stones: *"I am, Amir Timur, have arrived on the sacred land of Ulytau and am heading with my army on a great campaign against Tokhtamysh."*

It is worth nothing to mention, that original stone is in the collection of the Hermitage in St. Petersburg (Figure 6). Edyge Peak, located near the village of Ulytau (35 km), is a geographical feature with the highest point of the Ulytau mountain range in Kazakhstan. At the top of this peak is the burial place of Tokhtamysh, the famous khan of the Golden Horde. According to history, the mountain was named after Edyge after his death.

Figure 6. The inscription of Tamerlane (Source: The authors)

Edyge was a contemporary of Tokhtamysh, who ruled the Golden Horde from 1380 to 1395. They became the founders of the horde, named Nogai Horde, which dominated the territory from the Volga to the Ural. The name of Edyge became a symbol of the founder of Nogai Horde in Kazakh, Karakalpak and Bashkirian folk tales and legends. In the "years of unrest" between 1410 and 1412, Edyge lost his power in the Golden Horde, and in 1419 he was killed by the son of Tokhtamysh, Kadyrberdy. His body was buried in the Ulytau Mountains, and there was installed a special tombstone. It has become a tradition to call these place as "Edyge Mountain" and "Edyge Tomb." Legends describe his courage, intelligence, and wisdom. He was a respected hero and orator, who was always concerned about the welfare of his people and defended his homeland from enemies. The route is given in Figure 7. Toktamys was the famous khan of the Golden Horde, who reigned from 1379 to 1395. He belonged to the Zhoshy dynasty, one of the great branches of the Mongol Empire.
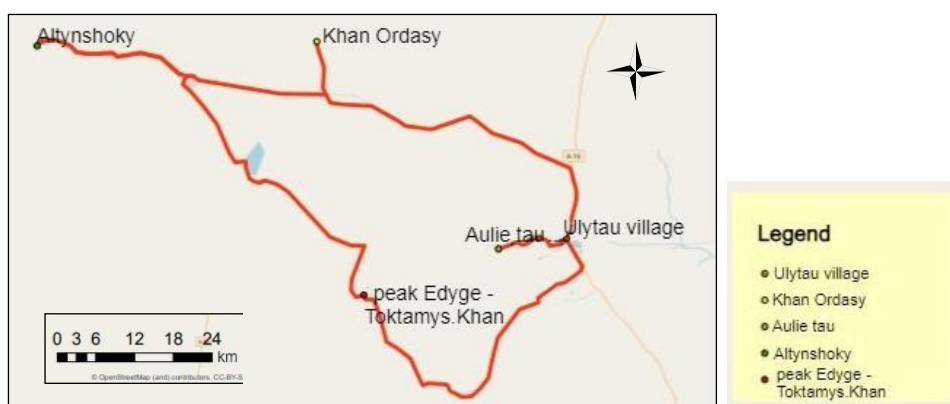

Figure 7. Route 2 (Source: The figure was constructed by authors based on the ARGIS program)

Toktamys went through a long path of political ascension, was a powerful military leader and politician. He was known for his wisdom and organizational skills. Under his leadership, the Golden Horde regained its power and stability after previous conflicts and internal strife. The historical personality of Toktamys Khan can have a significant impact on the development of tourism in Ulytau, as it provides an opportunity for in-depth study of the history, culture and heritage of the Golden Horde and offers a huge amount of tourism opportunities (Zhanaidarov, 2008).

3.3. Route 3: Ulytau village - Zhezdy village - Karsakpay village - Baikonyr village (Battle of Bulanty)

Baikonyr village is known because of coal deposits discovery in Baikonyr tract, which gave the possibility to launch coal mining from the beginning of the 20th century. Karsakpay village is famous for its rich ore deposits, additionally coal mining and metallurgical industry are developed in this place. Zhezdy village is famous for its deposits of manganese ores. It is an important center for their extraction and processing. The development of mining and metallurgical industries connected Zhezkazgan city and three villages - Baikonyr, Karsakpay and Zhezdy, also turned them into centers for the extraction of coal, manganese, and other valuable minerals. The quality of the ores is exceptionally high, which attracts interest from investors and ensures the economic development of the region. This direction can be attractive to some types of tourism development, such as mountain, industrial and historical. The historical significance of this area is associated with the Battle of Bulanty. The battle took place in 1728 in the interfluve of the Bulanty (Baikonur) and Bileuti

(Kalmakkyrgan) rivers. The Kazakhs attacked the Dzungars there. In honor of this battle, Bileuty River was renamed as Kalmakkyrgan, which means "Place of Kalmyks death." The route is given in Figure 8.
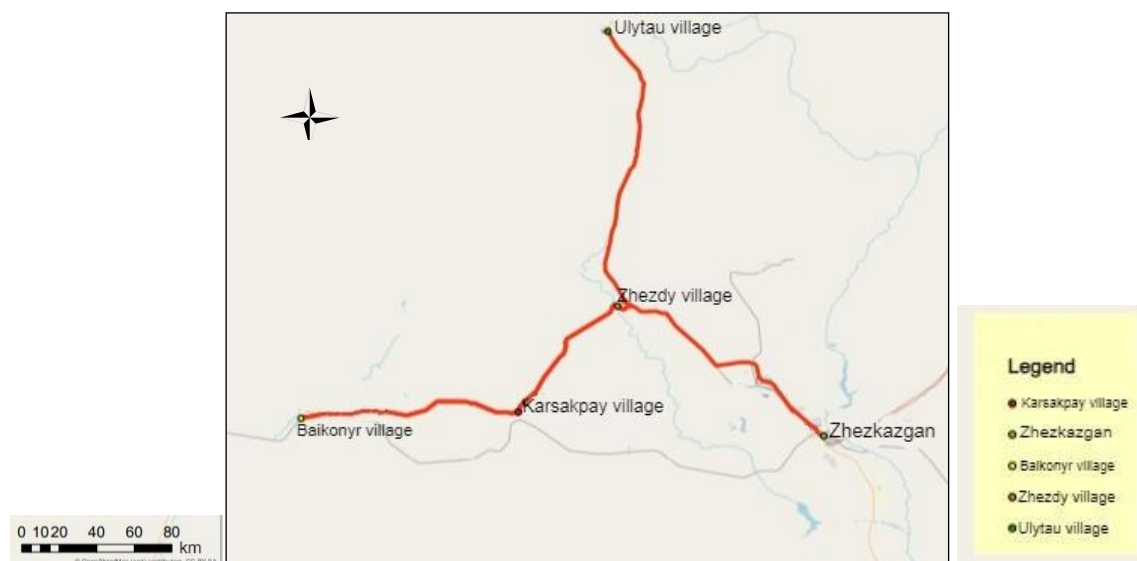

Figure 8. Route 3 (Source: The figure was constructed by authors based on the ARGIS program)

3.4. Route 4: Zhezkazgan city - Terekti Aulie, Zhezkazgan city - Bolgan ana, Kulan ana

Route 4 can be interesting for tourists too (Figure 9). Terekti-Aulie is an archaeological complex located 90 km northeast from Zhezkazgan city. The complex consists of petroglyphs, various artifacts, and attractions. Petroglyphs found in Terekti-Aulie are stone images that were carved or scratched into the surface of rocks (Figure 10). One of the main themes there is horse image, but there are also images of other animals such as bulls, goats, deer, snakes and cats of prey, chariots. In addition, there are symbolic marks, holes, cup-shaped recesses, and geometric shapes that are part of this rich cultural heritage.
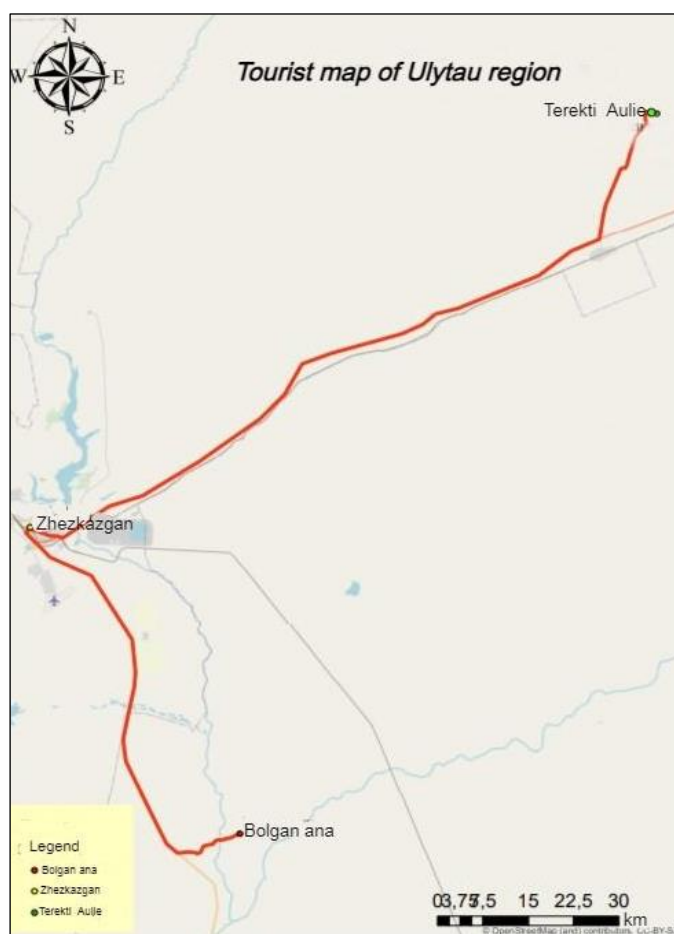

Figure 10. Terekti-Aulie Petroglyphs
(Source: The authors)

Figure 9. Route 4 (Source: The figure was constructed
by authors based on the ARGIS program)

Beautiful natural views and springs make Terekti-Aulie more attractive to tourists and explorers. This archaeological complex contributes to the preservation and popularization of the cultural and historical heritage of Kazakhstan, and stimulates interest in the study of ancient cultures and art. Cultural and historical sites Bolgan Ana and Kulan Ana are located on the southeast of Zhezkazgan city. Historical facts indicate that Bolgan Ana was the second wife of Genghis Khan during his early manhood and youth. She was considered as one of the most influential women in the life of Genghis Khan and provided him with great support during his political and military activities (Kadirbayeva et al., 2015).

In addition, Kulan Ana, as stated, was the daughter of Kasar, son of Genghis Khan. She played a vital role in the life of Genghis Khan and was his advisor. These women were members of the great empire, created by Genghis Khan, and made important contributions to the development of that empire.

Their family ties to the great leader gave them importance and status, and their presence in his life helped strengthen Genghis Khan's power and maintain his leadership. Some historical sources and legends gave information about them, and their role and influence are turning to subject of debates and discussions.

CONCLUSION

The results of the study show that it is necessary to use the following mechanisms for the successful development of tourist routes in natural parks:

1. Research and analysis: Conducting a comprehensive regional study to identify its tourism potential and unique features. It includes analysis of the region's historical, cultural, natural, and gastronomic heritage, attractions, events, and other tourism resources. Systematic collection of data on the provided tourist routes can be one of the key tools for determining their effectiveness. It consists of visitor counts, tourist surveys, analysis of hotel and other accommodation data, statistical information from government agencies. This data will help determine the popularity of the route, the seasonality of visits, tourists' preferences, and their level of satisfaction.

2. Planning and coordination: Development of a strategic plan for regional tourism development, which includes identifying priority areas, goals, and objectives. Cooperation with government agencies, local authorities, tourism operators and other stakeholders are crucial. Coordinating all participants' efforts helps to provide effective implementation of plans, and achievement of main goals.

3. Infrastructure development: Creation and support of necessary tourism infrastructure, such as hotels, restaurants, transport routes, information centers and other facilities that provide comfort and convenience for tourists. Infrastructure development includes the creation and maintenance of tourist routes with sufficient level of facilities and services to provide an interesting and rich tourist experience.

4. Marketing and promotion: Development of effective marketing strategies and tools to attract tourists, including creation of attractive tourism brands, promotion through various communication channels, organizing events and advertising campaigns. Marketing and promotion should be aimed at attracting the target audience and increasing awareness of the region's tourism opportunities.

5. Education and training of specialists in tourism is important for effective development and management of tourism routes in the region. Training may include educational programs, seminars, and experience exchange to improve competence and professionalism of personnel.

6. Monitoring and assessment: Regular monitoring of tourism activities and evaluation of tourist routes effectiveness. It allows to identify problems and opportunities, correct plans, as well as measure the results achieved and analyze the effectiveness of activities.

7. Tax revenue: Developed tourism routes should lead to increased revenue for the region through increased visitor numbers and spending. Assessment of tax revenues from tourism activities helps to determine the impact of developed routes on the regional economy and their effectiveness. The development of tourist routes is a complex process that requires the interaction of various mechanisms and resources. This includes research and analysis, planning and coordination, infrastructure development, marketing and promotion, training, monitoring, and assessment. Only using these mechanisms together will make it possible to effectively develop and manage tourist routes in the region. Rational planning, collaboration, infrastructure and attracting tourists and investment can help to preserve cultural and natural heritage in protected areas, as well as contribute to economic growth and well-being of residents.

REFERENCES

Achmad Bahar, A. M., Udin, W. S., Hussin, H., Sulaiman, N., & Sulaiman, N. (2020). Geomorphosite Assessment of Renyok River, Jeli, Kelantan. *IOP Conference Series: Earth and Environmental Science*, 549(1), 012023. https://doi.org/10.1088/1755- 1315/549/1/012023

Aldi H. L. & Heidi D. (2021) A community perspective on local ecotourism development: lessons from Komodo National Park. *Tourism Geographies*. https://doi.org/10.1080/14616688.2021.1953123

Aliyeva, S., Chen, X., Yang, D., Samarkhanov, K., Mazbayev, O., Sekenuly, A., Issanova, G., & Kozhokulov, S. (2019). The Socioeconomic Impact of Tourism in East Kazakhstan Region: Assessment Approach. *Sustainability*, 11(17), 4805. https://doi.org/10.3390/su11174805

Akbar, I., Yang, Z., Mazbayev, O., Seken, A., & Udahogora, M. (2020). Local residents' participation in tourism at a world heritage site and limitations: Aksu-Jabagly State Nature Reserve, Western Tian-Shan, Kazakhstan. *GeoJournal of Tourism and Geosites*, 28(1), 35–51. https://doi.org/10.30892/gtg.28103-450

Azbantayeva, M. N., Sagynbayeva, A. B., Sagatbayev, Y. N., & Pashkov, S. V. (2022). Determination of the tourist position of lakes of Western and Central Kazakhstan by space survey. *GeoJournal of Tourism and Geosites*, 45(4spl), 1625–1632. https://doi.org/10.30892/gtg.454spl12-983

Bahaire, T., & Elliott-White, M. (1999). The Application of Geographical Information Systems (GIS) in Sustainable Tourism Planning: A Review. *Journal of Sustainable Tourism*, 7, 159-174. https://doi.org/10.1080/09669589908667333

Baipakov, K. M. (1998). *Srednevekovye goroda Kazahstana na Velikom Shelkovom puti [Medieval cities of Kazakhstan on the Great Silk Road]*. Almaty, Gylym, 235. ISBN: 5-628-02237-3, (In Russian).

Bakytova, L., & Medeuova, K. (2023). *«Kosmos» v muzejno-memorial'nom landshafte Zhezkazgana* ["Cosmos" in the museum and memorial landscape of Zhezkazgan]. *Anthropological Forum*, 57, 151–186, (In Russian). https://doi.org/10.31250/1815-8870- 2023-19-57-151-186

Barchukov, I. (2008). *Metody nauchnyh issledovanij v turizme: ucheb. posobie dlya vuzov [Methods of scientific research in tourism: a textbook for universities]*, Publishing center "Academy", Moscow, (In Russian).

Bilgihan, A., Okumus, F., Nusair, K., & Bujisic, M. (2014). Online experiences: flow theory, measuring online customer experience in ecommerce and managerial implications for the lodging industry. *Information Technology & Tourism*, 14(1), 49–71. https://doi.org/10.1007/s40558- 013-0003-3

Boers, B., & Cottrell, S. (2007). Sustainable Tourism Infrastructure Planning: A GIS-Supported Approach. *Tourism Geographies*, 9(1), 1–21. https://doi.org/10.1080/146166806 01092824

Björk, P. (2000). Ecotourism from a conceptual perspective, an extended definition of a unique tourism form. *International Journal of Tourism Research*, 2, 189-202. https://doi.org/10.1002/(SICI)1522-1970(200005/06)2:3%3C189::AID-JTR195%3E3.0.CO;2-T

Brokou, D., Darra, A., & Kavouras, M. (2021). The new role of cartography in modern tourism. *AGILE*: GIScience Series, 2, 19. https://doi.org/10.5194/agile-giss2-19-2021

Bulan, C. D. (2021). Kopi Arabika Kalosi Enrekang. Pangadereng : *Jurnal Hasil Penelitian Ilmu Sosial Dan Humaniora*, 7(2), 269–284. https://doi.org/10.36869/pjhpish.v 7i2.203

Calderón-Puerta, D. M. Y., & Arcila-Garrido, M. (2020). Proposal for the Design of Cultural Tourist Routes through the Use of GIS: An Applied Case. *Revista de Estudios Andaluces*, 39, 134-148. https://dx.doi.org/10.12795/rea.2020.i39.07

Chen, W. (2023). Developing a Sustainable Business Model of Ecotourism in Ethnic-Minority Regions Guided by the Green Economy Concept. *Sustainability,* 15, no. 2: 1400. https://doi.org/10.3390/su15021400

Chu, T., Lin, M., Chang, C., & Chen, C. (2011). Developing a Tour Guiding Information System for Tourism Service using Mobile GIS and GPS Techniques. *International Journal on Advances in Information Sciences and Service Sciences*, 3, 49-58. http://dx.doi.org/10.4156/aiss.vol3.issue6.6

Duan, S., Yang, Z., Han, F., Bayarhuu, B., Mazbayev, O., Dunets, A., & Shishin, M. (2024). Assessment and mapping of priority areas for transboundary ecological conservation: Suggestions for the protection of the Altai Mountains in Central Asia. *Journal for Nature Conservation*, 81. https://doi.org/10.1016/j.jnc.2024.126671

Eboy, O. (2017). Tourism Mapping: An Overview of Cartography and the Use of Gis. BIMP-EAGA *Journal for Sustainable Tourism Development*, 6, 61–67. https://doi.org/10.51200/bimpeaga jtsd.v6i1.3068

Electronic resource Law of the Republic of Kazakhstan. On Specially Protected Natural Areas. July 7, 2006 N 175, Access date: 18.01.2024. https://adilet.zan.kz/rus/docs/Z060000175_/z060175.htm

Electronic resource on approval of the tourism map. Order of the Minister of Culture and Sports of the Republic of Kazakhstan. October 27, 2021 No. 332. Registered with the Ministry of Justice of the Republic of Kazakhstan on October 29, 2021, 24950, Access date: 13.01.2024. https://adilet.zan.kz/rus/docs/V2100024950

Ershad, M., & Ali, E. (2020). Geographic Information System (GIS): Definition, Development, Applications & Components. https://doi.org/10.36869/Pjhp ish.v7i2.203

Fadillah I., Amina I., Nohman K., & Muhammad I.Q. (2021). Monograph. Past, present and future of ecotourism, a systematic literature review from last decade. 39(4), Special Issue, *Managing Economic Growth in Post COVID Era: Obstacles and Prospects*, PP3914-4592. https://doi.org/10.25115/eea.v39i4.4592

Fatemeh H., Marzieh P. & Elham Y. (2020) Scenario based capability evaluation of ecotourism development – an integrated approach based on WLC, and FUZZY – OWA methods, *Asia Pacific Journal of Tourism Research*, 25:6, 627-640. https://doi.org/10.1080/10941665.2020.1752752

Ghoddousi, S., Pintassilgo, P., Mendes, J., Ghoddousi, A., & Sequeira, B. (2018). Tourism and nature conservation: A case study in Golestan National Park, Iran. *Tourism Management Perspectives*, 26, 20–27. https://doi.org/10.1016/j.tmp.2017.12.006

Ghorbanzadeh, O., Pourmoradian, S., Blaschke, T., & Feizizadeh, B. (2019). Mapping potential nature-based tourism areas by applying GISdecision-making systems in East Azerbaijan Province, Iran. *Journal of Ecotourism*, 18(3), 261–283. https://doi.org/10.1080/14724049.2 019.1597876

Hanyoung G. & Ulrike G. (2010). The Role of Interactive Maps and Spatial Ability in Creating Virtual Tourism Experiences: A Measurement Framework. *TTRA International Conference*, 1–11. https://scholarworks.umass.edu/entities/publication/d0fef01c-6625-41d0-8f78-7a2fbd4af6eb

Issakov, Y., Laiskhanov, S., Mazbayev, O., Ussenov, N., Zheldibayev, A., Kamelkhan, G., & Dávid, L. D. (2022). Opportunities to use mobile GIS applications in the formation of tourist and local lore competencies in students: case study in Almaty, Kazakhstan. *GeoJournal of Tourism and Geosites*, 41(2), 597–605. https://doi.org/10.30892/gtg.41234-868

Magige, J.M., Jepkosgei, C., & Onywere, S.M. (2020). *Use of GIS and Remote Sensing in Tourism*. Handbook of e-Tourism. *Springer, Cham*. https://doi.org/10.1007/978-3-030-05324-6_118-1

Jankowski, P., Andrienko, N., & Andrienko, G. (2001). Map-centred exploratory approach to multiple criteria spatial decision making. *International Journal of Geographical Information Science*, 15, 101 - 127. https://doi.org/10.1080/13658810010005525

Johnson, L. (1990). Analyzing spatial and temporal phenomena using geographical information systems. *Landscape Ecology*, 4, 31-43. https://doi.org/10.1007/BF02573949

Jovanović, V., & Njeguš, A. (2008). The application of GIS and its components in tourism. *Yugoslav Journal of Operations Research*, *18*(2), 261-272. https://doi.org/10.2298/YJOR0802261J

Clifton, J., & Benson, A. (2006). Planning for Sustainable Ecotourism: The Case for Research Ecotourism in Developing Country Destinations. *Journal of Sustainable Tourism*, *14*(3), 238–254. https://doi.org/10.1080/09669580608669057

Kadirbayeva, D. A., & Tuleshova, K. A. (2015). *Osobennosti razvitija jekoturizma v Ulytau* [Peculiarities of development of ecotourism in Ulytau]. *International Scientific Research Journal*, 10(41), 127-133, (In Russian). https://doi.org/10.18454/IRJ.2015.41.040

Khan, A., Bibi, S., Lorenzo, A., Lyu, J., & Babar, Z. U. (2020). Tourism and Development in Developing Economies: A Policy Implication Perspective. *Sustainability*, *12*(4), 1618. https://doi.org/10.3390/su12041618

Krishna, A., Hadian, M., Agus, R., & Hurriyati, R. (2016). Developing geotourism as part of sustainable development at Ciletuh Sukabumi, West Java, Indonesia. *Journal of Environmental Management and Tourism*, 7. https://doi.org/10.14505/jemt.v7.1(13).05

Mukatova, R., Mussina, K., & Rodríguez, M., (2022). The Untapped Potential of Ethno-Tourism in Ulytau Region. *Journal of Environmental Management And Tourism, 13*(6), 1534-1550. https://doi.org/10.14505/jemt.v13.6(62).02

Mukatova, R., Kulcsár, N., & Tleubayeva, A. (2024). Residents' attitude towards ethno-tourism in Ulytau, Kazakhstan. *GeoJournal of Tourism and Geosites,* 52(1), 77–84. https://doi.org/10.30892/gtg.52107-1184

Oh, M., Kim, S., & Choi, Y. (2019). Analyses of determinants of hiking tourism demands on the Jeju Olle hiking trail using zero-truncated negative binomial regression analysis. *Tourism Economics*, 26(8), 1327–1343. https://doi.org/10.1177/1354816619888337

Oliver-Velez, D., Finlinson, H., Deren, S., Robles, R., Shedlin, M., Andia, J., & Colon, H. (2002). Mapping the Air Bridge Locations: The Application of Ethnographic Mapping Techniques to a Study of HIV Risk Behavior Determinants in East Harlem, New York, and Bayamón, Puerto Rico. *Human Organization*, 61(3), 262–276. https://doi.org/10.17730/humo.61. 3.99nm1tuxan9yd7ap

Parent, N. (2020). From Exile to Homeland Return: Ethnographic Mapping to Inform Peacebuilding from Afar. *Stability: International Journal of Security and Development.* https://doi.org/10.5334/sta.772

Pramono, J., Sumartana, I. M., Santosa, I. M., Denny Herlambang, P. G., & Purwantoro, B. (2020). Destination Success Factors for Millennial Travelers Case Study of Tanah Lot Temple, Tabanan, Bali. *ADI Journal on Recent Innovation*, 1(2), 136–146. https://doi.org/10.34306/ajri.v1i2.44

Roque Guerrero, J. V., Teixeira Gomes, A. A., de Lollo, J. A., & Moschini, L. E. (2020). Mapping Potential Zones for Ecotourism Ecosystem Services as a Tool to Promote Landscape Resilience and Development in a Brazilian Municipality. *Sustainability,* 12(24), 10345. https://doi.org/10.3390/su122410345

Salomão Graça, A., & Fiori, S. (2015). Proposal for a Tourist Web Map Of The South Area Of Rio: Cartographic Communication And The Act Of Representing The Landscape In Different Scales And Levels Of Abstraction. *Revista Brasileira de Cartografia*, 67, 1079–1090. http://dx.doi.org/10.14393/rbcv67n5-44629

Sagatbayev, Y. N., Pashkov, S. V., Dunets, A. N., & Mazbayev, O. B. (2019). Landscapes of the Teniz-Korgalzhyn depression: evaluation of ecosystem functions and opportunities for tourism. *GeoJournal of Tourism and Geosites*, 26(3), 1046–1056. https://doi.org/10.30892/gtg.26328-416

Sagatbayev, E. N., Krupochkin, E. P., & Dunets, A. N. (2019). A spatio-temporal analysis of the Teniz-Korgalzhyn trench geosystems based on the Landsat and Sentinel satellite image decoding materials. IOP Conference Series: Earth and Environmental Science, 395 012047. http://dx.doi.org/10.1088/1755-1315/395/1/012047

Seidualin, D. (2023). Ekologicheskij turizm i ustojchivoe razvitie: opyt, analiz i perspektivy v Kazahstane [Ecotourism and Sustainable Development: Experience, Analysis and Prospects in Kazakhstan], Monograph, Astana, (In Russian).

Shuptar, V. V. (2016). T*uristskij putevoditel' - Ulytau [Tourist guide - Ulytau]. Karaganda: Historical and Geographical Society "Avalon", 100*. ISNB 978-601-7373-65-8, (In Russian).

Sintayehu A.A. & Raminder K.S. (2020): Ecotourism development in Ethiopia: costs and benefits for protected area conservation, *Journal of Ecotourism*. https://doi.org/10.1080/14724049.2020.1857390

Sofronov, B. (2018). Millennials: A New Trend for the Tourism Industry. *Annals of Spiru Haret University.* Economic Series, 18, 109–122. https://doi.org/10.26458/1838

Thecla I.A. & Odum J.C. (2014). Designing and Developing a GIS Database for Tourism in Nigeria: The Case of Anambra State. *International Journal of Humanities and Social Science* 19 (10), 109-120. https://doi.org/10.9790/0837-19108109120

Tripathi, B., Sharma, H., Pelto, P., & Tripathi, S. (2010). Ethnographic Mapping of Alcohol Use and Risk Behaviors in Delhi. *AIDS and Behavior*, 1(4), S94-103. https://doi.org/10.1007/s10461- 010-9730-z

Wei, W. (2012). Research on the Application of Geographic Information Systems in Tourism Management. *Procedia Environmental Sciences*, 12, 1104–1109. https://doi.org/10.1016/j.proenv.20 12.01.394

Wainwright, J., & Bryan, J. (2009). Cartography, territory, property: Postcolonial reflections on indigenous counter-mapping in Nicaragua and Belize. *Cultural Geographies*, 16(2), 153–178. https://doi.org/10.1016/j.proenv.2012.01.394

Wulung, S., Putra, R., Permadi, R., & Maulana, M. (2020). Concentration-Dispersal Strategies to Assist Geotourism Destination Planning: A Case Study of Ciletuh-Palabuhanratu UNESCO Global Geopark. *Journal of Indonesian Tourism and Development Studies*, 8(3), 156–164. http://dx.doi.org/10.21776/ub.jitode.2020.008.03.05

Xu, L., Zhang, J., & Nie, Z. (2022). Role of Cultural Tendency and Involvement in Heritage Tourism Experience: Developing a Cultural Tourism Tendency–Involvement–Experience (TIE) Model. *Land*, 11(3), 2–16. https://doi.org/10.3390/land11030370

Zharkenova, B., Mukanov, A., Mussina, K., Mutaliyeva, L., Sagatbayev, Y., & Pashkov, S. (2023). Branding of tourist cluster systems: case of Almaty mountain cluster in the republic of Kazakhstan. *GeoJournal of Tourism and Geosites*, 49(3), 1152–1164. https://doi.org/10.30892/gtg.49330-1114

Zhanaidarov, O. (2008). *Toqtamys han. Tarih, tūlğa, uaqyt. «Şyğystyñ ūlylary» toptamasy [Khan Tokhtamys. History, personality, time. "Greats of the East" collection],* Aruna, Almaty (In Kazakh).

Zhensikbayeva, N. Z., Abiyeva, G., Sabyrbayeva, B. T., Avgusthanova, G. A., Kabdrakhmanova, N. K., & Amangeldy, N. (2024). Studying the Development Potential of Tourism Industries in the South Altai by Hydrological, Climatic, Geomorphological Way and Visualization Using GIS. *Geojournal of Tourism and Geosites*, 53(2), 528–537. https://doi.org/10.30892/gtg.53216-1228