

Alakol's tourism industry and environmental challenges

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Abstract. This research analyzes the ecological state of Lake Alakol and its surrounding environment, with a focus on the resort and tourism cluster. It examines the adjacent Abai and Zhetsuisi regions, where the Alakol resort, tourist cluster, and nature reserve are located. The study specifically investigates the influence of anthropogenic factors on the ecology of Lake Alakol. The development of the resort and tourism cluster, progressing within the framework of a specially adopted state program in Kazakhstan, represents an important direction but has also intensified anthropogenic environmental issues. Currently, there is dynamic growth in resort tourism facilities, yet this growth is accompanied by violations of state environmental legislation. This article addresses the environmental problems of Alakol, which are partly linked to its natural climatic conditions, such as extreme temperature variations between hot summers and cold winters, when large ice floes damage the lake's shorelines. A critical issue is the pollution of Lake Alakol, driven by human activity and various unresolved social and communal challenges.

1 Introduction

The relevance of the proposed topic stems from one of Kazakhstan's unique lakes – Alakol. The lake's coastlines are connected from the south by the Zhetsuisi region and from the east by Abai (formerly Semipalatinsk), creating a unique convergence of transport corridors and tourist routes.

According to geological data, the area around Alakol is notable for its forty wells, connected by underground water channels. The importance of the study lies in the fact that, while Lake Alakol occupies a crucial role in Kazakhstan's tourism sector, it faces numerous environmental safety challenges. Kazakhstan has already experienced a significant environmental disaster in the 20th century with the near-loss of the Aral Sea, which continues to have a damaging effect on local ecosystems and disrupts the environmental balance [1].

The purpose of this research is to provide an analytical overview of the ecological state of Lake Alakol and its surrounding environment, particularly in relation to the resort and tourism cluster. Given the tourism cluster's heightened activity during the summer season, this study aims to highlight the influence of human activities on the region's environmental problems.

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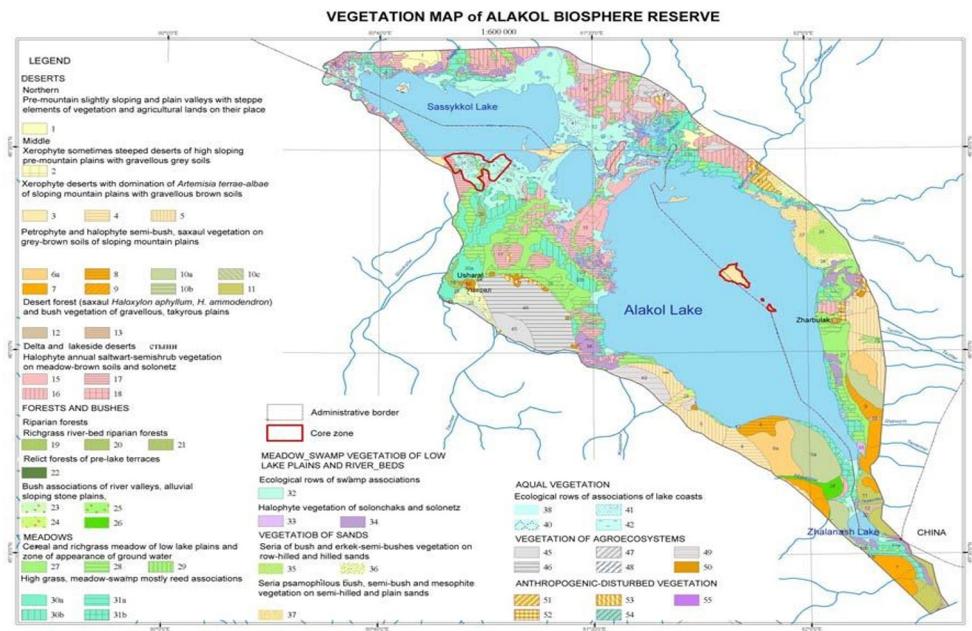


Fig. 1. Alakol (from open sources <https://www.kazmab.kz/index.php/biosfernye-reservaty/1/natsionalnaya-set/alkol/opisanie>).

2 Materials and Methods

Based on previous knowledge and established conceptual principles regarding the toponymy of Lake Alakol, this research integrates an interdisciplinary approach, combining geography and ecology within the framework of 'ecology of geographical knowledge' [2]. The study also considers the existing classification of the tourist and recreational cluster, using a system analysis methodology. The analytical review incorporates fragmentary results from published research that are directly or indirectly related to the author's subject. The use of interdisciplinary scientific methods, tailored to address the research objectives, has enabled a comprehensive analysis and a clearer understanding of the current environmental issues facing Lake Alakol.

3 Discussion

Various scientific disciplines have addressed the issues facing Lake Alakol, depending on their specific research goals. Researchers have studied the lake's cartography, its dynamic changes [3], and the area of the Alakol catchment [4]. Since the establishment of the Alakol State Nature Reserve in 1998 and its expansion in 2010, biologists, zoologists, climatologists, and tourism industry representatives have conducted research related to the region. For instance, ornithologists have focused on the endangered Dalmatian pelican, listed in the Red Book, which nests in the Alakol lake system [5].

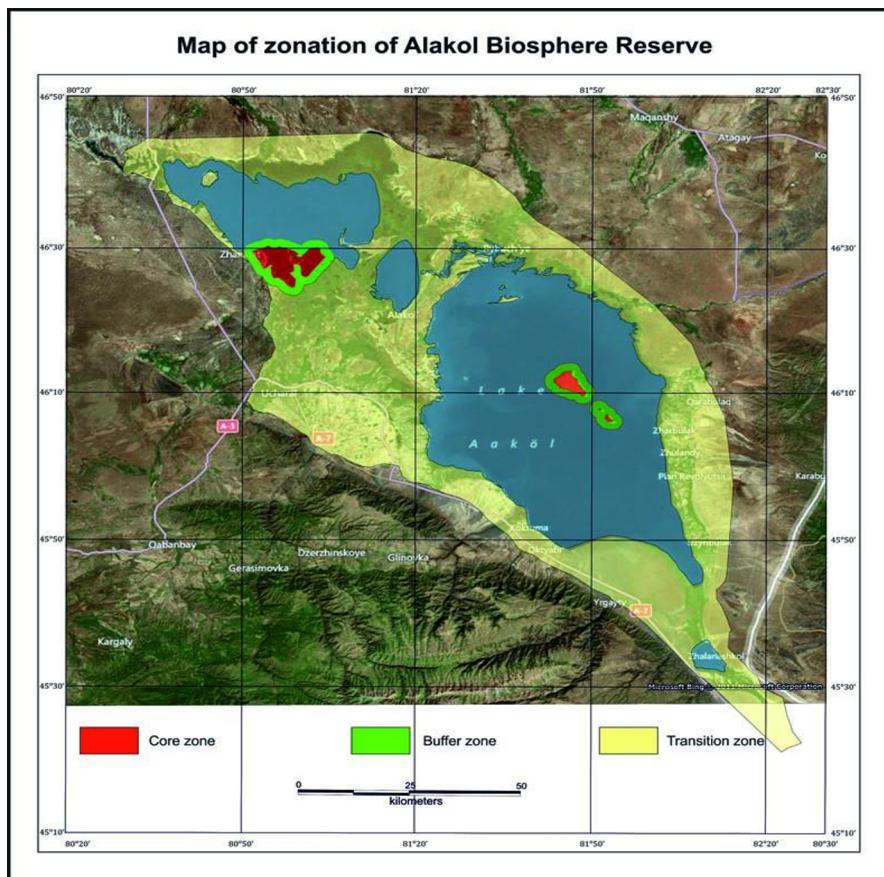


Fig. 2. Alakolsky Nature Reserve (from open sources <https://www.kazmab.kz/index.php/biosfernye-reservaty/1/natsionalnaya-set/alkol/opisanie>).

Efforts to preserve nature reserves, particularly in the Abai region (formerly East Kazakhstan), which includes several state-protected areas, have been explored by specialists studying the activities of local authorities and protected area management [6]. Environmental safety concerns, where the tourism cluster is often seen as a source of threat, have also been actively discussed [7]. These include fire safety and the impacts of human activity. In different dissertation research, interdisciplinary approaches have highlighted the global environmental issues of Alakol [8].

The authors acknowledge the significance of Lake Alakol within Kazakhstan's eco-landscape and tourism-recreational cluster. In light of numerous media reports on violations committed by both tourism service providers and visitors, this analytical research is dedicated to addressing the current challenges facing Alakol and exploring potential solutions [9, 10, 11].

4 Results

Lake Alakol ranks second among Kazakhstan's lakes in terms of surface area (2,460 km²) and catchment area (413,000 km²) [4]. The phrase 'mystery of the lake' is often heard in the media, referring to several intriguing questions. The authors focused on two key questions: The first, to which no one has yet provided an answer, is how the chemical composition of

the lake's water compares to that of seawater. The second question relates to balneology. The mud of Alakol is not only comparable to the best balneological resorts in the world, but even surpasses them, including the resorts of the Dead Sea. Tests conducted by expert commissions analyzing the composition of Alakol's water show that the lake contains one to eight grams of salt per liter, as well as elements like fluorine, bromine, magnesium, potassium, lithium, selenium, and more [12]. Another unique advantage of Alakol is its shungite and therapeutic mud. Mud, shungite, and radon baths all contribute to the health benefits enjoyed by visitors to the lake. It is worth noting that world-famous radon resorts include Baden-Baden (Germany), Gastein (Austria), and Misasa (Japan) [13].

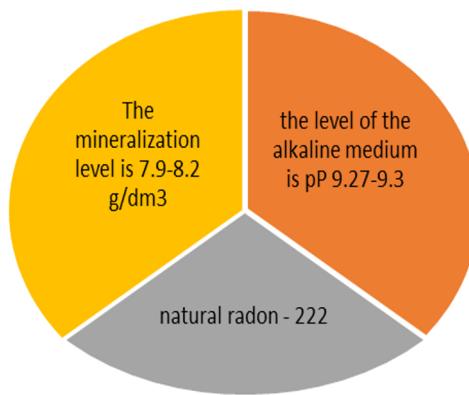


Fig. 3. Chemical composition of Lake Alakol.

The attractiveness of Alakol's tourist and recreational space lies in the natural opportunities it offers for treating a wide range of diseases.

In Soviet times, Alakol served as a place for rest and recovery for cosmonauts returning from space flights. Today, the lake is visited by tourists who purchase vouchers from resorts located on its shores, both in the Abai and Zhetysu regions.

Previously, the administrations of the East Kazakhstan and Almaty regions were responsible for implementing the state program to develop the Alakol tourism cluster. After the territorial and administrative division, the Alakol Nature Reserve and adjacent areas became part of the Abai and Zhetysu regions. According to optimistic reports and forecasts from regional authorities, there has been significant growth in both the tourism infrastructure and the number of visitors to Alakol's shores. The development of tourist facilities on the Zhetysu coast of Alakol has been impressive. In 2018, there were 181 facilities, while by 2024, this number had increased by 127% to 318. In the Abai region, the number of tourists reached 2.5 million. According to official statistics, in 2022, more than 354.5 thousand tourists were accommodated at resort facilities on the lake's coast (stat.gov.kz). This includes 164.7 thousand tourists on the east coast and 189.7 thousand on the south coast, not counting independent travelers [14].

However, tourist sites do not always match the star ratings they advertise. The infrastructure of Alakol's recreational areas faces many issues that often go unnoticed. Unfortunately, these problems extend beyond transportation and roads to include basic needs such as food, internet, communication, and services related to a comfortable stay, including environmental safety practices. Although Kazakhstan's tourism cluster boasts wonderful vacation spots comparable to those in Europe and Turkey, internal challenges prevent recreational tourism from reaching a high-quality standard. Entrepreneurs frequently express the need for 'high-quality infrastructure' to support the industry [15].

The lack of adequate infrastructure often leads to violations, which can sometimes result in environmental disasters. Several environmental safety concerns regarding Alakol's recreational areas require state intervention. The authors have identified a set of key issues, along with their causal relationships, that affect the ecological state of the Alakol region:

The first problem is road infrastructure.

The second problem is communal infrastructure.

The third problem is the anthropogenic factor, specifically the lack of environmental awareness among both the local population and visitors to the resort and tourist cluster. Notably, this factor is interconnected with the first two issues.

The road infrastructure leading to Lake Alakol at the turn of the 20th and 21st centuries was a challenge for thrill seekers. At the time, the only available transport options to reach the destination were motor vehicles and buses. While rail transport was available, travelers had to hire a taxi from the station, and there was no air service. The end of the first decade and the beginning of the 2020s marked the start of significant road works aimed at addressing issues related to road infrastructure. In July 2024, state authorities announced that the highways were fully operational. Using two major cities as starting points for the journey to Alakol, the travel times were reported as 16 hours and 11 minutes from northern Astana, and 7 hours and 8 minutes from southern Almaty. Tourists who traveled this route from Almaty to Alakol expressed satisfaction with both the road conditions and the road maintenance services [16].

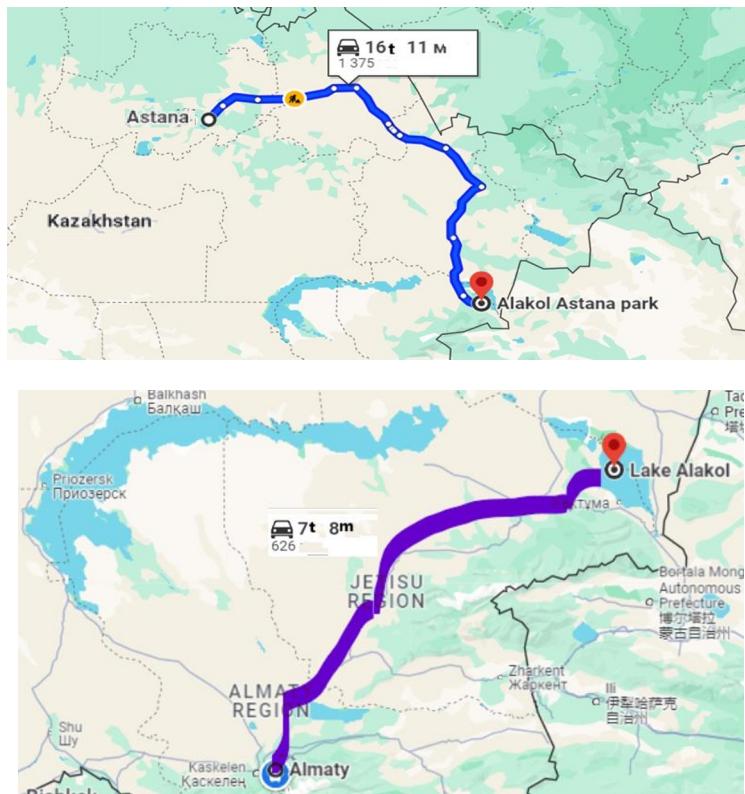


Fig. 4. Astana and Almaty routes to Alakol.

The second problem is quite complex and serious, requiring substantial investment from the state – these are issues related to water supply and sanitation. In fact, this pertains to the communal infrastructure of the entire Alakol Nature Reserve. The recreational space of the

Alakol Nature Reserve, which includes private households, private resort infrastructure, individual sewage systems, and landfills, poses an environmental threat and could become a source of significant problems.

The source of the third problem is human activity. On one hand, it is encouraging that the flow of tourists to local resorts has increased. On the other hand, the tourism infrastructure is not prepared to accommodate such a large influx. In addition to those who buy vouchers, many tourists visit Lake Alakol for one to three days, preferring to camp or stay in less comfortable conditions. The ecological awareness of Alakol's visitors, including local residents, varies. Not everyone is willing to pick up trash or even dispose of it properly. Compliance with environmental legislation within the state reserve requires constant monitoring, which, unfortunately, is not always evident in Alakol. At the same time, active changes in the recreational landscape of the tourism and resort space are occurring, which, in our opinion, could lead to delayed environmental problems.

It is also important to note the issue of ecological safety at the lake, specifically the unresolved problem with the Alakol coastline. In 2012, the leadership of the East Kazakhstan region was involved in addressing this matter. The coastline of Alakol remains one of the weak points of the Alakol Reserve, largely due to natural phenomena such as constant storms, wind erosion, spring ice floes, and the geological structure with coastal loam.



Fig. 5. Destruction of the shore of Lake Alakol [10].

The issue of the Alakol coastline has been under discussion and addressed for two decades, as experts and scientists have written about it. However, no definitive solution has yet been found [17]. Although some experts have proposed systematic solutions, citing 'recent tectonic shifts,' they suggest building an underwater boom and filling the area with rubble stone, based on existing global practices. Up to ten meters of coastline are eroded annually, and the cost of reinforcing seven kilometers of the coast is estimated to be around four to four and a half billion tenge [18, 19].

4 Conclusion

Summarizing the interim results of the author's research within the framework of "Comprehensive Research of the Natural, Historical-Cultural Landscape Potential of Alakol and the Development of Effective Mechanisms for Recreational Tourism", it is important to highlight that the Alakol State Reserve is a unique location with significant potential as a tourist destination [20]. The State policy regarding its development prospects is well justified and reasonable [21]. However, there are issues that require direct intervention from State authorities and active participation from the civil community. Entrepreneurs developing tourism businesses cannot address the full range of problems related to environmental threats. We believe that recreation at Lake Alakol should evolve from being seasonal to year-round, which would undoubtedly contribute to the

development of the recreational space, resolve many social issues, and reduce social tension. At the same time, priority must be given to the environmental safety of the Alakol Reserve, with strict enforcement of environmental legislation and the promotion of environmental education for the younger generation. It is essential to heed the recommendations of the scientific community and take steps to implement programmatic measures to preserve the Alakol coastline and engage in environmental actions to protect the recreational landscape of the State Reserve.

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