TRANSPORT ACCESSIBILITY OF THE LAKE ECOSYSTEMS IN THE NORTH KAZAKHSTAN REGION AS A FACTOR OF TOURISM DEVELOPMENT

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Abstract: The conducted research is aimed at assessing the current state of the tourist and recreational potential of the lake system in the region of North Kazakhstan (Kazakhstan). The research included the relationship between the distribution and natural diversity of reservoirs and landscapes and the density of the transport network of the studied region in the administrative division of the region. The aim of the research undertaken is to indicate the spatial differentiation of the conditions for the development of tourism in relation to the degree of lake density and transport accessibility. The quantitative and qualitative characteristics of the lakes in terms of spatial diversity and transport accessibility in the region were presented. The analysis of the natural and recreational potential, with the use of statistical methods, satellite images, comparative analysis and field studies, made it possible to identify lake ecosystems that are already used or recommended for use as objects in tourism, as well as in the national economy. The analysis of the road network allows to conclude that its density, despite the higher indicators than the national average, does not fully allow the use of the region's tourist potential and may constitute a barrier to its development.

Key words: lakes, lake ecosystems, North Kazakhstan region, road network, tourism, transport

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INTRODUCTION

Tourism in Central Asia, in the pre-Covid-19 era, was becoming more and more popular, which resulted in the interest of numerous researchers (Werner, 2003; Kantarci, 2007a; 2007b; 2007c; Smykova, 2015; Shakirova, 2015; Tleubayeva, 2018; Wendt, 2020). Due to its importance, numerous studies were conducted in Kazakhstan, but most of them concerned mountain regions located in the south and south-east of the country (Ziyadin and Takhtaeva, 2014; Aliyeva et al., 2019; Chernova and Sukhova, 2017; Chlachula, 2019; 2020; Kalugin et al., 2019). However, according to the government's decision, tourism is to constitute a rapidly growing sector of the economy, both at the national and regional level (Zhidkoblinova, 2013; Abubakirova et al., 2016; Tulbayeva et al., 2017), as well as with cross-border tourism, which plays an increasingly important role in the tourism services sector (Dunets et al., 2019; Więckowski and Saarinen, 2019; Cerić and Więckowski, 2020).

The North Kazakhstan region is characterized by unique physical and geographical conditions and historical heritage (Kuralbayev et al., 2016), which are important factors in the development of tourism. The region is located in the north of the Republic, on the southern edge of the West Siberian Lowland, partially occupying the Kazakh Highlands, known as Saryarka. The northernmost point is at 55°26`N, in the south 52°13`N, the westernmost point is 65°57`E, and the easternmost point is 74°02`E. The maximum distance from north to south is 375 km, and from west to east - 602 km. The region's boundaries and division were established on April 8, 1999, its area is 97.99 thousand km^2. The region covers only 3.6% of Kazakhstan's territory, and 60% of its territory is arable land. The total length of the borders is 2,220 km, including the Kustanay region - 300 km, Akmola - 810 km, Pavlodar - 180 km, he regions of the Russian Federation - 930 km, including Kurgan - 210 km, Tyumen 180 km, Omsk 540 km. The North Kazakhstan region is divided into 13 administrative counties (Table 1). In administrative terms, there are five cities in the region - Petropavlovsk, Bulaevo, Mamlyutka, Tayinsha, Sergeevka; four urban settlements - Smirnovo, Talshyk, Enbek (Novoishimskoye), Kishkenekol, 203 rural communes and 759 rural settlements.

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The administrative center of the region is Petropavlovsk, founded in 1752 as the fortress of St. Peter. Tourism is an important sector of the economy of each country (Zhakupov et al., 2015), and its importance is also appreciated in Kazakhstan (Zhidkoblinova, 2013; Ziyadin and Takhaeva, 2014; Syzdykbayeva et al., 2015), a country with a great potential of natural values, which include lake ecosystems of the North Kazakhstan region. Tourism, and especially sustainable tourism (Aimagambetov et al., 2018) and agritourism (Tleubayeva, 2018), balneotourism (Wendt, 2016), slow tourism (cittaslow) (Lewandowska et al., 2019) and a new techlogies as VR in tourism and economy (Ziyadin et al., 2014; Watkins et al., 2018; Korinth et al., 2019; Ziyadin et al., 2019a; 2019b; Bógdał-Brzezińska, 2020) play an important role as a perspective direction of development of its ecomy. However, its development still faces a number of barriers (Aliaskarov et al., 2017), among which transport, which is of key importance for the development of tourism (Bazarbekova et al., 2018), unfortunately holds a high position. The marketing of tourist services and their promotion are similarly poorly developed in Kazakhstan, also playing an important role in the development of this sector of the economy.

From the point of view of values conducive to the development of tourism, the natural resource potential of the research area is characterized by a high degree of lakes. Numerous lakes are used mainly for agricultural purposes (fishing) and as an important tourist asset (Nazarova et al., 2019; 2020). However, the use of lakes is limited, although the region ranks first in Kazakhstan in terms of their number. It is important that numerous studies emphasize the uniqueness of the origin of northern Kazakhstan's lakes at the geosystem and ecosystem level, which is important as a tourist asset. Scientific research on the study of lakes and river basins in northern Kazakhstan was published in the works (Beletskaya, 1987; Vodopyanova, 1985), confirming their high natural value and importance in the region's ecosystems. The study of landscape, recreational and tourism potential has been the subject of the work of numerous authors (Semochkina, 2012; Moldakova and Dmitriyev, 2016; Fomin et al., 2020; Wendt, 2020). Data on the number of lakes of the northern region of Kazakhstan (mainly in the old borders) vary from 2,500 to 3,500. This can be explained by taking into account the water reservoirs in the flood plains (periodic), which become lakes as a result of spring floods (Dmitriyev et al., 2016; Fomin, 2020).

The aim of the study is to analyze the spatial differentiation of tourism development conditions in relation to the degree of lakes and transport accessibility (Więckowski et al., 2014; Michniak et al., 2015). The analysis of the natural and recreational potential will allow the identification of lake ecosystems that are already used or recommended for use as objects in tourism and in the economy. The hypothesis verified in the research is the poor development of the road network, which is characterized by too low density. Which is a barrier to the development of mass tourism.

MATERIALS AND METHODS

The research material includes data collected on the basis of research carried out under the "Ekosfera" association, from the project "Natural resources and environmental management of Akimat in the North Kazakhstan region", from the research topic "Creation of a lake database in the North Kazakhstan Region" (Dmitriyev et al., 2013). Additional data comes from the interpretation of the collected satellite images of the region. All the factual material was verified and supplemented during field research. Mathematical and statistical methods, classic for research in the geography of tourism, were used to analyze the research results and the characteristics of lake ecosystems (Wendt and Bógdał-Brzezińska, 2018). Statistical methods were used for the classification of lakes and the analysis of spatial differentiation broken down into administrative units of the region. Administrative regions were subjected to a comparative analysis using quantitative methods (Creswell, 2003). Similarly, an analysis of the transport accessibility of lake ecosystems was carried out and their classification depending on the number, size of the area, lake level or ownership relations.

RESULTS AND DISCUSSION

As a result of the research, 2.328 lakes were identified in the northern region of Kazakhstan with a total area of 452430.5 ha. Lakes were defined as water reservoirs over 10 ha, excluding smaller reservoirs from the research.

Table 1. Lake rate index of administrative units of North Kazakhstan Region
Source: https://elib.skolib.kz/catalog/item386.html and the authors' own calculations

Name of administrative units	Area (thous. km²)	Number of lakes	Area of lakes (hectares)	Lake rate index (%)
Region North Kazakhstan	97.99	2328	452430.4	4.62
County Zhambyl	7.46	826	62870.0	8.43
County Mamlyutsky	4.10	404	28442.5	6.94
County Kyzylzhar	6.15	244	21273.7	3.46
County Esil	5.14	138	15468.8	3.01
County M. Zhumabayeva	7.81	122	21015.5	2.69
County Akkayyn	4.71	115	38608.1	8.20
County Ayyrtau	9.62	95	31869.1	3.31
County Timiryazevsky	4.51	91	21674.6	4.81
County Shal akyna	4.84	82	17816.2	3.68
County Taiynshinsky	11.42	68	29505.6	2.58
County Ualikhanov	12.88	67	113015.2	8.77
County Akzhar	8.04	39	32983.1	4.10
County G. Musrepov	11.09	30	16038.0	1.45
City of Petropavl	0.22	7	1850.0	8.41

Table 2. Road network density in selected countries
Source: (Bazarbekova et al., 2018 and https://www.cia.gov/the-world-factbook/field/roadways/country-comparison/)

Country	Area (km²)	Road (km)	Road density (km/100 km²)	Year of data
Kyrgyzstan	78867	34000	43.11	2018
Belarus	207600	86600	41.71	2017
Ukraine	603550	169694	28.12	2012
Tajikistan	144100	30000	20.82	2018
Uzbekistan	447400	86496	19.33	2000
Turkmenistan	488100	58592	12.00	2002
Russia	17098242	1283387	7.51	2012
Mongolia	1564116	113200	7.24	2017
Afghanistan	652230	34903	5.35	2017
Kazakhstan	2724900	95409	3.50	2017

Interesting results were obtained regarding the spatial distribution of lakes in the region of North Kazakhstan, which update and confirm the results of previous studies (Dmitriyev et al., 2016). The largest number of lakes is in the territory of the Zhambyl County. In second place is the Mamlyut region - 404 lakes. The third area of Kyzylzhar - 244 lakes. The smallest number of lakes is in the Akzhar County – 39, within G. Musrepov - 30 lakes and the city of Petropavel - 7 lakes. However, in the latter case, numerous smaller water tanks should be noted (Table 1).

The research allowed to determine the total area of lakes, which amounted to 452430.4 ha. Research shows that the lakes are very unevenly distributed in the territory of the North Kazakhstan region. Thus, the largest area of lakes, and hence the lake index, is in the Ualikhanovsky County – 113015.2 ha. The Zhambyl region is in second place – 62870.0 ha. Smaller values of the total lake area are found in the Shal akyn regions – 17816.2 ha, G. Musrepov – 16038.0 ha, Esilsky – 15468.8 ha. The area of lakes in the city of Petropavlovsk was 1850.0 ha, which gives it a high lake index. In order to achieve the aim of the research, apart from determining the lake density index, it was necessary to analyze the spatial differentiation of the road network density. It was carried out in terms of the entire road network and its division into national and regional roads. According to the literature (Page, 2004; Bazarbekova et al., 2018; Dinu, 2018), the transport network, the wider communication accessibility is crucial for the implementation of various forms of tourism. When researching the North Kazakhstan region, it should be borne in mind that both the size of the country and the region and the degree of development of the transport network should be analyzed in relation to the geographical conditions of Central Asia and the country's population density (18 million). And its comparison to the density of the road network of classic European tourist destinations (e.g. Austria, France, Germany and even to Belarus or Ukraine) is not substantively justified (Table 2).

The analysis of the transport network in terms of the length of roads and railways in the region allows it to be concluded that the main role is played by road transport. The available railway lines limit the traffic to the stations, among which a large railway junction stands out - the city of Petropavlovsk. The road network is differentiated into roads of national (republican) importance and regional roads. The total length of all national and regional roads is 3905 km. National roads constitute 37.5% (1468 km) and regional roads 62.5% (2437 km). Despite the low density of the road network, especially national roads in some regions, in the case of Kazakhstan, it can be concluded that the road network of the North Kazakhstan region (3.5km/100km^2) is slightly, but still higher than the national average (4.0km/100km^2). This allows for a good degree of road development in the studied region compared to the whole country, but does not translate into sufficient transport accessibility to naturally valuable lake areas.

Table 3. Diversification of the road network and lakes rate index in the administrative units of the North Kazakhstan region (Source: https://elib.skolib.kz/catalog/item386.html and the authors' own calculations)

Region, county and city	Area (thous. km²)	Roads			Lakes rate index (%)
		Total	state	regional	
		km	km / 100 km²		
North Kazakhstan region	97.99	3905.0	3.99	1.50	2.49	4.62
County G. Musrepov	11.09	664.3	5.99	2.96	3.03	1.45
County Taiynshinsky	11.42	613.2	5.37	1.24	4.13	2.58
County Akzhar	8.04	374.2	4.65	1.01	3.65	4.10
County Shal akyna	4.84	223.4	4.62	2.22	2.40	3.68
County Zhambyl	7.46	325.1	4.36	1.61	2.74	8.43
County Ayyrtau	9.62	415.4	4.32	0.89	3.43	3.31
County Esil	5.14	209.2	4.07	1.45	2.62	3.01
County Kyzylzhar	6.15	245.0	3.98	3.45	0.54	3.46
County Mamlyutsky	4.10	154.0	3.76	2.24	1.51	6.94
County Akkayyn	4.71	155.9	3.31	1.10	2.21	8.20
County Timiryazevsky	4.51	128.4	2.85	0.52	2.33	4.81
County M. Zhumabayeva	7.81	166.6	2.13	0.98	1.15	2.69
County Ualikhanov	12.88	230.3	1.79	0.57	1.22	8.77
City of Petropavl	0.22	-	-	-	-	8.41

As many as 9 out of 13 regions have a road density higher than the average for the whole country and 7 of them higher than the average for the region (Table 3). The length of roads in the counties of the region varies, depending on the development of infrastructure, settlement, and the presence of industrial, agricultural and other facilities in their area. The greatest length of roads is recorded in the area of G. Musrepova, it is 664.3 km. The second place in terms of the length of roads is taken by the Taiynshinsky County – 613.2 km. The third place belongs to the Ayyrtau County – 415.4 km. The fourth and fifth places are shared by the Akzhar and Zhambyl Counties, with road lengths of 374.2 km and 325.1 km respectively. The shortest length of roads is in the Mamlyutsky region - 154 km. Nevertheless, there are many well-known and significant ecological tourism sites in this area.

Among them is Minkeser Lake with healing mud, as well as the Mamlyutsky State Reserve (Baryshnikov et al., 2019). The collected data characterizing the length and density of the road network justify the conclusion that the road network is well developed in comparison to the entire country. It enables relatively (in the conditions of Kazakhstan) access to tourist attractions, the ability to reach some lakes, transit to other regions of the country and to the Russian Federation (Ismagulova et al., 2020). The density of the road network, above the national average (including G. Musrepov, Taiynshinsky, Akzhar, and Shal akyna regions), is related to numerous sediments established by the lakes (access to water and obtaining food).

At the same time, the quality of road surfaces does not always meet international standards, which is one of the possible problems for the development of the tourism industry in the region. However, in the years 2006-2019, the quality of roads clearly improved, increasing from 2.78 (2006) to 3.60 (2019), with the world average (for 141 countries) at the level of 4.07. Of all the regions in the north of Kazakhstan, the region of North Kazakhstan has the highest lakes – 4.62%. Ualikhanovskiy county has the highest lake rate - 8.77%. This ratio is slightly lower in the counties, Zhambyl 8.43% and Akkayyn – 8.20%. Similarly, within the city of Petropavel, the lake rate is high, reaching – 8,41%. Less than 5% of the lake surface is characterized by 8 regions, including the G. Musrepova County has the lowest lake surface index value (Figure 1).

The analysis of the "average" lake surface indicators in the administrative division revealed their ranking. The maximum value of 1686.79 ha belongs to the Ualikhanov County. In addition, there was a sharp decrease in the indicator by half in the Akzhar region - 845.72 ha. Very low rates were recorded in the remaining 11 counties of the region, including less than 100 ha. Another index characterizing the share of lakes was determined, which indicates the share of the area occupied by lakes in the area of the area of the studied region. Thus, the Ualikhanovsky County has the highest lakes, which are 1.13 thousand km^2. In the remaining 12 counties and the city limits of Petropavlovsk, the value of the indicator is lower than 1 (Figure 2).
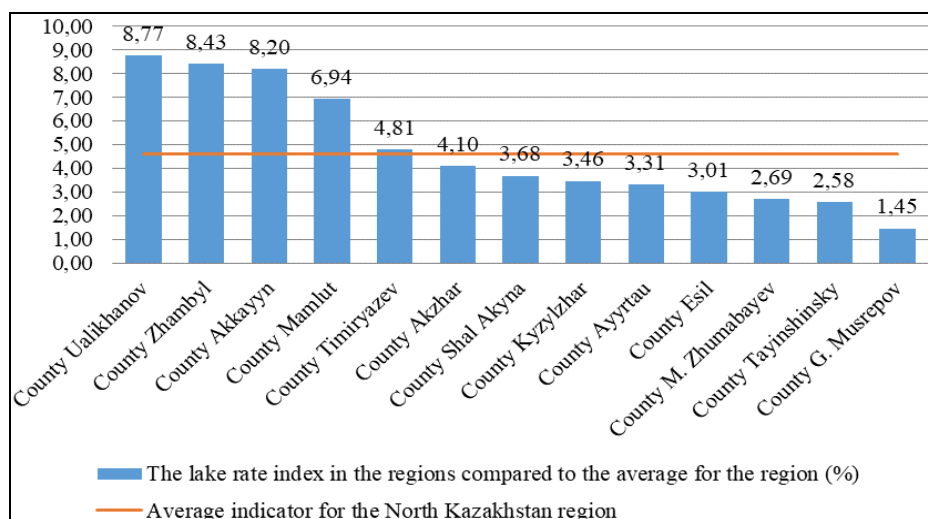

Figure 1. The lake rate index in the North Kazakhstan region, compared to the average for the study area (%) (Source: based on the authors' calculations)
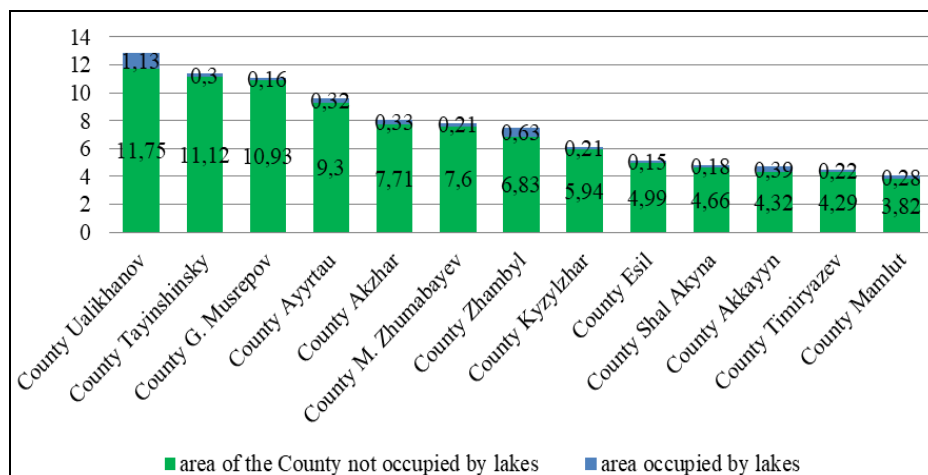
The analysis of the number of lakes depending on the area allowed to draw some conclusions. The reservoirs ranging in size from 20 to 50 ha predominate. The smallest indicator concerns reservoirs up to 20 hectares. At the same time, as already mentioned, it should be noted that when compiling a database of lakes in the North Kazakhstan region, water bodies of less than 10 hectares were not taken into account (there are a lot of them, especially in the Zhambyl and Mamlyutsky counties). So the actual picture may be slightly different. The number of lakes from 50 to 100 ha and over 100 ha, 549 and 512, respectively, which is almost the same. One of the problems related to the development of the recreational

Figure 2. Ratio of the area of lakes in the counties to the area of the region of North Kazakhstan (thousand km^2) (Source: based on the authors' calculations)

potential of lakes is their overgrowing. There is an increase in overgrowing of lakes with a smaller area, which can be seen in Figure 3. It can be assumed that the smaller the area of a lake, the more susceptible to degradation and eutrophication processes is. The anthropogenic factor is the main cause of lake degradation. Small-scale water bodies find it difficult to cope with anthropogenic pressures through natural processes, which inevitably leads to degradation. There are the largest water reservoirs in the study area. In the Aiyrtau - Imantau region, they cover 54.5 km^2, Shalkar – 31.2 km^2. In the Akzhar region, these are the lakes Ulken-Karoy – 199.0 km2, Kishi-Karoy – 96.0 km^2. In Yesil Big Tarangul – 42.1 km^2, in the Timiryazevsky area - M. Kak – 39.6 km^2. On the territory of the Mamlyut region, Minkeser Lake – 38.6 km^2, Stanovoe – 29.6 km^2. There are Seletyteniz lakes – 750.0 km^2 in the Ualikhanov region, Teke – 265.0 km^2, and in the Tayynshinsky Kalibek region – 94.0 km^2, Alabota – 27.4 km^2 (Fomin, 2020). The largest water catchment area is the lake Seletyteniz – 750.0 km^2. In favorable years, its depth reaches 3.2 m, and the volume of water mass is 1.5 km^3. It is supplied by the Sholaksay and Seleta rivers, as well as 19 streams. The average depth of the reservoirs in the region is
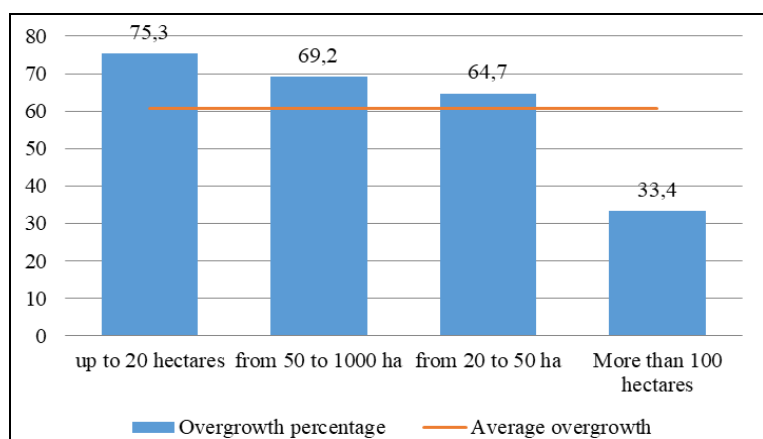

Figure 3. Dependence of lake overgrowth on their area (Source: based on the authors' calculations)

1.5-2.5 meters, and the water volume depends both on the lake surface and the depth and season of the year. The amount of rainfall that determines the high flow of water bodies is very important. There are lake basins of various origins in the region: tectonic, hydrogenic, residual, suffusion-landslide, aeolian and thermocarp.

There are lake basins of various origins in the region: tectonic, hydrogenic, residual, suffusion-landslide, aeolian and thermocarp. The lakes are diverse in terms of their chemical composition and the degree of mineralization of the water. Reservoirs belonging to the classes of hydrocarbons and chlorides, rarely - sulphide ones, prevail. The mineralization ranges from 0.4 to 300 g/l (self-deposited). Unleavened ones include those that have a salinity of up to 1 g/l. Water from such lakes is used for domestic needs and irrigation. Brackish tanks have a salinity of 1 to 25 g/l, water with a salinity of up to 2 g/l can be used for drinking purposes, and up to 3.5 g/l - for watering animals. At a concentration of 25–50 g/l and higher, water is classified as salt. The water is bitter-salty in many of the region's lakes. Magnesium salts give it this flavor (Fomin et al., 2020).

The uniqueness of freshwater lakes determines their strategic importance as freshwater reservoirs. The share of fresh water in the lakes of the northern region of Kazakhstan is about 4 km^3, in this respect almost all sediments in the region are located on the shores of fresh and brackish reservoirs. For example, the share of the three lakes Shagalalyteniz, Imantau, Saumalkol accounts for more than 900 million m^3 of fresh water. The self-identification of the cultural and historical past of this territory is complemented by a variety of toponyms of hydronyms of Turkish and Russian origin. This creates an opportunity for the formation of ethno-ecological tourism (Moldakova and Dmitriyev, 2016; Tiberghien et al., 2017; 2018; Tiberghien, 2019) and ethno-cultural tourism (Bancerova and Kasimova, 2018; Tiberghien and Xie, 2018). As in other regions of the country (Saparov et al., 2017), the names most often reflect some important feature that distinguishes the reservoir that determines the quality of the water or its other characteristics: Bitter, Sól, Pitnoe, Zhamankol, Akkol, Karakol, Zhaltyrkol, Kyzylsor, Shirokoe, etc. Often the names of people such as Plekhanovo, Ponomarevo, Shitovo, Marushkino, etc. appear in the name of the lake. Many reservoirs are named after plants and animals - Kamyshnoye, Rogozyanka, Volchye, Sobachye, Kobylye, Tekekol, Koyandykol. Unfortunately, for most lakes it is impossible to determine the origin of their names.

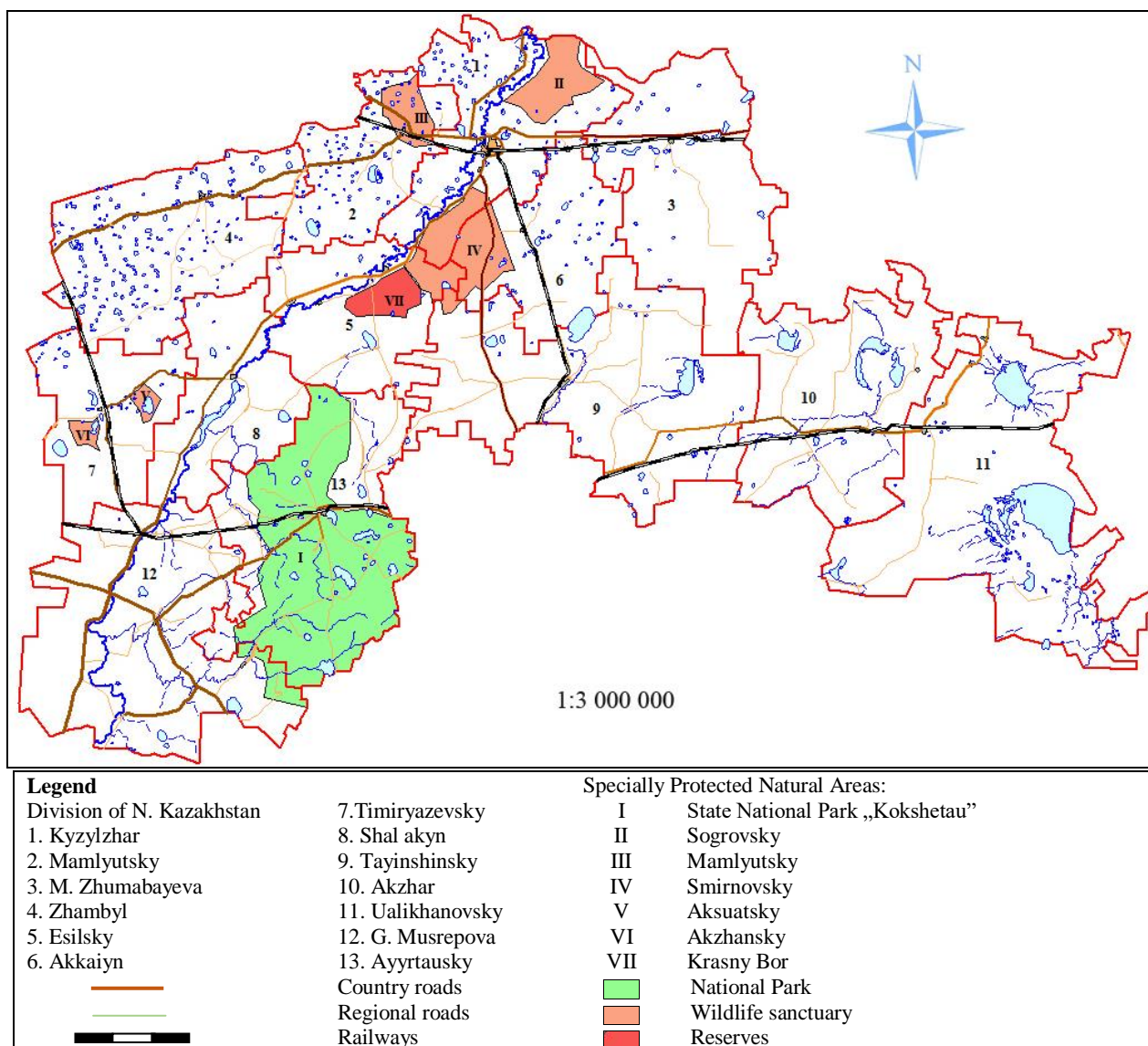| Legend		Specially Protected Natural Areas:	
Division of N. Kazakhstan	7.Timiryazevsky	I	State National Park „Kokshetau"
1. Kyzylzhar	8. Shal akyn	II	Sogrovsky
2. Mamlyutsky	9. Tayinshinsky	III	Mamlyutsky
3. M. Zhumabayeva	10. Akzhar	IV	Smirnovsky
4. Zhambyl	11. Ualikhanovsky	V	Aksuatsky
5. Esilsky	12. G. Musrepova	VI	Akzhansky
6. Akkaiyn	13. Ayyrtausky	VII	Krasny Bor
Country roads			National Park
Regional roads			Wildlife sanctuary
Railways			Reserves

Figure 4. Distribution of reservoirs and nature areas under special protection, in connection with the transport routes of the North Kazakhstan region (Source: author development)

The lakes are characterized by plant diversity, represented by vegetation immersed in water, and deposits of peat, reeds, etc. Peat deposits can be used as organic fertilizers, and reeds in construction can be used to produce house wall panels. There is practical experience and high positive results from using lakes submerged vegetation as food for domestic animals and birds.

The analysis of the results of mathematical statistics showed that in the region of northern Kazakhstan there is a large number of lake ecosystems, which are distinguished by their natural uniqueness, and have great recreational potential for the development of economic activities and tourism. The research results allowed for the creation of a schematic map visually confirming the natural and recreational potential of lake ecosystems, as well as reflecting the development of the transport network in the region (Figure 4). We assume that for the development of tourist and recreational potential large and deep water reservoirs used as recreational facilities, such as Bolshoi Tarangul from the Yesil region, Maly Tarangul from the Shal Akyna region, Shalkar and Imantau from the Aiyrtaussky region, etc., will be more in demand. At the same time, it is important to remember about shallow waters with a large layer of bottom sediments, represented by mineral silt, which enables their development as balneological objects. In many lakes, bottom sediments are represented by healing muds, which are widely used by the region's population, including Zhamankul (Zagradovka village), Minkeser (Minkeser village), Snezhinka - Krivoye (Mirnoye village), Stanovoye (Stanovoye) village) of the region Mamlyut (Dmitriyev et al., 2018).

Each of the 13 administrative counties of the North Kazakhstan region has at least several unique lake systems that can be used to develop tourism. Since the population of the region makes extensive use of the recreational potential of local water reservoirs, one can speak of possible domestic tourism. The main factors of attractiveness are natural aesthetics, cultural and historical attractiveness, the presence of biological resources (mineral silt, fish, waterfowl).

The main addition is the features of the landscapes, with their unique charm. Based on the analysis of the annual limit of withdrawal of fish stocks in the region of northern Kazakhstan, the largest fish reserves are in Bolshoi and Maly Tarangul, Zhaksy Zhangistau, Kuspek, Kishi Karoy and Sergeevskoye lakes. The role of specially protected natural areas, which include unique natural landscapes, cultural and historical sites, is important. Sixteen prospective, specially protected natural objects have been scientifically confirmed in the region of northern Kazakhstan.

The reserves have been officially introduced, these are the Sogrovsky, Smirnovsky, Mamlyutsky reserves of national importance, as well as Akzhansky and Aksuatsky reserves of regional importance. The Sergeevskoe reservoir, built on the Esil River, as well as the river itself with numerous floodplain lakes, is of particular recreational importance for the region (Dmitriyev et al., 2020). Sergeevskoe reservoir is located in the Shal akyn area, it is about 100 kilometers long. This place is unique in terms of nature and recreation, it is recommended both for the beach and outside. There are unique landscapes and topography, rich flora and fauna, and a large number of floodplain lakes. There is a part of the "Kokshetau" State National Park in the Aiyrtau County. The ecosystems of the Shalkar and Imantau lakes are of particular importance for recreation. In their area, with unique landscapes, pedestrian and bus routes, ecological paths have been marked out, tourist service facilities were built, represented by holiday resorts, with a total capacity of about 500 people.

CONCLUSION

The raw material potential of northern Kazakhstan is certainly interesting. The high index of lakes in this area, the diversity of reservoirs and landscapes of the studied region indicate the possibility of using water ecosystems for economic purposes, for the development of ecological tourism and the tourism industry in general. The limited use of the natural potential of lakes today (mainly for fishing purposes) poses certain tasks for their future development as recreational and balneological facilities. Of course, lakes should be considered in conjunction with landscapes. This gives a wider range of recreational use, including horse riding, hiking, sunbathing and sightseeing, hunting for water game, fishing, picking berries, mushrooms, etc. The favorable geographical location of the North Kazakhstan region, the diversity of landscapes, the cultural and historical heritage, the location in the zone of the restricted region, the uniqueness of the nature of the forest-steppe region, are of interest to the development of tourism. It proves the enormous possibilities of domestic and international tourism development in the region. In the region of northern Kazakhstan, transport routes are well developed, compared to other regions of the country, which ensures traffic in its territory, including lake ecosystems. The motorways, especially in the Nur-Sultan - Petropavel direction, are of particular importance in this case.

Additionally, the border location of the North Kazakhstan region with the Russian Federation enables tourists from Russia to visit it (Batyrova et al., 2018). However, the analysis of road network density indicators, compared to other countries in the region, shows their relatively low value. Thus, higher values than the indicators for the rest of the country, the density of the road network does not ensure sufficient transport accessibility to areas with a high degree of lakes, which is a barrier to the development of tourism both domestic and the arrival of tourists from the Russian Federation.

At the same time, one of the main problems for the development of the recreational potential of the lakes of the North Kazakhstan region is the insufficient development of tourist infrastructure and services. Further research on recreational nature management is necessary for the harmonious and sustainable functioning of ecosystems, the development of scientific recommendations for the development of facilities in order to preserve their value.

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