GeoJournal of Tourism and Geosites
ISSN 2065-1198, E-ISSN 2065-0817

Year XVI, vol. 50, no. 4, 2023, p.1494-1505
DOI 10.30892/gtg.50429-1147

GEOSPATIAL MODELING OF THE DISTRIBUTION OF TOURIST ATTRACTIONS FOR THE FUNCTIONAL DELIMITATION OF COASTAL ZONES

Anna A. MIKHAYLOVA
Immanuel Kant Baltic Federal University, Kaliningrad, Russia, e-mail: tikhonova.1989@mail.ru

Vladimir N. BOCHARNIKOV
Pacific Geographical Institute FEBRAS, Vladivostok, Russia, e-mail: vbocharnikov@mail.ru

Evgeniya E. GIRICHEVA
Far Eastern Federal University, Vladivostok, Russia, e-mail: evg.giricheva@yandex.ru

Dmitry V. HVALEY
Immanuel Kant Baltic Federal University, Kaliningrad, Russia, e-mail: DKHvalei1@kantiana.ru

Andrey S. MIKHAYLOV*
Institute of Geography of the RAS, Moscow, Southern Federal University,
Rostov-on-Don, Russia, e-mail: mikhailov.andrey@yahoo.com

Citation: Mikhaylova, A.A., Bocharnikov, V.N., Giricheva, E.E., Hvaley, D.V., & Mikhaylov, A.S. (2023). GEOSPATIAL MODELING OF THE DISTRIBUTION OF TOURIST ATTRACTIONS FOR THE FUNCTIONAL DELIMITATION OF COASTAL ZONES. *GeoJournal of Tourism and Geosites*, 50(4), 1494–1505. https://doi.org/10.30892/gtg.50429-1147

Abstract: Coastline attracts people for recreational, residential, entrepreneurial, and industrial activity, resulting in a worldwide phenomenon of coastalization – the shift to the coasts. The proximity to marine coasts is, therefore, a competitive advantage and a development resource for coastal regions around the globe. However, the efficient use of coastal economic-geographical position depends on the numerous external and internal factors, and requires, firstly, a functional delimitation of the coastal zone, and, secondly, an integrated coastal zone management. This article studies the relationship between the proximity to the seacoast and the development of the tourism sector. The aim is to identify the geographical boundaries of using the seaside position in the interest of tourism development; in other words, we identify the functional boundaries of the coastal zone associated with tourist attractions. The research area covers two Russian regions located on the Baltic Sea (Kaliningrad Oblast) and the Sea of Japan (Primorsky Krai). The findings reveal that the optimal zone for developing coastal tourism is within a 10km of the sea, with the most preferable zone extending no further than 1km from the coast. The density of tourist attractions has a positive correlation with the concentration of service sector facilities and infrastructure.

Key words: coastal tourist attractions; coastal region; economic potential; coastal area; tourism; coastal eco-system; coastline; sustainable development

* * * * * *

INTRODUCTION

Planet Earth is the realm of the hydrosphere that covers over 70% of the entire globe. The sea and its coasts are of historical interest for mankind, and the World Ocean remains to be the vital resource for the wealth of nations. Countries with access to the sea have been able to benefit from this advantageous economic-geographical position throughout history (Hoegh-Guldberg et al., 2013). Coastal location has always provided the best access to the worldwide trade and the use of a diversity marine resources (Li et al., 2023; North, 1958). Recent developments in geo-information analysis and remote sensing have improved our understanding of the natural and anthropogenic processes that occur in the coastal zone. Studies have evaluated the population change in coastal areas as an indicator of their development. Burke et al. (2001) estimate that by mid-1990s about 39% of the world's population (or 2.2 bln people) lived on 20% of the landmass, or 100-km coastal zone of 1.6 mln km long. An early study by Small and Nicholls (2003) showed that the world's most favored area for human settlement is the 5-kilometer coastline predominantly concentrated in small and medium-sized cities and densely populated rural areas. The altitude of the territory also plays an important role: the population density in the coastal zone decreases faster with altitude than with distance from the coast. The favorable height for population concentration is below 20 m above sea level. The United Nations (2023) approach also includes a two-dimensional measurement of the coastal zone, with a range of 100 km from the coast and a threshold of 50 m above sea level. The first indicator aims to measure anthropogenic pressure on coastal ecosystems and the second to measure their vulnerability to the influence of natural factors.

Crowell et al. (2007) raise the methodological problem of classifying municipalities as coastal and the associated inaccuracy in estimates of the coastal population. Using the example of the USA, the authors show that when including the

* Corresponding author

administrative units with 100 km of coastal zone, which actually do not have access to "big water", as well as those bordering the Great Lakes, the share of "coastal" population increases from 30 to 53%. As a recommendation, the authors propose to apply a wider set of criteria for classifying territories as coastal. According to Maul and Duedall (2019), the development of the world's coastal territories are determined by three factors of anthropogenic origin: higher population density, being twice the world average; growing migration inflows (especially the coastal areas of China and Southeast Asia); and urbanization (14 of the 17 largest cities in the world are coastal). Neumann et al. (2015) provide estimates of the coastal population growth in the horizon of 2030 and 2060, projecting the strongest growth in Asia and Africa, moderate growth in Europe and North America, and population stabilization for Latin America and the Caribbean.

Non-demographic factors have a significant impact on coastal ecosystems, and the most important among them are economic factors. In 2012 at the United Nations' "Rio+20" conference the economies related to the use of marine resources were named blue economy. According to the OECD (2016), in 2010, the maritime industries accounted for 2.5% of global value added and 1% of jobs. Second among the blue growth activities is the marine and coastal tourism sector. A review by Kabil et al. (2021) shows an active growth of interest in the topic of the Blue Economy after 2012, but the issues of marine and coastal tourism still occupy an insufficient place in the scientific agenda. Aspects related to the location of marine and coastal tourism infrastructure is particularly underrepresented. Coastal regions lead in attracting tourism, making marine and coastal tourism one of the fastest growing sectors of the global economy and tourism segments. One in two tourists visited the coastal zone for tourism and recreational purposes, and the contribution of coastal regions to the global tourism sector is estimated at 30% (Kabil et al., 2021). By 2030, the share of marine and coastal tourism is expected to reach 26% of the global ocean economy with an increase in total employment to 8.6 million people (Dwyer, 2018). For individual countries, the figures for tourism's contribution to blue growth are even higher: in China (Liu et al., 2020), for example, it already accounted for 47.8% of the value added of major maritime industries in 2018.

Previous studies on the geography of coastal tourism have shown spatial asymmetry of tourism activities (Mou et al., 2020; Kubo et al., 2020). China's experience shows skewness of tourist attractions (TAs) of coastal regions to the coast, resulting in structural holes and imbalance of tourist flows (Mou et al., 2020). The factor of transport accessibility has a significant impact: shorter (about 10 km) tourist routes with a higher concentration of TAs are preferred. An example of Spain shows that increase tourist accommodation facilities (rural estates) in the coastal zone over time results in a gradual reduction of the average distance to the sea (Vojnović, 2005). Proximity to the city has a positive effect as well. The analysis of the land transformation as a result of the development of tourist infrastructure (Boavida-Portugal et al., 2016) showed that the main zone of urban land use is concentrated within 500 m from the coastline, and the most promising tourist zone is located within 2-5 km from the sea. The experience of Japan (Kubo et al., 2020) showed an average median distances traveled by a tourist to the beach of 35.5 km in summer and 12.5 km in winter. Also, a number of researchers point out the significance of socio-economic factors when assessing the demand (Liu et al., 2023) and latent economic value of coastal tourism facilities (Boto-Garcia and Leoni, 2023).

In this regard, assessing the use of coastal location for tourism development is becoming increasingly important. The aim of the study is to define the functional coastal zone by assessing the spatial location of coastal tourist attractions (CTAs) – objects related to coastal tourism or marine resources. The main objective is to quantify the characteristics of the coastal territories, to identify the existing practices of use and the potential opportunities in the development of coastal areas. We test the hypothesis that the location of TAs is positively influenced by factors of proximity to the sea, state border and urban settlement. In this study we examine the location of TAs in relation to the coastline of the Kaliningrad Oblast and Primorsky Krai. Based on the functional approach to the delimitation of the coastal zone, the paper focuses assessing the territorial distribution of the marine and coastal tourism industry in the coastal regions.

MATERIALS AND METHODS

Research data for analyzing spatial patterns in the location of coastal tourist attractions

The study adopts the methodology proposed by Ciacci et al. (2023), who view both natural and infrastructural objects of the coastal zone as an asset (for tourism industry) to economic development potential of coastal regions.

An important methodological task was to determine the types of activities that can be identified as part of coastal tourism cluster – organizations operating in the field of recreation, entertainment, leisure, transport, and services. Open data on the location of the following types of facilities were used: a) Tourist attractions (places of interest, natural objects, infrastructural objects, sports facilities), b) Tourist accommodation facilities, c) Public catering establishments (cafes and restaurants), d) Retail stores. Additionally, CTAs were identified according to one of the criteria: a) they are part of the coastal ecosystem; b) functionally, historically or thematically related to the sea; c) utilize the image of the sea; d) located on the coast, but not directly related to the marine theme.

The territory of the regions was segregated into proximity zones (hereinafter referred to as cells) by distance:

- from the seacoast (for the Kaliningrad Oblast – the Baltic Sea, incl. the Kaliningrad and Curonian Lagoons; for the Primorsky Krai – the Sea of Japan, incl. the Peter the Great Gulf);
- from the administrative border of the nearest urban settlement (city, town), located within the administrative boundaries of the studied regions;
- from the state border (for the Kaliningrad Oblast – with Poland and Lithuania, for the Primorsky Krai – with China and North Korea).

Zoning of the territory was done using the built-in tools of the QGis 3.28 program. Zoning step is 1 km. For each region, a three-dimensional matrix "Border – Sea – City" was built (Fig. 1). Mutual overlay of grids gives 21802 cells for the Kaliningrad Oblast and 246445 cells for the Primorsky Krai. Within the cells, tourism facility objects were counted.

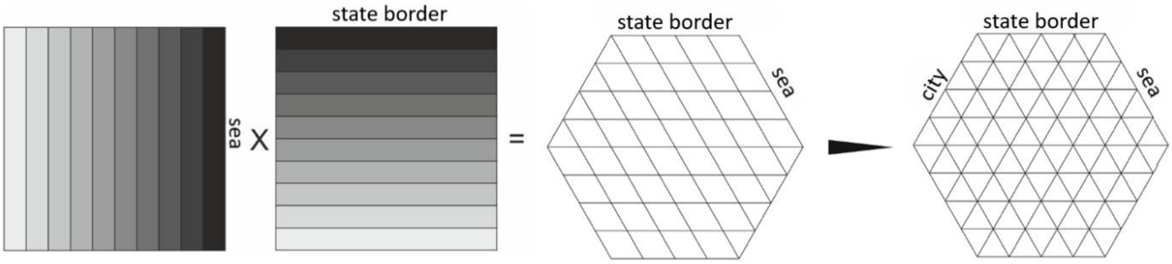


Figure 1. Geoinformation model for delimitation of the territory of coastal regions (Source: developed by the authors)

The influence of location factors on the concentration of TAs was measured using methods of econometric analysis – correlation and variance analysis, and the method of principal components. The analysis accounted for distance from the state border, coastline, and urbanized area, as well as two factors indicating the provision of infrastructure – availability of mobile Internet and a Infrastructure Diversity Index reflecting the density of roads and the provision of places for tourist accommodation facilities, public catering establishments, retail stores.

To calculate the CI, the Min-Max Scaler was applied using Cohen's (1960) formula:

$$y_{ij} = \frac{x_{ij} - x_{i,min}}{x_{i,max} - x_{i,min}}, \qquad i = 1,2,3. \tag{1}$$

Where, x_{1j} – density of retail stores and public catering establishments per 1 km^2 in a cell j, x_{2j} – density of tourist accommodation facilities in a cell j, x_{3j} – density of roads in a cell j, $x_{i,max}$, $x_{i,min}$ – maximum and minimum values of factor i for all cells, y_{ij} – normalized value of factor i in cell j.

To calculate the integral indicator, the principal component analysis was used. It enables to transform three factors to one with minimal loss of information. After receiving the coefficients of the first principal component, we used them as weighting coefficients w_i factors when determining the authors' Infrastructure Diversity Index:

$$I_j = w_1 y_{1j} + w_2 y_{2j} + w_3 y_{3j} \tag{2}$$

The causality in the distribution of TAs was assessed based on analysis of variance. A preliminary categorization of quantitative factors was carried out using the boundary method. As a result, for each factor a criterion was obtained for dividing the analyzed cells into groups, which were compared in pairs for each factor using the Mann-Whitney U test. It allows testing the significance of the difference between two independent groups of variables when the distributions of values in the samples are different from normal. To conduct the test, the null and alternative hypotheses were formulated:

H_0: The two groups of distribution of TAs regarding the factor do not differ.

H_1: Two groups of distribution of TAs regarding the factor differ from each other.

The null hypothesis is rejected if p-value of the U-statistic is smaller than the threshold α. In this study, a significance level of α =0.05 was used, that is, differences between groups are considered statistically significant at the 95% confidence level. Statistical analysis of data and their visualization were carried out in the R environment using the psych, dplyr, ggplot2 packages.

Data sources and processing

A new source of tourism information is data from user content, incl. posts on social media: Instagram, Twitter, Facebook, etc. (Mikhaylova et al., 2021), photo hosting, for example, Flickr (Liu et al., 2023), digital travel diaries (Mou et al., 2020), online tourist reviews (Liu et al., 2023), ads on tourist accommodation, such as Airbnb (Boto-Garcia and Leoni, 2023), etc. Modern information technologies make it possible to study not only the location of tourism objects and tourist flows, but also tourists' perception over tourist destinations. Another source of data on tourism geography is anonymized mobile phone network (Kubo et al., 2020). In this study, the main sources of geoinformation data (as of April 2023) were:

- open tourist atlas of the world "OpenTripMap" (opentripmap.com), aggregating data from the OpenStreetMap and Wikimedia projects and portals of the Ministry of Culture and The Federal Subsoil Resources Management Agency of the Russian Federation.
- online hotel booking service www.ostrovok.ru used to source data on tourist accommodation facilities in the studied regions.

The raw dataset was additionally processed as different TAs could have identical titles, one object could have multiple tags, etc. Each TA was verified by osm identification number and by geographic coordinates on the GoogleMaps or YandexMaps websites. The final list of TAs was manually supplemented with missing objects, resulting in 1302 for the Kaliningrad Oblast and 1186 for Primorsky Krai. The number of objects in the categories "tourist infrastructure" and "accommodation" for the Kaliningrad Oblast was 1734 and 3364 units, and for the Primorsky Krai – 3318 and 1097 units.

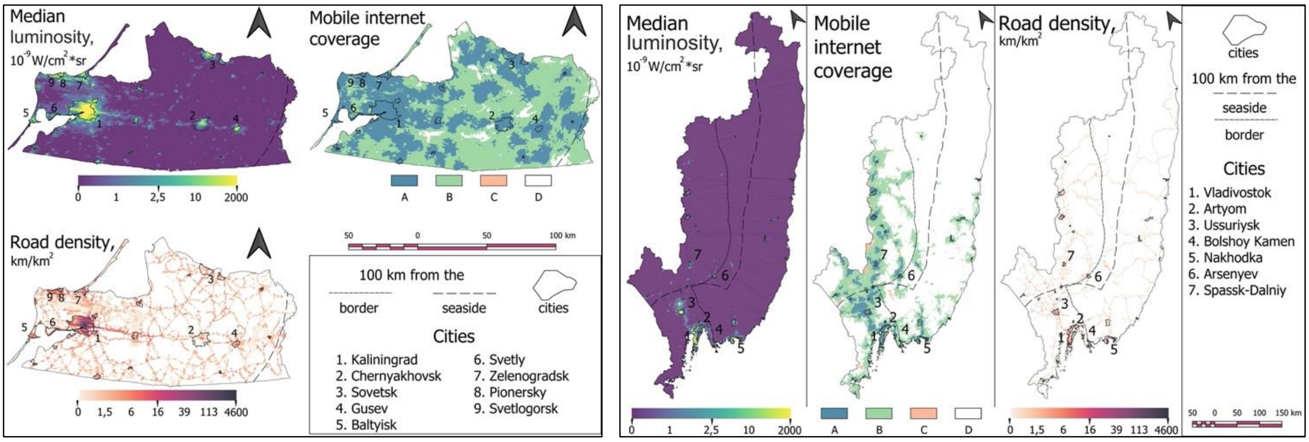
Three additional factors were taken into account that reflect the infrastructure provision of the territory and influence the development of tourism (Figure 2):

1. Earth remote sensing data on night-time lights. Excessive luminosity is an indicator of urbanization and human activity, and, thus, an anthropogenic load on natural ecosystems. The data source is www.lightpollutionmap.info, which displays light pollution-related content on Microsoft Bing base layers. VIIRS scanner data is presented for 2022.

2. Coverage of the territory with mobile Internet. Earlier studies show a mixed relationship between mobile coverage and tourism development (Adeola and Evans, 2019). However, the wider the experience in using ICT, the higher the need for them in tourist destinations (Law et al., 2018). Mobile Internet is important for introducing modern digital technologies

in tourism (Kounavis et al., 2012). The source of the data was mobile Internet coverage maps, presented on the websites of telecom operator companies – Megafon, Beeline, Tele2, MTS. The data was initially collected within the framework of the Russian Science Foundation project 21-77-00082 and presented as of April 2023. For each zone/cell, the main type of mobile Internet was determined, represented on at least 50% of its territory.

3. The density of highways of inter-settlement level and above. The density of the road network is important in managing tourism flows (Talebi et al, 2019). Studies by Zhang and Ju (2021) and Ramadan (2020) show that the development of transport and tourism is mutually beneficial and generates synergistic effects. Low density and quality of roads are inhibitory factors that limit the influx of tourists and access to tourism resources. In this regard, this study makes the assumption that road density is a positive factor for the development of coastal tourism. The data source is the Geofabrik.de service, which retrieves and processes open geodata from the OpenStreetMap portal. Data is presented for 2023.



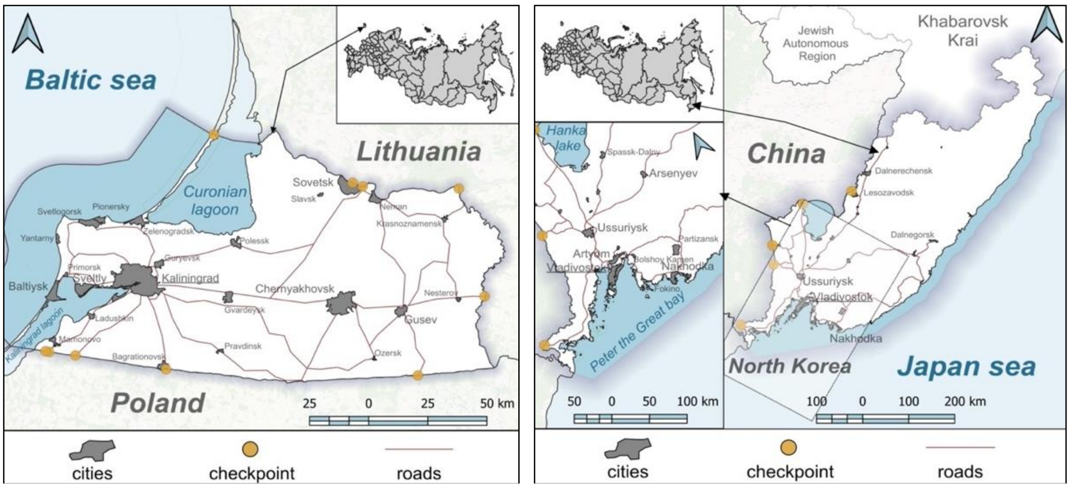
Kalningrad Oblast | Primorsky Krai

Figure 2. Infrastructure development of the territory of the coastal regions (Source: developed by the authors based on data from Lightpollutionmap.info, Geofabrik.de, Moscow.megafon.ru, Moskva.beeline.ru, Kaliningrad.tele2.ru, Moskva.mts.ru)

Description of the study area

The Kaliningrad Oblast is a coastal region of Russia on the Baltic Sea (Figure 3). This is an exclave region bordering with Poland and Lithuania (incl. by water through the Kaliningrad and Curonian bays). Communication with mainland Russia is carried out by sea transport (ferries) along the Baltic Sea, there is air service, and also rail and road transport routes through the territory of third countries (Lithuania and Belarus – towards Moscow, and Lithuania and Latvia – towards St. Petersburg). The administrative center is Kaliningrad. The total population of the region is 1.03 million people (as of January 1, 2023). The share of gross added value of the tourism industry in the GRP was 3.7% (in current prices) with domestic tourism as main contributor. The total flow of tourists in 2022 was about 1.8 million people.

Kalningrad Oblast



Primorsky Krai

Figure 3. Geography of the studied coastal regions (Source: developed by the authors)

According to Borovik (2020), there are 115 cultural heritage sites per 1 thousand km^2. The coastal territories of the Kaliningrad Oblast, namely the southern and southeastern coasts of the Baltic Sea, make up about 3% of the total territory of the region and concentrate many recreational resources (Afanasyeva, 2014). There are seaside resort towns – Svetlogorsk, Zelenogradsk, Pionersky, Yantarny. In the southern part of the Curonian Spit, adjacent to the Lithuanian border, there is a unique National Natural Park "Curonian Spit", which is protected by the UNESCO Convention for the Protection of the World Cultural and Natural Heritage. The sanatorium-resort complex of the Kaliningrad Oblast is part of the broader recreational system of the South-Eastern Baltic (along with the sea coasts of Lithuania, Latvia, Estonia, Poland) due to the common geomorphological structure (Abdullaeva and Bredikhin, 2018), and numerous cross-border cooperation initiatives that took place before COVID-19 and current geopolitical tension between Russia and the EU. A number of other coastal cities – Kaliningrad, Svetly, Baltiysk have commercial seaports. Located near the Polish border, the coastal Mamonovo and Ladushkin serve border needs (Kropinova et al., 2015).

In general, the Kaliningrad Oblast is characterized by strong differentiation of the coast according to the level of socio-economic development (Gumenyuk et al., 2019). The most developed coastal areas are near the Kaliningrad agglomeration, as well as those with direct access to the sea. The least developed municipalities are those facing only the waters of bays.

Primorsky Krai is located in the opposite southeastern part of the country and overlooks the Sea of Japan. Between Kaliningrad and Vladivostok (the administrative center of the region) there are over 10 thousand km by road or 11 hours when taking a direct flight. Primorsky Krai occupies 0.97% of the area of Russia and has a population of 1.82 million people (as of May 1, 2023). The share of GVA of the tourism industry in the GRP of the Primorsky Krai in the pre-pandemic period reached 2.8%, and taking into account such industries as transport, catering, trade, communications – about 5.9% (as of 2019). The total flow of tourists in 2022 amounted to 2.98 million people. In recent years, the main contributor, as in the Kaliningrad Oblast, was domestic tourism, mainly from the neighboring Khabarovsk Krai. Restrictive measures during the pandemic acted as a strong barrier to the development of inbound tourism, drastically (more than 10 times) reducing the flow of foreign tourists from neighboring China, North Korea, Uzbekistan, and Japan, which was stable until 2020.

The region contains about 4 thousand cultural heritage sites, of which about 40% are under state protection. A significant share is occupied by archaeological monuments (remains of ancient settlements), incl. the popular TAs – the Nikolaevskoye and Shaiginskoye settlements, located in the coastal zone (no further than 20 and 70 km from the port city of Nakhodka). The rugged coastline has created many bays, lagoons and islands that act as attractors for tourists. In a number of bays there are ports for year-round navigation, which distinguishes the region favorably from other regions of the Russian Federation on the Pacific coast. The recreational and tourist zoning can be done by measuring the distance from the largest city – Vladivostok. A study of tourist flows in high season (Martishenko, 2011) showed that most tourists from Vladivostok concentrate in a 75-km zone from the city with short (1-2 days) travel period. Tourists from other regions of Russia travel for longer (6-10 days) further – up to 150 km from Vladivostok, including remote coastal areas with high natural potential. All resorts of the Primorsky Krai can be divided according to their wellness profile and nature-mineral complexes. The southern part of the region, stretching along the Amur Bay, administratively belonging to the Khasansky district, is attractive for tourists. In the northern mountainous side of the region there are two largest nature reserves (Land of the Leopard and Kedrovaya Pad National Park), and in the southern side – watery area with numerous islands. The water area of the Amur Bay is considered one of the warmest in the region, having numerous beaches and embankments. There are many rivers and several lakes as well.

The resource potential of the Khasansky district makes it possible to organize beach, bathing, medical, hunting and fishing, educational, historical, memorial and water sports types of tourism on its territory. The district leads in the number of recreation centers among other municipalities (89.7% of them are located in the coastal zone) (Rudenko et al., 2022). The main therapeutic and preventive profile of the area is based on deposits of silt sulfide mud and mineral water sources. The largest mud baths are located in Expeditsii and Melkovodnaya bays, as well as in Uglovoye Bay. The region also contains three international seaports (Zarubino, Posyet, Slavyanka) and two land checkpoints (Kraskino with China, Khasan with the North Korea). The second and third places in terms of the number of coastal recreation centers are occupied by the urban districts of Nakhodka and Vladivostok (Rudenko et al., 2022), which creates a high anthropogenic impact on these highly urbanized areas of the Pacific coast of Russia. The largest influx of population to this coastal zone (incl. the Bolshoy Kamen settlement) was in 1959–1989, incl. with migration, and remains to date (Ushakova, 2019).

The relatively high population density and level of socio-economic development have created favorable conditions for the development of the tourism industry. Another small resort area is located 500 km from Vladivostok, in the southeast of Primorsky Krai and overlooks the sparsely populated shore of Olga Bay. There are beaches, sanatorium and recreational areas, and pump rooms. Among the treatment procedures, oxygen therapy, ozone therapy, and healing with minerals predominate. In the village of Gornovodnoye there is a large mineral spring.

RESULTS AND DISCUSSION

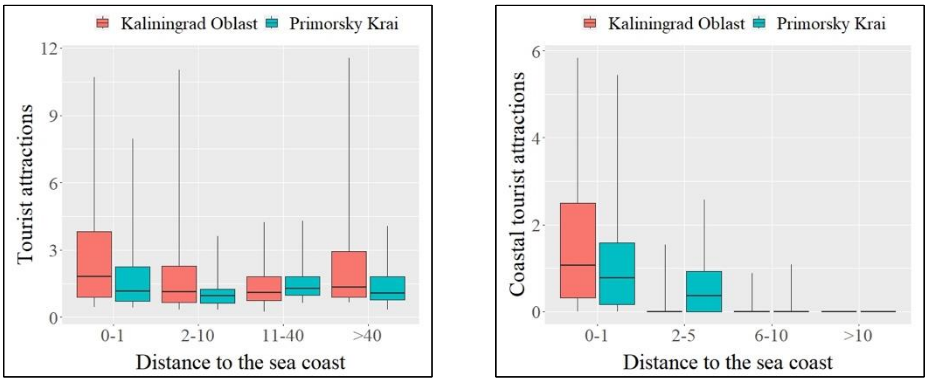
The influence of territorial factors on the concentration of tourist attractions; Factor of proximity to the sea coast

All cells were divided into four groups by the distance to the coast – Table 1.

Table 1. Average and median value of tourist attractions (TAs) in groups by proximity to the coastline (Source: developed by the authors)

Group	Range, km	Region					
		Kaliningrad Oblast			Primorsky Krai		
		Number of cells	mean	median	Number of cells	mean	median
	Tourism attractions (TAs)						
I	0-1	85	3.28	1.81	198	3.01	1.17
II	2-10	152	2.6	1.13	118	1.29	0.96
III	11-40	165	1.51	1.09	158	1.67	1.28
IV	>40	137	5.22	1.33	190	1.51	1.08
	Coastal tourist attractions (CTAs)						
I	0-1	85	1.9	1.06	198	2.07	0.78
II	2-5	70	0.27	0	80	0.74	0.36
III	6-10	82	0.37	0	38	0.16	0
IV	>10	302	0	0	348	0.02	0

For the Kaliningrad Oblast, the differences between groups II and III are not statistically significant, thus, only three groups are defined: (1) up to 1 km from the coast; (2) 2-40 km; (3) over 40 km. The highest density of TAs is found at a distance under 1 km from the coast. The distribution of objects within all groups is uneven. The most heterogeneous is the group of cells at a distance of over 40 km, incl. several cells with a very high concentration of TAs. In the Primorsky Krai, the entire region was divided into four groups I-IV, since the differences between all groups are statistically significant. The highest density of TAs is also found in the coastal area up to 1 km. The distribution of cells within groups for the Primorsky Krai is more uniform than for the Kaliningrad Oblast (Figure 4). With regard to CTAs, all four zones are statistically different (Table 1). Most CTAs in both regions are located within a 10 km zone from the coast. The vast majority of objects are located in the 1 km coastal zone; in the rest of the territory there are only a small number of cells in which CTAs are clustered. The difference of Primorsky Krai from the Kaliningrad Oblast is the 2-5 km zone from the coast, in which more than 50% of the cells contain CTAs (Figure 4). The boxplots show outlier limiters (min and max values are 0.05 and 0.95 quantiles).

(**a**)


(**b**)

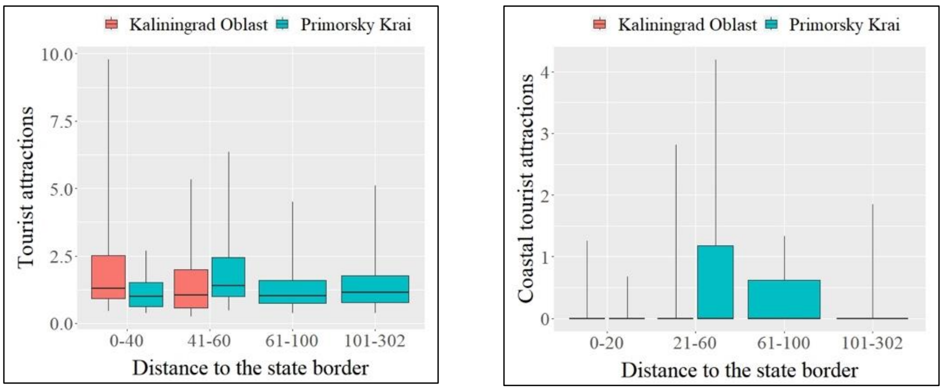
Figure 4. Comparison of the distribution of (a) tourist attractions (TAs) and (b) coastal tourist attractions (CTAs) by proximity to the coastline, km (Source: developed by the authors)

Factor of proximity to the state border

In the Kaliningrad Oblast TAs are located at a distance of up to 60 km from the state border (Table 2). The highest concentration is observed in the 40 km border zone with a high average density and the location of cells with a maximum density of TAs compared to 41-60 km. For the Primorsky Krai, most TAs are located in the 41-60 km zone from the state border. This group of cells is statistically different from the cells located in the “0-30” and “61-100” zones (Figure 5). At a distance of over 60 km from the border, the distribution of TAs is homogeneous.

Table 2. Average and median value of tourist attractions (TAs) in groups by proximity to the state border (Source: developed by the authors)

Group	Range, km	Region					
		Kaliningrad Oblast			Primorsky Krai		
		Number of cells	mean	median	Number of cells	mean	median
	Tourism attractions (TAs)						
I	0-40	376	3.43	1.3	88	1.17	1.00
II	41-60	163	1.04	1.17	121	2.83	1.39
III	61-100	0	-	-	116	1.82	1.01
IV	101-302	0	-	-	339	1.89	1.14
	Coastal tourist attractions (CTAs)						
I	0-20	166	0.18	0	38	0.11	0
II	21-60	373	0.49	0	171	1.38	0
III	61-100	0	-	-	116	0.51	0
IV	101-302	0	-	-	339	0.54	0

(**a**)


(**b**)

Figure 5. Comparison of the distribution of (a) tourist attractions (TAs) and (b) coastal tourist attractions (CTAs) by proximity to the state border, km (Source: developed by the authors)

Two groups of CTAs, located in zones up to 20 km and 21-60 km from the border of the Kaliningrad Oblast, are statistically different. The greatest concentration of TAs is at a distance from 21 to 60 km. The average density in this group and the max concentration are much higher than in the call located in the area adjacent to the border. For the Primorsky Krai, the 21-60 km border zone is significantly different from the and contains cells with the max density of CTAs.

Factor of proximity to an urbanized area

The territory of the Kaliningrad Oblast is divided into three (I-III) zones by the distribution of TAs depending on proximity to the urbanized area (Table 3). Most of the objects are located within urban settlements (group I "0"). Moreover, the density of TAs in individual cells is very high, as evidenced by the average value and the difference between the average and median values. In an area up to 10 km from an urbanized area, the density of TAs is much lower, and their distribution is much more homogeneous. At a distance of beyond 10 km, an increase in the concentration of TAs reappears, with more than 95% of the cells containing TAs, which indicates the high tourism potential of the rural areas of the Kaliningrad Oblast.

Table 3. Average and median value of tourist attractions (TAs) in groups by proximity to the urban area (Source: developed by the authors)

Group	**Range, km**	**Region**					
		Kaliningrad Oblast			**Primorsky Krai**		
		Number of cells	**mean**	**median**	**Number of cells**	**mean**	**median**
	Tourist attractions (TAs)						
I	0	145	6.56	1.82	178	1.41	1
II	1-10	280	1.58	1.08	219	2.25	1.2
III	>10	114	2.14	1.31	267	2.07	1.16
	Coastal tourist attractions (CTAs)						
I	0-5	289	0.55	0	301	0.66	0
II	>5	250	0.21	0	363	0.78	0

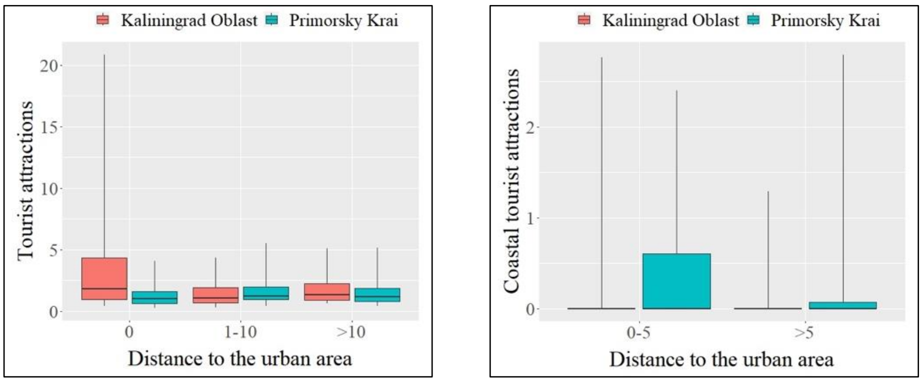
(a)  (b)

Figure 6. Comparison of the distribution of (a) tourist attractions (TAs) and (b) coastal tourist attractions (CTAs) by proximity to the urban area, km (Source: developed by the authors)

For Primorsky Krai, two statistically significant groups were identified: the urban area itself and the remaining territory located outside urban settlements (Table 3). This coastal region, unlike the Kaliningrad Oblast, is characterized by the distribution of TAs outside the urbanized area, but at a short distance from cities. Cells with the max concentration of TAs are at 1-10 km zone (group II), the average density of TAs in this group is also maximum. In general, the distribution of TAs throughout the region can be considered homogeneous (Figure 6). The main CTAs in the Kaliningrad Oblast are located in urban settlements and 5 km away from them. In some cells there is a very high concentration of CTAs, which indicates the unevenness of their distribution relative to the urbanized area. In the Primorsky Krai, territorial zones up to 5 km and over 5 km from cities have little difference. The average density of CTAs in the remote area is only slightly higher than the average density within the urbanized area. CTAs in this territory are evenly distributed, only a few cells have a very high concentration of CTAs.

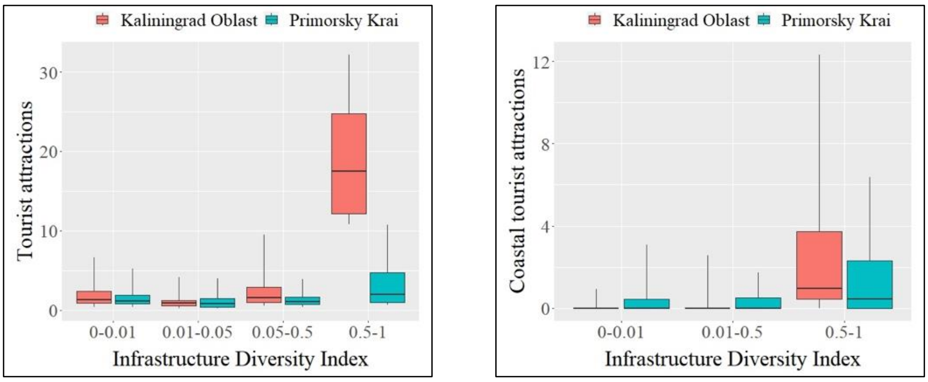
Table 4. Average and median value of tourist attractions (TAs) in groups by the Infrastructure Diversity Index value (Source: developed by the authors)

Range	**Region**					
	Kaliningrad Oblast			**Primorsky Krai**		
	Number of cells	**mean**	**median**	**Number of cells**	**mean**	**median**
Tourism attractions (TAs)						
0-0.01	139	4.4	1.3	369	2.15	1.14
0.01-0.05	133	1.72	0.9	29	1.3	0.85
0.05-0.5	259	2.76	1.55	243	1.61	1.09
0.5-1	8	19.44	17.48	23	3.28	2
Coastal tourist attractions (CTAs)						
0-0.01	139	0.16	0	369	0.82	0
0.01-0.5	392	0.41	0	272	0.5	0
0.5-1	8	3.48	0.96	23	1.79	0.44

The influence of infrastructural factors on the concentration of tourist attractions (CTAs)
Infrastructure Diversity Index

Based on the principal component analysis carried out for the factors (A) "Public catering establishments and retail stores", (B) "Tourist accommodation facilities" and (C) "Road density", the coordinates of the first principal component were obtained. For the Kaliningrad Oblast, the level of information content of the first component was 0.75, and for the Primorsky Krai – 0.81. These values exceed the threshold of 0.55, so the coordinates of the first principal component were chosen as factor weights when calculating the Infrastructure Diversity Index. Weighting coefficients for the Kaliningrad Oblast: w_1=0.42, w_2=0.38, w_3=0.82, for Primorsky Krai: w_1=0.31, w_2=0.14, w_3=0.94. For both regions, road density makes a larger contribution to the Index. The normalized index values were divided into ranges presented in Table 4.

For the Kaliningrad Oblast and Primorsky Krai, in the case of TAs, all groups of cells are statistically different. The highest density of TAs is observed in the territory with maximum Index values. However, for both coastal regions these are only small areas: 1.5% of cells in the Kaliningrad Oblast and 3.5% in the Primorsky Krai. Figure 7 demonstrates a fairly uniform distribution of TAs with Index values not exceeding 0.5. A large scatter of values is typical only for the last group (0.5-1). This suggests that only in a small area there is a high concentration of TAs with a high index value.

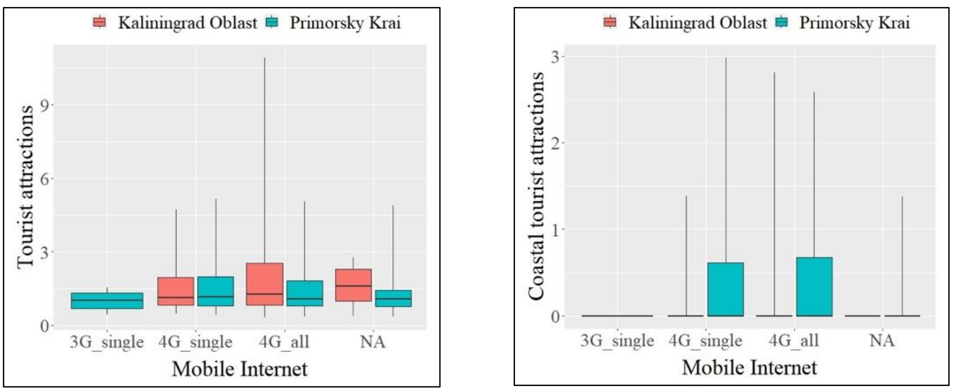


(**a**) (**b**)
Figure 7. Comparison of the distribution of (a) tourist attractions (TAs) and (b) coastal tourist attractions (CTAs) by the level of the Infrastructure Diversity Index (Source: developed by the authors)

A significant density of TAs is observed in cells for which the provision of infrastructure facilities can be considered average (i.e. Index values in the range of 0.05-0.5). This is especially typical for the Kaliningrad Oblast, which has more than 48.1% of such cells, and for the Primorsky Krai – somewhat less (36.6% of cells). A large number of cells fell into the group with the lowest Index value (up to 0.01); the average density of TAs in this territory exceeds the average density of objects located in the territory with higher values. The Primorsky Krai has 55.6% of such cells, the Kaliningrad Oblast has fewer (25.8%). This indicates that the territory of the Kaliningrad Oblast, where the TAs are located, is better provided with infrastructure than the Primorsky Krai (partially due to the factor of urbanization; see above). As with TAs, both coastal regions have large areas with a high concentration of CTAa, but with a low degree of infrastructure facilities. But for the Kaliningrad Oblast, most of the territory with CTAs is still characterized by average Index values, while in the Primorsky Krai the overwhelming number of CTAs are located in areas with very low Index values (Table 4).

Provision of tourism attractions (TAs) with mobile Internet

Most of the territory of the Kaliningrad Oblast, where all TAs (except for 6 cells) and CTAs are located, is connected to the 4G mobile Internet. Cells with a high concentration of objects are located in the "4G from all telecom operators" area – Table 5, Figure 8. For Primorsky Krai, the distributions of TAs in areas with 4G Internet coverage from one and from all operators are almost similar (Table 5, Figure 8). However, in a fairly large area of the region with a high density of TAs and CTAs, mobile Internet coverage is absent or unstable.



(**a**) (**b**)
Figure 8. Comparison of the distribution of (a) tourist attractions (TAs) and (b) coastal tourist attractions (CTAs) by mobile Internet coverage (Source: developed by the authors)

Table 5. Average and median value of tourist attractions (TAs) in groups by mobile Internet coverage (Source: developed by the authors)

Mobile internet type	**Region**					
	Kaliningrad Oblast			**Primorsky Krai**		
	Number of cells	**mean**	**median**	**Number of cells**	**mean**	**median**
Tourism attractions (TAs)						
Not available	6	1.6	1.61	148	1.94	1.08
Single operator 3G	0	-	-	3	1	1.03
Single operator 4G	155	1.76	1.12	255	1.89	1.16
All operators 4G	378	3.59	1.28	258	2.04	1.08
Coastal tourist attractions (CTAs)						
Not available	6	0	0	148	0.67	0
Single operator 3G	0	-	-	3	0	0
Single operator 4G	155	0.21	0	255	0.71	0
All operators 4G	378	0.47	0	258	0.78	0

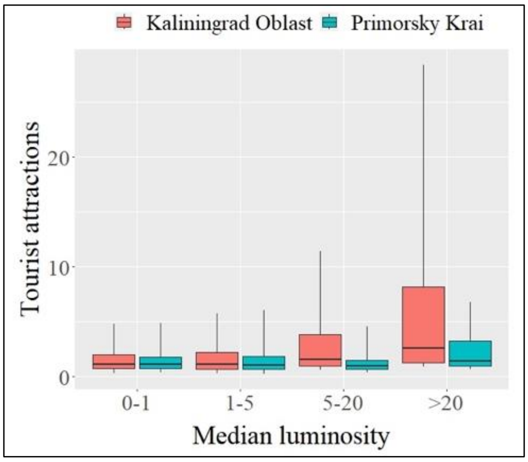
Median luminosity of night-time lights

Based on the level of luminosity, the territories of the regions were divided into four groups (Table 6). Most of the territory with TAs has a low level of light pollution. In the Kaliningrad Oblast, the distribution of TAs among cells where luminosity level does not exceed 5 is quite uniform. As the luminosity level increases, the average density of TAs also increases. In an area with a luminosity level of “above 20”, 5% of cells have a density of TAs of over 10 objects per km^2. In the Primorsky Krai, TAs are distributed evenly over the territory for which the luminosity level does not exceed 20 (Figure 9). The distribution of TAs is less uniform in a small area, incl. 5% of cells with a high degree of light pollution.

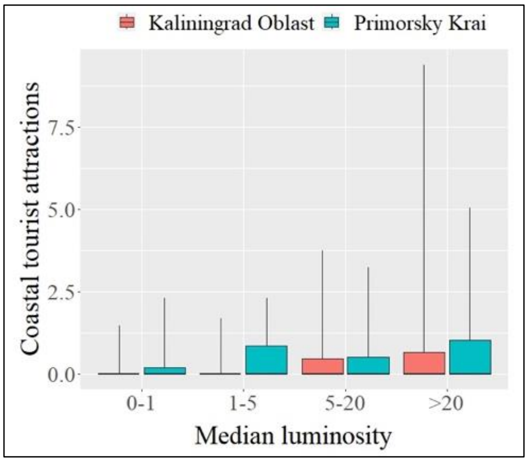
Table 6. Average and median value of tourist attractions (TAs) in groups by the level of median luminosity (Source: developed by the authors)

Ranges, 10^{-9} W/cm^2*sr	Region					
	Kaliningrad Oblast			Primorsky Krai		
	Number of cells	mean	median	Number of cells	mean	median
Tourism attractions (TAs)						
0-1	342	1.82	1.12	450	1.90	1.15
1-5	73	1.80	1.13	101	1.94	1.06
5-20	77	2.97	1.57	79	2.08	1.00
>20	47	6.89	2.60	34	2.45	1.38
Coastal tourist attractions (CTAs)						
0-1	342	0.22	0	450	0.64	0
1-5	73	0.25	0	101	0.70	0
5-20	77	0.68	0	79	1.11	0
>20	47	1.35	0	34	0.90	0

The distribution of CTAs in the Kaliningrad Oblast is similar to the distribution of TAs. The maximum density and cells with very high concentrations are located in areas with a luminosity level exceeding 20 (Figure 9). In Primorsky Krai, differences between groups are less noticeable. The max average density of CTAs is in areas with illumination levels from 5 to 20 units. Cells with the highest concentration, as in the Kaliningrad Oblast, are luminosity level above 20.



(a)



(b)

Figure 9. Comparison of the distribution of (a) tourist attractions (TAs) and (b) coastal tourist attractions (CTAs) by the level of light pollution (Source: developed by the authors)

Delimitation of the functional coastal zone of coastal regions

Table 7 presents the final results of the placement of TAs, which were obtained when assessing the influence of territorial and infrastructural factors.

CONCLUSION

This study contributes to the research on the coastal zone management and focuses on the functional delimitation of the coastal zone by measuring the spatial distribution of tourism activity. Tourism has been chosen as the leading sector of the blue economy and one of the key drivers for the development of coastal regions, the influence of which is projected to grow.

The study was conducted using data from two coastal regions: one located on the shores of the Baltic Sea, in Europe – the Kaliningrad Oblast, and the second is on the shores of the Sea of Japan, in Asia – the Primorsky Krai. The contrasting geographical location and different natural potential of these regions unable to account for specific features in the economic use of coastal territories while maintaining the general institutional framework. Our research has shown that the most promising area for tourism development is 1 km zone from the sea coast. This is where the main tourist attractions (TAs) are concentrated. In general, the 10 km coastal zone has the greatest tourism potential. These findings are common to both regions. However, regional specifics express various location patterns throughout the territory.

Table 7. Influence of factors on the placement of TAs in coastal regions (Source: developed by the authors)

Factors	Kaliningrad Oblast		Primorsky Krai	
	Tourist attractions (TA)	Coastal tourist attractions (CTA)	Tourist attractions (TA)	Coastal tourist attractions (CTA)
Spatial factors				
Proximity to the sea	Three zones: up to 1 km; 2-40 km; over 40 km. Max concentration at 1 km coastal zone.	Max concentration at 1 km coastal zone; most at 10 km. Distribution is uneven relative to the coastline.	Four zones: up to 1 km; 2-10 km; 11-40 km; over 40 km. Max concentration in 1 km coastal zone.	Max concentration at 1 km coastal zone; most at 10 km. Density decreases with distance.
Proximity to the state border	Max concentration within 40 km	Max concentration at 21-60 km zone	Max concentration at 41-60 km zone	Max concentration at 21-60 km zone
Proximity to urban settlement	Highest in cities and over 10 km	Highest in cities and within 5 km	Highest at 1-10 km from urban area	Uniform urban-rural distribution
Infrastructure factors				
Infrastructure Diversity Index	Most in areas with an average level of IDI		Vast areas with TAs/CTAs and low IDI	
Mobile internet	Most in areas with 4G mobile internet		Many in no or unstable mobile internet	
Light pollution	The level of luminosity corresponds to density of TAs/CTAs. The highest levels of luminosity in areas with the highest concentration of TAs/CTAs. Most areas with TAs/CTAs have low luminosity.		Over most of the territory, light pollution is evenly distributed and has low values. Only in certain areas with the highest concentration of TAs/CTAs the level of luminosity is high.	

Since the socio-economic development of coastal regions and, in particular, the coastal tourism industry is influenced by numerous factors, we processed the delimitation of the coastal territory by proximity to an urban settlement and the state border. The level of urbanization of the coastal area is, on the one hand, an indicator of the development of the territory, and on the other, indicates a higher anthropogenic load compared to non-urbanized areas. Also, urbanization is consistent with the global trend of development of coastal territories, expressed in the pull of human resources to coastal cities – "coastalization" (Mikhaylov et al., 2018). Despite the differences between the Kaliningrad Oblast and the Primorsky Krai in the degree of coastal urbanization, we conclude that TAs are predominantly located directly in urban settlements and no further than 5–10 km away. However, coastal rural areas may also have tourism potential (Marcinkevičiūtė et al., 2022; Ramos and Costa, 2017; Ullah et al., 2020). Proximity to the national border could be an additional driver to the development of tourism in coastal region. Given favorable foreign policy and good neighborhood relations with adjacent countries, one can expect a synergistic effect of the coastal-border position for tourism (Ioannides et al., 2006; Spiriajevas, 2008; Wendt et al., 2021). Our study shows that in each of the two regions there is no high concentration of TAs in the immediate border area. In this regard, with active tourist mobility, tourists should move deeper into the region towards the sea coasts. On average, the distance of CTAs from the state border ranges from 20 to 60 km in each of the studied regions.

The Infrastructure Diversity Index applied showed that infrastructure is indeed important for the development of coastal tourism. The highest concentration of TAs is noted in the most infrastructurally developed areas (mainly in cities). At the same time, there remains a reserve for unlocking the tourism potential of coastal areas, since a significant part of the TAs are located in areas with an average and low levels of infrastructure provision (roads, accommodation, cafes, shops). The same conclusions are true for ICT infrastructure and the night-time lights luminosity measured for the coastal regions.

The novelty of this study lies in the implementation of a multifactorial approach to the delimitation of the coastal zone using geospatial modeling methods. We assessed the territorial patterns in the development of the tourism potential of coastal zones. The results obtained are of high practical value for the management of coastal areas. The proposed approach considers tourism potential of the coastal zone in a broader framework – accounting for the overall tourism potential of the region, as well as the possibilities of increasing its effectiveness by incorporating other benefits of the economic-geographical location (for example, border proximity) and increasing the value of the territory.

Further research should be focused on an in-depth assessment of the possibilities of obtaining synergistic effects in the economic development of the coastal zone resulting from a combination of territorial and infrastructural factors. It is preferable to test the proposed approach on a larger number of coastal regions as to further validate the identified patterns.

Author Contributions: Conceptualization, A.A.M. and V.N.B.; methodology, A.A.M. and E.E.G.; software, E.E.G. and D.V.H.; validation, A.A.M., E.E.G. and A.S.M.; formal analysis, A.A.M. and E.E.G.; investigation, A.A.M.;

resources, D.V.H.; data curation, A.A.M.; writing - original draft preparation, A.A.M., E.E.G., V.N.B., D.V.H. and A.S.M.; writing - review and editing, A.S.M.; visualization, D.V.H. and E.E.G.; supervision, A.A.M. and V.N.B.; project administration, A.A.M.; funding acquisition, A.A.M. and V.N.B. All authors have read and agreed to the published version of the manuscript.

Funding: Not applicable.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: The data presented in this study may be obtained on request from the corresponding author.

Acknowledgments: Part of the study carried out by A.A. Mikhaylova (participation in formulating the problem and developing the research design, writing a draft article, preparing a recreational-geographical characteristic of the Kaliningrad region, conceptualizing empirical results) was funded by the RUSSIAN SCIENCE FOUNDATION grant No. 22-28-00022. Part of the study carried out by V.N. Bocharnikov (participation in problem statement, text editing, recreational-geographical description of the Primorsky Krai) was funded by the RUSSIAN SCIENCE FOUNDATION grant No. 22-17-00186.

Conflicts of Interest: The authors declare no conflict of interest.

REFERENCES

Abdullaeva, I.V., & Bredikhin, A.V. (2018). Recreational-geomorphological zoning of the South-Eastern Baltic coast. *Regional Environmental Issues*, 2, 119–123, (In Russ.). https://doi.org/10.24411/1728-323X-2018-12119

Adeola, O., & Evans, O. (2019). Digital Tourism: Mobile Phones, Internet and Tourism in Africa. *Tourism Recreation Research*, 44, 190–202. https://doi.org/10.1080/02508281.2018.1562662

Afanasyeva, E. (2014). Peculiarities of tourism development in coastal areas of the Kaliningrad region. *Pskov Journal of Regional Studies*, 18, 68–77, (In Russ).

Boavida-Portugal, I., Rocha, J., & Ferreira, C.C. (2016). Exploring the Impacts of Future Tourism Development on Land Use/Cover Changes. *Applied Geography*, 77, 82–91. https://doi.org/10.1016/j.apgeog.2016.10.009

Borovik, N.A. (2020). Trends and directions of development of cultural and historical tourism in the Kaliningrad region. *Geopolitics and Ecogeodynamics of regions [Geopolitika i ekogeodinamika regionov]*, 6, 76–92, (In Russ).

Boto-García, D., & Leoni, V. (2023). The Economic Value of Coastal Amenities: Evidence from Beach Capitalization Effects in Peer-to-Peer Markets. *Environ Resource Econ*, 84, 529–557. https://doi.org/10.1007/s10640-022-00735-5

Burke, L., Kura, Y., Kassem, K., Revenga, C., Spalding, M., & McAllister, D. (2001). Coastal ecosystems. *World Resources Institute*, Washington, DC. 94 p.

Ciacci, A., Ivaldi, E., Mangano, S., & Ugolini, G.M. (2023). Environment, Logistics and Infrastructure: The Three Dimensions of Influence of Italian Coastal Tourism. *Journal of Sustainable Tourism*, 31, 1583–1607. https://doi.org/10.1080/09669582.2021.1876715

Cohen, J.A. (1960). Coefficient of agreement for nominal scales. *Educational and Psychological Measurement*, 20, 37–46.

Crowell, M., Edelman, S., Coulton, K., & McAfee, S. (2007). How Many People Live in Coastal Areas? *Journal of Coastal Research*, 23. https://doi.org/10.2112/07A-0017.1

Dwyer, L. (2018). Emerging Ocean Industries: Implications for Sustainable Tourism Development. *Tourism in Marine Environments*, 13, 25–40. https://doi.org/10.3727/154427317X15018194204029

Gumenyuk, I.S., Gumenyuk, L.G., & Belov, N.S. (2019). «Primorskiy faktor» v programmakh territorial'nogo razvitiya munitsipal'nykh obrazovaniy Kaliningradskoy oblasti [The coastal factor in spatial development programmes for the municipalities of the Kaliningrad region]. *Vestnik of Immanuel Kant Baltic Federal University. Natural and Medical Sciences*, 2, 5–22, (In Russ.).

Hoegh-Guldberg, O., Poloczanska, E., & Richardson, A. (2013). Australia's marine resources in a warm, acid ocean. *In Four Degrees of Global Warming: Australia in a Hot World* , 84–100, Taylor and Francis, London, United Kingdom. https://doi.org/10.4324/9780203370476-14

Ioannides, D., Nielsen, P.Å., & Billing, P. (2006). Transboundary Collaboration in Tourism: The Case of the Bothnian Arc. *Tourism Geographies*, 8, 122–142. https://doi.org/10.1080/14616680600585380

Kabil, M., Priatmoko, S., Magda, R., & Dávid, L.D. (2021). Blue Economy and Coastal Tourism: A Comprehensive Visualization Bibliometric Analysis. *Sustainability*, 13, 3650. https://doi.org/10.3390/su13073650

Kounavis, C.D., Kasimati, A.E., & Zamani, E.D. (2012). Enhancing the Tourism Experience through Mobile Augmented Reality: Challenges and Prospects. *International Journal of Engineering Business Management*, 4, 10. https://doi.org/10.5772/51644

Kropinova, E., Belova, A., & Afanasyeva, E. (2015). Ustoychivyy turizm – al'ternativa razvitiyu pribrezhnykh gorodov (na primere malykh gorodov Kaliningradskoy oblasti) [Sustainable tourism – an alternative to the development of coastal cities (on the example of small towns in the Kaliningrad region)]. *Vestnik of Immanuel Kant Baltic Federal University. Natural and Medical Sciences*, 7, 104–113, (In Russ).

Kubo, T., Uryu, S., Yamano, H., Tsuge, T., Yamakita, T., & Shirayama, Y. (2020). Mobile Phone Network Data Reveal Nationwide Economic Value of Coastal Tourism under Climate Change. *Tourism Management*, 77, 104010. https://doi.org/10.1016/j.tourman.2019.104010

Law, R., Chan, I.C.C., & Wang, L.A. (2018). Comprehensive Review of Mobile Technology Use in Hospitality and Tourism. *Journal of Hospitality Marketing & Management*, 27, 626–648. https://doi.org/10.1080/19368623.2018.1423251

Li, W., Bai, X., Yang, D., & Hou, Y. (2023). Maritime Connectivity, Transport Infrastructure Expansion and Economic Growth: A Global Perspective. *Transportation Research Part A: Policy and Practice*, 170, №103609. https://doi.org/10.1016/j.tra.2023.103609

Liu, J., An, K., & Jang, S.S. (2020). A Model of Tourists' Civilized Behaviors: Toward Sustainable Coastal Tourism in China. *Journal of Destination Marketing & Management*, 16, 100437. https://doi.org/10.1016/j.jdmm.2020.100437

Liu, Y., Chen, Y., & Han, F. (2023). Exploring Temporal and Spatial Structure of Tourism Market through a Big Data Approach: Whether Geographic Distance Still Matters? *Journal of Hospitality and Tourism Management*, 55, 292–299. https://doi.org/10.1016/j.jhtm.2023.03.017

Marcinkevičiūtė, L., Pranskūnienė, R., & Makutėnienė, D. (2022). Opportunities for Ecosystem Services in the Protected Areas in the Coastal–Rural Area of the Nemunas Delta and the Curonian Lagoon (Lithuania). *Sustainability*, 14, 9647. https://doi.org/10.3390/su14159647

Martishenko, N. (2011). Estimation of spatial tourist allocation in Primorye in high season. *Practical Marketing*, 8, 17–25, (In Russ).

Maul, G.A., & Duedall, I.W. (2019). Demography of Coastal Populations. In Encyclopedia of Coastal Science (692–700). *Springer International Publishing*. Cham. https://doi.org/10.1007/978-3-319-93806-6_115

Mikhaylov, A.S., Mikhaylova, A.A., & Kuznetsova, T.Y. (2018). Coastalization Effect and Spatial Divergence: Segregation of European Regions. *Ocean & Coastal Management*, 161, 57–65. https://doi.org/10.1016/j.ocecoaman.2018.04.024

Mikhaylova, A., Plotnikova, A., Goncharova, J., & Mikhaylov, A. (2021). Digital capacity of Russian tourist territories. *GeoJournal of Tourism and Geosites*, 35, 322–331. https://doi.org/10.30892/gtg.35209-655

Mou, N., Zheng, Y., Makkonen, T., Yang, T., Tang, J., & Song, Y. (2020). Tourists' Digital Footprint: The Spatial Patterns of Tourist Flows in Qingdao, China. *Tourism Management*, 81, 104151. https://doi.org/10.1016/j.tourman.2020.104151

Neumann, B., Vafeidis, A.T., Zimmermann, J., & Nicholls, R.J. (2015). Future Coastal Population Growth and Exposure to Sea-Level Rise and Coastal Flooding - A Global Assessment. *PLoS ONE*, 10, e0118571. https://doi.org/10.1371/journal.pone.0118571

North, D. (1958). Ocean Freight Rates and Economic Development 1730-1913. *J. Eco. History*, 18, 537–555. https://doi.org/10.1017/S0022050700107739

OECD (2016). The Ocean Economy in 2030. *OECD Publishing*. Paris. https://doi.org/10.1787/9789264251724-en

Ramadan, M. (2020). Impact of Road Infrastructure on Tourism Development in Kosovo. *International Journal of Management*, 11, 466–474.

Ramos, D.M.B., & Costa, C.M.M.D. (2017). Coastal Tourism in Rural Areas: Development Model. *IJEIM*, 21, 242. https://doi.org/10.1504/IJEIM.2017.083473

Rudenko, L.L., Kosolapov, A.B., Barashok, I.V., & Lozovskaya, S.A. (2022). Territorial differentiation and classification of recreation centers in the coastal zone of Primorsky Krai. *Servis v Rossii i za rubezhom [Services in Russia and Abroad]*, 16, 141–148. (In Russ). https://doi.org/10.5281/zenodo.7404165

Small, C., & Nicholls, R.J. (2003). A global analysis of human settlement in coastal zones. *Journal of Coastal Research*, 19, 584–599. http://www.jstor.org/stable/4299200

Spiriajevas, E. (2008). The Impact of Tourism Factor for Development of the South-East Baltic Coastal – Border Regions. *GeoJournal of Tourism and Geosites*, 2, 118–128.

Talebi, M., Majnounian, B., Makhdoum, M., Abdi, E., Omid, M., Marchi, E., & Laschi, A. (2019). A GIS-MCDM-Based Road Network Planning for Tourism Development and Management in Arasbaran Forest. Iran. *Environ Monit Assess*, 191, 647. https://doi.org/10.1007/s10661-019-7831-3

Ullah, Z., Johnson, D., Micallef, A., & Williams, A.T. (2020). Coastal Scenic Assessment: Unlocking the Potential for Coastal Tourism in Rural Pakistan via Mediterranean Developed Techniques. *J Coast Conserv*, 14, 285–293. https://doi.org/10.1007/s11852-009-0078-3

Ushakova, V.L. (2019). Population's Dynamics of the Pacific Coast of the Far East. *In Geosystems of the Eastern regions of Russia: The features of their structures and spatial development*, 101–109, Pacific Geographical Institute of FEB RAS, Vladivostok, Russia, (In Russ). https://doi.org/10.35735/tig.2019.24.73.012

Vojnović, N. (2005). Some characteristics of rural tourism in the region of Istria from 1999 to 2003. *Ekonomska Istrazivanja*, 18, 80–102.

Wendt, J.A., Grama, V., Ilieş, G., Mikhaylov, A.S., Borza, S.G., Herman, G.V., Bógdał-Brzezińska, A. (2021). Transport Infrastructure and Political Factors as Determinants of Tourism Development in the Cross-Border Region of Bihor and Maramureş. A Comparative Analysis. Sustainability. *Sustainability*, 13, 5385. https://doi.org/10.3390/su13105385

Zhang, S., & Ju, H. (2021). The Regional Differences and Influencing Factors of Tourism Development on Hainan Island, China. *PLoS ONE*, 16, e0258407. https://doi.org/10.1371/journal.pone.0258407

***The United Nations. Percentage of total population living in coastal areas. https://www.un.org/esa/sustdev/natlinfo/indicators/methodology_sheets/oceans_seas_coasts/pop_coastal_areas.pdf (accessed on 02 September 2023).

Article history: Received: 11.09.2023 Revised: 11.10.2023 Accepted: 09.11.2023 Available online: 15.12.2023