COASTAL STUDIES

THE COASTS WE LIVE IN: CAN THERE BE A SINGLE DEFINITION FOR A COASTAL ZONE?

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Throughout the history of humankind, people have settled along seashores. The gradual accumulation of population and industrial activity in coastal areas has created preconditions for coastalisation — the movement of people and socio-economic activity to marine coasts. To date, coastal areas have a higher rate of economic development, fostering migration and an influx of capital across the globe. Scholars and policymakers voice concerns about the asymmetry of regional development and the increasing anthropogenic impact on the coastal ecosystem. It reinforces the importance of coastal zone management. In this study, we use an example of the Baltic region to identify the coastalisation patterns in the Baltic region and answer the question, whether there can be a single definition of the coastal zone of the Baltic region. According to a broad definition, the Baltic macro-region is nearly all coastal and, consequently, all settlements are influenced by the coastalisation effect. We have studied urban population dynamics in 128 cities of 45 coastal regions through the lens of various characteristics of a coastal city — the distance from the sea (10, 50, 100, and 150 km), location in a coastal region (NUTS 2), availability of a port and its primary maritime activity (tankers, cargo, fishing, passenger, recreational vessels and others). The research results suggest that despite the strong coherence of the Baltic region countries, there should not be a single delimitation approach to defining the coastal zone. Overall, the most active marine economic processes occur in the zone up to 10 km from the seacoast and 30 km from ports and port infrastructure. However, in the case of Sweden, Poland, and Latvia, the coastal zone can be extended to 50 km, and in Germany — up to 150 km inland.

Keywords:
coastal region, coastal zone, coastalisation, Baltic region, coastal zone management

Introduction

Coastal regions around the globe demonstrate an increased concentration of population and infrastructure, as well as intensified economic activity. The all-embracing 'rush to the coast' described by McFadden [1, p.430], which results in depopulation and deterritorialisation of midland territories in favour of areas

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adjacent to sea and ocean shores, is known as coastalisation or thalasso-attractiveness. The unbalanced dynamics between the coast and the midland is said to be a historical phenomenon, with areas closer to the shoreline receiving migratory influxes for centuries and experiencing 'boom and burst development' [2]. By attracting new residents, the favourable environments of coastal zones become national and international development poles [3—5].

The results of previous studies suggest that, with a density over 2.5 times the global average, coastal areas are home to about 40 per cent of the world population [6; 7]. At a national level, scholars identify significant variations in coastal occupation — from 4.5 to 100 per cent [5, 8—20], depending on the study area and research design. Most of the studies provide valuable information on the spatial distribution of human activity, emphasising the remarkable attractiveness of 'low elevation coastal zone [s] ' [21] or 'coastal lowlands' [13] (2 per cent of the world's total land surface area inhabited by up to 10 per cent of the world population). Yet, ambiguity in the interpretation of coastal regions and inconsistent delimitation criteria for coastal areas obstruct both comparative analysis and the subsequent elaboration of policies on integrated coastal management.

This article focuses on the development patterns of coastal cities in ten countries of the Baltic region — a macro-region with strong cross-border ties and a historically embedded identity. We use various techniques and parameters to identify urban settlements affected by coastalisation, aiming to answer the question of whether there can be a uniform definition of the coastal zone, at least, in a single macro-region. The paper proceeds by discussing the conceptual understanding of coastal regions, drawing a distinction between the terrestrial area of the coastal zone and the adjacent territories of the inland area. Section 3 describes the methodological basis of the study, followed by Section 4 presenting research results. The article concludes with Section 5, which offers our interpretation of the data obtained.

Literature review

What is meant by a coastal region or coastal zone in the literature? In the broadest sense, these terms refer to the 'meeting point' of land and sea (ocean), a focal area of the land-water boundary or a locus of transition between the terrestrial and marine ecosystems [3; 22—29]. Both environments of the transitional region influence each other. The consequences of this interaction, such as floods, landslides, marine anthropogenic pollution, etc., are most strongly manifested in the littoral zone. The ambiguity of the term 'coastal' increases dramatically when its physiographical connotation is replaced by socio-humanitarian one, which is the subject of human geography. The coastal influence on social, economic, political, innovative and other systems extends inland, far beyond the coastline.[1] Reg-

[1] Researchers distinguish between coastal and marine (ocean) economies, pointing to the fact that coastal regions incorporate marine resources as direct or indirect inputs to economic activity, with marine-based enterprises located in both coastal and inland areas [30—32].

ularities in residential, infrastructural and industrial patterns suggest that regions termed as coastal spread the economic and social impacts of coastal and marine activities to inland areas, well beyond the narrowly defined shoreline. This suggests the necessity to push the virtual boundary of the coastal zone as far inland as needed to capture the effects of coastalisation and achieve the objectives of integrated coastal management [28].

The European Commission defines EU coastal regions as third-level territorial units for statistics (NUTS 3) with either direct access to the sea or ocean coastline or with most residents living within a 50-kilometre coastal band [33]. A similar criterion for coastal delimitation is used by scholars and state statistics bureaus of many countries when delineating the boundaries of a coastal zone or a coastal strip (the 50-mile coastal zone standard is applicable in the USA and Australia) (see [19, 34—39]. Despite the reasonable consistency of public bodies in this matter, the scientific community has not yet reached a consensus. Pernetta and Elder [40], Rakodi and Treloar [15] and Turner et al. [18] define the coastal zone as extending 60 km (or 40 miles) inland, whilst Salnikov [41] sets an 80 km limit. The 100 km threshold is used by most scholars when demarcating the boundaries of coastal cities and agglomerations (CCAs), coastal regions and 'near-coastal zones' as it is the psychological limit of remoteness from the coast (see [5—8, 11—14; 21; 42—46]. A strong argument for the 100 km limit has been put forward by Small et al. [47]. The findings of these highly cited scholars show that population density diminishes beyond 100 km of the sea. Many researchers, including Small and Cohen [17], have argued for other widths of land classified as coastal, ranging from 10 to 500 km (e.g. [9; 48—51]). Investigations focusing on islands (e.g. the Balearic Islands) tend to use a denser gradation and a lower threshold than those exploring China, Russia, the USA and other large and predominantly continental countries. With that, it remains questionable whether a 'flat-rate' approach to the delimitation and demarcation of coastal regions is applicable at all. Thus, the question posed by Colgan [30, p. 28] of 'how far inland the coast extends' is still relevant and should be approached using an integrated perspective.

Methodologically, the above calls for a research design based on a systemic approach: it is essential to consider coastal regions as holistic and homogeneous sociocultural, economic, demographic, geo-environmental and administrative-territorial systems. Therefore, the geophysical (i.e. natural, geospatial) approach involving an assessment of a region's geographical remoteness from sea and ocean shores against a predetermined or variable distance has to be complemented by analysis the integrity of its socio-economic system, i.e. an administrative approach. This conclusion, to some extent, falls in line with the Homogeneous Environmental Management Unit (HEMU) approach propounded by Balaguer et al. [52]. Delimitating the terrestrial area of a coastal zone from adjacent territories and other inland areas has to correspond to a territorial subdivision (e.g. LAU, NUTS3, or NUTS2) capturing a sufficient set of elements tied

by intra-system socio-economic, political, technological and other relations and existing in a common contextual environment. This approach demonstrates that the socio-economic effects and properties of a coastal area are predetermined by not only the presence or proximity of a marine coast but the overall architecture of a territorial community and its geo-economic and geopolitical structure.

Research methodology

This study is based on an analysis of urban population dynamics in the coastal zone of the Baltic region. A broad interpretation of the macro-region is used extending to the Scandinavian states (Denmark, Finland, Norway and Sweden), the Baltic states (Estonia, Latvia and Lithuania), the northern regions of Germany and Poland, and part of the North-Western Federal District of the Russian Federation (the Kaliningrad, Pskov and Leningrad regions, the city of St Petersburg and the Republic of Karelia). The geography of the study covered 128 cities with over 50 thousand residents (Fig. 1) without considering those with a smaller population. Coastal zone boundaries were set 10, 50, 100 and 150 km away from the sea. Additional segregation was carried out by identifying second-level territorial administrative units (NUTS 2). Russia's and the EU's administrative-territorial divisions were juxtaposed, and Russian regions were equated with territories at NUTS 2. Forty-five coastal regions were identified within the 150-km coastal zone at NUTS 2 in total.

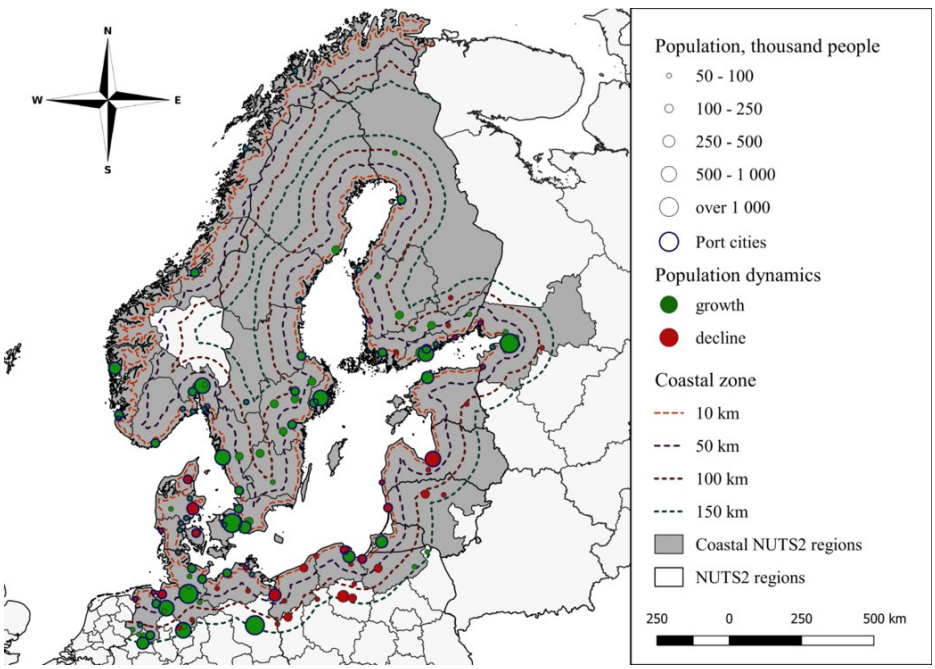

Fig. 1. Urban population dynamics in coastal zones of the Baltic Sea region, 2000—2020

Source: prepared by the authors.

The study design aimed to consider the population share and dynamics for each possible definition of the coastal zone. Table 1 presents the distribution of sample cities by size relative to the resident population.

Table 1

Classification of cities in the Baltic region countries

City type	Population, 1,000 people	Number of cities		Growth rate, %
		2000	2020	
Below threshold value	Under 50	14	0	0
Small	50—99	61	67	9.8
Medium	100—249	34	40	17.6
Large	250—499	12	10	–16.7
Major	500—999	6	7	16.7
Millionaire	1 000—5 000	3	4	33.3

Source: calculated based on [2].

The study period was from 2000 to 2020. The sources of data on the population size were: for the cities of Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Norway, Poland and Sweden — the Eurostat database and the database of the City Population project, which accumulates census data by countries of the world; for Russia — Rosstat and the 2002 All-Russian Census results. The sources of data on the population of countries and regions were Eurostat and (for Russia) Rosstat.[3]

The involvement of coastal cities in maritime activities was evaluated using data on the performance and specialisation of ports. Amongst cities in the sample, 71 per cent had a port: 71 cities had a seaport, and 20 a river port with sea access (Table 2). Port specialisation data were obtained from the Marine Traffic website[4] and ship arrival information as of August 2021 (Fig. 2). The following categories of navigation were distinguished: tankers, cargo, fishing, passenger and high-speed vessels, pleasure and sailing vessels, others (including special vessels, tugs, search and rescue operations).

[2] Population on 1 January by age groups and sex — cities and greater cities, 2021, *Eurostat*, available at: https://ec.europa.eu/eurostat/databrowser/view/urb_cpop1/default/table?lang=en (accessed 03.08.2021); Population statistics for countries, administrative divisions, cities, urban areas and agglomerations — interactive maps and charts, 2021, City Population, available at: https://www.citypopulation.de/Europe.html (accessed 03.08.2021); Database of indicators by municipalities, 2021, *Rosstat*, available at: https://www.gks.ru/free_doc/new_site/bd_munst/munst.htm (accessed 03.08.2021) (in Russ.); The size and location of the population, 2021, *All-Russian Population Census 2002,* available at: http://www.perepis2002.ru/index.html?id=11 (accessed 03.08.2021) (in Russ.).

[3] Population on 1 January by age groups and sex — cities and greater cities, 2021, *Eurostat*, available at: https://ec.europa.eu/eurostat/databrowser/view/urb_cpop1/default/table?lang=en (accessed 03.08.2021); Population statistics for countries, administrative divisions, cities, urban areas and agglomerations — interactive maps and charts, 2021, *City Population*, available at: https://www.citypopulation.de/Europe.html (accessed 03.08.2021); Database of indicators by municipalities, 2021, *Rosstat*, available at: https://www.gks.ru/free_doc/new_site/bd_munst/munst.htm (accessed 03.08.2021) (in Russ.); The size and location of the population, 2021, *All-Russian Population Census 2002*, available at: http://www.perepis2002.ru/index.html?id=11 (accessed 03.08.2021) (in Russ.); Population on 1 January by NUTS 2 region, 2021, *Eurostat*, available at: https://ec.europa.eu/eurostat/databrowser/view/tgs00096/default/table?lang=en (accessed 03.08.2021); Resident population as of January 1, 2021, *Rosstat*, available at: https://showdata.gks.ru/report/278928 (accessed 03.08.2021) (in Russ.).

[4] *Marine Traffic*, 2021, available at: https://www.marinetraffic.com (accessed 03.08.2021).

Table 2

Distribution of cities in the Baltic region countries by port type

City type	Coastal zone, km					
	0—10		10—50		50—100	100—150
	Seaport	River port	Seaport	River port	Seaport	River port
Small	21	7	—	—	—	2
Medium	16	2	1	1	1	1
Large	6	—	—	1	—	1
Major	4	—	1	1	—	1
Millionaire	2	—	—	—	1	1
Total	49	9	2	3	2	6

Source: prepared by the authors based on the Marine Traffic database, 2021, available at: https://www.marinetraffic.com (accessed 03.08.2021).

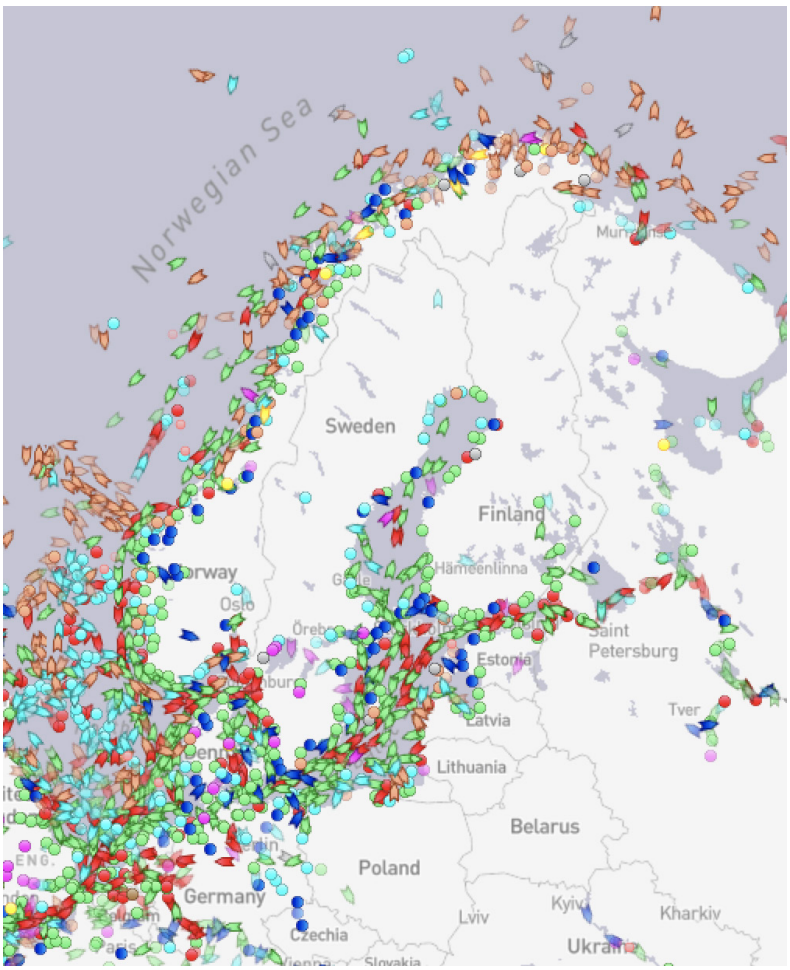

Fig. 2. Shipping density in the Baltic region on 10.09.2021

Source: Marine Traffic database, 2021, available at: https://www.marinetraffic.com (accessed 03.08.2021).

Research results

Coastalisation in the Baltic region is closely related to urbanisation. Data in Table 1 suggest that the distribution of cities in the macro-region by size-type changed over the study period. There was a general tendency to enlargement: the number of cities with over a million population and major cities increased, whilst 14 towns surpassed the predefined minimum threshold of 50 thousand people, having moved to the group of small cities by 2020. Table 3 presents the results of the analysis of urbanisation in the coastal zone of the Baltic region in view of the distance from the city to the seacoast.

Table 3

Population dynamics in the Baltic region by types of cities and distance from the sea

Coastal zone, km*	Cities		Population, mln								
			2000			2020			2020 to 2000, %		
	Total	Incl. with seaport	total	with port	without port	total	with port	without port	total	with port	without port
Small											
Under 10	31	27	1.86	1.62	0.24	2.08	1.79	0.29	12.0	10.6	21.4
10—50	12	C	0.81	—	0.81	0.87	0.00	0.87	7.0	—	7.0
50—100	8	—	0.5	—	0.5	0.6	0.0	0.6	11.3	—	11.3
100—150	16	2	1.1	0.1	1.0	1.1	0.2	0.9	–1.1	39.1	–5.6
Total	67	29	4.28	1.73	2.56	4.61	1.94	2.67	7.7	12.3	4.5
Medium											
Under 10	23	19	3.05	2.56	0.49	3.64	3.04	0.60	19.3	18.9	21.4
10—50	5	2	0.61	0.32	0.29	0.81	0.29	0.52	33.4	–9.1	79.5
50—100	6	1	0.61	0.10	0.51	0.82	0.16	0.67	34.3	51.7	30.8
100—150	6	1	0.95	0.16	0.78	0.97	0.17	0.80	2.42	0.6	2.8
Total	40	23	5.22	3.14	2.08	6.24	3.65	2.59	19.7	16.2	24.9
Large											
10	7	6	2.27	2.06	0.21	2.60	2.31	0.29	14.3	12.1	35.9
10-50	1	1	0.42	0.42	0.0	0.40	0.40	0.0	–4.4	–4.4	0.0
100-150	2	1	0.64	0.27	0.38	0.66	0.32	0.34	2.6	18.0	–8.4
Total	10	8	3.33	2.74	0.59	3.66	3.02	0.63	9.7	10.2	7.6
Major											
Under 10	4	4	2.27	2.27	—	2.91	2.91	—	28.1	28.1	—
10—50	2	2	1.30	1.30	—	1.20	1.20	—	-8.2	-8.2	—
100—150	1	1	0.52	0.52	—	0.54	0.54	—	4.3	4.3	—
total	7	7	4.09	4.09	—	4.64	4.64	—	13.5	13.5	—
Millionaire											
Under 10	2	2	5.19	5.19	—	6.74	6.74	—	29.8	29.8	—
50-100	1	1	1.72	1.72	—	1.85	1.85	—	7.7	7.7	—
100—150	1	1	3.38	3.38	—	3.67	3.67	—	8.5	8.5	—
Total	4	4	10.29	10.29	—	12.25	12.25	—	19.1	19.1	—

The end of table 5

Total											
Under 10	67	58	14.64	13.69	0.95	17.96	16.78	1.18	22.7	22.5	24.7
10—50	20	5	3.14	2.04	1.10	3.27	1.88	1.39	4.3	–7.6	26.3
50—100	15	2	2.87	1.82	1.05	3.27	2.00	1.27	14.1	10.2	20.8
100—150	26	6	6.56	4.44	2.12	6.90	4.84	2.06	5.1	9.0	–3.0
Total	128	71	27.20	21.98	5.22	31.40	25.50	5.90	15.4	16.0	13.0

Note: * from the nearest point of the seacoast to the city centre.

Source: prepared by the authors based on City Population, Rosstat and Eurostat data.[5]

By 2020, 52.3 per cent of all cities in the sample (including 81.7 per cent of those having a port) were concentrated within 10 km of the sea. Moreover, the 10-km coastal zone attracted most population in the other zones considered: 10—50, 50—100, and 100—150 km. In 2020, it accounted for 57.2 per cent of the total urban population of the Baltic region (17.96 million people), which grew by 22.7 per cent in 2000—2020. For comparison, over the past 20 years, population growth in other coastal zones was more modest: within 10—50 km from the coast, it was 4.3 per cent; 50—100 km, 14.1 per cent; 100—150 km, 5.1 per cent. In addition, data in Table 3 show that population growth in port cities of the Baltic region is higher than in cities without a port: 16 versus 13 per cent. There is an interesting territorial pattern: within the 10-km coastal zone, population growth is comparable in both types of cities (with and without a port); in 10—50 km and 50—100 km zone, those without a port perform better in terms of population increase; in the 100—150 km zone, the presence of a port positively correlates with population growth in cities.

A territorial-temporal outlook on the population distribution in the Baltic region by city type points to the attractiveness of two categories of cities: millionaire and medium-sized ones, where population growth amounted to over 19 per cent. The population of cities of other types also increased in the study period, but the growth rates were significantly lower. This trend may relate to the agglomeration effect in the development of cities: people move from towns to medium-sized cities and from the latter to even larger ones. In general, 59 per cent of the total urban population of the Baltic region lived in millionaire (39 per cent)

[5] Population statistics for countries, administrative divisions, cities, urban areas and agglomerations — interactive maps and charts, 2021, *City Population*, available at: https://www.citypopulation.de/Europe.html (accessed 03.08.2021);
Database of indicators by municipalities, 2021, *Rosstat*, available at: https://www.gks.ru/free_doc/new_site/bd_munst/munst.htm (accessed 03.08.2021) (in Russ.);
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Population on 1 January by NUTS 2 region, 2021, *Eurostat*, available at: https://ec.europa.eu/eurostat/databrowser/view/tgs00096/default/table?lang=en (accessed 03.08.2021).

and medium-sized cities (20 per cent) in 2020. For comparison, towns and major cities accounted for 14.7 per cent of all residents; large cities, for 11.6 per cent. The 10-km coastal zone was the most attractive place of residence, including by city type (Table 3). In 2020, 55 per cent of the residents of millionaire, 62.7 per cent of major, 71.1 per cent of large, 58.3 per cent of medium-size and 45.1 per cent of small cities resided within 10 km of the seacoast. The proportion of people in the 10-km zone increased in 2000—2020 for all city types (except for medium-sized cities, where it remained unchanged).

The relationship between the population growth rate in a city and its proximity to the seaport or river port with sea access is investigated as an indicator of maritime economic activity. The correlation coefficient between the distance from a city to the nearest port and the population dynamics rate is –0.19, pointing to a weak inverse relationship between these indicators (Fig. 3).

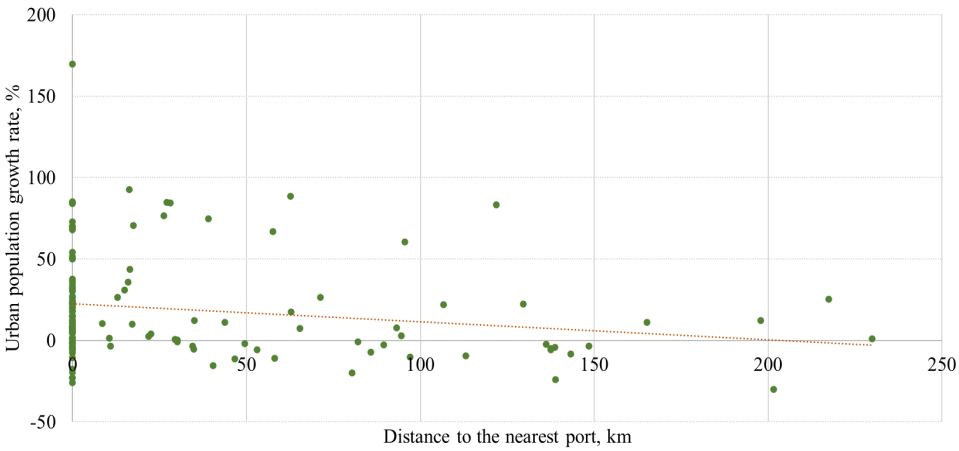

Fig. 3. Correlation between the urban population growth and the proximity of the city to a port in the Baltic region, 2000—2020

Source: prepared by the authors based on City Population, Rosstat and Eurostat data.[6]

Analysis of the distribution of urban population depending on proximity to a sea or river port (Table 4) shows that the most populated cities (millionaire, major and large ones) act as large transport and logistics hubs with developed maritime connections (except for two cities of the large group – Poland's Bydgoszcz and Finland's Espoo). With a decrease in size, the share of port cities in the group falls to 57.5 per cent amongst medium-sized and 43.3 per cent amongst small ones. Positive population dynamics are characteristic of all groups of port cities averaging 16 per cent growth over the 21 years. Amongst cities without ports, the increase was the largest in those located no further than 30 km from port infrastructure (Table 4).

[6] Ibid.

Table 4

Distribution of the urban population in the Baltic region by proximity to a port

City type	Number of cities/ population size	Total	With port	Proximity to port, km						
				under 10	10—30	30—50	50—100	100—150	150—200	200—250
Millionaire	Number	4	4	—	—	—	—	—	—	—
	In 2000, people	10.29	10.29	—	—	—	—	—	—	—
	In 2020, people	12.25	12.25	—	—	—	—	—	—	—
	2020 to 2000, %	19.1	19.1	—	—	—	—	—	—	—
major	Number	7	7	—	—	—	—	—	—	—
	In 2000, people	4.09	4.09	—	—	—	—	—	—	—
	In 2020, people	4.64	4.64	—	—	—	—	—	—	—
	2020 to 2000, %	13.5	13.5	—	—	—	—	—	—	—
large	Number	10	8	—	1	—	—	1	—	—
	In 2000, people	3.33	2.74	—	0.21	—	—	0.38	—	—
	In 2020, people	3.66	3.02	—	0.29	—	—	0.34	—	—
	2020 to 2000, %	9.7	10.2	—	35.9	—	—	-8.4	—	—
medium	Number	40	23	—	4	1	6	5	—	1
	In 2000, people	5.22	3.14	—	0.41	0.09	0.70	0.76	—	0.10
	In 2020, people	6.24	3.65	—	0.59	0.16	0.92	0.79	—	0.13
	2020 to 2000, %	19.7	16.2	—	43.6	74.7	31.1	2.9	—	25.3
small	Number	67	29	1	10	9	9	5	2	2
	In 2000, people	4.28	1.73	0.050	0.55	0.64	0.67	0.34	0.11	0.19
	In 2020, people	4.61	1.94	0.055	0.69	0.63	0.66	0.37	0.13	0.15
	2020 to 2000, %	7.7	12.3	10.5	24.1	-1.7	-2.6	8.4	11.5	-18.8
total	Number	128	71	1	15	10	15	11	2	3
	In 2000, people	27.20	21.98	0.050	1.18	0.73	1.37	1.48	0.11	0.29
	In 2020, people	31.40	25.50	0.055	1.57	0.79	1.57	1.50	0.13	0.28
	2020 to 2000, %	15.4	16.0	10.5	33.0	8.1	14.6	1.3	11.5	-3.2

Source: developed by the authors based on City Population, Rosstat and Eurostat[7].

The principal attractors of the population and maritime activity in the Baltic region are four cities with a population of over one million: St. Petersburg (Russia) and København (Denmark), which have seaports, and Hamburg and Berlin (Germany), which have river ports. With that, whilst the main specialisation of St. Petersburg and Copenhagen, located within 10 km of the seacoast, is passenger transport, Hamburg and Berlin, located in the 50—100 and 100—150 km coastal zones respectively, concentrate on cargo operations (Fig. 4). The correlation between the distance between the port city and the seacoast and the share of Tanker and Cargo vessels specialisation is positive (0.47); for Passenger and High speed, Pleasure

[7] Ibid.

and Sailing, Fishing, Craft, Tug and Search, it is negative (–0.53). In other words, the construction of river ports deep inland (up to 150 km away from the seacoast) is often due to industries' need for cargo transportation (this also holds for towns, for example, Germany's Lingen), whilst ports located within 10 km of the coast use their natural proximity to the sea and often specialise in marine economic activities such as sea passenger transport, sea tourism, fishing, etc. (Table 5).

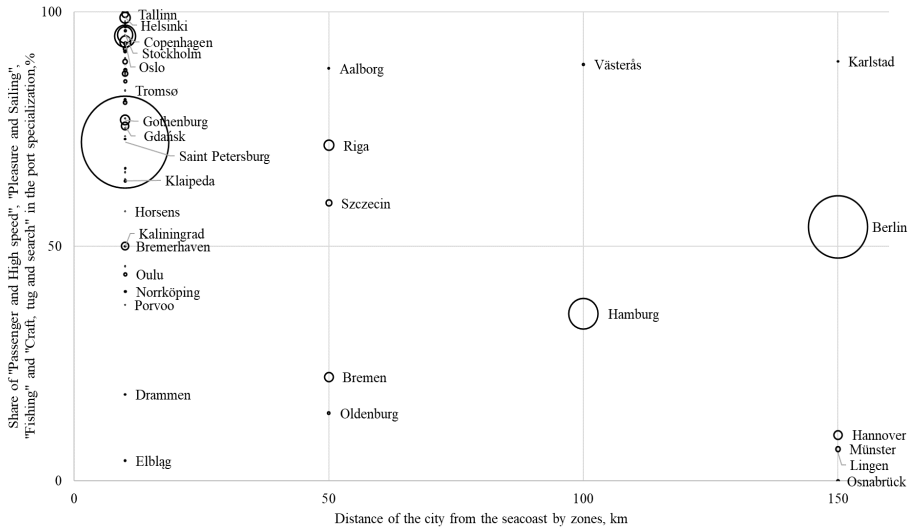

Fig. 4. Distribution of cities in the Baltic region by port specialisation

Note: the share of Passenger and High speed, Pleasure and Sailing, Fishing, and Craft, Tug and Search below 50 per cent in a port's specialisation means that it specialises in the transportation of goods. The circle diameter reflects the population size in 2020.

Source: calculated by the authors using Rosstat, Eurostat, and Marine traffic databases.[8]

Table 5

Specialisations of sea and river ports of the Baltic region countries by city types, %

City type	Tanker	Cargo	Passenger and High speed	Fishing	Pleasure and Sailing	Special Craft, Tug and Search
Seaports						
Small	0.8	13.1	11.9	0.0	24.9	12.8
Medium	2.5	11.9	23.7	0.2	29.5	15.9
Large	3.0	8.1	15.6	0.0	21.0	15.0
Major	1.3	5.5	66.4	0.1	20.3	13.5
Millionaire	4.8	11.0	45.2	0.2	28.3	9.8
Total	1.8	10.6	23.0	0.1	22.8	14.2

[8] Database of indicators by municipalities, 2021, Rosstat, available at: https://www.gks.ru/free_doc/new_site/bd_munst/munst.htm (accessed 03.08.2021) (in Russ.); Population on 1 January by NUTS 2 region, 2021, *Eurostat*, available at: https://ec.europa.eu/eurostat/data-browser/view/tgs00096/default/table?lang=en (accessed 03.08.2021); *Marine Traffic*, 2021, available at: https://www.marinetraffic.com (accessed 01.09.2021).

The end of table 5

River ports						
Small	3.2	13.5	28.6	0.0	27.8	5.4
Medium	2.6	45.5	0.6	0.0	9.8	2.4
Large	11.1	45.7	3.1	0.1	19.2	10.5
Major	6.4	65.6	2.4	0.0	7.9	5.7
Millionaire	9.1	34.4	16.1	0.0	13.2	15.6
Total	5.8	29.5	3.1	0.0	14.9	6.1

Note: the table shows average median values of the share of each shipping category.

Source: calculated by the authors using the Marine Traffic database, 2021, available at: https://www.marinetraffic.com.

We made a comparative assessment of macroregional changes in the urban population against national and regional trends to examine the specifics of coastalisation in the Baltic region. The correlation coefficient between the population change rates in cities and across the country is higher than between cities and their regions: 0.636 versus 0.595 (Fig. 5).

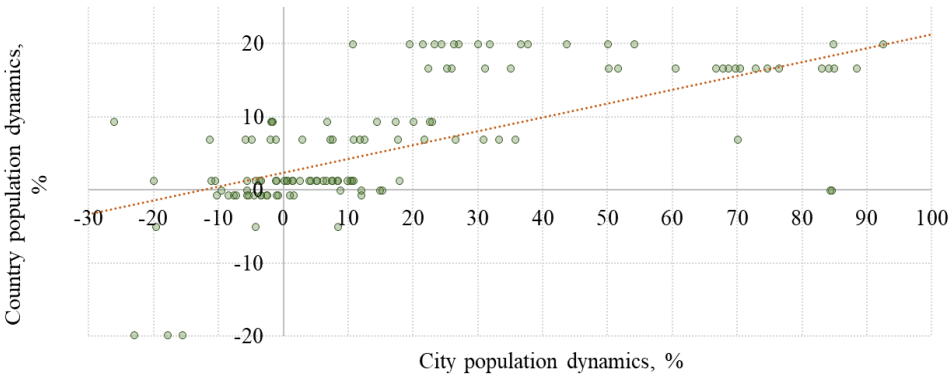

Fig. 5. Distribution of Baltic region cities by population growth rate against the country average, 2000—2020

Source: calculated by the authors based on data from Eurostat, Rosstat and City Population.[9]

[9] Population on 1 January by age groups and sex — cities and greater cities, 2021, *Eurostat*, available at: https://ec.europa.eu/eurostat/databrowser/view/urb_cpop1/default/table?lang=en (accessed 03.08.2021); Population statistics for countries, administrative divisions, cities, urban areas and agglomerations — interactive maps and charts, 2021, *City Population*, available at: https://www.citypopulation.de/Europe.html (accessed 03.08.2021); Database of indicators by municipalities, 2021, *Rosstat*, available at: https://www.gks.ru/free_doc/new_site/bd_munst/munst.htm (accessed 03.08.2021) (in Russ.); The size and location of the population, 2021, *All-Russian Population Census 2002*, available at: http://www.perepis2002.ru/index.html?id=11 (accessed 03.08.2021) (in Russ.); Resident population as of January 1, 2021, *Rosstat*, available at: https://showdata.gks.ru/report/278928 (accessed 03.08.2021) (in Russ.); Population on 1 January (national level), 2021, *Eurostat*, available at: https://ec.europa.eu/eurostat/databrowser/view/tps00001/default/table?lang=en (accessed 03.08.2021).

Remarkably, cities without a port are more likely than seaport cities to follow the general national trend in population dynamics: the correlation coefficient is 0.594 for port cities versus 0.692 for cities without a port.

Conclusion

Our study showed that the coastalisation effects would differ depending on the delimitation criteria used to distinguish coastal zones, especially when the distance from the coast is considered. In most cases, general coastalisation effects were visible within 10 km of the seacoast and 30 km of the nearest port. However, cities with river ports lying 150 km away from the seacoast can still have elements of the marine economy.

We constructed a typology of Baltic region countries according to the most appropriate approach to delineating the boundaries of coastal zones (Table 6).

Table 6

Distribution of the urban population of Baltic region countries within 150 km of the seacoast, 2020

Country	Distance from the seacoast, km							
	Under 10 km		10—50 km		50—100 km		100—150 km	
	Number of cities	Population, %	Number of cities	Population, %	Number of cities	Population, %	Number of cities	Population, %
Group 1								
Norway	16	100.0	—	—	—	—	—	—
Russia	4	95.7	3	3.5	—	—	1	0.8
Denmark	9	92.7	2	7.3	—	—	—	—
Estonia	2	83.5	—	—	—	—	1	16.5
Finland	10	71.2	2	5.8	4	11.9	2	11.0
Lithuania	1	37.3	—	—	—	—	2	62.7
Group 2								
Sweden	10	66.3	3	12.7	5	15.2	2	5.8
Poland	5	38.3	3	19.5	2	9.8	6	32.3
Latvia	1	9.1	2	90.9	—	—	—	—
Group 3								
Germany	9	12.0	5	10.6	4	22.1	12	55.3

Source: calculated by the authors based on data Eurostat and Rosstat.

The first group includes six countries (Norway, Russia, Denmark, Estonia, Finland and Lithuania), for which the 0—10 km approach to coastal delimitation is reasonable since over 70 per cent (100 per cent in Norway) of the urban population of the 0—150 km coastal zone reside there. Therefore, marine economic activities concentrate within the 10-km area too. This conclusion also holds for Lithuania since its only port city, Klaipeda, lies within this zone.

For the second group (Sweden, Poland and Latvia), coastalisation effects are better described when using the 0—50 km approach. In these countries, the corresponding zone accounts for more than 50 per cent of the urban population and is home to port infrastructure. Even though a third of Poland's urban population in the sample lives in the 100—150 km zone, expanding the coastal zone to 150 km is impractical since cities in that area do not have ports.

The third group includes Germany, whose urban population is distributed across the studied zones: 'up to 10 km', '10—50 km', '50—100 km' and '100—150 km'. For the country, the '0—150 km' approach to coastal delimitation is justified because it has ports actively involved in maritime activities, including cargo operations, even at a considerable distance from the seacoast.

Our findings point to differentiation in the coastal population size depending on the approach to coastal delimitation. Taking countries of the Baltic region as an example, we estimated the population in the coastal zone in three gradations: 0—10 km, 10—50 km, 50—100 km and 100—150 km. It was established that the most active marine economic processes occurred within 10 km of the seacoast and 30 km of port infrastructure. At the same time, there was significant heterogeneity across countries of the Baltic region: in Sweden, Poland and Latvia, the coastal zone can be extended up to 50 km, and in Germany up to 150 km.

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