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IMPORTANCE OF THE MARINE CADASTRE IN THE DEVELOPMENT OF THE REAL ESTATE INDUSTRY IN LATVIA

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Abstract. In Latvia, the issues of the Real Estate Cadastre are arranged; however, it should be noted that part of the issues affecting the Baltic Sea, i.e., the issues of the Marine Cadastre, are not covered by the Real Estate Cadastre.
The status of the Baltic coastline is an essential element of infrastructure for all countries around the Baltic Sea. This baseline serves as the key element or reference for the Marine Cadastre. In place-to-place, this line is the dynamic element as it is possible to monitor location with advanced and progressive technologies. The issues of the Marine Cadastre are on the agenda in many EU countries, and several international projects are being realized. Land parcels from the sea are registered and maintained in the Cadastre Information System in Latvia.
Starting from 2017, the State Land Service of Latvia has started to register coastal areas two kilometres in width from the Baltic Sea baseline. Cadastral information about the Marine Cadastre is being used for spatial planning and taxation.

Keywords: *Baltic Sea, Marine Cadastre, Real Estate Cadastre, sea areas.*

INTRODUCTION

When researching the questions related to the Marine Cadastre, the authors of the research indicate that the United Nations Convention on the Law of the Sea (UNCLOS) was accepted on 10 December 1982, but UNCLOS entered into force on 16 November 1994. All European Union member states as well as the European Union itself have ratified the convention or have acceded to the convention. In every individual country, the Marine Cadastre implementation process and the stage of its development are very uneven and different. The Marine Cadastre is in operation in Australia, USA, Canada and Trinidad Tobago for example. In the Baltic Sea region, the leading country in the Marine Cadastre is Sweden.

The Marine Cadastre is attracting interest and attention from an ever growing number of scientists. For example, most of the similarities and differences between

the Marine Cadastre and its equivalent land units are due to the fact that any marine environment has unique characteristics that are not applicable to the terrestrial environment, hence, they are not applicable to the land register and cadastre, although many of the components used in the cadastre, rights, etc., and scientific and applied research and other components, are of equivalent status both in the sea and in the ocean (Binns, Rajabifard, Collier, & Williamson, 2004; Collier, Leahy, & Williamson, 2001a, 2001b; Neely, Treml, LaVoi, & Fowler, 1998; Widodo, 2003).

The aim of the research is to lay down the framework and main principles of the implementation of the Marine Cadastre in participating countries.
Research tasks are as follows:

1) analysis of the best practice concerning the existing cadastral systems of the marine and the possibilities of implementing this knowledge under the Baltic Sea conditions;
2) legal matters related to the Marine Cadastre in Latvia;
3) administrative and organizational issues related to the Marine Cadastre.

The idea is to look at the implementation of the Marine Cadastre as widely and in detail as possible, involving a larger audience and more institutions. By cooperating with all countries of the Baltic Sea region, one can hope to achieve effective results and returns.

The comparison, data analysis and logical access control methods were used during research development.

1. THEORETICAL ASPECTS OF THE DEFINITION OF THE MARINE CADASTRE IN EUROPE AND LATVIA

A significant part of the conducted scientific researches on the Marine Cadastre points at similarities and differences between the Marine Cadastre and the Land Cadastre.

S. Nichols, D. Monahan and M. Sutherland (2000) indicate that the ",Marine Cadastre is a marine information system, encompassing both the nature and spatial extent of interests and property rights, with respect to ownership and various rights and responsibilities in the marine jurisdiction." It is also mentioned that other researchers indicate that the marine cadastre is a system to enable the boundaries of maritime rights and interests to be recorded, spatially managed and physically defined in relation to the boundaries of other neighbouring or underlying rights and interests (Grant, 1999; Robertson, Benwell, & Hoogsteden, 1999).

The authors of the present research believe that the first definition is referring to a broader perspective and the second one is similar to the land cadastre, referring to boundaries.

In the report "The Marine Cadastre: Legal and Spatial Data Contribution to Economic, Environmental and Social Development", M. Sutherland (2005) indicates that "the marine cadastre is any information system established to manage legal and even informal marine and coastal tenure and other information, and its linked spatial quantity".

During the creation of the system of the Marine Cadastre, the collection of data did not cause problems; however, the integration and exchange of data resources between different information systems was problematic. The central concept of the Marine Cadastre must be considered within the broader context (see Fig. 1).

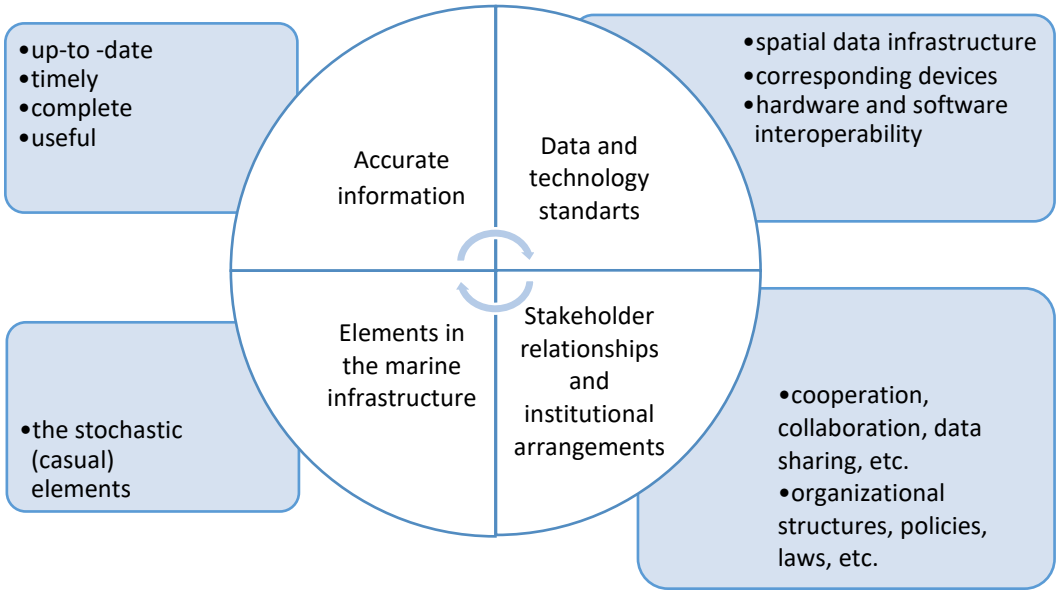

Fig. 1. The central concept of the Marine Cadastre [compiled by authors on the basis of a figure given by (Sutherland, 2005)].

The information summarized in Fig. 1 shows that the central concept of the Marine Cadastre should be assessed from a wider perspective:

1) more accurate information is required; it should be up-to-date, timely, complete and useful at the same time;
2) correct data and technology standards should be created, spatial data infrastructures, supporting the compatibility of the corresponding devices, technologies and software;
3) interaction between stakeholders, which facilitates the exchange of information necessary for decision making, should be created. Examples for such interaction are collaboration, cooperation, data exchange, etc., as well as the institutional structure, such as organizational structures, policies, laws, etc., which, in its turn, promotes greater probability that every stakeholder will achieve his individual goal;
4) casual elements in the marine infrastructure should be taken into account.

As it is maintained in De Latte's paper (2016), the concept of the land cadastre as well as of the Marine Cadastre is the idea of the marine cadastre units that is defined as the volumetric reality of every distinct marine zone: water column, sea surface, seabed or soil and subsoil, with the rights and charges under the UNCLOS and the patrimonial rights which include rights *in rem*. Rights *in rem* are made or availing against or affecting a thing and, therefore, other people generally or imposing a general liability. Next dimension, meaning the temporary nature of any

particular rights – fixed term licenses, concessions and leases for mining, production of energy, aquaculture, fishing, and other rights.

Most of the similarities and differences between the Marine Cadastre and the Land Registry and Cadastre are based on the fact that the marine environment has unique features, which is not the case if we are considering the terrestrial environment. As a result, this applies also to the Land Cadastre (Binns, Rajabifard, Collier, & Williamson, 2004; Collier, Leahy, & Williamson, 2001a, 2001b; Widodo, 2003), although many of the cadastral components have an equal status and condition in the sea (Neely, R. M., Treml, E., LaVoi, T., & Fowler, C. (1998).

The marine cadastre is based on the three main criteria (see Fig. 2).

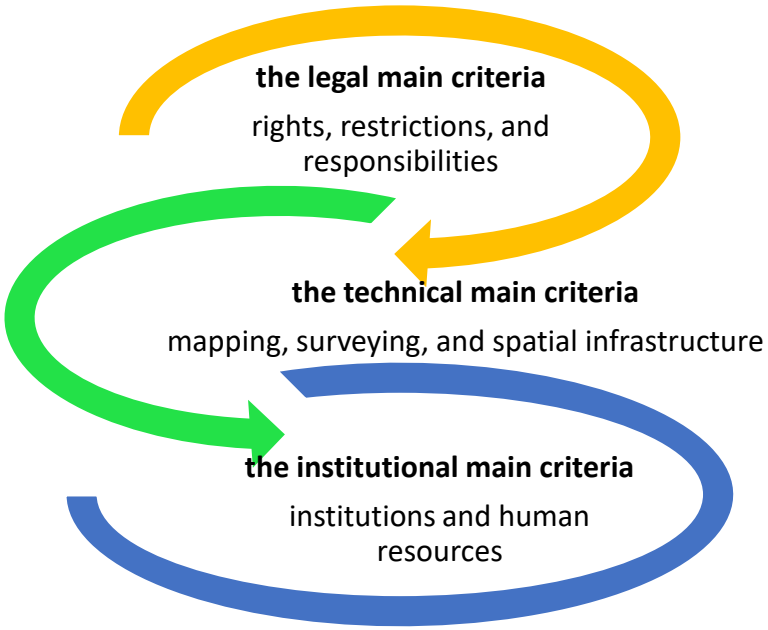

Fig. 2. The main criteria of the design of the Marine Cadastre [compiled by authors on the basis of a figure given by (Tamtomo, 2004)].

J. Tamtomo (2004) pointed out that the same as the Land Cadastre, the Marine Cadastre has also been designed based on main criteria, as follows: legal, technical, and institutional. In the paper "Marine Cadastre in Europe: a preliminary study" (PCC, EULIS, ELRA, CLGE, & Eurogeographics, n. d.), he has indicated that as a part of the legal system or Land Cadastre, the Marine Cadastre provides legal definition to the sea space directions of development planning, sea units rights and leases, and public access to and from the seas. Continuing the analysis of available scientific literature, it is concluded that as regards the technical main criteria, the Marine Cadastre is designed as a tool and mechanism for providing information and data as a resource for planning and the decision making process, and as legal acts of definite sea and marine rights and lease. But the Marine Cadastre part of the public administration system serves as a public service provider and aid for the resolution of sea conflicts (PCC, EULIS, ELRA, CLGE, & Eurogeographics, n. d.).

In Table 1, the authors of the research have reflected the differences between the Marine Cadastre and the Land Cadastre in accordance with world research

reports at international conferences (Collier, Leahy, & Williamson, 2001a, 2001b; (Binns, Rajabifard, Collier, & Williamson, 2004; PCC, EULIS, ELRA, CLGE, & Eurogeographics, n. d.).

Table 1. The differences between the Marine Cadastre and the Land Cadastre [created by authors according to (Collier, Leahy, & Williamson, 2001a, 2001b; Binns, Rajabifard, Collier, & Williamson, 2004)]

Land Cadastre	Marine Cadastre
Rights of full ownership or exclusive use.	There are virtually no rights of full ownership or exclusive use of marine space.
Ordinary the land demarcation techniques apply in land environment: boundaries are delimited and demarcated, and there is physical evidence of offshore boundary.	Ordinary land demarcation techniques cannot apply to the marine environment. Marine boundaries are delimited, not demarcated, and there is no physical evidence of offshore boundaries.
In the land environment, the existence of overlapping rights in a single area is not common	In the marine environment, the existence of multiple (overlapping) rights in a single area is common.
Classical 2D simplifications will suffice.	The marine environment is three-dimensional – classical 2D simplifications will not suffice.
Rights cannot vary with time.	The rights can vary depending on the time scale, adding spatial data to the fourth dimension.
The baseline to which many land boundaries are related is no transferable.	The baseline to which many marine boundaries are related is transferable.

In Latvia, the Marine Cadastre is not established yet. The authors of this paper offer the following definition of the Marine Cadastre: Marine Cadastre is a cartographically demarcated territory of territorial waters and of the coastal area of land, and information system, encompassing both the nature and spatial extent of interests and property rights, with respect to ownership and various rights and responsibilities in marine jurisdiction.

According to the authors of the present research, theoretical analysis, which reveals a wide range of related issues, helps to understand the content of the Marine Cadastre.

The authors believe that the development of the Marine Cadastre in Latvia has been previously hindered by the lack of support from the governmental body (the Ministry of Environmental Protection and Regional Development) to the progress of the INTERREG project, which caused the suspension of the project. However, starting with 2017, the first Marine Cadastre has emerged as from 1 January 2017; municipality possession of the right to coastal waters is being recorded in the Cadastre information system of the State Land Service.

The main reasons for establishing the Marine Cadastre are as follows to help:

- to ensure sustainable management of the territorial and internal waters;
- to resolve the rights of ownership in the territorial and internal waters;
- to accumulate complete cadastral textual and spatial data for land units and buildings that are located in the sea.

The State Land Service envisages that in 2020, upon entry into force of the new Law on the State Cadastre, maritime cadastral parcels will be registered in the cadastre in the territorial waters of the Republic of Latvia and in the exclusive economic zone.

2. BALTIC SEA COAST AND CONSTITUENT ELEMENTS

The UNCLOS convention (United Nations, 1982) that was signed in 1982 and came into effect in 1994, defines the rights and responsibilities of nations with respect to their use of the world's oceans and seas, establishing guidelines for businesses, the environment, and the management of marine natural resources. As of 2017, a total of 168 parties have ratified the UNCLOS, which includes 167 states and the European Union.

During the research, the authors have concluded that the UNCLOS introduced a number of provisions, among them the setting of marine areas and their respective limits, navigation and transit regimes, jurisdiction of the exclusive economic zone and the continental shelf, deep seabed mining, the exploitation regime, protection of marine environment, scientific research, and settlement of disputes.

UNCLOS splits marine areas into five main zones (United Nations, 1982), each with different legal status: internal marine waters, territorial sea, contiguous zone, exclusive economic zone, and the high seas (see Fig. 3).

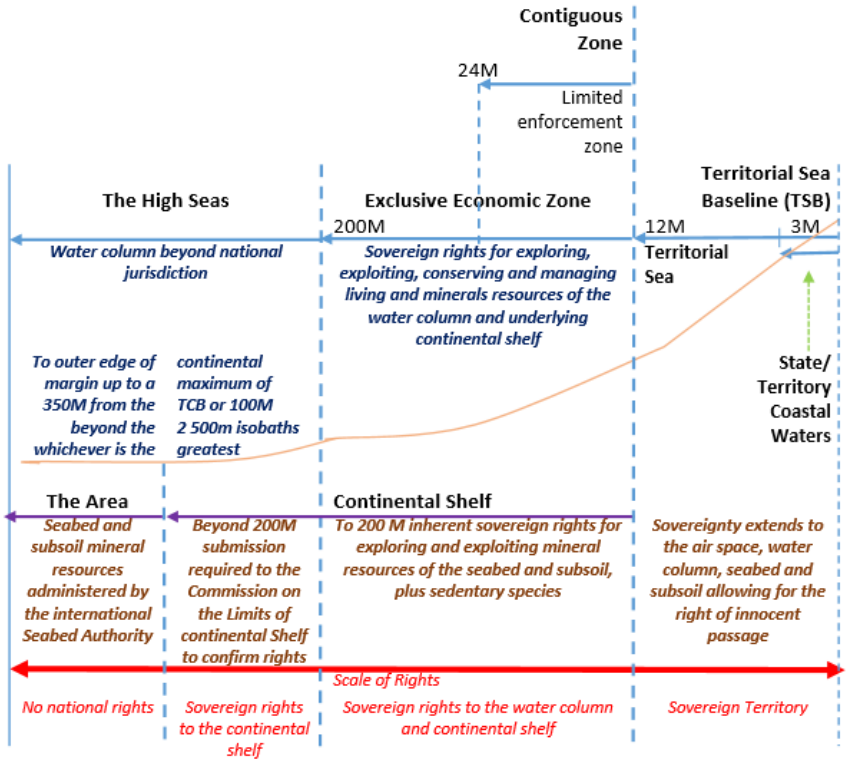

Fig. 3. Marine zones under the UNCLOS [compiled by authors on the basis of a figure given by (Balla & Wouters, 2017)].

In accordance with UNCLOS (United Nations, 1982), the following distinct marine areas or zones, each with its own legal status and rights, assigned to the coastal state, other states and other stakeholders involved, restrictions, measured from a carefully defined baseline:

1) Territorial sea is a marine area up to a limit not exceeding 12 nautical miles measured from baselines determined in accordance with the Convention, which encompasses airspace and sea surface, and water column overlying to the seabed and soil or seabed and subsoil;
2) Contiguous zone – encompasses the sea surface and water column and soil and subsoil – breadth of 12 nautical miles measured from the outer limit of the territorial sea;
3) Exclusive economic zone – encompasses the sea surface and water column and soil and subsoil – breadth of 200 nautical miles measured from the outer limit of the territorial sea;
4) Continental shelf – encompasses only the seabed and its subsoil – breadth of 200 nautical miles (maximum of 350 miles) measured from the outer limit of the territorial seabed;
5) High seas – consists only of the sea surface and the water column subjacent to the surface – beyond the exclusive economic zone – beyond any national jurisdiction;
6) the Area encompassing only the seabed and its subsoil under the High Seas – beyond the outer limit of the continental shelf – beyond any national jurisdiction (Balla & Wouters, 2017).

In the Republic of Latvia, the Baltic Sea coast is a unique value of Latvia and the whole Baltic Sea region. The coastline with its unique natural and cultural heritage, with its three large and seven small ports, and with the longest sandy beaches in the Baltic Sea region is an essential component of the state image and an important development resource that has contributed to the development of Latvia for many centuries; and this coast has been highly valued also in many other countries in a wider scale also for many centuries.

The total area of the Baltic Sea waters under the jurisdiction of Latvia is 28 000 km^2. The marine waters of Latvia take up about 7.7 % of the total area of the Baltic Sea. The marine waters of Latvia include inland maritime waters, territorial sea, and the exclusive economic zone (see Fig. 4).

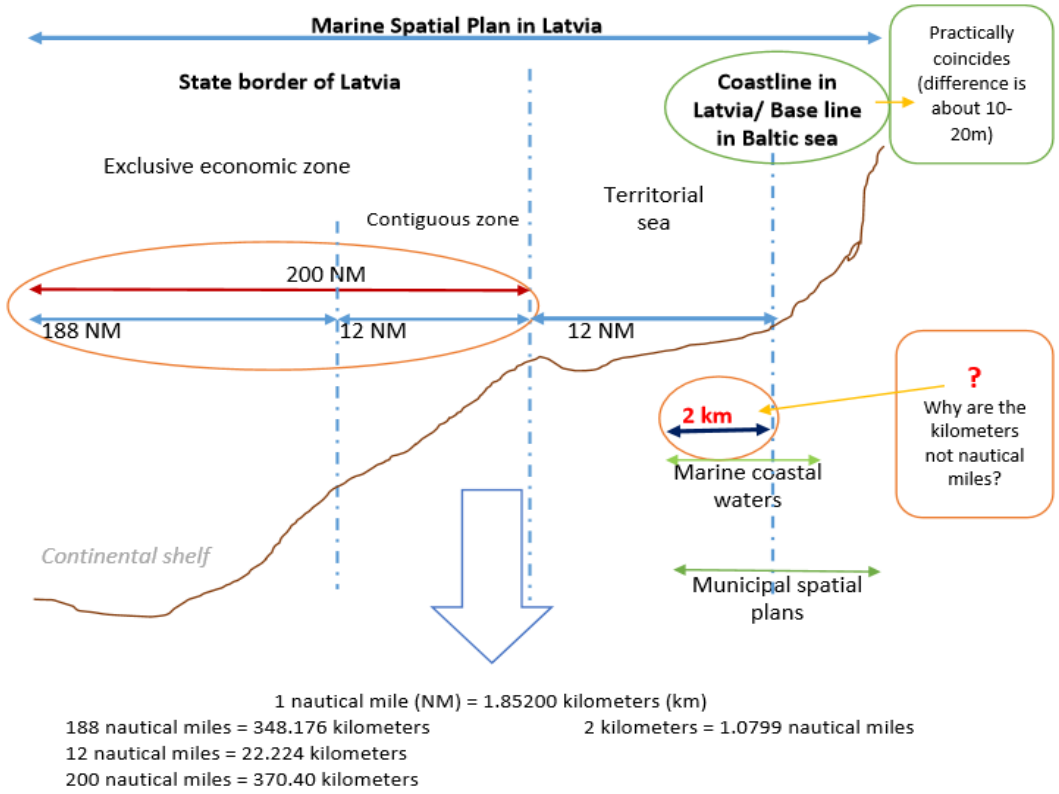

Fig. 4. Marine zones in Latvia [authors compiled on the basis of a figure given by the (Ministry of the Environmental Protection and Regional Development, 2016)].

In Fig. 4, the distances of the components of the Latvian Marine Zones are calculated. In Latvia, there is a technically clear sequence of the zones of the Marine Cadastre, similar to the one already introduced in many countries of the world; however, the authors of the research would like to point out that these are measured in nautical miles everywhere, but in Latvia, for unknown reasons, these distances are measured in kilometres. When determining the distance from the Marine Coastal waters, the unit of measurement used is 2 kilometres, which corresponds to 1.0799 nautical miles.

1. Territorial sea – the waters of the Baltic Sea and of the Gulf of Riga of the Baltic Sea in the width of 12 nautical miles counted from the baseline if it has not been otherwise specified by international agreements.
2. Baseline in the Baltic Sea – the maximum low-water line and straight lines that connect the points of the hydro-technical structures or other structures located on the opposite side of a specific port, which are located further towards the sea.
3. The continental shelf of the Republic of Latvia is the seabed and the depths below it in submarine regions adjacent to the seacoast of Latvia, which are beyond the boundaries of the territorial sea and extends up to the boundaries determined in the Marine Environment Protection and Management Law (Legislation of the Republic of Latvia, 2010).

4. Exclusive economic zone – the exclusive economic zone of the Republic of Latvia is the waters of the Baltic Sea beyond the territorial sea boundaries and which extend to the boundaries determined in the Marine Environment Protection and Management Law (Legislation of the Republic of Latvia, 2010) (see Fig. 5).

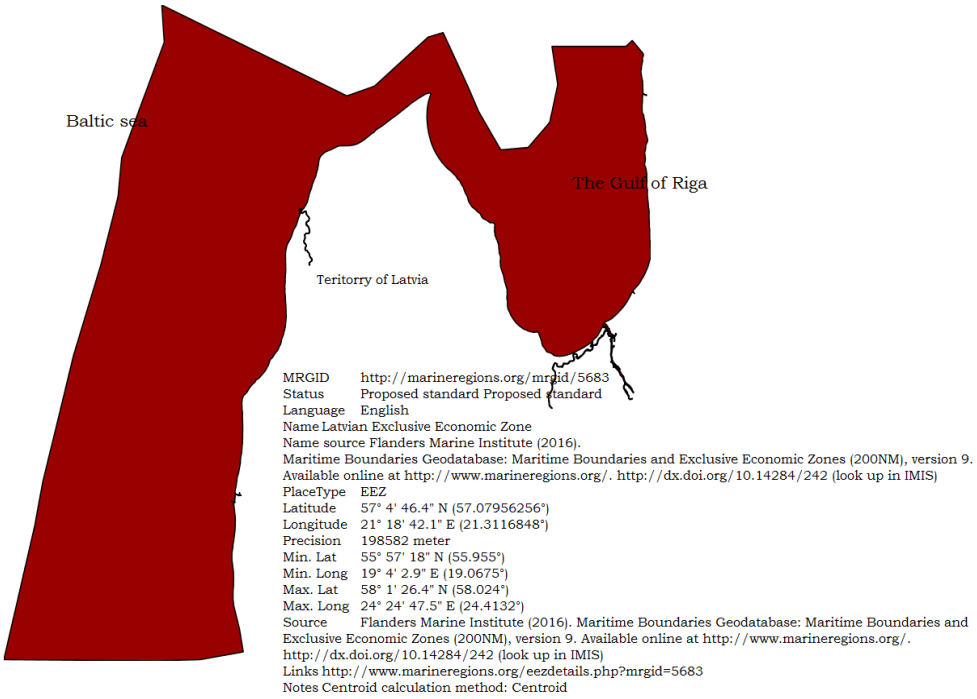

Fig. 5. Exclusive economic zone in Latvia [authors compiled on the basis of a figure given by (Flanders Marine Institute, 2016)].

The boundaries of the continental shelf of the Republic of Latvia and of the exclusive economic zone of the Republic of Latvia with the Republic of Estonia, the Republic of Lithuania, and the Kingdom of Sweden shall conform to the international agreements entered into force by the respective countries. The Marine Environment Protection and Management Law (Legislation of the Republic of Latvia, 2010) defines them.

The specified length of the Latvian maritime border is 509 km, and it differs from the general statistical data, where the specified length is 494 km. More than 65 % of Latvia's coastline in length of 509 km are exposed to various intensities of erosion effects (Eberhards, 2003). The Baltic Sea is a common resource for all countries surrounding it, and that is reason why joint and coordinated activities are required.

When talking about the constituent elements of the coast of the Baltic Sea in the territory of Latvia, attention should also be dedicated to the sea baseline (Fig. 6).

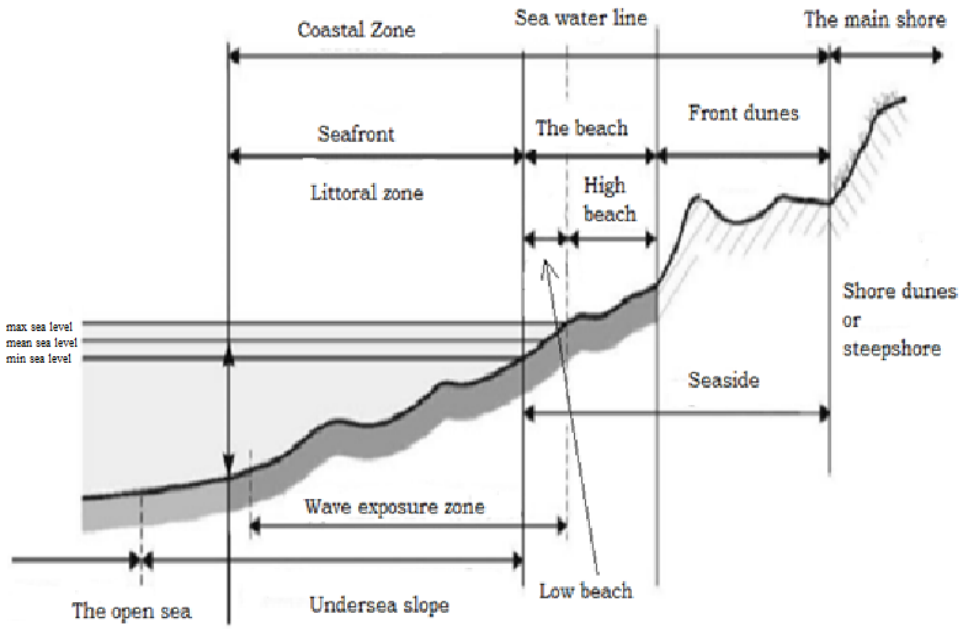

Fig. 6. Constituent elements of the coast of the Baltic Sea [compiled by authors on the basis of a figure given by (Anderson, R., & Anderson, S., 2010)].

Analysing Fig. 6, a conclusion can be drawn that the front dune as an element of the Baltic Sea coast can be displaced by wind influence at such an extent that is characteristic only in Latvia.

The dynamics of coastal changes indicate that, if there is erosion in one place and the beach is being washed out, sand accumulation is being observed in another place. These processes have to be monitored regularly, and modelling work should be done. Coastal erosion is frequent and self-sufficing, in particular due to storms and other geophysical processes.

Many researchers and students have devoted their research to this theme, for example, the bachelor thesis "The Coastal Erosion near Šķēde" (Papirtis & Lapinskis, 2017).

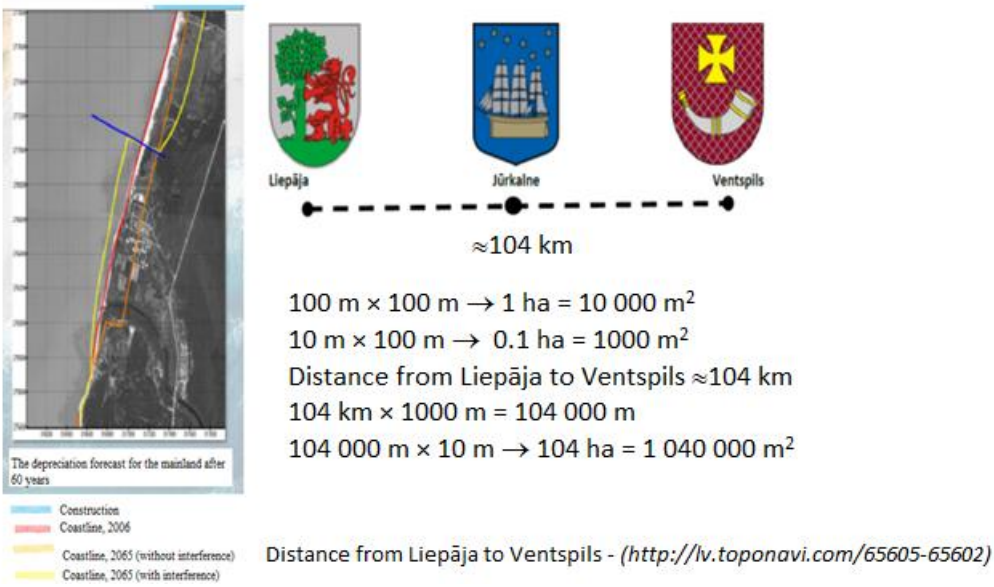

Fig. 7. Dynamics of the territorial sea baseline in the Baltic Sea coast from Liepāja to Ventspils (Kaminskis, Stamure, & Geipele, 2017a).

In Fig. 7, the authors of the research have calculated and visually depicted the dynamics of the territorial sea baseline in the Baltic Sea coast from Liepāja to Ventspils.

In general, changes in the boundary line between Liepāja and the Ventspils Marine Cadastre cause changes in the area associated with it by more than one million square meters. It indicates that such processes should be followed up to control the development of events.

3. DEVELOPMENT OF THE MARINE CADASTRE IN LATVIA

Maritime Spatial Plan of Latvia is a national level long-term spatial development planning document that shall define the use of the sea, considering a terrestrial part that is functionally interlinked with the sea and co-ordinating interests of various sectors and local governments in use of the sea. The Maritime Spatial Plan of Latvia covers territorial waters and exclusive economic zone. (Baltic Environmental Forum. (n.d.))

The cartographic material analysis considered a suitable long-term change in the assessment of relatively extensive coastal areas; however, this method has several disadvantages:

1) orthophoto imagery works are performed too infrequently (every three years);
2) low resolution;
3) sensitive to changing climatic conditions.

Cartographic materials were always used to capture and retrieve the report information. The authors of the study believe that positive results can be obtained if the cartographic materials correspond to a situation with a shift of a few days rather than a three-year step. There is a possibility of using the state-of-the-art

technology such as unmanned aerial vehicles (drones) and satellite imagery (Kaminskis, Stamure, & Ziemele, 2017b).

The development of the economy increasingly generates a desire for design to use the territory of seawaters.

Despite the fact that legislation of Latvia on construction in seawaters is still incomplete, some hydraulic engineering structures and marine navigation structures are already built in the Baltic Sea and the Gulf of Riga. The state is interested in collecting taxes on objects located in seawaters. As a result, the State Land Service will have to register marine objects as cadastral objects and depict them graphically in seawater as the jurisdiction of Latvia extends.

The concept of the subsoil and the plan of land policy promote the economic activity in the sea (see Fig. 8).

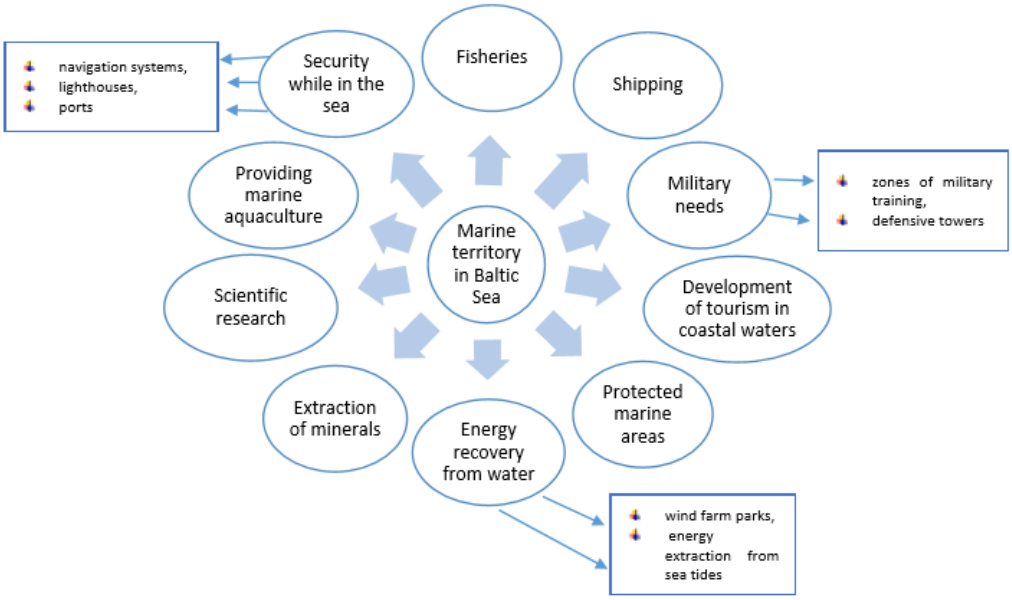

Fig. 8. Activities in marine territory in the Baltic Sea [compiled by authors].

Marine territory is used for shipping, fisheries, military needs (defensive towers, zones of military training), protected marine areas, development of tourism in coastal waters, energy recovery from water (wind farm parks, energy extraction from sea tides), extraction of minerals, providing marine aquaculture, security while in the sea (lighthouses, navigation systems, ports).

Different industries have many interests in the use of marine territory. The task of maritime planning is to combine the interests of using the sea territory. In turn, these interests should be registered and the Marine Cadastre is required for this.

One of the main conditions for effective land use and management is clear and definite rights to land ownership and land tenure.

To ensure the management of land and its rational use, the Ministry of Environmental Protection and Regional Development has developed the Law on Land Management. The law includes such norms that provide for the protection and management of dry land as well as for the management of marine coastal waters.

The Marine Coastal Zone is defined by the Land Management Law, which entered into force on 1 January 2015. This zone consists of two parts: coastal waters occupying 2 km, and part of the coast (i. e., the beach). The law includes a legal framework on the management of the coast and marine coastal waters.

Municipalities own land in coastal waters and coordinate actions there and at the coast, with the exception of the area where natural reserves, national parks and nature protection zones are located. The responsible Ministry of Environmental Protection and Regional Development realizes the ownership of these areas. It is not provided for registration of the Marine Coastal Zone in the Land Register.

Since the Law on Land Management determines the legal ownership of coastal waters, according to the norms of April 6 of 2017, there are 30 land parcels which are situated in coastal waters and are registered in the Cadastre Register.

For the construction of the lines of the Marine Cadastre, postponed 2000 m from the shore, where the land parcels of the cadastral territories divided in state cadastre system in Latvia, respectively. The marine cadastral territories by territorial affiliation divided into respective seaside municipality.

The coastline is depicted based on orthophoto maps, with no land surveying. The shoreline has been registered or fixed in the cadastre database at a certain epoch of time. The dynamics of the coastline, so far, has not been implemented in reference or functionality for the Marine Cadastre. Today when having available border plan no sea (until 2 km from coast) or the Marine Cadastre, then it is possible to register buildings in coastal waters. To register special engineering objects or buildings, it is necessary to know the height and depth of the selected structure. A complete Marine Cadastre is useful for planning sea routes or possible fishing areas, for the development, monitoring and taxation of the region.

CONCLUSION

At present, the Cadastre of the Republic of Latvia registers marine areas only 2 km from the coastline, but in international practice, this distance is three nautical miles (almost 6 kilometres). It should be noted that coastline data were derived from orthophoto maps of the Latvian Geospatial Information Agency. Orthophoto maps are updated every three years – hence it is assumed that the coastline is constant for three years; however, in practice, the changes are much faster. The authors of the research believe that it is necessary to use satellite data or airborne surveying to track shoreline changes more efficiently.

It is also necessary to indicate that normally the areas of the Baltic Sea cadastral area in Latvia overlap, which, in turn, would be an inadmissible situation in the land cadastre.

Cadastral information about the Marine Cadastre is used for spatial planning. Spatial data are used for marine monitoring.

In addition, to the complete Marine Cadastre, it is necessary to indicate the utilities, cables under the water surface, and the sites of mineral deposits, both already discovered and potential ones. It should include a depth card or bathymetry and various other data.

The authors believe that the modern Marine Cadastre means not only the standard cadastral map but also the possibilities of spatial visualization, when the cadastral area can be found in the three-dimensional (3D) virtual reality.

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