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Administrating Marine Interests in the Sea of Data

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eGovernment and autoritative public data in Denmark are still mainly focused on the landside of Danmark. But the need to eloborate the coordinating effort of administration at sea is recognised and the development of maritime eGovernment is happening within the next years. This paper discusses the data involved in this administration and focuses on the need to understand the function and hence value of data. Some maritime data contain accurate placements of objects, and, as a tricky part, some are dealing with floating placement. Other data show non-visible areas in terms of zoning, e.g. planning and interest areas and finally some data are representation of legislation, whether it is rights or restrictions. These different data are not always usable in the same manner. This paper investigates the correlation between spatial data and legislation. Experience from many years of land administration can be used as part of this discussion, furthermore, the conclusions from this paper provide input for the ongoing development on land.

Keywords: eGovernment, marine spatial data infrastructure, mSDI, sea administration

Data with a spatial dimension are crucial elements in the administration of land today. The different functions in the land administration system are administrated with the use of geodata to tie the data to a specific location. These functions could reflect e.g. land tenure or land use planning, where the administration is strongly reliant on spatial data the support the registration of rights and restrictions.

All the mentioned functions are related to the administration of interests whether it be the rights or the restrictions concerning them. This administration system is mostly only serving its purpose on land. But there are also an increasing amount of interests at sea. These interests include fishing, offshore activities related to the establishment of fixed facilities and all kinds of shipping. Research from the Belgian part of the North Sea shows that the total demand for space in their marine territory is 2.6 times larger than the actual available space in the Belgian part of the North Sea (Maes et al., 2005). This illustrates that the increasing claim for space at sea eventually will lead to conflicts.

This increasing demand for space at sea and the conflicts that have already happened at sea show that there are two central problems: Firstly that the responsible institutions and different parties are facing problems such as lack of qualitative information exchange among responsible institutions to secure good governance of the marine territory. Secondly, there are many interests in the sea, and it will cause conflicts between the interest groups and also in relation to the responsible institutions, if the decision makers are not providing good governance, with proper acknowledgment of the interests at stake. The importance of proper management of the marine territory is steadily increasing, as the claim for space is growing, thus larger conflicts can be expected. thus there is a need for a different way of managing and administrating the sea. The increase of interests and activities at sea are at high risk of generating conflicts. Hence it is necessary to recognise that there cannot only be a focus on administrating the land areas of Denmark. There has to be a focus on the development of a system at sea that supports a sustainable development.

The Danish Minister of the Environment recently issued a statement prior to an international conference concerning the administration of data at sea on January 30th 2012 at the Geodata Agency. Among other things she stated:

"The sea is a huge workplace, and there are many commercial interests at play. Likewise the sea is a big nature area with rich animal life. Therefore is it important to secure the best possibilities to exploit the resources at sea without damaging the environment. When we plan on land, there is knowledge about where the protected nature is, and where the big traffic corridors are. This is what we want to achieve at sea as well. (Auken, 2013, authors translation)"

The statements prior to the international conference from the Minister of the Environment show that it is the intention of the ministry to make it possible to e.g. plan and protect the sea. Above all this is to be done through a better coordination of the geodata concerning the sea territory through a joined effort between the relevant sectors. The statement from the Minister of the Environment shows that the spatial data behind it has been recognised politically as an essential element in the administration of the sea, but it does not show any specific means of achieving this goal of a sustainable development at sea.

In the development of an administration system to handle the geodata at sea it is relevant to focus on the geodata that have some kind of juridical status attached to it, because they are tricky but vital in the administration of the sea territory. This could be geodata on physical objects such as offshore windmills with attached ownership or it could be non-visible objects such as protected areas. These juridical geodata represent interests that somehow secure the rights and the restrictions of the interest at sea and are regulated through related legislation.

To be able to achieve a sustainable development through a proper administration of the rights and restrictions at sea, it is necessary to look at the administration from an overall perspective. This paper investigates this through an identification of the core functions in a land administration system related to the rights and restrictions, and by drawing on this in the discussion of the development of an administration system at sea.

As mentioned above, this paper focuses mainly on the geodata that have a juridical status attached to them. This means that the central elements of the discussion of administrating the sea concern the link between the geodata and the legislation as shown in figure 1.

Framework for potential solutions

There are existing strategies that are either present or are in development concerning the administration of the sea. In July 2010 the former Danish government developed a strategy for the Marine environment (Regeringen, 2010). In this strategy a chapter is dedicated to coordination of the efforts in the marine environment. The chapter states that by focusing on the creation of institutional

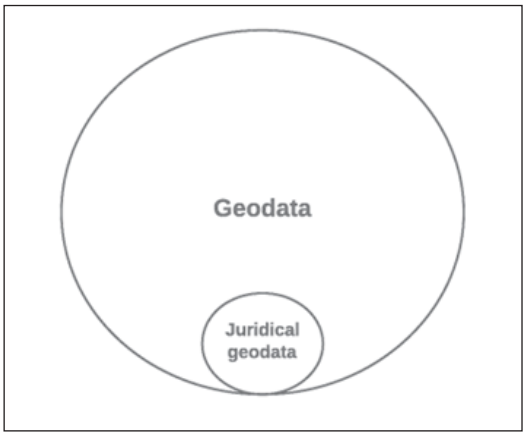

Figure 1: Relations between geodata and juridical geodata. Source: created by authors.

frameworks, better planning and better foundation for the further development, it is possible to create a better administrative basis for marine politics. Further in the strategy it is argued that this should happen through better coordination between the different authorities, better overall planning, better geographic infrastructure for marine information and easier reports on the marine environment.

The Geodata Agency hosted a conference on 30th January 2013 with participants from 16 countries (Dael, S., 2013), in an effort to make strategies on how to gather, exchange and arrange maritime geodata. A focus of the conference was also to discuss new ways of using nautical charts beyond the navigation sector. The participants at the conference are members of the "Marine Spatial Data Infrastructure Working Group", which is organized under the International Hydrographic Organization. The Danish Geodata Agency was asked to chair the conference and the following collaboration in the group. This gives Denmark the possibility of influencing and taking a leading role in this development.

The European Commission has created a strategy called "Roadmap for Maritime Spatial Planning: Achieving Common Principles in the EU" (European Commission, 2008). The strategy states the following principles for the future planning in the marine environment:

- The marine planning has three dimensions (the seabed, the water column and the surface) and it cannot copy the planning on land
- Goals should be defined for the planning process
- It should be incorporated by law
- The planning process should be transparent and secure involvement from all the stakeholders
- The planning needs to be coordinated internationally.

The different existing strategies concerning the administration of the sea define an overall path for how to achieve a sustainable development at sea and thereby also a framework for the potential solutions of the present paper.

In the following parts of the paper the correlation between the spatial data and legislation at sea will be investigated. Firstly, a theoretical framework is defined to create a theoretical background for the further investigation. To be able to manage the large number of interests at sea in the discussion, the concept of rights, restrictions and responsibilities is introduced. Because the goal is sustainable development at sea, the global land administration perspective is used and investigated.

To be able to identify the aspects found in the theoretical framework in a real-life context case studies are used. The case studies are based on rights and restrictions with an analysis of offshore windmills and Natura 2000 protected areas respectively.

Rights, restrictions and responsibilities and the global land administration perspective – a theoretical framework

Rights, restrictions and responsibilities (RRR) is a land administration principle that represents interests in land. According to Enemark (2009) "… *property rights are con-*

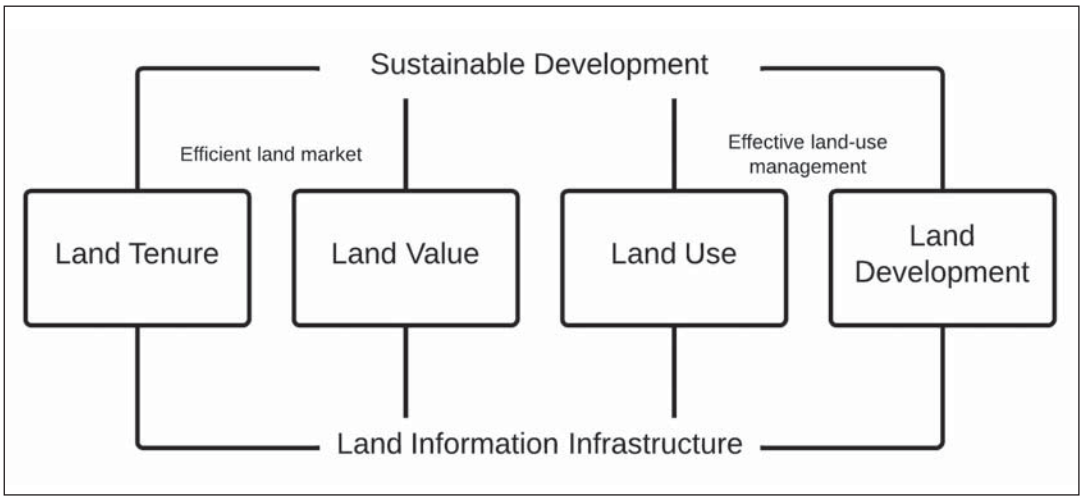

Figure 2:The global land administration perspective. Source: based on Enemark et al. 2010, p. 119.

cerned with ownership and tenure, restrictions usually control use and activities on land, and responsibilities relate more to a social, ethical commitment or attitude to environmental sustainability and good husbandry." However RRR as a land administration principle does not apply to the management of land itself. It is more about understanding the relations between people, land and land policy.

The global land administration perspective (Figure 2), developed by Enemark, Williamson and Wallace, offers a solution for how to structure a land administration that promotes efficient land markets and effective land use management, which eventually can lead to sustainable economic, social and environmental development in a country (Enemark et al., 2005). This perspective includes the interaction between the identification of land parcels, the registration of land rights, the valuation and taxation of land and property, and the present and possible future use and development of land (Enemark et al. 2010, p. 119). The global land administration perspective includes four main functions – land tenure, land value, land use and land development. *Land tenure* refers to activities and institutions that secure tenure rights, for instance the cadastral mapping and property transfer from a former owner to a new owner. *Land value* is related to the valuation and taxation of land. An example of activities regarding land value is assessment of the value of land. *Land use* is about the general land use policies and regulations, such as planning on different levels like state, regional and municipal level. *Land development* is about giving permits of land development to specific projects (Enemark et al., 2010, p. 119-120). All of these functions are closely interrelated to each other, which means that a change in one element will affect the other elements. These land administration functions are regulated by law and determinations. However the functions of the land administration are supported by the land information infrastructure. The *land information infrastructure* includes various datasets and the interaction between them (Enemark et al., 2010, p. 127). These datasets support all functions of the global land administration perspective and improve the realisation of laws and regulations.

When looking at the global land administration perspective in relation to rights, it mainly relates to land tenure and land value. Another aspect is that land tenure and land value tend to support efficient land markets. Thus they are principally about individual interests, such as the right to own land as well as to buy or sell it. Land use and

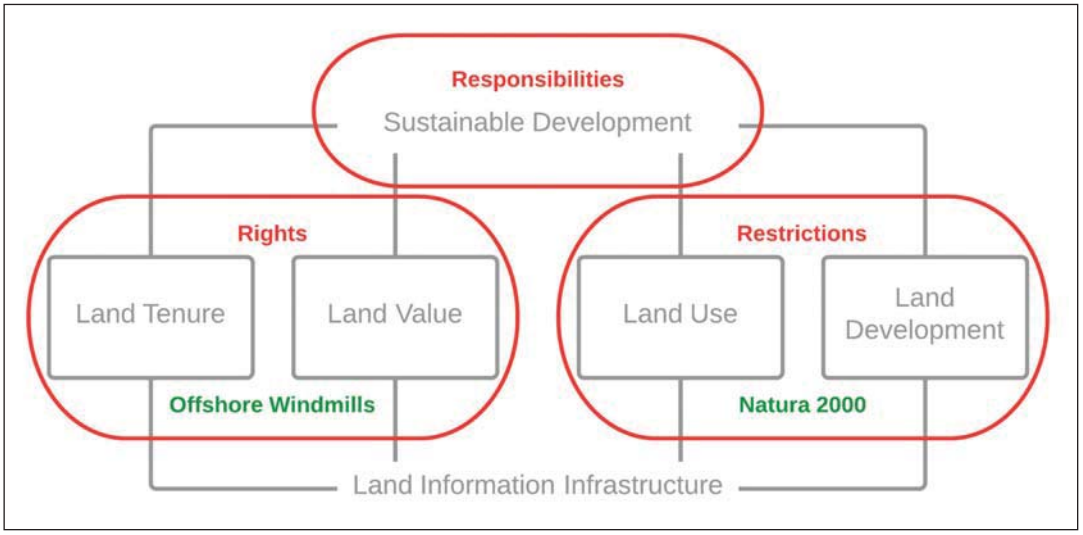

Figure 3: RRR and the global land administration perspective. Source: based on Enemark et al. 2010, p. 119.

land development are planning acts and specific permits. Thus they primarily refer to restrictions. These two functions promote effective land use management. However, it is relevant to keep in mind that all functions are affecting each other. Responsibilities refer to the purpose of the global land administration perspective, which is sustainability, which only can be achieved by collaboration between the four functions.

Both the RRR concepts and the global land administration perspective are relevant in the land administration process. Joining them into one system helps us understand how the land administration should function and how it could lead to sustainable development. Figure 3 shows how the global land administration perspective relates to the concept of RRR, and the two case studies that were investigated during this research, cover rights and restrictions respectively.

To regulate the intensive use of the marine territories, some countries try to create management systems for the marine environment. However, these systems tend to be silo oriented and unable to manage the whole system. According to Enemark et al. (2010), the three main components of the land information infrastructure is cadastre, registers and SDI. These components could be used in the MAS as well. However, there must be awareness of the issues that MAS has to deal with, such as inconsistent coastal boundaries, overlapping interests and different data types than those used on land.

The global land administration perspective provides a unified management approach that can be used in the marine environment as well. Therefore, the global land administration system in a combination with RRR is used to analyze the two Danish cases, Offshore Windmills and Natura 2000 territories in the marine environment and how they are functioning from the global land administration perspective. The case of offshore windmills represents the relationship between the private owner and the state in the marine territory – how the individual property rights are registered and secured, and how the state is organizing and administrating it. While the case of Natura 2000 territories in the marine environment represents restrictions originating from various levels of the political hierarchy, such as The European Commission, national, municipal and local levels.

Results

Offshore Windmills

As described previously, the case of offshore windmills

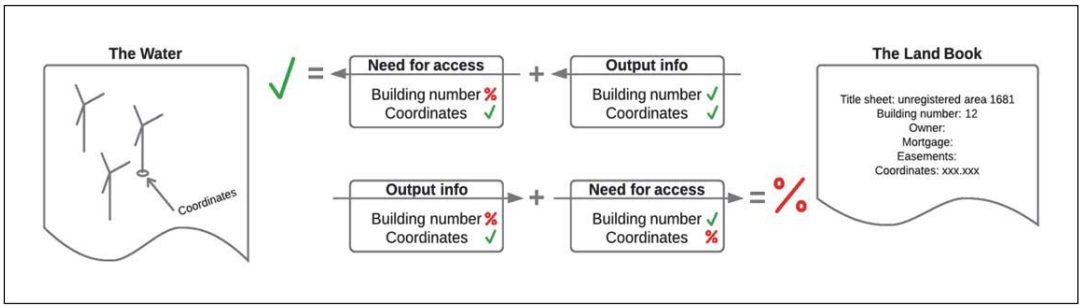

Figure 4: Information flow between territory and the Land Book. Source: created by authors.

represents rights related to the land tenure and land values from the global land administration perspective.

When a right to an offshore windmill is to be registered in the Land Book to secure property against a third party, the windmill will be registered as "building on rented ground". To complete the registration procedure, it requires the basic information: the owner(s), the shareholding, the information on the parcel, mortgage, easements, in some cases the ID-number provided by the Danish Energy Agency (*Energistyrelsen*) in Master Data Register for Wind Turbines (MDRwt) as well as coordinates which provide a spatial dimension to these data. By providing this information, it is assumed that information is available and will be used in the administration system, for instance when searching the particular windmill in the Land Book.

However in the Land Books online web portal (Tinglysningsretten, S.a.) it is possible to search on the address, the title number, the building number, the BBR number given by the Building and housing register (*Bygnings- og boligregistret*), the head notice number (*hovednoteringsnummer*) or unregistered area. There are no options to search through the coordinates. If the particular windmill's building number is unknown, the only option is to use unregister area 1681 as a search criterion. Unregistered area 1681 covers all territorial waters in Denmark. However, the search result presents only three windmills. According to the MDRwt (Energi Styrelsen, S.a.), there exist more than 400 offshore windmills. When a random building number was chosen as search criterion, it was found that even though the chosen building number was not shown in the overall view, it actually does exist. Thus it is possible to get information about coordinates and the ID number from the MDRwt, but only if the particular offshore windmill's building number is known. Otherwise it is not possible to get the information, unless the search starts with building number 1 and continues until the right one has been found. The coordinates are stored under notices in the Land Book. This is a non-searchable text column; therefore coordinates cannot be used as search criteria. Thus this information, which could be useful in identifying tenure, is not usable for this purpose at present.

According to "Tinglysningloven" § 19 (Bekendtgørelse af lov om tinglysning, 2006) it is stated that if a building and the parcel do not have the same owner, then the building needs its own sheet. Also, according to "Tinglysningsloven" § 19, it is stated that it is necessary that there is a clear reference to and from the parcel's property sheet. In practice, this does not function, however.

Figure 4 illustrates that the interaction between the Land Book and marine territories functions in only one direction. Thus it is possible to search windmills in the Land Book using different search criteria as described above, but it is a very cumbersome process if only the coordinates are known.

Similar problems occur on land. This implies that there are similar problems in the Land Book searching system regarding buildings on rented ground on land. Thus when

the title number is chosen as the search criterion, the title number's property sheet does not show that there exists a building on rented ground. If the search is done using the address as search criterion, both the title number's property sheet and the building on rented ground occur. Hence the connection from the property sheet to the building's sheet depends on the search method applied.

Finally, the case shows that this information is only available "as text". It is not possible to turn on a map and see the windmills and hence the rights and restrictions. The cadastral map does not allow entities smaller than the parcel hence the Land Book has been the only solution for registration of rights at sea.

The problem about rights in relation to buildings on rented ground, and the unsatisfactory way it is handled in the Land Book, is a known problem, and a change in the Cadastre in 2015 will address this problem (Knudsen, 2012). Also, it is decided that the Cadastre will be extented into the sea and property rights will be registered in the Land Book as it is partly done at present. Though the problem is to be solved in a couple of years, it is still a good example of how rights are handled today, and that the registration does not provide the necessary security of the right.

The case of windmills shows that in order for the geodata to work as a tool to secure rights, it is necessary that the data be made accessible and usable, and not just existing in the Land Book. In other words, a reference system for the marine territory is missing when dealing with rights.

Natura 2000

The case of Natura 2000 territories in marine environment represents restrictions related to the land use and land development from the global land administration perspective.

The Natura 2000 order ("Natura 2000 bekendtgørelsen" Miljøministeriet, 2007) provides the juridical delimitation of the Natura 2000 areas. A change in the delimitation of the specific areas is not valid until it is changed by law. The delimitation provided by law is static geodata, and is hardly of any use except in securing that the restriction is legally binding and legitimate. In the enforcement of Natura 2000, use of interoperable geodata is needed, and is provided through maps and portals, which gives the possibility of navigating in the map and make overlay analysis with the other datasets. Therefore it is important that maps and portals provide geodata that show the latest updated boundaries. When looking on a specific plan where the delimitation has been changed in the latest ministerial order, it is expected that the SDI provided geodata has updated the boundaries at the same time. However one should always be aware that it takes time to make data changes and the latest changes are presented in the law.

Other conflicts occur with the Natura 2000 plans. In Miljømålsloven § 36 (Miljøministeriet, 2009) it is stated that the Minister of the Environment is responsible for making the Natura 2000 plans which appoint the relevant areas that need protection, and § 46 states that these plans have to be updated every six years.

Firstly, each of the Natura 2000 plans has a unique number. A Natura 2000 plan can contain more than one area. Likewise each habitat, ramsar or bird protection area also has a number of its own, which is not the same as the Natura 2000 area number. For example, the Natura 2000 plan 116 contains e.g. Habitat area H100 and the two bird protection areas F73 and F98, which adds up to 4 different ID numbers. Therefore it is easy to mix up these identification numbers.

Secondly, when looking into the "Natura 2000 order", Appendix five, each Natura 2000 area is mentioned with number, name and habitat, ramsar or bird protection numbers. This information is not implemented in the data provided through The Danish Environmental Portal ("Danmarks Miljøportal"). Here it is only possible to get information about the habitat, ramsar and bird protection areas, but the ID number for the Natura 2000 plans is not available. This is a problem concerning availability, because the Natura 2000 ID number is an easy way of linking what is found on "Danmarks Miljøportal" with the correct plan on the Danish Nature Agency web portal (Miljøministeriet Naturstyrelsen, 2013). However it is possible to find the Natura 2000 plan

by using the name of the area, but since the Natura 2000 plans are sorted by number, finding the plan in this way is a slow process, which reduces the availability of the geodata contained in the plans. An independent solution is found on the Danish Nature Agency's web portal, where it is possible to find the plans on Natura 2000 by using a selectable map that narrow the search to a regional level.

Thirdly, when looking into the "Natura 2000 bekendtgørelse" all the plans are mentioned, whereas on the Danish Nature Agency's website this information is missing. A further investigation into some of the other marine plans showed that a lot of the newly selected habitat areas haven't got any plan either. If looking into both plans 190 and 246, that contain both an old bird protection area and two newly selected habitat areas, it is mentioned that this plan only counts for the bird protection and that the habitat areas will be in the plan from next planning period.

By investigating areas that have been selected in the "Natura 2000 bekendtgørelse", it was found that the problematic plans were added to the ministerial order 22. January 2010. This is three years ago, and the information has not been updated since then on the web portal. This is problematic, not just that the plans either are not created, published or mentioned at all, but also because all the missing plans relate to the marine environment.

The above shows that the juridical geodata on Natura 2000 actually works well to secure the restrictions that are implied in the Natura 2000 areas. Because of this level of usability of the data, it would seem relevant that even more information concerning the Natura 2000 areas were given a spatial dimension. A supplementary feature could be a data visualization showing the specific restrictions within each Natura 2000 area. In order to find this information today it is necessary to look into both "Miljømålsloven", "Natura 2000 bekendtgørelse" and the individual Natura 2000 plans.

Conclusion

To make an effective marine administration system there is a need for further development and extension on the whole legislation for the marine environment. To support that, a Marine Spatial data infrastructure (MSDI) is required. Both of the case studies show that the methods used today to administrate offshore windmills and Natura 2000 territories in the marine environment are land administration methods, based on land legislation adjusted to the sea.

The differences between land and sea administration means that the general information infrastructures at sea do not work at present. Keeping the case of offshore windmills in mind, the conditions at sea can be considered different from those on land. Hence there is a need for legislation which is not just a copy of the land system, a MSDI that supports the legislation and an institutional framework that can administrate it.

The key connector between the data and the legislation system is the reference data which add a spatial dimension to the legislation. The only existing general reference data in the marine environment are the nautical charts. The nautical chart conveys hydrographical, navigational and topographical information. But no datasets show general administrative boundaries as the Cadastre does on land. This probably explains why there has been a significant discussion about the Sea Cadastre and how to build it. In relation to the conclusion of this paper, the Sea Cadastre in itself is not interesting. The important point is how to make datasets that secure the connection between the legislation, the administrative boundaries and the sea. This could be accomplished through a marine cadastre, but it might also be achieved through e.g. orthofotos.

Understanding relationships between data and legislation is relevant in creating and maintaining the processes of an administration system, whether it be on land or in marine territories. When looking at juridical data, it is important to take the legislation and procedures behind it into account. The legislation is what makes the juridical data stronger than other data. It is not possible to change juridical data in other ways than as described in the legislation. In other words – legislation secures the juridical data. It is therefore relevant when looking into the whole MSDI di-

scussion to remember the relations between legislation and juridical geodata.

The statements from the Minister of the Environment in Denmark, Ida Auken, at the Geodata Agency Conference show that the Minister recognizes the importance and necessity of a marine administration system in Denmark. However, the statements suggest that a clear understanding of the relationship between juridical data and legislation, and an approach to how to manage the marine environment in general, are still missing. This involves the questions of what kind of juridical data is necessary, how to produce these data, as well as investigating how MSDI and legislation together can provide the basis for these data. The purpose of the overall administration system is to support the four core functions: tenure, value, use and development in order to reach a sustainable development. To get these four core functions to work together, there is a need to deal with e.g. how to register tenure in the marine territory, how to valuate assets in the marine territory, how the marine-use should function, and how to give permits? When these questions regarding institutional framework and legislation are solved, it is possible to make a MSDI which supports juridical geodata.

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