Construction map model of water location permits in the implementation of licensing for marine space utilization

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Abstract. Based on the results of the identification and inventory of existing laws and regulations, there are 12 ministries carrying out sea space utilization activities consisting of sea surface space, sea column space, and seabed space. The 3-dimensional marine space is influenced by dynamic characteristics of the sea which makes recording and administering Marine Space Utilization Location Permits more difficult than recording and administering permits on land. This study makes a Water Location Permit Map model that describes the location of marine space utilization objects and their utilization boundaries. Water Location Permit Map is made using a coastal environment map and a marine environment map from the Geospatial Information Agency, as well as a zoning map of the coastal area from the Ministry of Marine Affairs and Fisheries. The results obtained that the Water Location Permit Map that was made using existing maps cannot yet describe the object of sea space utilization. A larger input map scale is needed, one of which is by taking remote sensing satellite image. Visualization of sea space in 3 dimensions can be displayed by classifying Location Permit Maps into 3 layers based on different sea depths namely sea level, sea column, and seabed.

1. Introduction
The Indonesian archipelagic state has a marine area 3,374,668 km² which is wider than the land area 1,922,570 km², 13,466 islands and a coastline of 99,093 km [1] makes Indonesia has natural resources of the marine more than the natural resources on land. Potential conditions of marine resources is seen as an opportunity for Indonesia as a developing country to build excellences in the field of coastal and marine.

The management of coastal and marine territories in Indonesian archipelago based on the regional autonomy system has a high degree of difficulty. It is because the given number of regencies/municipals in this state as many as 479 regencies/municipals, 324 regencies/municipals those have coastal areas [2]. Each part of Indonesian coastal areas has different characteristics from other areas, so it has different ways to manage them. If that so, the policies and institutional instruments are not the same. As a result, it will also effect on data provision management information of coastal and marine areas along with each region will be varied as well.

The national marine resources are not only managed by local but also managed by sector. Based on the identifications result is shown that at least 12 ministries get involved in the resource marine management in Indonesia. This condition that occurred in these ministries for instance has their own policies and regulation systems (not-integrated among each other’s). Their points of views and various management objectives and undirected well (without clear management and shared planning together
among the ministries) cause the exploitation activities and marine areas functions (marine boundaries) are limited and overlapped among them. For example: marine parcels use for fish farming overlapping with shipping lanes own by revenues disruption in fish farming sector, or other example: the fishing areas uses for fishing overlapping with Navy space areas as a result the revenue disruption for fishermen in getting fishes. These uncertain conditions of marine boundary activities in the areas make some barriers among marine economic activities such as fisheries, aquacultures, biotechnology industries, marine tourisms, marine transportations, conservations, explorations and exploitations sectors [3].

Based on cultural aspect, the Unitary State of the Republic of Indonesia as an archipelagic state has multicultural ethnic. There are 10,640 villages (more than 14%) of village numbers in Indonesia (67,249 villages, the Board of Statistic Centre 2012) is a coastal village with an area of 35,949,021 hectare or 19% of the total area in Indonesian Villages. Approximately 92% of coastal villages in Eastern Indonesia are a traditional village who practiced natural resource management based on their own local custom [4]. It is where the implementation of marine management in Eastern Indonesia is frequently confronted to the existence of customary marine management (customary marine law).

The difference between using land space and marine space is that the marine has common property resource and open access. There is no ownership (ownership rights) at marine, only permits for utilization / management. Marine space consists of sea level, water column and seabed (3 dimensions) [5]. The marine is dynamic (influenced by astronomical and non-astronomical factors).

Utilization of marine space is regulated in RI Law No. 1 of 2014 concerning Management of Coastal Areas and Small Islands through the granting of Water Location Permits. The definition of Coastal Water Location Permit is explained in general in RI Law No. 1 of 2014 concerning Management of Coastal Areas and Small Islands which states that "Coastal Water Location Permits are permits granted to utilize space from a portion of coastal waters covering sea level and sea columns up to the seabed at certain extent and / or to utilize some of the smaller islands ". Every person who using space from a part of coastal waters and uses part of small islands permanently is obliged to have a Coastal Water Location Permit. Coastal Water Location Permit is given based on zoning plans for coastal area and small islands [6].

After the Coastal Water Location Permit is introduced in RI Law No. 1 of 2014 there are no operational regulations in the form of government regulations or ministerial regulations that discuss the procedures for granting Coastal Water Location Permits until now. On the other hand, the application for Coastal Water Location Permits by the community, cooperatives, and companies are increasing.

2. Methods

Astor, Y [7] made a Marine Cadastre Map referring to the Geospatial Information Act using a base map 1:250,000 scale Indonesian Coastal Environment Map, and thematic maps that are regency/municipal sea boundary maps and Zoning Plan for Coastal Areas and Small Islands (RZWP3K) Map of East Java Province. In Figure 1, although the map is displayed in 2-dimensional, it illustrates several types of utilization of sea space in three different spaces namely shipping lines (surface and sea columns), oil and gas pipelines (seabed), and conservation areas (surface, columns, and seabed). The use of Marine Cadastre Maps for large scale is expected to be able to map marine resource management activities in parcels (sea space) organized by private parties (e.g. mining area parcels, tourism), traditional communities (e.g. fishing parcels), customary marine (for example: sasi and pertuanan laut), as well as local government.
Maulana, S [8] built the Cirebon City Marine Cadastre Map based on different sea spaces namely sea level, sea column, and seabed. Aiming that every activity that uses sea space can be mapped. The results of this study are the Marine Cadastre Map for Sea Surface, Marine Cadastre Map for Sea Column, and Marine Cadastre Map for Seabed. The Marine Cadastre Map can be used as a joint reference by the central government (ministries), regional (provincial and district/city) governments, private sector and customary communities in determining location along with the boundaries of a marine resource management activities. In the marine cadastre map there are elements of right/permit, restriction and responsibility which can be used as a basis for issuing Location Permits and Management Permit for activities on sea surface, column and seabed issued by the government and local governments.

**Figure 1.** Marine cadaster map visualized utilization in surface, columns, and seabed.

**Figure 2.** Marine cadastre map for sea surface, column, and seabed (Modification from towards a marine cadastre, 2009).
Classification of Marine Cadastre Maps based on contour intervals is shown in Figure 2.

- Marine Cadastre Map of Cirebon City (Sea level and air space above) contour interval ranges from 0 to 2 meters.
- Marine Cadastre Map of Cirebon City (Column) contour interval ranges from 2 to 5 meters.
- Marine Cadastre Map of Cirebon City (Seabed) contour interval ranges from 5, 8 to 10 meters.

Ariyanto, FY [9] made Water Spatial Control Map of Coastal Areas and Small Islands, the sea space is classified based on the deepest conditions in the study area, in Madura Strait has a depth 90 meters above sea level. Therefore, sea space classified as three:

- Sea level that contains information about all forms of activities that take place above sea level to the shallow sea depth (the shallow contours drawn on the base map) which is 2 meters.
- Sea column that contains information about all forms of sea space utilization activities at depths of 2 to 90 meters or touching the sea floor.
- Seabed contains information about all forms of sea space utilization activities at a depth of 90 meters to layers three to 5 meters below the seabed.

Azzahrah, S [10] made Water Location Permit Map based on the existing Base Map and Marine Thematic Map. This research produces model of Map of Coastal Waters Permit Locations in the Maratua Island region, Berau Regency, East Kalimantan. Map of Coastal Water Location Permit in this study is only made for sea surface space, does not inform the sea column space and the seabed (Map is displayed in two dimensions). In the model of Map of Coastal Waters Location Permit for Maratua Island Waters using 1: 50.000 scale Topographic Base Map and National Strategic Area Zoning Plan (RZKSNT) scale 1: 32.000, site plan and boundaries submitted for Water Location Permit. Therefore, a 1: 50.000 scale RBI Map and scale 1: 32.000 RZKSNT cannot be used as a Map of Coastal Waters Permit Locations in the Maratua Island waters.

**Figure 3.** Waters location permit map using 2018 RZKSNT map scale 1: 32.000.

Based on the above problem, a large scale Coastal Waters Location Permit Map is needed. The obstacle at this time there is no large-scale base map that can be used as a basis for making Waters Location Permit Maps. Therefore, this research utilizes high-resolution satellite imagery to display large-scale utilization of marine space objects. Whereas sea contour information can be completed using contours obtained from the Indonesian Sea Map.
The location of the research was conducted in the Maratua Island region, Berau Regency, East Kalimantan, where there have been many applications for Waters Location Permit Maps by companies and the public. In addition, the Maratua Island National Strategic Area Zoning Plan (RZKSNT) has been established as a Regional Regulation. Marine space utilization objects data used in this study are spatial and attributes data of marine tourism in Maratua Island region, Berau Regency, East Kalimantan obtained from the Ministry of Marine Affairs and Fisheries.

3. Results and analysis
This research produces 2 models of Water Location Permit Map using satellite imagery, namely Water Location Permit Map Scale 1: 5.000 and 1: 1.000. Water Location Permit Map Scale 1: 5.000 can display one object of marine space utilization in the form of a tourist attraction on Maratua Island display with contour information (Figure 5), as well as several attractions that do not display contour (Figure 6). The second model is Water Location Permit Map Scale 1: 1.000 that can display several attractions (Figure 7) and one tourist attraction (Figure 8). In Figure 8 the tourist site plan is also displayed along with the coordinates and boundaries of spatial to obtain sea space utilization area.

Water Location Permit Map in this study is only for sea level. Water Location Permit Map should also be made for sea column and seabed. So that sea space is still seen as a 3-dimensional that is intact.
and interrelated to minimize the potential overlapping conflicts utilization based on sea depth. Water Location Permit Map using remote sensing method satellite imagery or aerial photogrammetry is only able to map utilization at sea level. Therefore, it is necessary to conduct a direct survey in the field to identify and inventory sea utilization in sea column and seabed.

Figure 5. Waters location permit map scale 1: 5,000 for one object with contour.

Figure 6. Waters location permit map scale 1: 5,000 for many objects without contour.
Figure 7. Waters location permit map scale 1: 1.000 for many objects.

Figure 8. Waters location permit map scale 1: 1.000 for one object with boundary.

The results in figures 5 until 8 show that the Water Location Permit Map using high-resolution satellite imagery can show very clearly utilization marine space utilization objects on Maratua Island, even the limits can be determined and calculated marine tourism area.
4. Conclusion

- Water Location Permit Map can be made using by remote sensing methods with satellite imagery is only used to make Water Location Permit Maps for Sea Surface.
- Water Location Permit Map can be displayed on scale 1: 5,000 and 1.000 as well as a larger scale.
- The making of a Water Location Permit Map for sea column and seabed requires a field survey to identify and inventory existing utilization in the column and seabed.

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