Evaluation of Application of RRR (Right, Restriction, and Responsibility) Cadastre Concept for Management of Industrial Marine Space

C B Pribadi1,*, Y Budisusanto1, W Raniah1

1Department of Geomatics Engineering, Institut Teknologi Sepuluh Nopember, Surabaya, 60111, Indonesia

*corresponding author: cheriebhekti@gmail.com

Abstract. To balance conflicting ocean uses, coastal resource management, and marine development, a governance framework that must be sustainable, holistic and informed is needed. The RRR concept is a basis for managing the resources of coastal and marine areas within the scope of determination of territorial sea boundaries (restriction), boundaries of authority (rights / permits and responsibilities), which form integration between administrative areas at the national scale, provincial scale, and district / city scale. by paying attention to the existence of indigenous peoples, as well as the harmony and synergy between the central government and local governments. One of the utilization of sea space is the Port Work Environment Area, there are many port management models in Indonesia, there are public ports, and terminals for their own interests (TUKS). PT PETROKIMIA GRESIG is one of the industries owned by the State or State-Owned Enterprises (BUMN) which has a port with Terminal for Interest (TUKS) model. In this research, an evaluation was carried out related to the application of RRR (Right, Restriction, and Responsibility) cadastre concept in the industrial coastal areas of PT PETROKIMIA GRESIG and the surrounding coastal areas. The identification process is carried out on each RRR (Right, Restriction, and Responsibility) cadastral concept, which aims to evaluate its suitability. The Right concept is implemented in the form of a water area management permit owned by the industry. Then for the application of Restriction concept, it is implemented in form of boundaries for management of water areas around the coastal areas and waters of PT PETROKIMIA GRESIG which is analyzed using NDWI (Normalized Different Water Index) classification method to obtain boundaries of the water area, the results of the analysis of land use changes of water areas to land in the number of additional areas for 4 years amount 438,723 m². While the concept of Responsibility is implemented in form of protecting ecosystems around PT. PETROKIMIA GRESIG's industrial areas through activities related to environmental management written in environmental permits that have been pocketed by PT. PETROKIMIA GRESIG.

Keywords: Marine Space, Cadastre, Right, Restriction, Responsibility

1. Introduction

Marine space and coastal area are very complex environment, subject to various demand, in example economy development, social interaction and necessary to protect the ecosystem, and marine habitually. For balancing marine use, coastal resources management, and marine development, is required sustainable framework (Rajabifard, et al, 2005). Integration between administration area has regulated by governance through RZWP-3K (Coastal Area Zone Planning) which in these zone involve plan to determine resource use in each planning unit [5].

Utilization of marine space in East Java is very various, such as port environment area, fish arresting area, shipping area, pipe line, and submarine cable, floating net cage, oil and gas area, sea sand mining area, military area, and conservation area which prone to rise conflict about utilization limit of marine area [6]. One of many kinds of marine space utilization is port environment area, management port model in Indonesia are very various, such public port, terminal for interest (TUKS) [3]. Industry is the
sector which utilize a port. According to Economy Committee and National Industry (KEIN) in year of 2016 the port is very important to support its industry, support economy and support the governance in maritim development. Development of economic area or industry area integrated to the port are very important to support transportation and industry distribution [7].

Port governance in Indonesia often occurs overlapping until competition between public terminal and terminal for interest (TUKS). So as conflict that occur in particular port development in industry area of PT.Petrokimia Gresik. Activity of terminal for interest (TUKS) should adapt to regulation about development process to management process which is written in District Regulation No 1 Tahun 2018 About Zone Planning of Coastal Area and Small Islands in East Java Province in Year 2018-2038 and UU No 17 year 2008 about public terminal and terminal for interest (TUKS). This study aim to analyze the application of RRR (Right, Restriction, and Responsibility) concept in management of marine space in industrial areas.

2. Methods

2.1. Study Area

This study located in Gresik Regency, East Java. Based on the coordinates of the boundary line, the position of Banyuwangi Regency lies between $7°08'10" - 7°08'40"$ South Latitude and $112°38'30" - 112°39'30"$ East Longitude. Administratively, Gresik Regency in the north side by the Java Sea, to the east side by the Madura Strait and Surabaya City, to the south side by Sidoarjo Regency, Mojokerto Regency, and to the west side by Lamongan Regency. This research was conducted at that location to analyze the application of the RRR cadastre concept in industrial areas. One form of analysis related to the application of the RRR concept is to evaluate the suitability of the plan by the government through RZWP-3-K and against Law No.1 of 2014 about Management of Coastal Areas and Small Islands.

2.2. Data

The data used in this study are:

a. Documents of the agreement letter between KSOP Gresik and PT Petrokimia Gresik regarding the use of waters.

In accordance with Article 16 paragraph (1) of Law No. 1/2014, everyone who uses space from part of coastal waters and utilizes part of small islands permanently is required to have a location permit. The location permit as referred to in Article 16 paragraph (1) is granted based on the zoning plan for coastal areas and small islands (Government of the Republic of Indonesia, 2014).
This research validates the application of the cadastral Right (Permit) concept through ownership of a water management permit that is in accordance with the zoning of the area in the 2018-2038 Coastal Zone and Small Islands Zoning Plan document.

b. PT.Petrokimia Gresik industrial environmental processing documents
The granting of a location permit as described in article 16 paragraph (1) of Law No.1 of 2014, must consider the preservation of coastal ecosystems and small islands, communities, traditional fishermen, national interests, and the right of peaceful passage for foreign ships. The granting of a location permit considering the preservation of the ecosystem is one of the provisions in Article 16 paragraph (1) of Law No.1 of 2014. This provision is used as the basis for validation of PT Petrokimia Gresik's industrial environmental processing documents as a form of application of the concept of Responsibility, existing in an industrial environment.

c. Spot 6 Satellite Imagery in 2015 and 2018, then Spot Satellite 7 in 2019 obtained from LAPAN (National Institute of Aeronautics and Space). This data is used to identify the RRR Restriction cadastral concept, by analyzing the change in function of water territories into land. SPOT 6 and SPOT 7 are satellite imagery products that can be easily integrated within a GIS scope or used to obtain thematic geoinformation information combined with other satellite, air or ground information. SPOT 6 and SPOT 7 obtain images simultaneously in two modes, namely panchromatic (black and white) and multispectral (LAPAN, 2018). In this research, SPOT 6 and 7 satellite imagery is used to support the NDWI (Normalized Different Water Index) method analysis process which requires green band channels and NIR (Near Infrared) bands.

2.2.1. Validation of Application of Right Cadastre Concept (Permit)
The validation process for the application of the Cadastre Right (Permit) concept is based on the document of the agreement between KSOP Gresik and PT Petrokimia Gresik regarding the use of waters. This document was obtained from the industrial company PT Petrokimia Gresik, where this document discusses the agreement on the use of waters by PT Petrokimia Gresik as a special port or Terminal for Owners (TUKS). In the document of this agreement, the water area around the PT Petrokimia Gresik industry is included in the area (Work Environment Area) and DLKp (Area of Interest). The location of the area around industrial waters is in accordance with the East Java Province Coastal Zone and Small Islands Zoning Plan (RZWP-3K) 2018-2038. It is explained in (RZWP-3-K) of East Java Province that the zoning of PT Petrokimia Gresik's industrial waters is in a Public Use Area with a Port and Sub-Zone DLKr (Work Environment Area) and DLKp (Environmental Area of Interest). The document of the agreement letter between KSOP Gresik and PT Petrokimia Gresik also explains the water area use permit that has been agreed between the two parties who have the right to use and regulate their respective waters, which is based on several related legal regulations.

2.2.2. Validation of Application of Responsibility Cadastre Concept (Responsibility).
The validation of the Cadaster Responsibility Concept is based on the industrial environmental processing documents of PT Petrokimia Gresik. The document was obtained from the industrial company PT Petrokimia Gresik, which describes environmental protection activities in industrial areas and several awards related to environmental protection. There are provisions for granting Location permits contained in article 16 paragraph (1) of Law No. 1 of 2014 which consider ecosystem preservation. This provision is used as a legal basis for validation of the industrial environmental processing documents of PT Petrokimia Gresik as a form of application of the concept of Responsibility in the industrial environment. Ownership of environmental protection permits in the vicinity of a special
port or Terminal for Owners (TUKS) can be used for analysis of the application of the concept of Responsibility.

2.2.3. Validation of Application of Restriction Cadastre Concept (Restriction).

a. NDWI (Normalized Different Water Index) Methods

In the validation process, the application of the Cadastre Restriction (Boundary) concept uses the process of classification of water and land areas using the NDWI (Normalized Different Water Index) method. The purpose of using the NDWI method is to obtain the boundaries of the water area with the land in industrial water areas. The NDWI (Normalized Different Water Index) method helps to separate water and land areas using the algorithm proposed by McFEETERS in 1996:

\[
NDWI = \frac{\text{band}_{NIR} - \text{band}_{SWIR}}{\text{band}_{NIR} + \text{band}_{SWIR}}
\]  

(1)

SPOT 6 2015 and 2018 Satellite Imagery is used as well as SPOT 7 Year 2019 Satellite Image to obtain the results from the definition process using the NDWI (Normalized Different Water Index) method.

b. Digitize and Overlay

After the NDWI method is carried out, it is continued with a digitizing process on the coastline resulting from the NDWI process itself, as a form of land boundary with water. Coastlines in 2015, 2018 and 2019. Then overlapping each year is carried out to analyze changes in the area of water.

c. Analysis of Land Use Change in Land and Marine Area

This analysis is used to determine the change in the function of water areas to land in the industrial area of PT Petrokimia Gresik and its surroundings. The analysis of changes in the function change of water areas to land is intended to determine changes in the management area of water areas which have the following areas:

| Table 1. Area Change |
|----------------------|
| Year | Area Change (m²) |
|------|------------------|
| 2018 | 457.252          |
| 2019 | 438.723          |

3. Results and Discussion

3.1. Identification of Right Concept

In accordance with the rules for granting permits according to Law No.1 of 2014 concerning Management of Coastal Areas and Small Islands, the PT Petrokimia Gresik area is included in the Area of Interest Area (DLKp) and Work Environment Area (DLKr) which in that area is used for special port. In accordance with the zone of RZWP-3-K, namely the port zone as well as from the existing map in the port zone which is also obtained from the Department of Marine Affairs and Fisheries (DKP) of East Java Province, PT Petrokimia Gresik has a terminal or special port to support its industry, which called TUKS (Terminal For Owners). PT.Petrokimia Gresik has an agreement on the ownership of TUKS TUKS (Terminal For Owners) with Class II Gresik KSOP (Port Authority Office) which is stated in a written agreement between the two related parties, First Party KSOP (Kantor Kesyahbandaran Otoritas Pelabuhan) kelas II Gresik and Second Party PT.Petrokimia Gresik.
3.2. Identification of Responsibility Concept

From the conformity validation process against the Environmental Management document, environmental permits were obtained which were owned by the industrial company PT Petrokimia Gresik. The permits stated in the document are in accordance with the management of ecosystems around the water area, along with the types of ecosystem preservation and environmental permits such as Amdal Terminal Development for Interest (TUKS) PT. Petrokimia Gresik and Mount Sari Water Purification Installation (IPA) Uprating, and PT Petrokimia Gresik’s wastewater quality has met the wastewater quality standard.

The concept of responsibility in this study is analyzed through the form of ecosystem preservation and waste management carried out by PT Petrokimia Gresik. This is manifested in the form of permits that have been pocketed by PT Petrokimia Gresik and several awards that have been won in waste management.

3.3. NDWI (Normalized Different Water Index)

There were 3 (three) appearance results from the NDWI (Normalized Different Water Index) classification method using SPOT Satellite Imagery in three years (2015, 2018, and 2019). The results of the analysis of land use changes of water areas to land in the number of additional areas for 3 years (2015 to 2018) amount 457.252 m² and the number of additional areas for a year (2018 to 2019) amount 438.723 m². Figure 2 to figure 4 show us that band ratio results from SPOT satellite imagery in 2015, 2018, and 2019, grey color in these figure is not as a land, but it is built-up land noise, it can occur due to many built-up land features which have positive values in NDWI image result. The difference in colors and patterns are obtained from the processing of land and sea masking, where the land area has a darker color than the sea area [9].

![Figure 2. NDWI Results in Year 2015](image1)

![Figure 3. NDWI Results in Year 2018](image2)
3.4. Map of the Transition of the Function of Water Areas to Land

Analysis and evaluation regarding the boundaries of the utilization of water areas are presented in the form of a map of the transition of the function of the water area to the land area of PT Petrokimia Gresik, which is measured approximately 4 nautical miles from the outermost coastline, through the NDWI (Normalized Difference Water Index) classification method from the image. SPOT multi-temporal satellite (2015, 2018, and 2019). The results of land use analysis from marine to land can be seen in the following figure.

Figure 4. NDWI Results in Year 2019

Figure 5. Map of the Transition of the Function of Water Areas to the Land of PT Petrokimia Gresik 2015 to 2018
Figure 6. Map of the Transition of the Function of Water Areas to the Land of PT Petrokimia Gresik 2018 to 2019

4. Conclusions

The Right concept has been applied in the water area of PT Petrokimia Gresik. The ownership of the agreement document for the ownership of TUKS (Terminal for Owners) with the Gresik Class II KSOP (Port Authority Office) is a form of permit carried out by PT Petrokimia Gresik related to the management of Special Ports in water areas. The concept of Restriction in the PT Petrokimia Gresik area has not been fully implemented. The change of water territory to land or reclamation which is quite significant in the last 4 years, can change the function of water use and change the ownership area of the water area. The concept of responsibility has been implemented in the waters of PT Petrokimia Gresik. Environmental permit related to Amdal for Terminal Development for Own Interest (TUKS) PT. Petrokimia Gresik and Mount Sari Water Purification Installation (IPA) and also PT Petrokimia Gresik’s wastewater quality have met the wastewater quality standards in accordance with the regulations of the Ministry of Environment and Forestry.

So the conclusion of this study is, the industrial area of PT Petrokimia Gresik has fully implemented 2 cadastral concepts, namely Right (Permit) and Responsibility (Responsibility). For the concept of Restriction, it is still possible to carry out further analysis related to the permit to change the water area to land which involves changes in the management area of the water area.

References

[1] A. Rajabifard, A. Binss and I. Williamson, "Administering the marine environment–the spatial dimension”. Journal of Spatial Science,” Journal of Spatial Science, vol. 50(2), pp. 69-78, 2005.

[2] Y. Astor, Pola Penyelenggaraan Kadaster Kelautan di Indonesia Dalam Perspektif Indonesia Sebagai Negara Kepulauan (Wilayah Studi: Selat Madura Provinsi Jawa Timur)., Bandung: Institut Teknologi Bandung, 2016.

[3] E. Yohanes, "TUKS dan Penataan Ulang Pelabuhan,” 2020. [Online]. Available: https://oceanweek.co.id/ada-apatuks-perlukah-pengelolaan-pelabuhan-ditata-ulang/. [Accessed 17 March 2020].
[4] R. Pribadi, "PETROKIMIA GRESIK TEKEN PERJANJIAN PELAYANAN JASA KEPELABUHANAN," 2019. [Online]. Available: http://bumn.go.id/pupukindonesia/berita/1-PETROKIMIA-GRESIK-TEKEN-PERJANJIAN-PELAYANAN-JASA-KEPELABUHANAN. [Accessed 20 March 2020].

[5] Pemerintah Republik Indonesia, Undang – Undang No 1 Tahun 2014 Tentang Perubahan Atas Undang-Undang Nomor 27 Tahun 2007 Tentang Pengelolaan Wilayah Pesisir dan Pulau-Pulau Kecil., Jakarta: Pemerintah Republik Indonesia, 2014.

[6] Dinas Kelautan dan Perikanan Jawa Timur (DKP), Dokumen Final Penyusunan RZWP3K (Rencana Zonasi Wilayah Pesisir dan Pulau-Pulau Kecil) Jawa Timur. Pemerintah Provinsi Jawa Timur., Surabaya: Pemerintah Provinsi Jawa Timur, 2017.

[7] S. Deny, "KEIN (Komite Ekonomi dan Industri Nasional)Tegaskan Pentingnya Pelabuhan untuk Kemajuan Industri," 2016. [Online]. Available: https://www.liputan6.com/bisnis/read/2532670/kein-tegaskan-pentingnya-pelabuhan-untuk-kemajuan-industri. [Accessed 17 March 2020].

[8] D. Bhirawa, "Diberi Peringatan, Petrokimia Tetap Anggap Bukan Limbah B3," 2014. [Online]. Available: https://www.harianbhirawa.co.id/diberi-peringatan-petrokimia-tetap-anggap-bukanlimbah-b3/.

[9] Pribadi, C. B., Hariyanto, T. "The Evaluation of the Physical Condition in Coastal Area as a Result of Changes of Suspended Sediment (Case Study: Coastal Area of Surabaya and Gresik)", 2019. *International Journal of Geoinformatics*, Vol. 15 (3), pp. 81-90.