The designation of special area in the Singapore Strait to solve the pollution due to the oil sludge discharge that affects to the coast of Bintan, Indonesia In order to achieve marine and coastal sustainability

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Abstract. The coast of Bintan, Indonesia, has experienced pollution due to violations of oil disposal regulations. This paper aims to find out whether the Singapore Strait area can have a special area as an alternative to establishing an area outside the port boundary area to overcome pollution caused by the dumping of oil waste off the coast of Bintan. This research was conducted using a non-doctrinal research method with an empirical approach. with the research methods used it was found that it is important to immediately reduce and prevent pollution by establishing special mandatory methods for the disposal of waste oil from ships. Therefore, the application of mandatory and special methods for special areas as regulated by International Convention for the Prevention of Pollution from Ships (MARPOL) if applied to the Singapore Strait can prevent marine pollution in the strait and have an impact on the Bintan Coast of Indonesia as a Littoral state.

1 Introduction

Pollution is a problem that the global community needs to address today [1]. Immediate action must be taken to address the critical threat of environmental pollution to human survival. Therefore, it is crucial to mitigate marine pollution effectively. The marine environment is susceptible to pollution, which adversely affects multiple facets of life [2]. Thus, ocean pollution carries ramifications, specifically the notion that nations require global and regional collaboration to regulate the peril of contamination in marine habitats, as enshrined in United Nations Convention on the Law of the Sea (UNCLOS).

The density of shipping traffic at sea means it is impossible to monitor every ship activity. Unmonitored shipping practices are suspected sources of pollution, including illegal disposal of oil sludge. Marine pollution, particularly in Indonesia, can cause disruptions to maritime operations. Ship activities account for one of the sources of marine pollution occurring along with sea-based activities. According to Article 194 (3), ship activities are one of the sources of marine pollution, with oil spills being a prominent contributor. The dispersion of oil spills into the ocean is affected by multiple factors, including local wind and current patterns, the quantity of spilled oil, as well as its characteristics and tides [3]. An instance of marine pollution has emerged, stemming from activities at sea that have caused contamination of the Northren Bintan Coastal. This is result of oil sludge, also known as ship pollution, caused by maritime activities [4]. This pollution has been ongoing since 1970 and has yet to be rectified. The pollution happens every year during the north wind season, which lasts from September to April. [5]. The origin of the oil sludge is tied to the process of ships cleaning their tanks within a designated area identified as Outside of Port Limit (OPL), hence for the referenced by the acronym OPL. This area is in the waters of 3 littoral states, namely in the Singapore Strait.[6]. The origin of the contamination is visible through the accompanying radar image acquired by satellite. The fact shows contamination on the coast of Bintan. Due to oil sludge, it still occurs to this day and this occurs because of the dumping of oil sludge from ships, as MARPOL allows the disposal of oil sludge from ships.[5]

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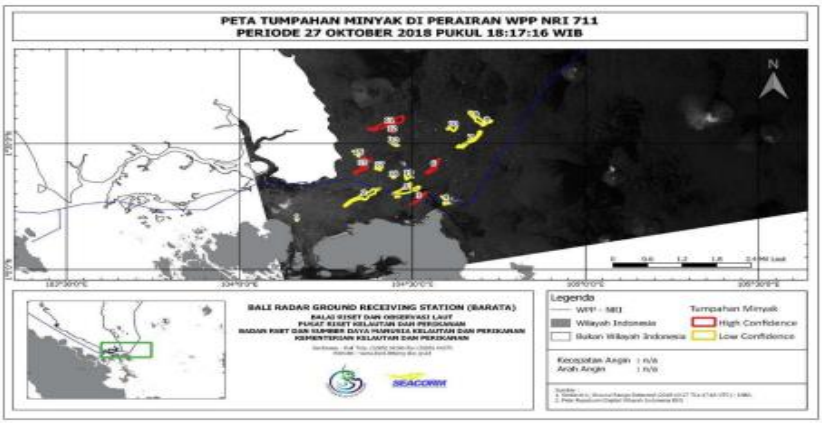

Fig. 1. Satellite images showing the presence of waste oil based on data of Bali Radar Ground Receiving station.

Satellite imagery reveals the existence of waste oil. Furthermore, the following figure shows the Bintan coast that is affected by the oil sludge from the pollution sources mentioned above.

Fig. 2. Impact of pollution on the Bintan Coastal, Indonesia due to oil sludge based on data of Riau Islands Provincial Environment Office, Indonesia.

Marine environmental problems that occur across national borders are the international community's obligation. The international community's obligation to execute marine environmental conventions and accords global, regional, and national tier is anticipated to offer solutions to marine environmental concerns. Global marine pollution is expressly addressed in Chapter XII of the 1982 United Nations Convention on the Law of the Sea (UNCLOS) [7]. The regulation of maritime environmental legislation also governs anti-pollution efforts. The pattern of countermeasures against marine pollution is governed at the global level by the 1982 UNCLOS, which controls the pattern of countermeasures against sea pollution. Global control of anti-marine pollution countermeasures is also inextricably linked to the requirements set by the International Maritime Organisation, abbreviated as IMO. Several revisions have been made to MARPOL 73/78 Annex I regulating sludge oil pollution from ships. Annex I, MARPOL governs the Oil Pollution Prevention Regulations. One of the pollution is sludge oil discharged that regulated based on disposal in special areas and outside special areas. As described below.

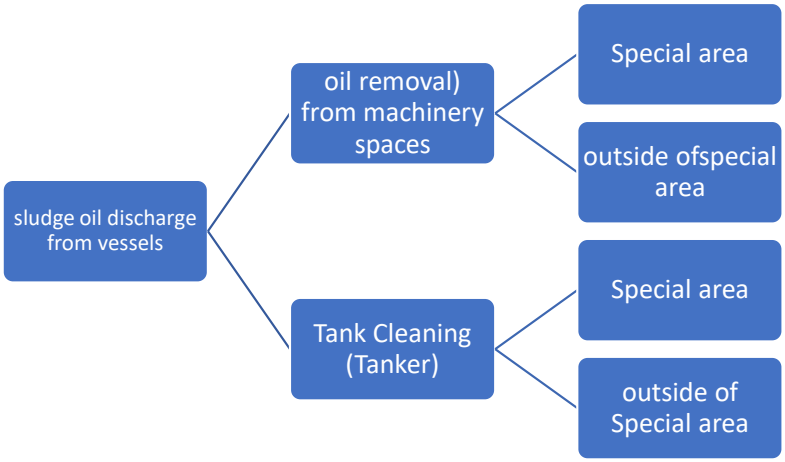

Fig. 3. Disposal of oil sludge from ships (oil sludge discharge).

In the special area, a special mandatory method is determined for the oil slsudge discharge activity for a high level of protection in the waters designated as a special area. herefore, based on the background outlined above, it is necessary to conduct a research study to identify whether the Singapore Strait area can have a designated area as an alternative to establishing an area outside the harbour boundary area to address pollution caused by waste oil discharges off the coast of Bintan, Indonesia. To ensure marine and coastal sustainability.

2 Method

Methods are specific ways of collecting and analysing data [8]. This research was conducted using a non-doctrinal research method with an empirical approach. Empirical legal study is a sort of legal research that investigates and studies how the law works in society. The effectiveness of the law, compliance with it, In the framework of the functioning of law in society, The function of legal institutions or institutions involved in law enforcement, the implementation of the rule of law, and the impact of the rule of law on specific societal concerns can all be investigated. The purpose of empirical legal research is to perform a thorough and unbiased assessment of key issues. [9]. The object of this research study is identify whether the Singapore Strait area can have a special area as an alternative to establishing an area outside the harbour boundary area to address pollution caused by oil sludge dumping off the coast of Bintan, Indonesia. To ensure marine and coastal sustainability. The data used in the study are primary and secondary data [10]. Qualitative research involves the analysis and interpretation of non-numeric data to reveal and uncover the truth through fieldwork and literature review. This outlines a structured approach to data processing, which consists of several steps. Data collection process, verbatim, field data checking or validation, editing, coding [11].

3 Result and Discussion

Oil leaks produced by ships are a significant environmental threat.Spills of this type can occur not just from oil tankers, but also from other marine activities: transport, container ships, chemical carriers, general cargo ships, and passenger or cruise ships. These accidents have the potential to have a large impact on both the marine and coastal environments, resulting in major physical and toxic repercussions, as well as economic ramifications. The economic, fishery, aquaculture, and tourist sectors are all affected, and the damage is increased by vessels transporting large volumes of oil (bunkers) [12].

Pollution by oil discharge is the main vessels marine pollution [13]. Annex I, MARPOL regarding, Prevention of Pollution by oil, Regulation 1, sludge oil is included in the oil category Tank cleaning is a critical activity on tanker ships because it eliminates any hydrocarbon vapours, liquids, or residues from tanks. Tank cleaning is necessary for a variety of purposes, including carrying clean ballast, removing deposits from tank top coatings, preparing tanks for interior examination [14]. According to MARPOL convention 73 / 78 to prevent oil (Oil Pollution), it must be maintained that oil or liquids containing oil are not pumped or discharged directly into the sea without going through MARPOL procedures [15]. Oil sludge is one of the waste products that accumulate on large vessels [16].

Oil sludge is classified as a hazardous waste. Human actions such as purposeful dumping, inappropriate treatment, and management cause oil sludge to infiltrate and contaminate the environment. The components in oil sludge are cytotoxic, mutagenic, and possibly carcinogenic. Oil sludge is classed as hazardous waste under the Basel Convention's Annex IV sections A and B [17]. The untreated release of hazardous oil sludge into the environment is severely forbidden. Pollution from untreated oil waste continues to be a problem on the Indonesian coast of Bintan.

The disposal process comes from cargo tanks that were previously used to transport oil so that they contain a high enough concentration of oil hydrocarbons that will pollute the sea / beach if not processed first on board before being discharged into the sea. According to MARPOL 1973/1978 has limited the amount of discharge of oil concentration and the amount of water and oil mixture discharged in special areas and outside special areas at sea with the limitation that the total amount of oil discharge during the voyage / en route does not exceed 15 litres per mile or ppm for those sourced from the engine room of all types of ships. As well as establishing a special mandatory method in special areas for discharging oil sludge from machinery spaces, namely with the additional condition that the oily mixture, in the case of oil tankers, does not mix with the remaining oil cargo. Furthermore, the discharge of oil sludge from cargo tanks in special areas is prohibited while outside special areas is allowed under the condition that the oil sludge discharge does not exceed 30 ppm for tank cleaning from tankers with The tanker's position must be more than 50 nm from the nearest land or port [18].

MARPOL73/78, specifies legal discharge limitations for ships, with emissions to water limited to no more than 15 ppm (parts per million). When oil is visible on the sea surface, it indicates that an oil discharge more than 15 ppm has occurred; hence, a breach has occurred, and prompt investigation is required. Waste oil from oil cargo can be discharged if the tanker is more than 50 nm from the nearest island, as specified in MARPOL 73/78 Regulation 34, and there is a limitation on oil discharge in particular zones. Any visible traces of oil at sea or around the vessel suggest a violation that should be investigated. [16]. The source of the pollution comes from the Eastern side of the waters of the 3 Littoral States, namely the Easternmost part of the Singapore Strait, as per the following radar data.

Fig. 4. Satellite images showing the presence of waste oil based on data of Bali Radar Ground Receiving station.

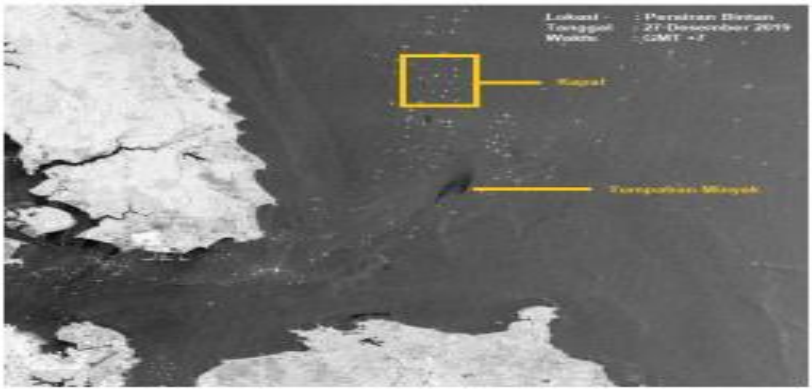

Fig. 5. Sentinel-1 Satellite Image Data Processing Results [19].

The findings of the data analysis utilizing the Sentinel Application Platform (SNAP) software demonstrate several regions with a darker appearance (referred to as dark spots). Areas with dark spots indicate oil spills, whereas white dots symbolize ships located in the area. However, identifying the culprits responsible for marine pollution is challenging due to legal issues. One problem is the difficulty of providing scientific evidence to establish the causal links between pollution and its source, which is required to determine liability and compensation for the extent of pollution [20]. The passage of

sludge oil pollution along the Bintan shore is influenced by wind conditions in Bintan Waters during the North Season. The north wind season lasts November to March.

Furthermore, based on present conditions, the Bintan Coast is part of Indonesia's maritime seas, which is also the Singapore Strait's Littoral State. There are also strait user states in the Singapore Strait. The Malacca Strait and the Singapore Strait allow access to international trade from the west to East Asia or vice versa. As a result, this location is rather crowded. Under present conditions, the Malacca and Singapore Straits are among the world's busiest marine waterways. One-third of the world's commercial items pass across the strait. According to forecasts, maritime traffic in the region will dramatically increase [24, 25].

Environmental pollution is based on the Stockholm Declaration, namely, the cessation of the discharge of toxic waste or other material that cannot be absorbed and exceeds the capacity of the environment, as stipulated in Principle 7 Stockholm 1972. Furthermore, pollution also has potential to affect the marine environment. Marine pollution is specifically regulated in UNCLOS 1982. Marine Pollution as stipulated in article 1 (4) of UNCLOS 1982. The designation of special area in the Singapore Strait as an alternative to the designation of outside of port limit area to solve the pollution due to the oil sludge discharge that affects the coast of Bintan, Indonesia in order to achieve marine and coastal sustainability. As described above, there is a special mandatory method applied in the special area to discharge oil sludge from ships.

Sludge oil is included in the oil category in Annex I, addressing Regulations for the Prevention of Pollution by Oil, Regulation 1 Definitions, Tank cleaning is a critical activity on tanker ships because it eliminates any hydrocarbon vapours, liquids, or residues from tanks. MARPOL, as previously said, defines unique regions. As previously stated, MARPOL comprises unique zones for the aim of preserving the maritime environment, such as the provision of oil discharge from machinery spaces and cargo tanks in special areas. [13]. MARPOL defines special areas. In special areas, mandatory and special methods, as described above, are applied for pollution prevention. Special areas under MARPOL.

Specific mandatory provisions in Special areas are set out in Annex I, Regulations 1(11) and 15(3), Annex II Regulation 13(8), Annex IV Regulation, Annex V, Regulation 1(14), Annex VI, Regulations 2(8), 13(6), 14(3) and appendix VII of MARPOL.

Special areas are subject to regulation under Regulation 1(11), Annex I, MARPOL. These designated areas refer to specific sections of the sea that necessitate special mandatory methods for preventing marine pollution caused by oil. The special character of their traffic, along with their oceanographic and ecological conditions, are recognized for technical reasons as requiring such action. Waste oil produced on ships emanates from various systems including sludge, slop, hull, and ballast water systems. Oil discharge into the sea from ship activities is caused by both legal and illegal means. The first occurrence of technical term abbreviations are always explained in full. Typically, waste oil generated on ships arises from tank cleaning, and the waste is either incinerated on board, legally discharged, or illegally discharged into the sea. The language is formal, objective, and free from biased, emotional, or figurative language, while adhering to conventional structure and academic writing principles. The text employs precise subject-specific vocabulary, adheres to grammatical correctness, and aligns with British English spelling and grammar conventions. As outlined previously, the discharge of oil from cargo tanks is prohibited in special areas under MARPOL 73/78. These designated sea areas are identified by MARPOL due to their unique oceanographic and ecological characteristics, as well as their significant maritime traffic. Consequently, the implementation of compulsory and tailored techniques aimed at preventing marine pollution is required in these distinguished zones. It is important to note that these special areas receive a higher degree of protection under the Convention than other marine regions.

In the instance of pollution in the waterways of three littoral states located east of the Singapore Strait (Eastern Segment 2), there has been a breach of the oil discharge regulation as stipulated in MARPOL concerning the provisions on oil discharge, resulting in the appearance of oil sludge on the surface dam. This has impacted the coast of Bintan, Indonesia Bintan Waters' wind conditions blow throughout the North Season. in a Southwesterly direction from the Northeast, with an average speed ranging between 3.6 and 5.7 metres per second. This season's wind speed is significantly impactful on the current movement, leading to oil spill transfer in these waters. Specifically, the wind speed is the highest compared to other seasons [19].

Furthermore, considering present circumstances, the Bintan Coast constitutes a section of Indonesia's maritime territory, which also serves as the Singapore Strait's Littoral State. It is worth mentioning that there exist user states in the Singapore Strait. The region is utilized as an international shipping pathway, utilizing the Malacca Strait and Singapore Strait to access global trade networks between East Asia and the West, or vice versa. Thus, this is a significantly congested area. Currently, SOMS stands out as one of the world's most active shipping lanes. [21].

To designate a special area, it must be proposed to the Marine Environment Protection Committee (MEPC). Within the purview of the IMO, the MEPC has the jurisdiction to evaluate all concerns affecting the prevention and control of maritime pollution from ships. The MEPC, in particular, is in charge of tasks connected to the approval and change of rules or other provisions provided for under the IMO's legislative documents. As a result, the formation of special zones for the Malacca Strait, Singapore, and North Natuna must be considered for inclusion in MARPOL 73/78 by an MEPC Resolution, as per Article 38 of the IMO convention. It is well known that the MARPOL Annex is routinely modified by MEPC resolution. MEPC has the jurisdiction to assess all concerns pertaining to the prevention and control of marine pollution from ships within the scope of the IMOCurrently, the MEPC facilitates all discussions on legal instruments and amendments to existing legal instruments pertaining to the marine environment and under IMO jurisdiction [15, 26, 27, 28].

4 Conclusion

Special areas under MARPOL are designated areas that require special methods to prevent marine pollution caused by oil. These areas are identified due to unique oceanographic and ecological characteristics and significant maritime traffic. Discharge of oil from cargo tanks is prohibited in these special zones. The Bintan coast in Indonesia has experienced pollution due to violations of oil discharge regulations, resulting in oil sludge in surface dams. The region is congested, with the Straits of (SOMS) being one of the most active shipping lanes in the world. To designate an area as a special area, it must be proposed to the Marine Environment Protection Committee (MEPC), which has the authority to consider all matters concerning the prevention and control of marine pollution from ships within the purview of the IMO. The designation of a special area for Singapore should be proposed for inclusion in MARPOL 73/78 through an MEPC Resolution, based on Article 38 of the IMO convention.

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