




# The Effectiveness of MARPOL Annex V Implementation on Ferry Ships in Parepare Harbor

Bustamin Bustamin<sup>1</sup>, Joko Purnomo<sup>2</sup>, Ismail Ismail<sup>3</sup>, Muhammad Rijal<sup>4</sup>, Andi Dirga Noegraha<sup>5</sup> 

<sup>1,2,3</sup> Polytechnic of Seafaring Science, Makassar, Indonesia

<sup>4,5</sup> Academy Maritime Indonesia AIPI, Indonesia  
andirgan@gmail.com

**Abstract.** The study aims to determine the standard of effectiveness of Marine Pollution (MARPOL) Annex V Implementation on Ferry Ships at the Port of Parepare. The research was conducted on 8 moored ferry ships at the Port of Parepare. This research uses descriptive qualitative research methods with observation and interviews. This effectiveness assessment is carried out based on certain regulations governing waste management. These regulations are important to maintain the sustainability of the maritime environment and protect marine ecosystems that are vulnerable to the negative impacts of waste disposal. The implementation of MARPOL Annex V on ferry vessels at Parepare Port found variations in the level of effectiveness of its implementation. The Fifth Vessel stood out with the best effectiveness, achieving "moderately effective." At the same time, the Second, Sixth, and Eighth ferry ships and the First, Third, and Seventh ferry ships showed lower effectiveness and were categorized as "less effective." An overall analysis of the eight vessels shows that the average effectiveness is still classified as "less effective," indicating constraints in applying MARPOL Annex V Regulations on these ships. Further efforts are needed to improve ferry ships' compliance with Annex V regulations.

**Keywords:** Marine Pollution, Annex V, Ferry Ship.

## Introduce

The Earth's vast waters are home to a wide variety of beautiful marine flora and fauna, making the ocean one of our planet's most valuable natural assets. [1]. However, as global economies and trade grow, ports worldwide have become essential hubs for marine transportation, international trade, and industrial activity. Effective waste management on ships plays a crucial role in protecting marine life, ecosystems, and water quality by preventing harmful waste and contaminants from being discharged into the ocean. By adhering to efficient waste management procedures, the plan mitigates the negative impact of pollution on the environment. [2]. Ships that release waste into the sea, whether directly or indirectly, pose a threat to marine life, the health and resources of marine ecosystems, human well-being, and the economic value derived from these ecosystems. The types of waste contributing to marine pollution

© The Author(s) 2024

R. Mahmud et al. (eds.), *Proceedings of the 3rd International Conference and Maritime Development (ICMaD 2024)*, Advances in Engineering Research 255,

[https://doi.org/10.2991/978-94-6463-628-4\\_6](https://doi.org/10.2991/978-94-6463-628-4_6)

include plastics, floating debris, packaging materials (such as cardboard), paper, rags, glass, metal, ceramics, food scraps, mixed waste, combustion ash, batteries, paint residues, cans, chemicals, oily rags, oil-contaminated plastics, leftover medicines, and other hazardous materials. Properly managing these categories of waste is essential to preserving the health and sustainability of marine environments.

Parepare Bay is a potential water area in South Sulawesi. Various activities in these waters include the Port service center [3], Fisheries and aquaculture [4], and Tourism [5]. Sea transportation activities in Parepare City have increased compared to 2021, this is indicated by the increasing flow of domestic ship passengers at the Port of Parepare City. In 2021, there were 456,983 passengers departing from Parepare City Port and 36,813 arriving at Parepare City Port with 730 ships (6). The high activity in these waters affects and has the potential to cause pollution in Parepare waters. Marine pollution is defined as the negative effect of waste disposal into the sea and the waters of South Sulawesi, one of which is the waters of the Gulf of Parepare, is classified as having a high level of marine pollution [7]. Several studies on pollution in the waters around Parepare Bay have been conducted [8], [9]

To mitigate waste pollution from ships, the entire crew must possess the knowledge, skills, and sense of responsibility needed to comply with waste disposal rules and use onboard equipment properly, following MARPOL Annex V regulations. Waste management on ships is structured through a garbage management plan, which aims to prevent pollution and promote proper disposal practices. This involves categorizing waste (solid, hazardous, oily, etc.) and applying specific processing and disposal techniques for each type. Waste is separated at the source to streamline handling and recycling, and waste storage and collection methods are employed to prevent leaks and spills. Appropriate waste treatment and disposal methods, such as recycling or using designated disposal sites, are also considered.

Additionally, thorough records of waste generation, management, and disposal are maintained to ensure compliance and evaluate waste handling procedures. Crew members receive training on pollution prevention and waste management to foster environmental responsibility. Promoting awareness of pollution prevention, along with adherence to national and international laws like MARPOL Annex V, encourages ethical behavior and supports sustainable maritime operations.

[10]. So based on this, it is necessary to conduct research to find out how the level of effectiveness of MARPOL Annex V in handling waste on Ferry Ships at the Port of Parepare.

## Methods

In terms of the type of data, the research approach used in this research is qualitative. What is meant by qualitative research is research that intends to understand the phenomenon of what is experienced by the research subject holistically, and using descriptions in the form of words and language, in a special natural context and by utilizing various scientific methods [11] The type of research approach is descriptive. Descriptive research is research that seeks to tell the solution to existing problems based

on data. The type of descriptive qualitative research used in this study is intended to obtain information about waste management on board ships and ports. In addition, the qualitative approach is expected to reveal the situation and problems faced in the implementation of MARPOL Annex V. This research was carried out on Ferry ships that were docked and anchored at the Nusantara Port of Parepare, South Sulawesi.

## Result and Discussion

Descriptive research aims to provide solutions to existing problems by analyzing collected data. In this study, a descriptive qualitative approach is used to gather insights on waste management practices on board ships and at ports. The qualitative method seeks to uncover the current situations and challenges in implementing MARPOL Annex V regulations. The research was conducted on ferry vessels docked at Nusantara Port in Parepare, South Sulawesi, providing a focused setting to observe and analyze these waste management practices and compliance issues.



**Fig. 1.** Map of Parepare Port

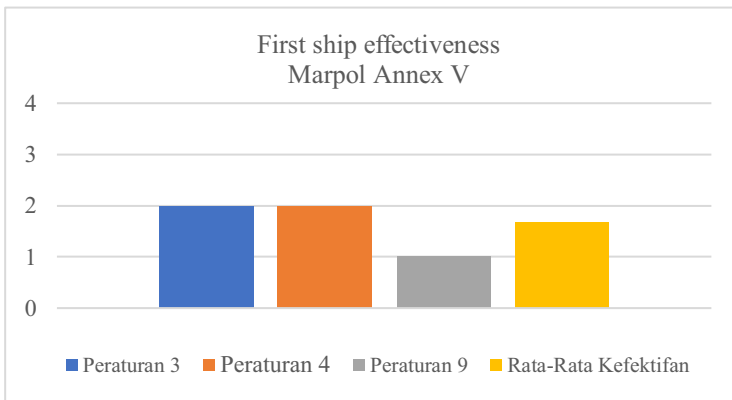
A ferry is a type of vessel designed for sea crossings, transporting passengers along with their vehicles, such as private cars, buses, trucks, or semi-trailers. The use of ferries is necessitated by the absence of a bridge for sea crossings. In this study, a sample of

eight ferry vessels was chosen for research, as shown in Table 1. The study uses both primary and secondary data. Primary data were collected through interviews with port officials and ferry crew members who are directly involved in the research. Secondary data were obtained from relevant documents regarding the implementation of MARPOL Annex V on ferry vessels at Parepare Port.

**Table 1.** List of Research Object Ferry Vessels

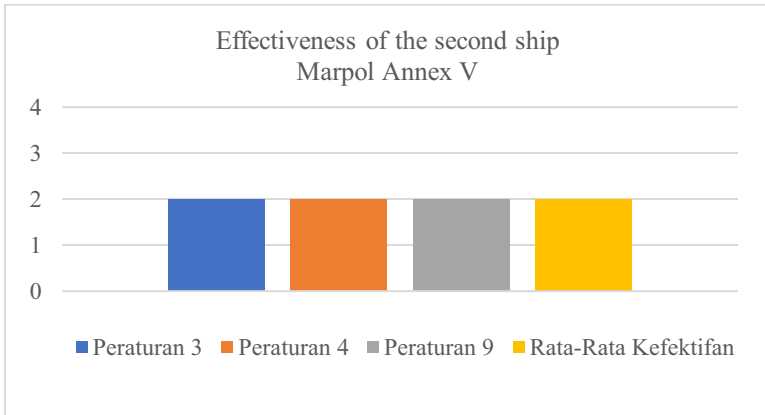
No	Ship Name	IMO No.	Gross Tonnage (GT)	Length Over All (m)	Capacity
1	First Ship	8611647	5920	109.2	1920
2	Second Ship	8804086	3017	90.0	1450
3	Third Ship	9110157	3655	95.7	1700
4	Fourth Ship	8905165	3950	95.7	340
5	Fifth Ship	9140023	6801	147.3	675
6	Sixth Ship	9042881	2983	97.7	1700
7	Seventh Ship	8813556	2987	95.7	1500
8	Sixth Vessel	8508694	3778	102.8	1600

The First Ship has a low level of effectiveness in complying with MARPOL Annex V Regulations. The implementation of Regulation 9 is rated as “Ineffective”, indicating that this vessel faces serious problems in complying with MARPOL Annex V Regulations. Although Regulation 3 and Regulation 4 are slightly better, there is still room for significant improvement. The average effectiveness of “less effective” indicates that this vessel needs to make substantial improvements in waste management practices to achieve a high level of compliance with MARPOL Annex V.



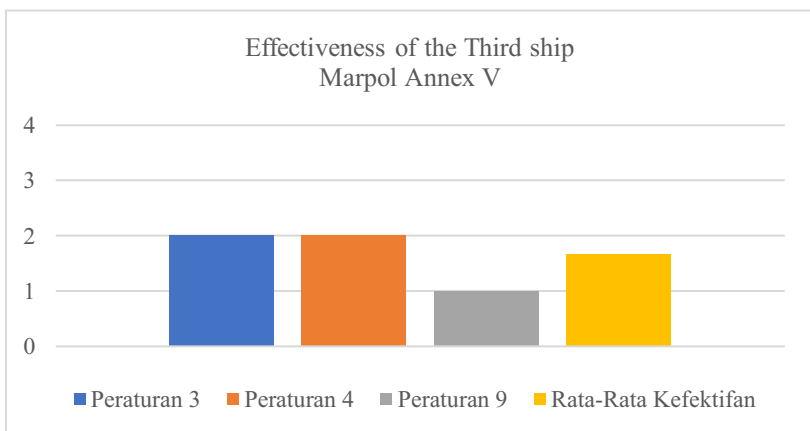
**Fig. 2.** First-ship effectiveness level

From Figure 2 it can be concluded that the Second vessel has a low level of effectiveness in complying with MARPOL Annex V Regulations. All Regulations evaluated were rated as “less effective”.



**Fig. 3.** The effectiveness level of the second ship

In Figure 3, the graph shows the results of the assessment of the effectiveness of the application of MARPOL Annex V. This vessel is less effective in complying with Annex V Regulations. In terms of waste disposal outside special areas (Regulation 3) and special requirements for waste disposal (Regulation 4), this vessel was given a score of 2, indicating a less effective level of compliance. This means that there are potential violations of the Rules in terms of waste management on this vessel.



**Fig. 4.** The effectiveness level of the Third ship

Figure 4 shows that the Fourth Vessel has varying levels of effectiveness in complying with MARPOL Annex V Regulations. The application of Regulation 4 is rated more than Regulation 3, which indicates that the vessel is less effective in meeting specific requirements for garbage disposal such as preparing placards and separating garbage by garbage category by the Garbage Management Plan rules.

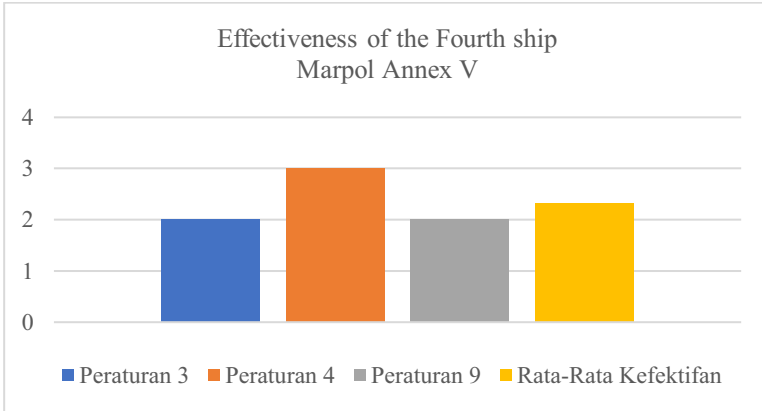


Fig. 5. The effectiveness level of the Fourth ship

Figure 6 shows that the Fifth vessel has a good level of effectiveness in complying with MARPOL Annex V Regulations. All Regulations were evaluated as “Moderately Effective”, indicating that this vessel has achieved a good level of compliance with MARPOL Annex V.

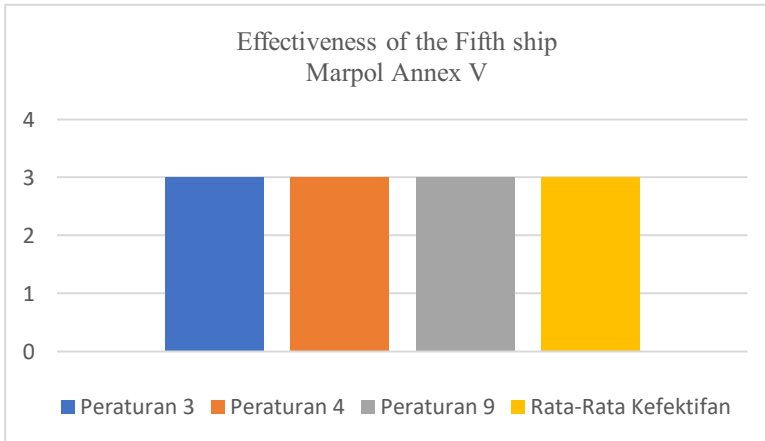
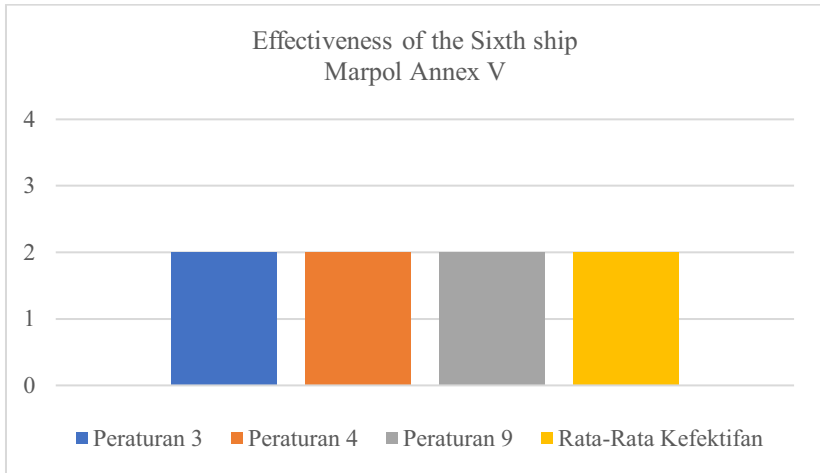


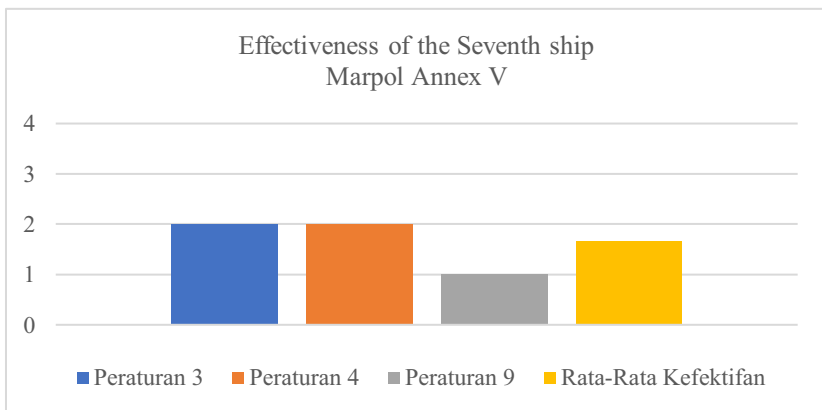
Fig. 6. The effectiveness level of the Fifth ship

Figure 7, shows that the Sixth vessel has a low level of effectiveness in complying with MARPOL Annex V Regulations. All Regulations were evaluated as “Less Effective”, indicating that this vessel needs to make improvements in waste management practices to achieve a higher level of compliance with MARPOL Annex V.



**Fig. 7.** The effectiveness level of the Sixth ship

Figure 8 below shows that the Seventh Vessel has a low level of effectiveness in complying with MARPOL Annex V Regulations. The implementation of Regulation 9 is rated as “Ineffective”, indicating that the Seventh Vessel is facing serious problems in complying with this Regulation, although the implementation of Regulations 3 and 4 is in some compliance, there is still room for significant improvement. As for the average effectiveness, it is “Less Effective”.



**Fig. 8.** The effectiveness level of the Seventh ship

Figure 9 shows the Effectiveness of the Eighth Vessel, indicating that the Eighth Vessel has a fairly low level of effectiveness in complying with several MARPOL Annex V Regulations. The application of Regulation 3 and Regulation 4 is rated as “Less Effective”, indicating that this vessel needs to make improvements in the practical waste management process to achieve a higher level of compliance with MARPOL

Annex V Regulations. However, the implementation of Regulation 9 was rated as “Moderately Effective”, indicating that this vessel has achieved a good level of compliance in this regard.

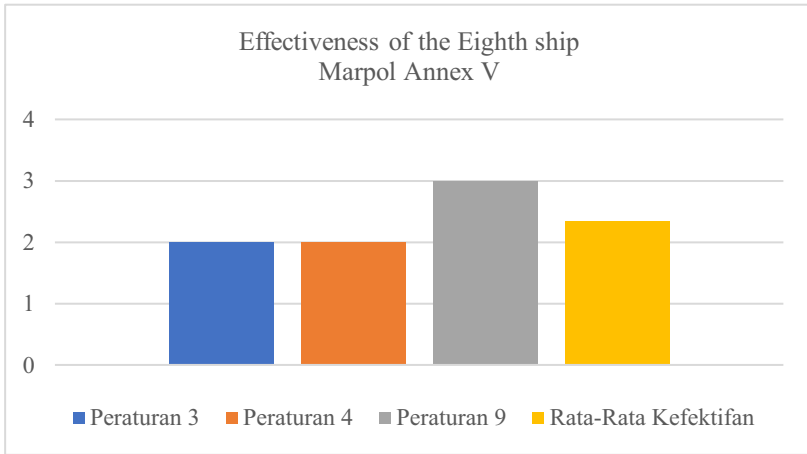


Fig. 9. Effectiveness level of the Eighth ship

The following is a recapitulation of the MARPOL Annex V Regulation Effectiveness Assessment of 8 Ferry ships that are the object of this research can be seen in Figure 10 below.

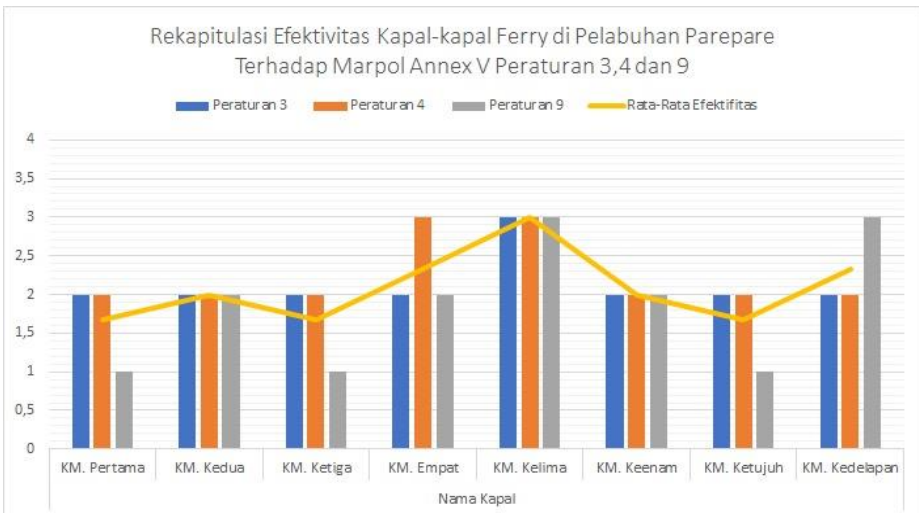


Fig. 10. Effectiveness of Ships against MARPOL Annex V



Figure 10 shows that of the eight Ferry ships that are the object of research there are several variations in effectiveness on each ship, Dharma Kartika which has an average effectiveness of 3 on a scale means that it is quite effective because from Regulation 9, some of the observations made by the Fifth Ship have placards and from the Garbage Record Book and waste disposal receipts there is a separation of waste based on the category of waste by the rules of the Garbage Management Plan, while for ships such as the Second Ship, Sixth Ship and Eighth Ship have less effective effectiveness with an average value of 2.00. For the First Ship, Third Ship, and Seventh Ship these ships show a low level of effectiveness with an average value of 1.67, this indicates on a less effective scale. From the data, it can be seen that the average effectiveness of MARPOL Annex V implementation on these eight vessels is 2.08, which is categorized as "less effective". This indicates that overall, these vessels have a poor level of compliance with MARPOL Annex V Regulations.

## Conclusion

Research on the effectiveness of MARPOL Annex V implementation on ferry ships anchored at Parepare Port reveals notable variations in compliance levels. The Fifth Ship achieved the highest effectiveness level, with an average score of 3, categorizing it as "Quite Effective." This suggests that the Fifth Ship has been fairly successful in adopting effective waste management practices in line with MARPOL Annex V. Conversely, the Second, Sixth, and Eighth Vessels showed a lower effectiveness level, each with an average score of 2, categorized as "Less Effective." Additionally, the First, Third, and Seventh Vessels recorded an even lower average effectiveness score of 1.67, also falling under the "Less Effective" category. Overall, the findings show that the ferry ships at Parepare Port generally exhibit a low effectiveness level, with an average still classified as "Less Effective." This indicates that these vessels encounter challenges in fully adhering to MARPOL Annex V regulations, highlighting a need for enhanced compliance efforts on these ships.

## Reference

1. L. Bagaskara, M. T. P, and S. Purwanto, 'Penerapan Marpol Annex V Dalam Pengolahan Sampah Di Atas Kapal MT. Serena III', *Jurnal 7 Samudra*, vol. 7, no. 2, pp. 13–16, Dec. 2022, doi: 10.54992/7SAMUDRA.V7I2.110.
2. N. van Truong and C. beiPing, 'Plastic marine debris: sources, impacts and management', *International Journal of Environmental Studies*, vol. 76, no. 6, pp. 953–973, Nov. 2019, doi: 10.1080/00207233.2019.1662211.
3. Amaliah *et al.*, 'Analisa Analisa Kapasitas Optimal Lapangan Penumpukan di Pangkalan Lontange Pelabuhan Parepare', *Jurnal Penelitian Enjiniring*, vol. 22, no. 1, pp. 76–80, May 2018, doi: 10.25042/JPE.052018.13.
4. M. H. Fattah, S. R. Busaeri, M. Kasnir, and Siswanto, 'Changes in Managerial Decision on Pond Management to Adapt to Climate Anomalies in the Coastal Area of Pare-Pare Gulf, District of Pinrang', *IOP Conf Ser Earth Environ Sci*, vol. 79, no. 1, p. 012032, Aug. 2017, doi: 10.1088/1755-1315/79/1/012032.

5. A. Mappagala, 'Penataan Ruang Kawasan Tepi Pantai Mattirotasi Dalam Menunjang Kepariwisata Di Kota Parepare', UIN Alauddin Makassar, Makassar, 2017.
6. Badan Pusat Statistik, *Kota Parepare Dalam Angka 2022*, 1st ed., vol. 1. Parepare: Badan Pusat Statistik (BPS) Kota Parepare, 2023. Accessed: Aug. 17, 2024. [Online]. Available: <https://pareparekota.bps.go.id/publication/2022/02/25/dbf3ecac786fe111ef7d893d/kota-parepare-dalam-angka-2022.html>
7. S. Diposaptono, *Membangun poros maritim dunia : dalam perspektif tata ruang laut*, 1st ed., vol. 2. Kementerian Kelautan dan Perikanan, Direktorat Jenderal Pengelolaan Ruang Laut, 2016. Accessed: Aug. 17, 2024. [Online]. Available: <https://cir.nii.ac.jp/crid/1130282272551904384>
8. A. G. Alisa, M. S. A. P, and I. Faizal, 'Kandungan Timbal dan Kadmium pada Air dan Sedimen di Perairan Pulau Untung Jawa, Jakarta', *Akuatika Indonesia*, vol. 5, no. 1, pp. 21–26, Mar. 2020, doi: 10.24198/JAKI.V5I1.26523.
9. H. Setiawan and E. Subiandono, 'Konsentrasi logam berat pada air dan sedimen di perairan pesisir Provinsi Sulawesi Selatan', *Indonesian Forest Rehabilitation Journal*, vol. 1, pp. 67–79, 2015.
10. W. A. Program, S. Nautika, I. Pelayaran, and M. Korespondensi, 'Peran Vital Garbage Management Plan Dalam Mencegah Polusi Laut : Kajian Implementasi dan Dampaknya', *Jurnal Penelitian Rumpun Ilmu Teknik*, vol. 2, no. 3, pp. 36–44, Jun. 2023, doi: 10.55606/JUPRIT.V2I3.1976.
11. L. J. Moleong, *Metodologi penelitian kualitatif edisi revisi*, vol. 24. Remaja Rosdakarya, 2007. Accessed: Aug. 17, 2024. [Online]. Available: <http://library.stik-ptik.ac.id>

**Open Access** This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

