

# Reconstruction of Marine Pollution Regulations and Control of Plastic Waste in The Indonesian Sea in The Context of Biodiversity Protection

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## ABSTRACT

This research examines the issue of Marine Pollution in Indonesia, which is the second largest contributor of plastic waste in the world with an estimated 3.22 million tons of plastic waste entering marine waters annually. The research aims to analyze the reconstruction of regulations controlling plastic waste in the sea for the protection of biodiversity. Using a normative legal research method with statutory and conceptual approaches, this research identifies gaps in Indonesia's Marine Pollution control regulatory framework. The results show fragmentation of regulations and overlapping authority between institutions, as well as significant impacts on marine biodiversity affected by plastic waste. This research proposes a regulatory reconstruction model comprising five main strategies: harmonization of regulations through the establishment of a specific Law on Marine Pollution Control, institutional strengthening through a Marine Pollution Prevention Coordination Agency, diversification of regulatory instruments including economic instruments, law enforcement reform, and strengthening multi-stakeholder participation. Implementation of this model is expected to increase the effectiveness of plastic waste control in Indonesian seas for the protection of marine biodiversity.

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## 1. INTRODUCTION

Indonesia, as the largest archipelagic country in the world with a coastline of 99,093 kilometers (Geospatial Information Agency 2019), faces serious problems related to marine pollution that threatens biodiversity and coastal ecosystems. Indonesia is classified as the second largest contributor of plastic waste in the world after China with an estimated production of plastic waste reaching 3.22 million tons per year that enters sea waters (Rahmayani and Aminah 2021).

The gap in regulations on the control of plastic waste in Indonesian waters is the main factor that exacerbates this pollution condition, such as the fragmentation of authority and overlapping regulations between the central and regional governments. There are 4 dominant categories of plastic waste that pollute Indonesian waters, namely plastic bags, food packaging, plastic beverage bottles, and

microplastics that are less than 5 mm in diameter and have the potential to enter the marine biota food chain (Kurnia Hamzani and Norita Tetra 2023).

The scale of the plastic pollution problem in Indonesia's oceans is reflected in quantitative data that is quite alarming. LIPI's research in 2022 showed that at 10 monitoring locations on the coast of Indonesia, it was found that the average density of plastic waste reached 0.27-0.59 items/m<sup>2</sup> with the dominance of microplastics of 65.2% of the total waste identified. Plastic consumption in Indonesia reaches 17 kg per capita per year with a low recycling rate, which is only around 10% (Yolanda and Saputra 2021).

The problem of plastic waste in Indonesia's waters can be traced through the development of regulations and their implementation. The ratification of the 1982 United Nations Convention on the Law of the Sea (UNCLOS) through Law Number 17 of 1985 was supposed to be the starting point for Indonesia's commitment to protecting the marine environment, but its implementation was hampered by limited institutional capacity and resources. The ratification of Law Number 32 of 2009 concerning Environmental Protection and Management provides a more comprehensive legal basis, but existing law enforcement is still weak with minimal marine pollution cases that have been successfully processed to court. The issuance of Presidential Regulation Number 83 of 2018 concerning Marine Waste Management marks the government's seriousness by targeting a reduction of plastic waste in the sea by up to 70% by 2025.

The solution to the problem of plastic pollution in Indonesia's oceans requires a comprehensive and integrated regulatory reconstruction approach. Based on this, the author is interested in conducting research with the formulation of the problem "how to reconstruct Marine Pollution regulations and control plastic waste in Indonesian seas in the context of biodiversity protection?".

## 2. METHOD

This study uses a qualitative approach with the aim of examining the reconstruction of *Marine Pollution regulations* and the control of plastic waste in Indonesian waters in the context of biodiversity protection. The qualitative approach was chosen because it was able to provide a comprehensive understanding of the complexity of marine pollution control regulation problems from philosophical, juridical, and sociological aspects. This type of research is a normative legal research (*doctrinal research*) that examines primary, secondary, and tertiary legal materials to obtain a comprehensive picture of the *regulatory framework of Marine Pollution* in Indonesia (Djulaeka 2019).

The approach used in this study consists of two main approaches. First, the *statute approach* is used to analyze various legal instruments related to marine pollution control and biodiversity protection, both at the international, national, and local levels. This approach allows researchers to identify hierarchies, harmonizations, and gaps in the existing regulatory framework (Marzuki 2022). Second, a *conceptual approach* is used to examine environmental law concepts relevant to *marine pollution* control, especially related to plastic waste, such as the *polluter pays principle*, the *precautionary principle*, *extended producer responsibility*, and the concept of *blue economy*.

## 3. FINDINGS AND DISCUSSION

### Marine Pollution Regulation in Indonesia

The results of the study show that the regulatory framework for *Marine Pollution* and Plastic Waste Control in Indonesia is distributed at various levels of hierarchy and sectors. These regulations can be mapped based on the type of legal instrument and the regulatory sector. Mapping of *Marine Pollution regulations* and plastic waste control in Indonesia includes from the constitutional level to regional regulations. At the constitutional level, the 1945 Constitution Article 28H paragraph (1) and Article 33 paragraph (3) provide a constitutional basis for environmental protection, including the sea, from plastic pollution. At the ratified international level, Law No. 17/1985 on the Ratification of UNCLOS 1982 regulates the state's obligations to protect and preserve the marine environment, especially in Articles 194 and 207 concerning the prevention, reduction, and control of marine pollution (Masdin 2016). Presidential Decree No. 46/1986 concerning the Ratification of MARPOL 73/78 regulates the

prevention of marine pollution from ships, where Annex V specifically regulates the prevention of waste pollution from ships, including plastics. Law No. 18/2008 on the Ratification of the Basel Convention regulates the control of cross-border movements of hazardous waste, with the Basel Amendment of 2019 specifically regulating the transportation of plastic waste (Junef 2016).

At the legislative level, regulations related to plastic waste control include Law No. 32/2009 concerning PPLH which regulates environmental protection and management, especially in Articles 13, 53, and 69 related to the control of environmental pollution, including the sea. Law No. 18/2008 on Waste Management regulates integrated waste management, with Article 15 specifically regulating waste reduction, including restrictions on plastic waste. Law No. 32/2014 on Marine Affairs regulates the protection of the marine environment, with Article 52 focusing on preventing marine pollution from various sources. At the government regulatory level, Government Regulation No. 82/2001 concerning Water Quality Management and Water Pollution Control regulates the management of water quality and pollution, including seawater quality standards for various purposes. Government Regulation No. 81/2012 on Household Waste Management operationalizes the Waste Management Law, including waste reduction through restriction, recycling and reuse. Government Regulation No. 27/2020 on Specific Waste Management regulates waste management that requires special handling, including plastic waste management as one of the specific types of waste.

At the presidential regulatory level, Presidential Regulation Number 83/2018 concerning Marine Waste Management regulates national coordination of marine waste management with a target of reducing plastic waste in the sea by 70% by 2025. Presidential Decree No. 97/2017 concerning National Waste Management Policies and Strategies sets the direction of waste reduction and handling policies with a target of reducing waste generation by 30% and handling by 70% by 2025. At the ministerial regulatory level, the Minister of Environment and Forestry Regulation No. 75/2019 concerning the Waste Reduction Roadmap by Producers regulates the responsibility of producers in reducing waste with targets and schedules for reducing packaging waste, including plastic.

Ministerial Regulation No. 18/2021 concerning the Placement of Fishing Gear regulates the management of fishing gear, including the control of plastic waste from fishing activities. At the level of regional regulations, there are various regulations such as the DKI Jakarta Regional Regulation No. 3/2013 concerning Waste Management which prohibits the use of single-use plastic bags and the Bali Regional Regulation No. 5/2011 concerning Waste Management which limits single-use plastics.

Based on the mapping, it was identified that the regulation of *Marine Pollution* and the control of plastic waste in Indonesia already has a fairly comprehensive legal basis from the constitutional level to regional regulations. However, the fragmentation of these regulations has implications for coordination and implementation challenges in the field. The gap analysis identified several gaps in the regulatory framework of *Marine Pollution* and Plastic Waste Control in Indonesia. The main gaps in the regulation of *Marine Pollution* and the control of plastic waste in Indonesia include gaps in regulatory substance, institutional gaps, gaps in regulatory instruments, gaps in law enforcement, and gaps in public participation.

In terms of the gap in regulatory substance, it was identified that there is no uniform definition of plastic waste in the sea in various regulations, overlapping regulations between waste in general and plastic waste in the sea, the lack of determination of specific quality standards for plastic pollution in the marine environment, and the lack of integration of biodiversity protection in plastic waste control regulations (Sucitra, Pratiknjo, and Kawung 2024).

In the context of institutional gaps, there is a fragmentation of authority between the Ministry of Environment and Forestry, the Ministry of Maritime Affairs and Fisheries, and the Coordinating Ministry for Maritime Affairs and Investment, an unclear coordination mechanism between institutions in handling plastic waste at sea, and an overlap of authority between the central and regional governments in controlling plastic waste in coastal areas.

The gap in regulatory instruments is characterized by the dominance of the command and control approach compared to economic and social instruments, the lack of optimal Extended *Producer Responsibility* (EPR) regulation for plastic waste, and the lack of economic incentives and disincentives

in controlling plastic waste in the sea. In terms of law enforcement gaps, there are weak monitoring and law enforcement mechanisms for violations of plastic waste disposal into the sea, the absence of specific administrative and criminal sanctions for plastic pollution in the sea, and limited capacity of law enforcement officials in handling plastic pollution cases at sea.

Meanwhile, the gap in public participation includes the lack of optimal regulation on community participation in the control of plastic waste in the sea, the lack of a public complaint mechanism related to plastic pollution in the sea, and the lack of integration of local wisdom in the control of plastic waste in coastal areas.

The results of research on the implementation of *Marine Pollution regulations* and plastic waste control in Indonesia show that there are variations in the success rate of implementation based on sustainability indicators. The implementation of *Marine Pollution regulations* and plastic waste control in Indonesia is still not optimal. The low implementation of the ecological sustainability aspect indicates that existing regulations are not effective in protecting marine biodiversity from the threat of plastic waste (Chotimah, Iswardhana, and Rizky 2022). More specifically, the implementation of regulations by region also shows significant variations.

The implementation of plastic waste control regulations varies between regions in Indonesia. Bali has shown success through Regional Regulation No. 5/2019 on the Ban on Single-Use Plastics, although it still faces challenges in enforcement in the tourism sector. DKI Jakarta with Governor Regulation No. 142/2019 concerning Restrictions on the Use of Plastic Bags, is also still faced with the challenge of high volume of waste. South Sulawesi with the implementation through the Clean Makassar Movement also faces obstacles in waste management infrastructure. This variation is influenced by several factors such as the existence of special regional regulations, local government commitments, waste management infrastructure, and public awareness.

### **Analysis of Reconstruction of Marine Pollution Regulations**

Based on the analysis of existing regulations and their gaps, a model for the reconstruction of *Marine Pollution regulations* and the control of plastic waste in Indonesian waters was formulated. The proposed regulatory reconstruction model includes five main components, namely regulatory harmonization, institutional strengthening, instrument diversification, law enforcement reform, and multi-stakeholder participation. Regulatory harmonization includes the establishment of a special law on Marine Pollution Control that integrates aspects of biodiversity protection, harmonization of definitions and provisions related to plastic waste in the ocean in various regulations, and the development of derivative regulations that are more operational and adaptive.

Institutional strengthening includes the establishment of a cross-sectoral coordinating body for the control of plastic waste in the sea, the strengthening of institutional capacity in coastal areas and small islands, and a clear division of authority between central and local governments. Diversification of instruments includes the development of economic instruments such as plastic taxes and recycling incentives, strengthening the *Extended Producer Responsibility (EPR)* scheme for plastic waste, and integrating ecosystem-based approaches in plastic waste control. Law enforcement reforms include strengthening oversight and enforcement mechanisms, developing specific administrative and criminal sanctions for plastic pollution in the sea, and increasing the capacity of law enforcement officials.

Multi-stakeholder participation includes strengthening community participation in plastic waste control, involvement of the private sector in producer responsibility schemes, and developing a public complaint mechanism related to plastic pollution in the sea. This regulatory reconstruction model is expected to be a reference framework in the development of policies to control *Marine Pollution* and plastic waste in Indonesian waters that are more effective in protecting marine biodiversity.

### **Comprehensive Mapping and Critical Analysis of the Regulatory Framework**

The protection of Indonesia's marine environment from plastic pollution has a constitutional basis in the 1945 Constitution through Article 28H paragraph (1) concerning the right to a good and healthy environment and Article 33 paragraph (3) concerning state control of natural resources for the

prosperity of the people. Although Indonesia has ratified several international conventions such as UNCLOS 1982, MARPOL 73/78, and *the Basel Convention*, its implementation is still not optimal and integrated in national regulations. At the legal level, Indonesia has Law No. 32/2009 on Environmental Protection and Management, Law No. 18/2008 on Waste Management, and Law No. 32/2014 on Marine Affairs, but all three do not have specific provisions regarding the control of plastic pollution in the sea. Derivative regulations such as Government Regulation No. 82/2001, Government Regulation No. 81/2012, and Government Regulation No. 27/2020 have also not comprehensively regulated the handling of plastic waste in the marine environment. Presidential Regulation No. 83/2018 concerning Marine Waste Handling is the first regulation that specifically regulates the handling of marine debris with a target of a 70% reduction by 2025, but its implementation has only reached around 32% until 2022. At the ministerial and regional levels, the Minister of Environment and Forestry Regulation No. 75/2019 regulates the responsibility of producers in reducing packaging waste, but the level of compliance is still low with only 41% of companies complying with this regulation. Some regions such as Bali and DKI Jakarta have issued special regulations on restrictions on single-use plastics, but their implementation varies and is uneven across Indonesia.

Plastic waste management in Indonesia's seas faces various implementation gaps, including overlapping authority between the Ministry of Environment and Forestry, the Ministry of Marine Affairs, and the Coordinating Ministry for Maritime Affairs, weak vertical coordination between the central and regional governments, and data fragmentation and monitoring. The budget allocation for marine pollution control is very limited, only 0.2% of the total state budget, while plastic producers have not considered the environmental costs of their products. Law enforcement is also still weak with only 23% of marine pollution cases being legally resolved out of the total reported cases. Public awareness of the impact of plastic waste is still low with only 37% of respondents understanding its impact on marine ecosystems, while waste management infrastructure in coastal areas only reaches 40-50%. The impact of plastic pollution on Indonesia's marine biodiversity is significant, with 78% of marine mammal species and 72% of turtle species affected by plastic waste, as well as the presence of microplastics in 64% of commercial fish samples. Plastic waste also contributes to the degradation of 30-45% of coral reefs in marine protected areas, causing significant economic losses to the fisheries and tourism sectors of up to US\$ 1-1.5 billion per year (World Bank 2021).

Based on this analysis, a comprehensive regulatory reconstruction is needed through the establishment of a Special Law on Marine Pollution Control that regulates substantive, procedural, and institutional aspects, as well as amendments to existing laws such as Law No. 32/2009, Law No. 18/2008, and Law No. 32/2014. Reconstruction of government and presidential regulations is also needed, including the revision of Presidential Regulation No. 83/2018 and the establishment of a special government regulation for the prevention of plastic pollution in the sea and the protection of biodiversity. The substance of the regulation needs to be strengthened through a preventive approach by limiting the production and use of single-use plastics, limiting microplastics in consumer products, and developing environmentally friendly alternatives.

Recovery approaches also need to be improved through marine plastic waste cleanup programs, rehabilitation of affected ecosystems, and mitigation of impacts on biodiversity. Strengthening the economic approach is needed through a stronger *Extended Producer Responsibility* scheme, the development of economic instruments such as plastic taxes and *deposit-refund systems*, and the establishment of a Trust Fund for the Prevention of Plastic Pollution in the Sea. Law enforcement mechanisms also need to be strengthened through an integrated monitoring system, increasing sanctions, and strengthening the capacity of law enforcement officials. In the institutional aspect, it is recommended the establishment of a Marine Pollution Prevention Coordinating Board (BKPPL) under the President, a *special task force* at the regional level, and the development of a cross-sectoral coordination system. Institutional capacity building and coastal community empowerment are also integral to the comprehensive regulatory reconstruction for the control of plastic pollution in Indonesia's seas for the protection of marine biodiversity.

#### 4. CONCLUSION

Indonesia, as the second largest contributor of plastic waste in the world after China with an estimated 3.22 million tons of plastic waste per year entering sea waters, Indonesia needs comprehensive regulatory reconstruction. The existing regulatory framework is inadequate, characterized by fragmentation of authority, overlapping regulations, and significant implementation gaps. Despite having a constitutional basis in the 1945 Constitution and various legal instruments from the legal level to regional regulations, the effectiveness of these regulations is still low in protecting marine biodiversity from the threat of plastic waste.

The results of the study show a significant impact of plastic waste on Indonesia's marine biodiversity. The reconstruction of *Marine Pollution regulations* and the control of plastic waste in Indonesia's waters must be carried out through five main strategies. First, the harmonization of regulations through the establishment of a special law on Marine Pollution Control that integrates aspects of biodiversity protection, as well as the harmonization of definitions and provisions related to plastic waste in the sea in various regulations. Second, institutional strengthening through the establishment of the Marine Pollution Prevention Coordinating Board (BKPPL) under the President, a clear division of authority between the central and regional governments, and strengthening institutional capacity in coastal areas and small islands.

Third, diversifying regulatory instruments by developing economic instruments such as plastic taxes and recycling incentives, strengthening the *Extended Producer Responsibility* (EPR) scheme, and integrating ecosystem-based approaches. Fourth, law enforcement reform through strengthening supervision mechanisms, developing specific administrative and criminal sanctions for plastic pollution in the sea, and increasing the capacity of law enforcement officials. Fifth, strengthening multi-stakeholder participation through the involvement of the community and the private sector in plastic waste control, as well as the development of a public complaint mechanism.

Concrete recommendations that can be implemented for short-term implementation are: Revision of Presidential Regulation No. 83/2018 on Marine Debris Handling to strengthen aspects of cross-sector coordination and measurable targets; Establishment of a Task Force for Controlling Plastic Waste in the Sea at the national and regional levels with adequate authority and budget; Implementation of a single-use plastic tax nationally with an earmarking scheme for waste management programs; Strengthening the Minister of Environment and Forestry Regulation No. 75/2019 with stricter targets and sanctions for plastic producers; and the development of an integrated information system on plastic pollution in the ocean that is accessible to the public. As for the medium term (3 to 5 years), the recommendations include: (1) Drafting and ratification of a special law on Marine Pollution Control; (2) The establishment of BKPPL under the President; (3) Development of the Plastic Pollution Prevention Trust Fund at Sea; (4) Implementation of a program to limit the production and use of single-use plastics in stages; and (5) Strengthening the rehabilitation program of marine ecosystems affected by plastic waste. The implementation of this recommendation is expected to increase the effectiveness of plastic waste control in Indonesian waters in the context of protecting marine biodiversity.

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