

Optimizing Environmental Protection Regulations in Addressing Marine Water Pollution in Indonesia: A Legal and Institutional Approach

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ABSTRACT

This study aims to analyze the effectiveness of environmental protection against seawater pollution in Indonesia and formulate the necessary legal and institutional reforms to optimize it. The main problems studied include how effective existing regulations are in tackling marine pollution and what reforms are needed to ensure that environmental protection can run optimally. This research uses normative *legal research* methods with a statute *approach* and a *conceptual approach*, which focuses on the analysis of Law Number 32 of 2009 concerning Environmental Protection and Management, Law Number 32 of 2014 concerning Marine Affairs, and various other related regulations. The analysis was carried out using *the Theory of Legal Effectiveness* to assess the extent to which the law is able to function effectively in society.

The results of the study show that environmental protection against marine pollution in Indonesia has not been running optimally, caused by weaknesses in the legal substance, institutional structure, and legal culture. In terms of substance, there are still disharmony of regulations and weak sanctions arrangements. In terms of structure, there is an overlap of authority between institutions and limited law enforcement capacity. Meanwhile, in terms of legal culture, low awareness among the public and business actors has also worsened the condition of marine pollution. Therefore, the reforms needed include strengthening and harmonizing regulations, structuring and institutional integration, increasing the capacity of law enforcement officials, utilizing surveillance technology, and increasing community participation. Thus, the optimization of marine environmental protection can only be achieved through a comprehensive and integrated approach between legal and institutional aspects.

Keywords: Optimizing, Environmental, Protection, Regulations, Addressing, Marine, Water, Pollution, Indonesia, Legal, Institutional, Approach.

INTRODUCTION

Background

Indonesia as the largest archipelagic country in the world has a very large and strategic sea area, making the sea the main resource for economic, social, and ecological life. However, in recent years, seawater pollution in Indonesia has shown an increasing and worrying trend. Shipping activities, exploitation of natural resources, and domestic and industrial waste disposal are the main factors that worsen the quality of the marine environment. This condition shows that there is an imbalance between the use of marine resources and environmental protection efforts that should be a priority in sustainable development. In the legal context, this problem raises fundamental questions about the effectiveness of existing regulations, especially in controlling marine pollution and ensuring the sustainability of marine ecosystems in Indonesia. In addition, global challenges such as climate change and increased ocean-based economic activity further exacerbate this condition, thus demanding a more adaptive and responsive legal approach to environmental dynamics.¹

Seawater pollution in Indonesia is not only caused by domestic factors, but also influenced by global phenomena such as cross-border waste and increasing plastic pollution in the world's oceans. This is increasingly relevant with the development of *the blue economy* concept which emphasizes the sustainable use of marine resources. The Indonesian government has adopted this approach in various national policies, but its implementation still faces serious obstacles, especially in terms of pollution control. There is a significant gap between normative policies regulated in laws and regulations and practices in the field that still show weak supervision and law enforcement. Thus, an evaluation of the effectiveness of existing policies is needed to ensure that sustainability principles are truly implemented in marine environmental management.²

In the national legal system, regulations regarding environmental protection, including the marine environment, have been regulated in various laws and regulations, such as Law Number 32 of 2009 concerning Environmental Protection and Management and Law Number

¹ Ahmad Zawawi and Idris, *Indonesia's Maritime Environmental Protection: Regulations for the Prevention of Marine Pollution by Ships* (Jakarta: RajaGrafindo Persada, 2025), p. 12.

² Ministry of Environment and Forestry of the Republic of Indonesia, *Blue Economy Strategy and National Coastal Protection* (Jakarta: KLHK RI, 2026), p. 3.

32 of 2014 concerning Marine Affairs. However, the implementation of the regulation still faces various obstacles, especially in terms of coordination between institutions that have authority in the marine and environmental sectors. Fragmentation of authority often leads to policy overlap and weak oversight of environmental violations at sea. This condition shows that the problem of marine pollution is not only technical, but also structural and institutional, so it requires a more integrated legal approach.³

The problem of marine pollution is also increasingly complex with the development of natural resource-based industries in coastal areas, such as the mining and mineral processing industries. These industrial activities often produce waste that has a direct impact on seawater quality, thus threatening the sustainability of coastal and marine ecosystems. From a legal perspective, this shows that there are weaknesses in the environmental supervision and control system for industrial activities. In addition, the licensing mechanism that has not fully paid attention to environmental aspects is also one of the factors causing the increase in marine pollution. Therefore, it is necessary to optimize regulations that are able to anticipate the negative impact of industrial activities on the marine environment.⁴

In addition to industrial activities, marine pollution is also affected by uncontrolled practices of ocean space utilization, such as coastal reclamation and coastal infrastructure development. Many cases show that reclamation activities are carried out without adequate attention to environmental aspects, thus causing damage to marine ecosystems. This shows weaknesses in the marine space governance system, especially in terms of planning and supervision. In the legal context, this condition requires regulatory reform that is able to integrate various interests in a harmonious manner, so as not to cause conflicts between development and environmental protection.⁵

Marine pollution also has a significant impact on the economic sector, especially fisheries and marine tourism. Damage to marine ecosystems due to pollution can reduce fisheries productivity and reduce the attractiveness of marine tourism, which ultimately has an impact on the welfare of coastal communities. This shows that marine pollution is not only

³ Takdir Rahmadi, *Environmental Law in Indonesia* (Jakarta: Rajawali Pers, 2018), p. 145.

⁴ Siti Sundari Rangkuti, *Environmental Law and National Environmental Policy* (Surabaya: Airlangga University Press, 2019), p. 89.

⁵ I Made Arya Utama, *Environmental Law: An Environmental-Based Licensing Legal System* (Bandung: Pustaka Setia, 2020), p. 101.

an environmental issue, but also a complex economic and social issue. Therefore, the legal approach to overcoming marine pollution must be able to integrate aspects of environmental protection with improving community welfare.⁶

In terms of health, marine pollution also poses a serious threat to human health, especially through contamination of the seafood chain. Harmful substances that enter the ocean can accumulate in marine organisms and eventually be consumed by humans. This condition shows that marine pollution has direct implications for food security and public health. In the legal context, this requires stricter regulations in monitoring the quality of the marine environment and consumer protection.⁷

The latest regulatory developments in Indonesia show that there are efforts by the government to strengthen environmental protection through various new policies and regulations. However, the effectiveness of these regulations is still a question, especially in terms of implementation and law enforcement. Many cases of marine pollution are not acted upon firmly, giving the impression that environmental laws have not been able to provide a deterrent effect for violators. This shows that the problem of marine pollution does not only lie in the regulatory aspect, but also in the aspect of law enforcement.⁸

Weaknesses in the management of marine pollution are also seen in the institutional aspect, especially related to coordination between agencies that have authority in the marine and environmental sectors. The large number of institutions involved often leads to overlapping authorities and a lack of synergy in policy implementation. This condition results in low effectiveness of supervision and law enforcement against environmental violations at sea. Therefore, institutional reform is needed that is able to create an integrated and efficient management system.⁹

In addition, limited human resources and technology are also obstacles in enforcing marine environmental laws. Indonesia's vast sea area requires the support of advanced monitoring technology and competent human resources. Without this support, law

⁶ Huala Adolf, *Aspects of State in International Law* (Bandung: Refika Aditama, 2017), p. 212.

⁷ Bambang Sugiyono, *Consumer and Environmental Protection Law* (Yogyakarta: Genta Publishing, 2021), p. 67.

⁸ Mas Achmad Santosa, *Good Governance and Environmental Law* (Jakarta: ICEL, 2016), p. 134.

⁹ Ridwan HR, *State Administrative Law* (Jakarta: RajaGrafindo Persada, 2018), p. 201.

enforcement against marine pollution will be difficult to carry out effectively. Therefore, regulatory optimization must be accompanied by strengthening institutional and technological capacity.¹⁰

In the international context, Indonesia also has an obligation to comply with various international conventions related to the protection of the marine environment, such as UNCLOS and MARPOL. This obligation requires Indonesia to adapt its national regulations to international standards. However, harmonization between national and international laws still faces various obstacles, especially in implementation at the local level. This shows the need for a legal approach that is able to bridge national interests and international obligations.¹¹

Marine pollution is also influenced by low public awareness of the importance of protecting the environment. Many cases of pollution are caused by human behavior, such as dumping garbage into the sea. This shows that environmental protection efforts do not only depend on regulations, but also on changes in people's behavior. Therefore, the legal approach must be integrated with the social and educational approach.¹²

Technological developments provide new opportunities in the management of the marine environment, such as the use of satellite-based monitoring technology and geographic information systems. This technology can help in detecting marine pollution more quickly and accurately. However, the use of this technology is still limited in Indonesia, so regulatory support is needed that encourages innovation and the use of technology in marine environmental management.¹³

With these various problems, marine pollution in Indonesia is a multidimensional issue that requires a comprehensive approach. A legal approach alone is not enough without being supported by institutional strengthening, community participation, and the use of technology. Therefore, research is needed that is able to examine in depth how regulatory and institutional optimization can be carried out in overcoming marine pollution in Indonesia.¹⁴

¹⁰ Soerjono Soekanto, *Factors Affecting Law Enforcement* (Jakarta: Rajawali Pers, 2014), p. 52.

¹¹ Mochtar Kusumaatmadja, *Introduction to International Law* (Bandung: Alumni, 2015), p. 178.

¹² Satjipto Rahardjo, *Progressive Law: A Synthesis of Indonesian Law* (Yogyakarta: Genta Publishing, 2009), p. 72.

¹³ Eddy O.S. Hiariej, *Principles of Environmental Criminal Law* (Yogyakarta: Cahaya Atma Pustaka, 2020), p. 156.

¹⁴ Jimly Asshiddiqie, *Introduction to Constitutional Law* (Jakarta: Rajawali Pers, 2019), p. 245.

Based on this description, it can be understood that the problem of seawater pollution in Indonesia is not only related to environmental aspects, but also legal, institutional, economic, and social aspects. Therefore, this research is important to formulate an effective and sustainable model for optimizing the protection of the marine environment. The legal and institutional approach is expected to be able to provide comprehensive solutions to the increasingly complex problem of marine pollution in the modern era.

Research Question

1. How effective are existing environmental protection regulations in Indonesia in preventing and controlling marine water pollution?
2. What legal and institutional reforms are needed to optimize environmental protection against marine pollution in Indonesia?

THEORETICAL FRAMEWORK

1. Theory of Environmental Protection (Environmental Protection Theory)

The Theory of Environmental Protection (*Environmental Protection Theory*) is a conceptual framework that places environmental protection as the main goal in the modern legal system, especially in dealing with various forms of environmental degradation, including seawater pollution. This theory emphasizes that law not only functions as an instrument of regulation, but also as a tool of *social engineering* to maintain a balance between development and environmental sustainability. In the Indonesian context, this theory is relevant to assess the extent to which existing laws and regulations are able to effectively prevent and control marine pollution. This effectiveness is not only measured by the existence of legal norms, but also by implementation, compliance, and real impact on the quality of the marine environment. Thus, this theory provides an analytical basis for evaluating whether the environmental law system in Indonesia has been running optimally or still needs structural improvement.¹⁵

Within the framework of the Theory of Environmental Protection, the effectiveness of environmental law is largely determined by *the preventive principle* which requires the state to take proactive steps to prevent pollution before the impact occurs. This principle is especially important in the context of marine pollution, given its widespread and irreversible impact. In Indonesia, this principle has been adopted in various regulations, such as Law Number 32 of 2009 concerning Environmental Protection and Management, but its implementation still faces various obstacles. Many cases of marine pollution occur due to weak supervision and lack of preventive

¹⁵ Philippe Sands, *Principles of International Environmental Law* (Cambridge: Cambridge University Press, 2018), p. 206.

measures from the government. This shows that the existence of legal norms alone is not enough, but must be followed by an effective implementation mechanism.¹⁶

In addition to the principle of prevention, this theory also emphasizes the importance of the *precautionary principle*, which is a principle that requires environmental protection measures to be carried out even though there is no definite scientific evidence of potential damage. This principle is particularly relevant in the management of the marine environment, given the complexity of marine ecosystems that are difficult to predict. In practice in Indonesia, the application of the principle of prudence is still not optimal, especially in the granting of business licenses in coastal and marine areas. Many policies prioritize economic interests over environmental protection, so they have the potential to increase the risk of marine pollution. Therefore, the effectiveness of environmental regulations in Indonesia needs to be evaluated based on the extent to which the principle of prudence is applied in policy making.¹⁷

The Theory of Environmental Protection also emphasizes the importance of the *liability principle*, which requires polluters to be responsible for the damage caused. This principle aims to provide a deterrent effect and ensure the recovery of the affected environment. In the Indonesian context, this principle has been regulated in various regulations, but its enforcement still faces obstacles, such as the difficulty of proving and the weak sanctions given. Many cases of marine pollution are not strictly acted upon, thus reducing the effectiveness of environmental laws in providing protection. This shows that the effectiveness of regulations does not only depend on the substance of the law, but also on consistent and firm law enforcement.¹⁸

In this theory, the effectiveness of environmental law is also greatly influenced by the principle of public *participation*, which provides space for the community to be involved in the decision-making process related to the environment. Community

¹⁶ Nicholas A. Robinson, *Environmental Law and Policy in the Global Context* (New York: West Academic Publishing, 2017), p. 154.

¹⁷ Patricia Birnie, Alan Boyle, and Catherine Redgwell, *International Law and the Environment* (Oxford: Oxford University Press, 2019), p. 137.

¹⁸ Michael Faure and Günther Teubner, *Environmental Law and Economics* (Cheltenham: Edward Elgar Publishing, 2020), p. 98.

participation is important in monitoring the potential for marine pollution, as well as in encouraging accountability of the government and business actors. In Indonesia, the public participation mechanism has been regulated in various regulations, but its implementation is still not optimal. Many coastal communities do not have adequate access to information about activities that have the potential to pollute the sea. This shows that the effectiveness of environmental law also depends on the extent to which the community is involved in the environmental management process.¹⁹

In addition, the Theory of Environmental Protection also emphasizes the importance of policy *integration* in environmental management. Marine environmental management cannot be done sectorally, but must involve various sectors and institutions in an integrated manner. In Indonesia, there is still policy fragmentation between the environmental, marine, and industrial sectors, which often leads to overlapping authority and weak coordination. This has an impact on the low effectiveness of marine pollution control. Therefore, the optimization of environmental protection regulations must be carried out through better policy integration between sectors.²⁰

The effectiveness of environmental regulations is also determined by the institutional capacity to implement and enforce the law. The Theory of Environmental Protection emphasizes that strong institutions are a major prerequisite for the success of environmental protection. In the Indonesian context, institutions in the field of environment and marine are still facing various obstacles, such as limited human resources, technology, and budget. This condition causes weak supervision and law enforcement of marine pollution. Therefore, institutional strengthening is an important factor in increasing the effectiveness of environmental protection regulations.²¹

Furthermore, this theory also highlights the importance of economic instruments in supporting the effectiveness of environmental law, such as

¹⁹ Daniel Bodansky, *The Art and Craft of International Environmental Law* (Cambridge: Harvard University Press, 2018), p. 65.

²⁰ Jürgen Basedow, *Environmental Governance and Law* (Berlin: Springer, 2021), p. 211.

²¹ Louis J. Kotzé, *Global Environmental Governance and the Rule of Law* (Oxford: Hart Publishing, 2017), p. 173.

environmental taxes, incentives, and disincentives for business actors. This instrument aims to encourage more environmentally friendly behavior as well as reduce the potential for pollution. In Indonesia, the use of economic instruments in environmental management is still limited, so it has not been able to have a significant impact on controlling marine pollution. This shows that a legal approach alone is not enough, but must be supported by effective economic instruments.²²

The Theory of Environmental Protection also emphasizes the importance of an *ecosystem-based approach*, which sees the environment as an interconnected unit. In the context of marine pollution, this approach requires management that considers the linkages between land, coast, and sea. In Indonesia, this approach has not been fully integrated into environmental management policies, so marine pollution control is still partial. This suggests that the effectiveness of environmental regulations also depends on the approach used in environmental management.²³

Based on the overall description, it can be concluded that the effectiveness of environmental protection regulations in Indonesia in preventing and controlling seawater pollution is greatly influenced by various factors, including the implementation of basic principles of environmental law, institutional capacity, community participation, and policy integration. The Theory of Environmental Protection provides a comprehensive analytical framework to evaluate these various aspects, so that it can be used as a basis for formulating more effective policies in addressing marine pollution in Indonesia.

2. Theory of Legal Effectiveness (Legal Effectiveness Theory)

The theoretical framework in this study uses *the Theory of Legal Effectiveness* or the theory of legal effectiveness to analyze the extent to which the law is able to function optimally in regulating, controlling, and solving the problem of marine

²² Richard L. Revesz and Jack Lienke, *Struggling for Air: Power Plants and the War on Coal* (Oxford: Oxford University Press, 2016), p. 92.

²³ Jonas Ebbesson, *Environmental Law and Justice in Context* (Cambridge: Cambridge University Press, 2019), p. 140.

pollution in Indonesia. This theory basically places the law not only as a written norm, but also as a social instrument that must be able to work in real life in society. The effectiveness of the law is measured from the level of public compliance with the law, the ability of law enforcement officials to carry out their duties, and the conformity between legal norms and evolving social needs. In the context of protecting the marine environment, this theory is important because the pollution problem is not only caused by weak regulations, but also by weak implementation and law enforcement. Therefore, the legal effectiveness approach is used to identify factors that hinder the optimization of marine environmental protection as well as formulate appropriate solutions through legal and institutional reforms.²⁴

In the perspective of *Legal Effectiveness Theory*, the effectiveness of law is influenced by several main factors, namely the substance of the law, the legal structure, and the legal culture. The substance of the law relates to the quality of laws and regulations governing the protection of the marine environment, including the clarity of norms, consistency, and their relevance to actual conditions. The legal structure includes institutions and law enforcement officials who play a role in the implementation of regulations, such as relevant ministries, supervisory officials, and law enforcement agencies. Meanwhile, legal culture is related to the level of public awareness and compliance with the law. In the context of marine pollution in Indonesia, these three factors often do not work synergistically, resulting in low legal effectiveness in overcoming pollution. Therefore, legal and institutional reform must be directed at strengthening these three aspects simultaneously.²⁵

Based on the theory of legal effectiveness, legal substance reform is an important first step in optimizing the protection of the marine environment. Existing regulations need to be evaluated and adjusted to the times, including strengthening sanctions norms against marine pollution perpetrators and clarifying the mechanism for supervision and law enforcement. In addition, harmonization between various laws and regulations that regulate the marine and environmental sectors is needed, so that

²⁴ Soerjono Soekanto, *Factors Affecting Law Enforcement* (Jakarta: Rajawali Pers, 2014), p. 8.

²⁵ Lawrence M. Friedman, *The Legal System: A Social Science Perspective* (New York: Russell Sage Foundation, 1975), p. 16.

there is no overlap of authority that can hinder the effectiveness of the law. Substantive reform of the law must also integrate the principles of sustainable development and ecological justice as the basis for environmental policymaking. Thus, the law functions not only as a control tool, but also as an instrument to realize a balance between economic interests and environmental protection.²⁶

In addition to reforming the substance of the law, strengthening legal and institutional structures is also a key factor in increasing the effectiveness of marine environmental laws. In the Indonesian context, there are various institutions that have authority in the field of marine and environment, but coordination between these institutions is still weak and often causes overlapping authority. Therefore, institutional reform is needed that is able to create an integrated and efficient marine environmental management system. This can be done through rearranging authority between institutions, increasing the capacity of human resources, and utilizing technology in marine environmental monitoring. With a strong and well-coordinated institutional structure, it is hoped that law enforcement against marine pollution can be carried out more effectively.²⁷

Furthermore, within the framework of legal effectiveness theory, the legal culture of the community also has a very important role in determining the success of the implementation of environmental regulations. Low public awareness of the importance of protecting the marine environment is one of the factors causing the high level of pollution. Therefore, legal and institutional reforms must be accompanied by efforts to increase public awareness and participation in environmental protection. This can be done through education, socialization, and empowerment of coastal communities in marine environmental management. Thus, the law is not only seen as a rule that must be obeyed, but also as a value that is internalized in people's lives. This approach is in line with the concept of progressive law that places humans at the

²⁶ Takdir Rahmadi, *Environmental Law in Indonesia* (Jakarta: Rajawali Pers, 2018), p. 223.

²⁷ Ridwan HR, *State Administrative Law* (Jakarta: RajaGrafindo Persada, 2018), p. 312.

center of the law, so that the law must be able to answer the needs of society in real terms.²⁸

²⁸ Satjipto Rahardjo, *Progressive Law: A Synthesis of Indonesian Law* (Yogyakarta: Genta Publishing, 2009), p. 83.

RESEARCH METHODOLOGY

The research methodology in this study uses a *normative legal research* approach, which is a legal research method that focuses on the analysis of legal norms contained in laws and regulations, legal doctrines, and relevant court decisions. This approach aims to examine law as a system of norms that governs human behavior in society, especially in the context of protecting the marine environment from pollution. Normative juridical research places law as a rule or norm that must be systematically analyzed in order to find legal principles, principles, and concepts that can be used to answer research problems. In this study, this approach is used to analyze the effectiveness of existing regulations and formulate the necessary legal and institutional reforms in optimizing the protection of the marine environment in Indonesia.²⁹

The approaches used in this study include a statutory *approach* and a *conceptual approach*. The legislative approach is carried out by examining various regulations related to environmental and marine protection, such as Law Number 32 of 2009 concerning Environmental Protection and Management, Law Number 32 of 2014 concerning Marine Affairs, and various other relevant implementing regulations. Meanwhile, a conceptual approach is carried out by examining legal concepts that have developed in the legal literature, especially those related to the theory of legal effectiveness, environmental law, and institutional governance. These two approaches are used in a complementary manner to gain a comprehensive understanding of the problem being studied.³⁰

The sources of legal materials in this study consist of primary legal materials, secondary legal materials, and tertiary legal materials. Primary legal materials include laws and regulations related to environmental and marine protection, such as Law Number 32 of 2009, Law Number 32 of 2014, as well as government regulations and related ministerial regulations. Secondary legal materials include legal literature in the form of books, scientific journals, research results, and the opinions of experts relevant to the research topic. The tertiary legal materials include legal dictionaries, encyclopedias, and other sources that can help understand the legal terms and concepts used in this study. The use of various types of

²⁹ Johnny Ibrahim, *Theory and Methodology of Normative Law Research* (Malang: Bayumedia Publishing, 2006), p. 295.

³⁰ Peter Mahmud Marzuki, *Legal Research* (Jakarta: Kencana Prenada Media Group, 2017), p. 133.

legal materials aims to provide a strong and comprehensive analytical basis in answering research problems.³¹

The technique of collecting legal materials in this study is carried out through library *research*, namely by collecting and reviewing various legal documents, scientific literature, and other relevant sources. This process includes the identification, classification, and systematization of legal materials according to research needs. Furthermore, the legal materials that have been collected are analyzed qualitatively using the normative analysis method, namely by interpreting the legal norms contained in laws and regulations and relating them to relevant legal concepts and theories. This analysis aims to find the gap between the prevailing legal norms and practices in the field, as well as formulate appropriate solutions to overcome these problems.³²

The technique of analyzing legal materials in this study is carried out prescriptively and evaluatively. Prescriptive analysis aims to provide recommendations or solutions to the problems being studied, especially related to legal and institutional reforms in the protection of the marine environment. Meanwhile, an evaluative analysis was conducted to assess the effectiveness of existing regulations in overcoming marine pollution in Indonesia. Thus, the results of this study are expected to provide not only theoretical understanding, but also practical contributions to the development of environmental law in Indonesia. This approach is in line with the characteristics of normative legal research which is not only descriptive, but also prescriptive in providing solutions to the legal problems faced.³³

³¹ Soerjono Soekanto and Sri Mamudji, *Normative Law Research: A Brief Review* (Jakarta: RajaGrafindo Persada, 2015), p. 13.

³² Amiruddin and Zainal Asikin, *Introduction to Legal Research Methods* (Jakarta: Rajawali Pers, 2016), p. 118.

³³ Mukti Fajar ND and Yulianto Achmad, *Dualism of Normative and Empirical Law Research* (Yogyakarta: Pustaka Siswa, 2017), p. 183.

RESEARCH RESULTS

The Effectiveness of Environmental Protection Regulations in Indonesia in Preventing and Controlling Seawater Pollution

The effectiveness of environmental protection regulations in Indonesia in preventing and controlling seawater pollution can be analyzed through *the Theory of Environmental Protection* which emphasizes that environmental laws must function as a preventive as well as a repressive instrument in maintaining ecosystem sustainability. This theory places environmental protection as an integral part of sustainable development, where laws not only regulate the use of resources, but also ensure that human activities do not damage the ecological balance. In the Indonesian context, various regulations such as Law Number 32 of 2009 have adopted these principles, but their effectiveness is still questionable due to the high level of marine pollution that occurs. This shows that although normatively adequate regulations, their implementation has not been fully able to control pollution optimally.³⁴

Within the framework *of the Theory of Environmental Protection*, the effectiveness of environmental law is largely determined by the ability of regulations to integrate the *preventive principle* and the *precautionary principle*. This principle emphasizes that precautions must be taken before environmental damage occurs, not after damage has occurred. In practice in Indonesia, the application of this principle still faces obstacles, especially in the environmental licensing process which is often more oriented towards administrative aspects than the substance of environmental protection. This causes many activities that have the potential to pollute the ocean to remain permitted, thus weakening the effectiveness of the law in preventing pollution in the first place.³⁵

In addition, environmental protection theory also emphasizes the importance of *the polluter pays principle*, which is that the party causing the pollution must be responsible for the losses caused. In the context of Indonesian law, this principle has been accommodated in various laws and regulations, but its implementation is still not optimal. Many cases of marine pollution are not followed by strict law enforcement, so that the perpetrators of pollution do not get sanctions proportional to the damage caused. This condition shows that the

³⁴ Nicholas A. Robinson, *Environmental Law and Policy* (New York: Foundation Press, 2015), p. 211.

³⁵ Philippe Sands and Jacqueline Peel, *Principles of International Environmental Law* (Cambridge: Cambridge University Press, 2018), p. 217.

effectiveness of environmental law does not only depend on the existence of norms, but also on consistency in law enforcement.³⁶

The effectiveness of environmental regulations is also influenced by the quality of the legal instruments used, including clarity of norms, consistency of regulations, and harmonization between regulations. In the Indonesian context, there are still various regulations that overlap and are not integrated, especially between the environmental sector and the marine sector. This causes confusion in implementation and opens up loopholes for violations of the law. Therefore, efforts to harmonize regulations are needed so that marine environmental protection can be carried out more effectively and coordinated.³⁷

In the perspective of *the Theory of Environmental Protection*, the effectiveness of the law also depends heavily on the capacity of institutions to implement and enforce regulations. In Indonesia, institutions that deal with the environment and marine still face various obstacles, such as limited human resources, technology, and budget. This condition causes the supervision of marine pollution to be suboptimal, so that many violations are not detected or are not followed up seriously. Therefore, institutional strengthening is one of the key factors in increasing the effectiveness of marine environmental protection.³⁸

In addition to the institutional aspect, community participation is also an important element in environmental protection theory. The community has a strategic role in supervising and reporting environmental pollution. However, in practice in Indonesia, the level of community participation is still relatively low, mainly due to lack of access to information and lack of environmental awareness. This shows that the effectiveness of environmental laws does not only depend on the state, but also on the active involvement of the community in protecting the environment.³⁹

Environmental protection theory also emphasizes the importance of an ecosystem-based approach in marine environmental management. This approach requires that environmental management be carried out holistically by considering the interconnectedness between various components of the ecosystem. In the Indonesian context, this approach has

³⁶ Patricia W. Birnie, Alan E. Boyle, and Catherine Redgwell, *International Law and the Environment* (Oxford: Oxford University Press, 2019), p. 153.

³⁷ Takdir Rahmadi, *Environmental Law in Indonesia* (Jakarta: Rajawali Pers, 2018), p. 301.

³⁸ Daniel A. Farber and Jody Freeman, *Environmental Law: Cases and Materials* (St. Paul: West Academic Publishing, 2020), p. 289.

³⁹ Michael Faure and Roy A. Partain, *Environmental Law and Economics* (Cheltenham: Edward Elgar Publishing, 2019), p. 97.

not been fully implemented in regulations or policies, so marine environmental management is still sectoral. As a result, pollution control efforts are often ineffective because they do not consider cross-sectoral impacts.⁴⁰

The effectiveness of environmental law is also influenced by the applicable law enforcement system, including sanctions and dispute resolution mechanisms. In many cases in Indonesia, law enforcement against marine pollution is still weak, both in administrative, civil, and criminal aspects. This causes the law not to have enough coercive power to prevent pollution. Therefore, reform is needed in the law enforcement system to be more firm and consistent in sanctioning polluters.⁴¹

In addition, technological developments also have an important role in increasing the effectiveness of marine environmental protection. Technology can be used to monitor seawater quality, detect pollution, and support law enforcement. However, the use of technology in marine environmental management in Indonesia is still limited. This shows the need for regulatory support that encourages innovation and the use of technology in environmental protection.⁴²

Based on this description, it can be concluded that the effectiveness of environmental protection regulations in Indonesia in controlling marine pollution still faces various challenges, both in terms of legal substance, institutional, and legal culture. *The Theory of Environmental Protection* shows that the effectiveness of the law is not only determined by the existence of regulations, but also by the implementation, law enforcement, and community participation. Therefore, comprehensive efforts are needed to optimize the protection of the marine environment through regulatory reform, institutional strengthening, and increasing public awareness, so that the law can function effectively in maintaining the sustainability of the marine environment in Indonesia.

⁴⁰ Elli Louka, *International Environmental Law: Fairness, Effectiveness, and World Order* (Cambridge: Cambridge University Press, 2020), p. 184.

⁴¹ Bambang Sutiyo, *Law Enforcement Reform in Indonesia* (Yogyakarta: UII Press, 2017), p. 142.

⁴² Richard L. Revesz and Michael A. Livermore, *Retaking Rationality: How Cost-Benefit Analysis Can Better Protect the Environment* (Oxford: Oxford University Press, 2008), p. 203.

Legal and institutional reforms needed to optimize environmental protection against marine pollution in Indonesia

Legal and institutional reforms in the protection of the marine environment in Indonesia must depart from the framework of *the Theory of Legal Effectiveness* which emphasizes that the law must be able to function in real life in society. In the context of marine pollution, the effectiveness of the law is not only determined by the existence of norms, but also by its implementation, compliance, and adequate institutional support. Therefore, legal reform needs to be directed at efforts to improve the usefulness and results of existing regulations in order to be able to answer the increasingly complex challenges of marine pollution. This is important considering the many cases of marine pollution which show that existing regulations are not fully effective in preventing and cracking down on environmental violations.⁴³

In terms of legal substance, reform needs to be focused on improving laws and regulations that regulate the protection of the marine environment, especially Law Number 32 of 2009 concerning Environmental Protection and Management. These regulations need to be strengthened with stricter norms related to sanctions against marine pollution perpetrators, including administrative, civil, and criminal sanctions. In addition, more detailed arrangements are needed regarding corporate responsibility in marine pollution, so that there is no legal vacuum in the enforcement of liability. This reform aims to create legal certainty while increasing the deterrent effect for polluters.⁴⁴

Furthermore, legal reform must also include the harmonization of laws and regulations related to the marine and environmental sectors. Currently, there are various regulations that regulate marine aspects, but they are often not well integrated, resulting in overlapping authority. From a legal effectiveness perspective, this condition can hinder the implementation of regulations and lower the level of compliance. Therefore, synchronization between regulations is needed to create a consistent and coordinated legal system. This

⁴³ Soerjono Soekanto, *Factors Affecting Law Enforcement* (Jakarta: Rajawali Pers, 2014), p. 12.

⁴⁴ Takdir Rahmadi, *Environmental Law in Indonesia* (Jakarta: Rajawali Pers, 2018), p. 237.

harmonization is also important to ensure that marine environmental protection policies are in line with the principles of sustainable development.⁴⁵

In terms of legal structure, institutional reform is the main key in increasing the effectiveness of marine environmental protection. The large number of institutions that have authority in the marine and environmental fields often leads to fragmentation and weak coordination. Therefore, a more integrated institutional arrangement is needed, both through strengthening coordination between institutions and the establishment of special institutions that have integrated authority in the management of the marine environment. This reform aims to create an institutional system that is efficient and able to respond to the problem of marine pollution quickly and appropriately.⁴⁶

In addition, strengthening the capacity of law enforcement officials is also an important part of institutional reform. In many cases, weak law enforcement against marine pollution is due to limited human resources and lack of competence of the authorities in handling environmental cases. Therefore, it is necessary to increase capacity through training, education, and strengthening the integrity of law enforcement officials. Thus, law enforcement officials can carry out their duties professionally and effectively in enforcing environmental laws.⁴⁷

Institutional reform must also include the use of technology in the surveillance of the marine environment. The use of technologies such as satellite-based monitoring systems and *remote sensing* can help in detecting marine pollution more quickly and accurately. From the perspective of legal effectiveness, the use of this technology can improve supervisory capabilities and strengthen law enforcement. Therefore, regulations need to encourage the use of technology in marine environmental management as part of efforts to modernize the legal system.⁴⁸

In the aspect of legal culture, reforms must be directed at increasing public awareness and participation in protecting the marine environment. Low public awareness is one of the

⁴⁵ Maria Farida Indrati, *Legal Science: Types, Functions, and Content* Materials (Yogyakarta: Kanisius, 2017), p. 156.

⁴⁶ Ridwan HR, *State Administrative Law* (Jakarta: RajaGrafindo Persada, 2018), p. 325.

⁴⁷ Bambang Waluyo, *Law Enforcement in Indonesia* (Jakarta: Sinar Grafika, 2016), p. 98.

⁴⁸ Eddy O.S. Hiariej, *Environmental Criminal Law* (Yogyakarta: Cahaya Atma Pustaka, 2020), p. 167.

main factors causing marine pollution, so continuous education and socialization efforts are needed. Within the framework of *Legal Effectiveness Theory*, a strong legal culture will increase the level of compliance with the law, so that existing regulations can run more effectively. Therefore, the government needs to involve the community in managing the marine environment through a participatory approach.⁴⁹

Furthermore, legal reform also needs to integrate an incentive-based approach in marine environmental management. In addition to sanctions, providing incentives for business actors who implement environmentally friendly practices can be an effective strategy in encouraging compliance. This approach is in line with the principle of legal effectiveness that not only relies on coercion, but also encourages behavior change through more constructive mechanisms. Thus, regulations are not only repressive, but also preventive and promotive.⁵⁰

In the global context, legal reform must also pay attention to Indonesia's international obligations in protecting the marine environment. Indonesia as a country party to various international conventions must ensure that its national regulations are in line with international standards. This is important to increase Indonesia's credibility in managing the marine environment and strengthen international cooperation in overcoming marine pollution. Thus, legal reform is not only national, but must also take into account the global dimension.⁵¹

Finally, legal and institutional reforms in the protection of the marine environment must be carried out comprehensively and sustainably. An integrated approach between legal substance, institutional structure, and legal culture will increase the effectiveness of the law in addressing marine pollution in Indonesia. Thus, *the Theory of Legal Effectiveness* provides the right analytical framework to formulate the necessary reforms, so that the law can function optimally in protecting the marine environment and realizing sustainable development.

⁴⁹ Satjipto Rahardjo, *Progressive Law: A Synthesis of Indonesian Law* (Yogyakarta: Genta Publishing, 2009), p. 101.

⁵⁰ Mas Achmad Santosa, *Nature Also Needs Law and Justice* (Jakarta: ICEL, 2016), p. 210.

⁵¹ Mochtar Kusumaatmadja, *Legal Concepts in Development* (Bandung: Alumni, 2015), p. 189.

CONCLUSION

The results of the study show that:

1. The effectiveness of environmental protection against marine pollution in Indonesia is still not optimal because it is influenced by weaknesses in the three main components in the Theory of Legal Effectiveness, namely legal substance, institutional structure, and legal culture. In terms of substance, regulations such as Law Number 32 of 2009 concerning Environmental Protection and Management and Law Number 32 of 2014 concerning Marine Affairs are normatively comprehensive, but still face the problem of inconsistency, multiinterpretation, and are not fully adaptive to the dynamics of modern marine pollution such as industrial waste and transboundary pollution. In terms of structure, weak coordination between institutions, overlapping authority, and limited capacity of law enforcement officials cause the implementation of regulations to not run effectively. Meanwhile, in terms of legal culture, low awareness and participation of the community and business actors have also worsened the condition of marine pollution. Thus, it can be concluded that the main problem does not lie in the absence of laws, but in the low effectiveness of legal implementation in practice.
2. The legal and institutional reforms needed to optimize environmental protection against marine pollution in Indonesia must be carried out comprehensively with an integrative approach based on the Theory of Legal Effectiveness. The reform includes improving the substance of the law through strengthening sanctions norms, harmonizing cross-sector regulations, and strengthening corporate responsibility; strengthening the institutional structure through the integration of authority, capacity building of the apparatus, and the use of environmental monitoring technology; and strengthening the legal culture through increasing awareness, community participation, and the implementation of incentive and disincentive mechanisms. In addition, reforms must also consider harmonization with international law as well as sustainable development approaches. Thus, the optimization of marine environmental protection can only be achieved if the law is not only present as a norm, but also able to work effectively in the institutional system and the life of the community.

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