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Legal Implications of Applying IMO Instruments to the Protection of the Marine Environment from Pollution by Ships, Especially in Ecologically Sensitive Waters

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Abstract: Protecting the marine environment from ship pollution is a global challenge regulated through various international legal instruments issued by the International Maritime Organization (IMO), such as the International Convention for the Prevention of Pollution from Ships (MARPOL), the Ballast Water Management Convention (BWM), the Oil Pollution Preparedness, Response and Co-operation (OPRC), and liability and compensation conventions, such as the Civil Liability Convention (CLC) and the Hazardous and Noxious Substances Convention (HNS). Indonesia, as an archipelagic country with ecologically sensitive waters, such as coral reefs, mangroves, and conservation areas, has a vital interest in integrating these provisions into national law. This study aims to analyze the legal implications of applying IMO instruments to protect the marine environment, particularly in Indonesia's ecologically sensitive waters. The research method uses a juridical-normative and conceptual approach by examining international and national laws and regulations, including Law No. 17 of 2008 concerning Shipping, as amended by Law No. 66 of 2024, Government Regulation No. 21 of 2010 concerning Maritime Environmental Protection, and Law No. 32 of 2009 concerning Environmental Protection and Management. The study shows that the ratification and implementation of IMO instruments create legal obligations for the prevention, monitoring, and enforcement of marine pollution. However, there are gaps between IMO standards and national capacity, including limited waste facilities, inter-agency coordination, and the effectiveness of sanctions. This study recommends harmonization of national regulations with IMO standards, strengthening of supervisory capacity, and the establishment of effective compensation mechanisms to ensure the protection of the marine environment in Indonesia's ecologically sensitive waters.

Keywords: IMO, Protection of the Marine Environment, Ship Pollution, Ecologically Sensitive Waters, Maritime Law

INTRODUCTION

Marine pollution from ships poses a real threat to the sustainability of coastal and marine ecosystems (Darza, 2020). Common sources of pollution include large oil spills and operational oil discharges, hazardous chemicals, ballast water flows carrying foreign organisms, air emissions from the use of sulfur-containing fuels, and ship waste and domestic waste (Widodo, 2020). Ecologically Sensitive Marine Areas (ESW), such as coral reefs, mangroves, seagrass beds, and marine conservation areas, are highly vulnerable due to their fragile biological structures and their role as centers for fish reproduction and coastal buffers (Peny, 2025). The impacts of pollution are not only ecological, but also extend to economic and social aspects, for example, decreased fishing catches, decreased tourism visits, and the costly burden of ecosystem restoration (Sudiyanto, 2025). This situation requires a thorough understanding of the source of the problem so that protection policies can be formulated with appropriate priorities.

The growth of international and domestic shipping activities increases the frequency of ship interactions with sensitive areas. Congested shipping routes, large ports, and narrow waterways increase the risk of accidents and operational discharges that can pollute the environment (Maulidia, 2024). The capacity of port infrastructure to accommodate ship waste is not evenly distributed across the archipelago, so ships calling oar passing through may lack safe disposal facilities (Fathurrahim, 2024). Chronic pollution from normal ship operations often goes undetected until significant impacts accumulate, while major incidents such as oil spills cause immediate, visible damage and require an emergency response (Yuddin, 2023). The interaction between shipping patterns, traffic intensity, and ecological vulnerability makes a protective approach imperative.

Different types of pollutants have different impacts on marine ecosystems. Mineral oils cloud the water surface, disrupting the respiration of surface organisms and smothering vulnerable habitats such as coral reefs; hazardous chemicals can trigger poisoning and disrupt the food chain; organisms carried through ballast water can become invasive species that alter local community structures (Nugroho, 2025). Marine debris from ships, especially plastic, clogs waters, damages habitats, and threatens fauna that ingest or become entangled in the debris (Sari, 2023). Ship air emissions contribute to atmospheric pollution and carbon dioxide, which affect seawater quality; these impacts overlap, making ecosystem restoration time-consuming and resource-intensive (Saidal Siburian, 2020).

The existence of international legal norms plays a crucial role as a reference point for safe shipping practices (Lioso, 2025). International bodies establish norms that serve as technical and procedural benchmarks for member states to prevent and address shipborne pollution. These norms also establish cross-border cooperation mechanisms for emergency response, information exchange, and enforcement of transboundary obligations. The relationship between international norms and domestic law determines how effectively preventative and response measures can be implemented on the ground. Recognition of international norms provides a basis for legitimacy and consistency for national policies aimed at protecting sensitive waters (Didik Suhariyanto, 2025).

Implementing international norms at the national level requires clear legal steps and supporting technical regulations. Ratification of international instruments will only be meaningful if accompanied by implementing regulations, technical standards, and regulations on sanctions and oversight mechanisms. National institutions must have defined authority to conduct inspections, enforce administrative and criminal sanctions, and coordinate cross-sectoral responses when incidents occur. Local stakeholders, including local governments, port operators, shipping associations, and coastal communities, also need to be involved for policies to be effective and acceptable. The availability of human resources, technical

facilities, and operational budgets is a determining factor in how far international norms can be operationalized.

The principles of marine environmental law provide normative direction for regulation development and enforcement. The precautionary principle emphasizes the obligation to take preventive measures when there is a threat of damage, even if scientific evidence is incomplete (Afandi, 2022); the polluter-pays principle stipulates that the party causing the pollution must bear the costs of cleanup and compensation (Purwendah, 2021); The concept of state responsibility places an obligation on states to protect their territory and prevent activities that harm others; the obligation of due diligence demands proactive measures from states to regulate and supervise activities in their waters (Septiarahma, 2025). These principles complement each other and serve as an evaluation framework for the success of legal actions and policies. Understanding these principles helps design procedurally just and effective legal instruments.

Maritime law enforcement theory focuses on the division of authority and working mechanisms between states (Purba, 2024). The flag state concept concerns the responsibility of the state of registration for ship compliance with safety and environmental standards (Silviani, 2025); coastal states have the right to protect their territorial waters and exclusive economic zones from pollution (Hafiuddin, 2024); and port states have the authority to inspect and take action against ships entering their ports (Adiputra, 2023). The principle of extraterritoriality is limited, so enforcement efforts often require international cooperation, for example, through requests for legal assistance or port state control mechanisms (Amalya, 2020). Differences in interests and capacities between countries can pose operational challenges in applying these theories in the field.

The outlines of international instruments serve as technical and procedural references without necessarily detailing their implementation here. Several conventions establish multilateral pollution prevention standards, reporting obligations, and emergency preparedness and response mechanisms. Technical standards often include ship equipment requirements, operational record-keeping, emission limits, and obligations to provide reception facilities at ports. International instruments can be binding on state parties upon ratification and sometimes require adjustments to domestic regulations to ensure their operationalization. This diversity of instruments requires synchronization when implemented at the national level.

Indonesia's national legal framework contains rules governing the prevention, monitoring, and sanctions of marine pollution. These laws and regulations provide the authority for relevant ministries and institutions to establish technical policies, conduct inspections, and impose administrative sanctions or other legal action against violations. National regulations are designed to accommodate international obligations while adapting them to the geographic and socio-economic conditions of archipelagic nations. The establishment of protection zones, the obligation to provide waste reception facilities at ports, and licensing mechanisms are examples of policies directly related to the protection of the Marine Protected Areas (WFSK). Coordination between institutions at the central and regional levels is crucial for the effective implementation of existing regulations.

The relationship between international norms and national law can be likened to two complementary layers that require a clear connection. The ratification process, the creation of implementing regulations, and the establishment of technical standards are part of the transposition mechanism that connects global obligations with local action. Port state control and national coastal policies serve as a meeting point between international obligations and local ecosystem protection needs. The main challenge lies in matching institutional capacity, the availability of facilities, and consistent law enforcement across the archipelago. Effective

protection of the WSPK requires not only compliance with norms but also ongoing efforts to strengthen capacity, build infrastructure, and ensure the participation of coastal communities.

METHOD

The research method used in writing this journal combines a statistical approach and a conceptual approach. The statutory approach is carried out by examining international legal instruments issued by the International Maritime Organization (IMO), such as MARPOL 73/78, Ballast Water Management Convention, OPRC, and other instruments relevant to marine environmental protection, then compared and linked to Indonesian national law, including Law Number 17 of 2008 concerning Shipping and its latest amendment through Law Number 66 of 2024, Law Number 32 of 2009 concerning Environmental Protection and Management, and Government Regulation Number 21 of 2010 concerning Maritime Environmental Protection, including various technical ministerial regulations governing supervision and sanctions. Through this review, it can be determined to what extent IMO instruments have been adopted, harmonized, or still leave gaps in implementation in national law. A conceptual approach is used to understand the principles of marine environmental law, such as the precautionary principle, the polluter pays principle, and the principle of state responsibility, and their relevance to maritime law enforcement practices in ecologically sensitive waters. This approach also helps in interpreting how the theory of absolute liability, compensation mechanisms, and models for enforcing administrative, civil, and criminal sanctions can be effectively applied. By combining these two approaches, this research seeks not only to describe applicable legal norms but also to provide a critical conceptual analysis of the effectiveness of their implementation and to provide normative and policy recommendations that can strengthen the protection of the marine environment from ship pollution in ecologically sensitive areas.

RESULT AND DISCUSSION

IMO Instrument Analysis: Provisions, Obligations, and Oversight Mechanisms

The International Convention for the Prevention of Pollution from Ships (MARPOL) is the IMO's primary instrument aimed at preventing marine pollution from both normal operations and accidents. Annex I regulates the prevention of oil pollution by establishing strict standards for the disposal of waste oil, requiring new tankers to use double hulls, and requiring the recording of disposal activities in the Oil Record Book. Furthermore, every port is required to provide reception facilities to accommodate ships' waste oil. This provision is crucial because oil spills pose one of the most serious threats to sensitive marine areas, such as coral reefs in eastern Indonesia.

Annex II regulates the prevention of pollution from noxious liquid substances. These substances are categorized into classes X, Y, and Z, each of which poses a different level of danger to the marine environment. Ships are required to follow specific procedures for transporting, cleaning tanks, and disposing of excess cargo. Annexes III and IV further complement the regulations by prohibiting the discharge of hazardous substances in packaged form and human waste (sewage), which have the potential to pollute coastal ecosystems and increase the risk of infectious diseases.

Annex V emphasizes the prohibition of the discharge of solid waste, especially plastic, into the sea. This prohibition is increasingly relevant given the microplastic crisis that threatens marine life. Ships are required to record all discharge activities in the Garbage Record Book (GRB). Annex VI then complements this with a focus on air pollution, including restrictions on fuel sulfur content (IMO Sulfur Cap 2020), the implementation of the Energy Efficiency Design Index (EEDI) for new ships, and the mandatory Ship Energy Efficiency Management Plan (SEEMP) for ships in operation.

Furthermore, Annex VI introduces a Data Collection System (DCS) that requires reporting on ship fuel consumption and CO_2 emissions. This provision is a first step towards the IMO's carbon-neutral target by 2050. However, implementation in developing archipelagic countries like Indonesia still faces technical and financial barriers, particularly related to the cost of ship modifications. Therefore, MARPOL analysis per Annex not only reflects technical obligations but also requires harmonization with national laws, such as Law No. 32 of 2009 concerning Environmental Management and Law No. 17 of 2008 concerning Shipping.

The Ballast Water Management (BWM) Convention was established to address the threat of the introduction of invasive alien species through ship ballast water. Every ship is required to install a Ballast Water Treatment System (BWT) that can kill organisms before they are discharged into the sea. This provision is reinforced by mandatory certification through the International Ballast Water Management Certificate and registration in the Ballast Water Record Book.

For Indonesia, this convention is crucial given its location at the center of international shipping lanes, which are vulnerable to the spread of invasive species. A clear example is the spread of zebra mussels and Caulerpa taxifolia in several marine areas worldwide. In Indonesia, similar threats could disrupt sensitive marine ecosystems such as Bunaken National Park or Raja Ampat. Therefore, BWM technical regulations must be integrated with the provisions of the Shipping Law and Government Regulation No. 21 of 2010 concerning Maritime Environmental Protection.

However, BWM implementation carries high costs, both for the installation of ballast water treatment systems and their operation. It creates a dilemma for ship operators, especially domestic companies with limited capital. Furthermore, certain exceptions allow ships to operate on domestic routes without the system installed, potentially creating legal loopholes. Therefore, Indonesia needs to adopt a subsidy or incentive strategy to accelerate BWM compliance.

Beyond technical factors, BWM oversight requires the active involvement of port authorities as the spearhead of inspections. Large ports such as Tanjung Priok and Tanjung Perak must be equipped with ballast water testing laboratories to verify vessel compliance. Therefore, an analysis of the BWM instrument shows that while crucial for protecting sensitive marine ecosystems, implementation challenges in Indonesia require an adaptive and collaborative legal approach.

The Oil Pollution Preparedness, Response, and Co-operation (OPRC) Convention and the OPRC-HNS protocol emphasize the importance of preparedness and response to oil and hazardous materials pollution incidents. States parties are required to develop a National Oil Spill Contingency Plan (NOSCP), which includes reporting mechanisms, standard operating procedures, and coordination of relevant agencies. Indonesia has developed a National Master Plan for Oil Spill Emergency Response at Sea (RIN-NAS), which serves as the basis for a rapid response to oil spills.

In an operational context, ship operators are required to develop a Shipboard Oil Pollution Emergency Plan (SOPEP) and report any incidents to port authorities. In addition, regular joint drills are conducted between ship operators, the Ministry of Transportation, the Ministry of Environment and Forestry, and the Maritime Security Agency (Bakamla). This is crucial to ensure response readiness in sensitive waters, such as offshore oil and gas areas in the Natuna Sea or the Makassar Strait.

However, challenges arise in cross-agency coordination. Fragmentation of authority between ministries often slows the response to pollution incidents. For example, the Montara oil spill in the Timor Sea (2009) demonstrated weak international coordination and

diplomatic mechanisms. Therefore, harmonization of national regulations is necessary to align with the international obligations of the OPRC.

Furthermore, the OPRC framework also encourages regional cooperation. For Indonesia, participation in the Coordinating Body on the Seas of East Asia (COBSEA) and the ASEAN Oil Spill Response Action Plan is crucial for strengthening solidarity in addressing transboundary pollution. Thus, the obligations of the OPRC and OPRC-HNS are not merely technical but also foster maritime diplomacy and strengthen Indonesia's position as a large archipelagic nation.

The aspects of liability and compensation are crucial components of IMO instruments. The Civil Liability Convention (CLC) 1969/1992 requires shipowners to cover losses due to oil pollution through a strict liability system. This provision is reinforced by the Fund Convention, which provides an international fund if the shipowner's liability is insufficient. For Indonesia, ratification of the CLC and Fund provides enhanced legal protection for pollution victims, both coastal communities and fishermen.

In addition to oil, pollution caused by hazardous and toxic substances is regulated by the HNS Convention. This convention extends the scope of liability to chemicals, liquefied petroleum gas, and other dangerous cargoes. The compensation mechanism through the HNS Fund provides guaranteed protection for coastal states in the event of accidents involving ships carrying hazardous substances.

In practice, several high-profile cases, such as the Exxon Valdez (1989), Prestige (2002), and the Montara oil spill in the Timor Sea, have set important precedents in affirming the responsibility of shipping companies and oil and gas operators. These cases demonstrate how IMO instruments work to provide compensation, while also revealing legal loopholes that need to be strengthened at the national level.

In Indonesia, the aspects of liability and compensation are integrated through Law No. 32 of 2009 concerning Environmental Management and Management, which recognizes the principle of strict liability for environmental pollution. Furthermore, Law No. 17 of 2008 concerning Shipping regulates mandatory marine pollution insurance for ships. However, weaknesses remain in enforcement, particularly when pollution occurs in sensitive waters with limited technical evidence. Therefore, strengthening national legal instruments and enforcement capacity is imperative.

Compliance with IMO instruments relies not only on substantive regulations but also on international oversight mechanisms. Flag State Control requires flag states to ensure that registered vessels meet IMO standards. However, the practice of flags of convenience, where ships register in countries with lax standards, often occurs to avoid liability.

Complementarily, Port State Control (PSC) allows port states to inspect incoming foreign vessels. Indonesia, as a member of the Tokyo MoU on Port State Control, is obligated to conduct random inspections of international vessels. The PSC has proven effective in preventing substandard vessels from operating in sensitive waters.

Furthermore, the IMO promotes the Member State Audit Scheme (IMSAS) to verify member states' compliance with IMO instruments. Indonesia needs to strengthen its position within this mechanism so that it becomes not only an implementing country but also plays an active role in formulating international policy.

The challenge for Indonesia is limited oversight capacity, both in terms of human resources and technical facilities. With the second-longest coastline in the world, monitoring vessels throughout Indonesia's maritime territory is a significant undertaking. Therefore, collaboration between the Ministry of Transportation, the Maritime Security Agency (Bakamla), the Indonesian Navy (TNI AL), and the Ministry of Environment and Forestry (KLHK) is crucial. The use of digital technologies such as the Automatic Identification System (AIS) and remote sensing needs to be enhanced for more effective oversight.

Therefore, international oversight and compliance mechanisms are crucial for the effectiveness of IMO instruments in protecting sensitive waters. Integrating national oversight with the international framework will strengthen Indonesia's position as a global maritime axis committed to protecting.

Legal Implications of Implementation in Ecologically Sensitive Water Areas

IMO instruments impose strict obligations on member states to adjust ship operational practices, particularly when operating in waters with high ecological sensitivity. MARPOL, through Annexes I, V, and VI, requires technical changes ranging from prohibitions on the discharge of oil waste and garbage to air emissions with specific sulfur content limits. The Ballast Water Management Convention emphasizes the need for ballast water treatment before discharge to prevent the introduction of invasive alien species. The OPRC and OPRC-HNS require integrated preparedness and response to oil and hazardous material pollution incidents. These adjustments to operational practices are not merely administrative but require real changes in the way ships are designed, operated, and monitored.

Technical obligations such as the implementation of double hulls for oil tankers are essential to minimize the potential for spills. The installation of ballast water treatment systems onboard is also a major investment required by shipping companies. Furthermore, ships must have technical documents such as a Shipboard Oil Pollution Emergency Plan (SOPEP) as evidence of preparedness for pollution incidents. All of these requirements essentially force ship operators to improve their technical standards while ensuring that shipping activities do not harm marine ecosystems. The zoning of maritime areas as Special Areas under MARPOL also has important legal implications. Ships are prohibited from discharging oil waste, garbage, or hazardous materials in these areas, and coastal states have the authority to tighten regulations and oversight. The designation of Special Areas requires Indonesia to strengthen its monitoring system to ensure that areas with high ecological value are fully protected. These zoning regulations also serve as an instrument for controlling maritime space, ensuring maritime activities can proceed without damaging fragile ecosystems.

The construction and operation of reception facilities at ports is an obligation for IMO member states. These facilities are intended to provide ships with an official place to dispose of oil waste, ballast water, and waste generated while sailing. The legal implication is that the Indonesian government must provide similar facilities at strategic ports, especially those adjacent to ecologically sensitive areas. Without such facilities, the ban on discharges into the sea is difficult to enforce because ship operators lack legal alternatives.

Maritime activity licensing is also directly affected by the implementation of IMO instruments. Ship sailing and operating permits now require compliance with stricter environmental standards, including verification of anti-pollution equipment and compliance with international operating procedures. This change signals that environmental protection is no longer an optional element, but rather a core requirement for all shipping activities. This regulation also expands the responsibilities of licensing supervisors, focusing not only on navigational safety but also on environmental quality.

Reporting and monitoring obligations serve as legal instruments that strengthen the accountability of ship operators. The oil record book, ballast water record book, garbage record book, and the Annex VI Data Collection System (DCS) ensure that every activity with a pollution risk is officially recorded. This record-keeping facilitates investigations into suspected violations and enables evidence-based oversight. Coastal states can use this data to assess ship compliance and determine appropriate law enforcement measures.

Ship operators' responsibilities are emphasized through the principle of strict liability, meaning the obligation to compensate arises without proof of fault. This principle is adopted

from environmental and maritime law to ensure protection for parties affected by pollution. Consequently, ship operators must be financially and technically prepared to cover pollution risks, including through insurance obligations or special compensation funds. This type of liability model provides stronger guarantees for ecosystem restoration and the protection of coastal communities.

IMO standards have not yet been fully adopted into Indonesia's national legal system. While most MARPOL Annexes have been ratified, implementation still faces limitations in infrastructure and technical legal frameworks. Some derivative regulations are not fully consistent with international standards, creating legal loopholes that could potentially be exploited by non-compliant parties. This situation demonstrates that acceptance of international instruments alone is not sufficient; effective adaptation of national regulations is essential. Indonesia's waste reception infrastructure is not yet up to par with the IMO's requirements. Even large ports are limited in providing adequate oil reception or ballast water treatment facilities. Seawater quality monitoring laboratories are also limited in capacity, making it difficult to quickly and accurately prove pollution. These limitations impact weak law enforcement, as technical evidence is a crucial requirement for imposing sanctions on violators.

The capacity of Port State Control (PSC) in Indonesia still needs to be improved. Developed countries have PSCs with rigorous environmental inspection and audit capabilities, while in Indonesia, the number and quality of inspectors are still limited. This creates a high risk of non-compliant vessels slipping through. This situation weakens Indonesia's position as a large, strategic archipelagic nation in international shipping lanes and poses a high risk to domestic marine ecosystems.

The fragmentation of authority between institutions also poses a serious obstacle. The Ministry of Transportation, the Ministry of Environment and Forestry, the Maritime Security Agency (Bakamla), the Port Authority (KSOP), and port authorities have different authorities regarding marine protection. This lack of coordination often results in overlapping, slow, or inconsistent policies. This bureaucratic conflict creates legal uncertainty for businesses and undermines the effectiveness of protecting sensitive waters. Regulatory gaps further exacerbate implementation challenges. While several IMO instruments have been ratified, they have not been fully internalized into national technical regulations, such as Government Regulations or Ministerial Regulations. Consequently, enforcement in the field remains half-hearted, as not all obligations have a clear operational legal basis. This situation creates a gap between Indonesia's international commitments and the reality of marine environmental protection, which should be optimally implemented.

The enforcement of administrative sanctions has become a primary instrument for monitoring ship operator compliance. Law Number 17 of 2008 concerning Shipping stipulates that ships violating obligations related to marine environmental protection can be subject to sanctions ranging from revocation of sailing permits, ship detention, to operational bans. This instrument is designed to prevent potential pollution before it occurs by applying direct pressure on ships' technical compliance. Its effectiveness depends heavily on the consistency of port authorities and the responsiveness of Port State Control in conducting inspections.

Criminal sanctions serve as a repressive instrument, providing a deterrent effect on environmental polluters. Law Number 32 of 2009 concerning Environmental Protection and Management stipulates imprisonment and substantial fines for parties found to have dumped hazardous waste into the sea. This provision strengthens the national legal regime so that it does not rely solely on limited administrative sanctions. Vessels, both foreign and domestic, found to have polluted sensitive waters can be prosecuted criminally, although implementation is often hampered by jurisdictional issues and technical evidence.

Civil sanctions provide a platform for redressing losses suffered by the state and coastal communities. Compensation suits can be filed against shipping companies or ship operators who cause economic losses due to pollution. The concept of strict liability, already recognized in Indonesian environmental law, provides a basis for victims to avoid the burden of proving fault; they simply need to demonstrate that the loss stemmed from the polluter's activities. This mechanism is expected to strengthen protection for local communities that rely heavily on marine ecosystems.

Ecological damage caused by pollution from ships causes long-term, difficult-to-recover losses. Destroyed coral reefs, damaged seagrass beds, and declining fish populations can take decades to recover. Pollution from oil spills and ship waste also triggers water quality degradation, reducing the habitat of marine life. The decline in marine ecosystem quality has implications for the loss of important ecosystem services, including carbon sequestration and coastal protection.

The economic losses experienced by coastal communities reinforce the urgency of implementing IMO instruments. Fishermen lose their livelihoods due to declining fish stocks, while marine tourism destinations suffer due to the decline in marine environmental quality. The potential for social conflict increases when communities demand accountability from shipping companies or the oil and gas industry operating in sensitive areas. This situation demonstrates that the impact of ship pollution is not limited to ecological aspects but also encompasses complex economic and social dimensions.

The public's right to a good and healthy environment, as guaranteed by Article 28H of the 1945 Constitution, requires the state to provide stronger protection. Implementing IMO instruments is one way to fulfill this constitutional obligation. The Environmental Protection and Management Law also emphasizes that everyone has the right to a healthy and sustainable environment and the right to compensation if harmed by pollution. This legal framework emphasizes that ecosystem restoration and compensation for coastal communities are not merely options but are a state obligation.

Evaluation of ship compliance with IMO instruments reveals serious gaps. Domestic vessels often fail to fully comply with technical standards, while foreign vessels frequently exploit weak oversight at Indonesian ports. Limited port reception facilities exacerbate the situation, encouraging ship operators to discharge waste directly into the sea. These weaknesses make compliance a mere formality without adequate infrastructure.

Strengthening waste reception facilities at major ports such as Tanjung Priok, Belawan, Makassar, and Sorong is a strategic priority. Ports adjacent to sensitive waters must be equipped with systems for receiving oil waste, ship debris, and ballast water to effectively implement IMO standards. Investment in these facilities requires state budget support as well as private sector involvement to ensure service availability is not solely dependent on government capacity.

The capacity of Port State Control officers also needs to be improved to ensure they can conduct inspections according to international standards. Training, certification, and exchange of experiences through regional collaborations such as the Tokyo MoU are essential. Competent officers will be able to detect technical violations and enforce sanctions more firmly. The success of developed countries demonstrates the significant role of quality human resources in ensuring ship operator compliance.

Harmonization of national regulations is a crucial step to closing existing legal loopholes. The Shipping Law, the Environmental Management Law, and government regulations related to maritime environmental protection must align with IMO instruments to avoid overlapping. The development of technical regulations, such as ship emission standards, ballast water management, and reporting systems, must be carried out in an

integrated manner. This harmonization must also be accompanied by a consistent law enforcement mechanism to ensure legal certainty.

An integrated enforcement mechanism across ministries and agencies is necessary to avoid fragmentation of authority. The Ministry of Transportation, the Ministry of Environment and Forestry, the Maritime Security Agency (Bakamla), the KSOP (Indonesian Port Authority), and port authorities must have clear, joint SOPs for handling marine environmental violations. Cross-sector coordination enables more effective law enforcement because each institution has a complementary role. Without integration, each violation risks being handled in a piecemeal manner and failing to provide a deterrent effect.

Regional cooperation through ASEAN and COBSEA can strengthen preparedness for transboundary pollution. Oil spills or hazardous waste from ships recognize no territorial boundaries, making coordination between countries key. Regional agreements allow for the sharing of information, technology, and resources in the event of a major incident. Indonesia's active participation will enhance international credibility while providing better protection for sensitive waters, which are a vital part of the global ecosystem.

CONCLUSION

The implementation of international legal instruments from the IMO, such as MARPOL, the BWM Convention, and the OPRC, provides a comprehensive framework for the protection of ecologically sensitive waters. The instrument requires changes to ship operational practices through technical obligations, reporting, and the implementation of strict liability for operators. However, implementation in Indonesia still faces serious challenges, ranging from limited waste reception facilities, weak Port State Control capacity, and overlapping authority between institutions. Critical points that emerged included regulatory gaps due to the lack of harmonization of IMO instruments in national law, disparities in the enforcement of sanctions against foreign and domestic vessels, and low compliance due to a lack of supporting infrastructure. This situation demonstrates that legal protection for sensitive waters remains partial and requires strategic steps to strengthen its effectiveness.

Urgent legal and policy recommendations include harmonization of regulations between the Shipping Law, the PPLH Law, and technical regulations to ensure consistency with IMO standards. Strengthening technical capacity is crucial, such as building reception facilities at major ports, providing monitoring laboratories, and improving the quality of PSC personnel through international training. Institutional coordination between the Ministry of Transportation, the Ministry of Environment and Forestry, the Maritime Security Agency (Bakamla), and regional governments must be clarified through a firm joint Standard Operating Procedure (SOP) mechanism, while law enforcement needs to balance administrative, civil, and criminal sanctions to improve compliance. Integration of sensitive marine zone plans into port and shipping route planning must also be prioritized to ensure ecological protection aligns with maritime economic interests.

At the normative level, amendments to the Shipping Law could be directed at sharpening the definition of WSPs, requiring reception facilities at strategic ports, and strengthening the authority of the PSC to take action in sensitive areas. To enrich the study, further research must be directed at empirical studies of the compliance of foreign vessels passing through Indonesian waters, cost-benefit evaluations of the application of ballast treatment technology, and comparisons of legal practices with other archipelagic countries that have successfully reduced marine pollution, such as the Philippines or Japan.

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