

# Environmental Injustice at Sea: The Impacts of Bilge Dumping on Indonesia's Coastal Communities

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## ABSTRACT

While oil spillage garners significant media attention for its environmental impact and contribution to pollution, bilge dumping remains a far lesser-known issue. However, the extent of pollution caused by bilge dumping poses a more significant harm, given its cumulative effect and frequency over time. Therefore, it is vital to have a serious discussion over bilge dumping compared to the more widely publicised issue of oil spillage. By employing the doctrinal approach, this research focuses on pollution associated with bilge water and the energy required to mitigate its impact. It hopes this will contribute to a more comprehensive understanding of formulating better climate policies to combat climate change. There is an urgent need to tackle this often-overlooked issue, which has severe environmental consequences. This article aims to raise awareness and inspire substantial actions to safeguard all marine ecosystems from this persistent threat, which results in environmental injustice and inefficient policy implementation.

**Keyword:** Bilge Dumping; Environmental Justice; Climate Policies; Marine Ecosystems; Pollution Mitigation

## INTRODUCTION

There is a phenomenon that is rarely known by many. This unique phenomenon is termed Bilge dumping, which concerns the illegal dumping of oily "bilge water" from ocean vessels into the ocean. This immoral act is a cause of environmental concern related to maritime operations. The result of heavy oil dispersed by ocean vessels in the form of heavy oil is due to the accumulation of thick, sludgy bilge water that needs to be removed from each vessel. Research has shown that indiscriminate practises of ocean vessels dumping bilge water are widespread to avoid expensive pollution protection machinery, which was mandated by international regulations (Corbiere, 2023). Research also highlights a disconcerting trend where ocean vessels opt for a cost-saving route by directly disposing of them in the open ocean to avoid meeting costly pollution prevention measures.

This negligent waste disposal practice is similar to those chemicals' dispersion from solar panel disposals, which triggers land, water, and air pollution (IRENA & IEA-PVPS, 2016). Intensifying such conditions is a continuous act, and the prolonged occurrence of offending ocean vessels to avoid their legal duties has taken a heavy toll on the environment. Thus, there is an urgent need for immediate action to stop this reckless and unlawful act of discharging chemicals from destroying marine ecosystems.

Our reliance on fossil fuel as the primary energy source often overlooks the gravity of bilge dumping. The U.S. Energy Information Administration (EIA) (2024) projected that global oil demand will continue to grow, and production will likely move towards the U.S. and the Middle East, affecting oil prices and market dynamics. Despite the decline in consumption due to the increase in electric vehicle usage, fuel usage and its demand remain high, as it is constantly relied upon by larger vehicles like cargo ships, where the issue of bilge dumping is related to the overall energy consumption patterns (International Maritime Organization, 2022).

It is well established that human activities have gravely impacted greenhouse gas emissions and that electricity and heat production are the most significant contributors. Nevertheless, it is imperative to note that the

industrial sector's significant role, particularly in shipping, is to contribute to the current 20% of the overall greenhouse gas emissions (United Nations Conference on Trade and Development, 2023). The report further states that it could increase to 180% by 2050. Thus, this discloses the interconnection of industrial operations and environmental degradation with bilge dumping as a contributing factor emerging from the context.

Bilge water, as a by-product of maritime activities, would directly threaten the marine ecosystem when discharged into the ocean. Notwithstanding the available legal framework to regulate such activities, ocean vessels adopt certain loopholes and conditions of non-compliance attitudes, resulting in continuous discharging practices. Due to this condition, a rigorous examination is needed to closely examine the impact of bilge dumping on the environment and assess the efforts required to avoid damages.

Therefore, conducting a comprehensive analysis of the effect of bilge dumping enables efforts to formulate and implement proper and comprehensive remediation. Due to its complexity, a holistic approach covering ecological and regulatory perspectives to meet the various challenges of bilge dumping must be explored, as it has a far-reaching impact on marine life, ecosystems and humanity.

### **Examining Bilge Dumping and Environmental Injustice In Indonesia's Coastal Communities**

Referring to Indonesian coastal communities, it means those groups of people living near the coastal areas of Indonesia. Individuals, families, and local communities depend on the sea and its marine resources for their livelihoods, culture, and lifestyle. Often engaged in fishing, tourism, and trade, they are the groups that will be directly affected by any environmental injustice like pollution, degradation, and disabilities. They do not have the power to influence policy decisions that impact their environment and lives.

There are many instances of bilge incidents on the Indonesian coast, like the incident of 2020, where a cargo ship discharged bilge water directly into the ocean off the coast of Indonesia (Sky Truth, 2020). Then, the Barge Incident in the Java Sea (2021) involved a barge leaking bilge water captured by satellite, where local fishermen suffered harmed fish stocks (Gokkon, 2019). The Marine Pollution Reports 2021 stated multiple cases of bilge dumping across Indonesian waters and documented incidents along major shipping lanes, worsening the pollution issue (Smith & Wong, 2021).

A comparative data analysis from other countries can garner a more precise context on how bilge dumping issues have been tackled elsewhere. For example, learning from the perspective of the European Union, where stringent monitoring and fines were implemented on ocean vessels found guilty of illegal discharging, eventually leading to a decrease in the number of incidences. The United States has also seen similar success in utilising similar tactics and advanced monitoring methods through advanced satellite surveillance and collaboration with international organisations. These examples signify the potential effectiveness of vigorous policy enforcement and technological investment.

Indonesia, which covers a slightly lesser coastline than the European Union but is significantly larger than the United States, is more vulnerable to any impact on its environmental ecosystem. Indonesia's coastlines contain a vibrant biodiversity of marine life, which supports an extensive mangrove forest, seagrass beds, and coral reef vital for carbon sequestration and offers critical protection against coastal erosion and tsunamis. It also plays a central role in the livelihood of millions of coastal communities that rely on it for fishing, aquaculture, and tourism. They are more vulnerable to environmental injustice due to their economic constraints and enforcement difficulties, making their environmental management more complex than the E.U.

According to the Environmental Monitoring Reports of 2022 by the Indonesian Ministry of Environment and Forestry, there is an increase in pollution incidents linked to bilge dumping involving ocean vessels, affecting coastal ecosystems and local fisheries (Indonesian Ministry of Environment and Forestry, 2022). Sabdono et al. (2024) suggested the potential impacts of shipping activities, including bilge dumping, which contributes towards the degradation of Indonesian coral reefs, ecosystems and marine life.

Furthermore, a case study concerning the impact of bilge dumping on coastal fishermen in Indonesia shows the struggles faced by local communities, which have seen a decline in fish populations because of ships that

discharge bilge water (Fishermen's Union of Indonesia, 2023). A study by the International Maritime Organisation (IMO) on bilge dumping in South Asian waters, including Indonesia, shows that enforcement of the International Convention for the Prevention of Pollution from Ships (MARPOL) is weak, resulting in ocean vessels engaging in illegal dumping (International Maritime Organisation, 2023).

Thus, in investigating the nature and concept of environmental injustice, we must go deeper into the complexities of distributional injustice within the energy context (Ali & Kamraju, 2023). There is a need to scrutinise the unequal distribution of energy consumption's benefits and detriments, revealing stark differences in how various weak communities bear the burdens of industrial activities. Indonesia provides a classic case study due to its position involving an intricate international network of maritime trade routes that intersects with the livelihoods of coastal communities. While the global economy and industry reap the benefits from the seamless transportation provided by these routes, the Indonesian fishermen and their families face the direct consequences of pollution resulting from bilge dumping.

Moreover, recognition-based injustice further compounds the challenges affected communities face (Jenkins et al., 2016). The marginalisation and neglect of their voices perpetuate a cycle of environmental degradation and social inequality. Policymakers and industry stakeholders intensify their vulnerability and marginalisation by failing to acknowledge these communities' lived experiences and struggles. This lack of recognition undermines the dignity and agency of affected individuals and impedes efforts to address systemic injustices.

Procedural injustice emerges from the systematic exclusion of coastal communities from decision-making processes about bilge dumping regulations and enforcement (McCauley et al., 2024). The absence of their voices in policy formulation reflects a fundamental disregard for their rights and interests. Without meaningful participation in shaping policies that directly impact their lives, coastal communities are rendered powerless in the face of environmental injustices perpetuated by industrial actors.

Criticism towards Indonesia's management of oil spills, including bilge dumping incidents, reflects a systemic failure to recognise and prioritise the needs of coastal communities. Despite readily available information and the situation's urgency, government inaction exacerbates the plight of affected individuals, highlighting a pervasive recognition-based injustice. Moreover, the lack of procedural justice is evident in the absence of coastal community involvement in decision-making processes, depriving them of agency in shaping policies that directly impact their well-being and livelihoods.

Therefore, observing the bilge dumping issue in Indonesia characterises various forms of environmental injustice, from the impact of distributional inequalities, recognition of injustices, and procedural limitations. To adequately address these injustices demands a multifaceted approach that not only holds polluters accountable but also takes actions that prioritise the involvement and empowerment of the affected communities in all decision-making processes. By adopting this equitable and participatory governance approach, can we expect better and more meaningful growth towards mitigating the environmental and social impacts of bilge dumping on Indonesia's coastal communities?

## **CONCEPTUAL FRAMEWORK ON BILGE DUMPING**

Due to the complex interrelations between energy production and energy policy and the implications they have on the environment, there is a need for an integrated conceptual framework that enables the analysis of the issue through a social justice perspective. Since bilge dumping is closely related to maritime pollution, it offers the ability to investigate environmental degradation and social equity as it damages the marine ecosystem and impacts communities that rely on these environments.

Thus, such a conceptual framework aims to illuminate the delicate relationships between energy practices, environmental harm, and social justice. It emphasises the need to establish a more equitable approach to meeting the challenges of bilge pollution. Integrating a social justice perspective within the analysis of energy concerns can highlight the ethical considerations encompassing bilge dumping and advocate for creating policies prioritising ecological integrity and social responsibility. Since there is an increasing urgency to

address environmental issues, conceptualising bilge dumping is a critical step towards promoting a more just and sustainable future for all stakeholders.

### **Distributional Justice and Energy Efficiency**

Sovacool et al. (2019) categorise distributional justice as concerns about how society distributes the benefits and burdens of its energy system in terms of an aspiration to be fair. Since it is expensive for ocean vessels to clean their bilge water, shipping corporations dump the waste into the oceans to reduce operational costs. In summary, this illegal behaviour will benefit the shipping firms and no one else.

The repercussions of bilge dumping are felt across society, location, and time. More specifically, the effects of bilge dumping across space are directly related to the unequal spatial distribution of economic advantages and environmental obligations. Related companies benefit from lower operational costs while escaping the consequences of such illegal behaviour unless prosecuted. Meanwhile, the environmental consequences it causes may result in severe and long-term environmental damage, with ramifications across society. Over time, the destruction of the environment will have an intergenerational impact, including climate change and food resource depletion.

Companies wanting to save money also have implications for energy efficiency. The idea of energy efficiency means to utilise energy in an efficient way that would reduce waste.

Bilge dumping is not energy efficient as it usually costs more fuel, and people would have to divert from their course to find a place to dump the bilge. Even if they do not divert, the amount of energy it would take by other ships that would come to try and clean up the mess would be more costly than the amount the ships saved by bilge dumping. With that in mind, due to the ships not being energy efficient, they are not virtuous, and adverse effects result from a lack of virtue.

### **Recognition Justice and Climate Change**

Recognition justice emphasises that people have the right to reasonably access a particular set of minimal energy services, allowing them to enjoy a bare minimum of well-being. The recognition justice concept also implies that future generations have a right to a happy existence free of the harm our energy systems cause now.

Because the effects of bilge dumping are irreversible, we must prioritise inter and intra-generational equity as an important foundation for mitigating the adverse effects of climate change on current and future generations and between people of the same generation based on economic status. While recognition justice is critical, practically every equity argument over climate justice in the energy law discourse only concentrates on intergenerational equality.

Bilge dumping has a lot to do with climate change. Ocean habitats such as seagrass and mangroves can isolate carbon dioxide from the atmosphere, which can capture and store carbon, with mangrove ecosystems able to store around 1000 metric tonnes of carbon per hectare (Friess et al., 2015). Mangroves, which help tremendously in carbon reduction, are pretty susceptible to bilge dumping due to their coastal locations, and the ocean currents and waves carry the oil over to the mangroves, resulting in the roots of the trees being coated in oil. If that happens, all the carbon stored inside will be released due to the trees dying (Govindasamy, 2011).

If the issue with bilge dumping is not taken seriously, then future generations will inherit a ruined Earth with a climate that will be forever changed.

### **Procedural Justice and Due Process.**

A responsive, accountable, and authoritative agency must be established to deal with the bilge dumping issue. In essence, this agency would head the decision-making efforts to combat and resolve the issue of bilge dumping through a qualified committee. This agency would function to attain fair results in dealing with the

issue through the mobilisation of local expertise, more information sharing, and improved institutional representation. Local expertise includes knowledge of those local and indigenous people heavily dependent on the ecosystem where bilge dumping occurs near their territorial water. In addition, meaningful involvement, impartiality, and complete disclosure of information by the government and business, as well as suitable and sympathetic engagement channels, are all necessary for procedural justice. That is to say, the decisions made should not be impacted by unequal representation in various organisations, including commercial, municipal, national, and international governmental agencies, as well as non-state players.

The concept that can be tied together with energy and due process would be the idea of procedural justice. Jurgen Habermas's communicative theory states that social order depends on the capability of those in power to recognise the validity of different claims from members of society (Chriss, 2022). When those in power do not recognise the claims of society's members and exclude them from the decision-making process, it can lead to a legitimisation crisis, which refers to the decline in confidence in the administrative functions, institutions, and leadership.

When relating to the issue of bilge dumping, one could see a lack of procedural justice in the way the issue of bilge dumping is being handled. The lack of enforcement could be seen as the needs and claims of those most affected by bilge dumping being ignored.

Bilge dumping highlights a significant gap in social and environmental justice. This entanglement further complicates the formulation of an advanced policy on energy. This balancing act that needs to be resolved affected coastal communities, particularly in Indonesia, who are facing disproportionate environmental and economic burdens, where their voices are often marginalised in policymaking. Comparatively exploring other regions, such as community-led environmental management programs in South America or Africa, shows that inclusive decision-making policy can lead to more effective and equitable outcomes. These programs emphasise participatory governance, where local knowledge and community engagement are integral to creating and enforcing environmental regulations. Addressing these gaps ensures that communities impacted by maritime pollution are empowered to contribute to policy discussions and safeguard their environment and livelihoods.

## **ADDRESSING BILGE DUMPING: INTERNATIONAL AND NATIONAL POLICY PERSPECTIVES**

The United Nations Sustainable Development Goals (SDG) aim to achieve Goal 6, universal access to clean water, sanitation, and hygiene, and Goal 14, to conserve and sustainably use the oceans, seas, and marine resources. Member states of the United Nations should strictly join in the efforts to realise these goals towards building an inclusive, sustainable, and resilient future for people and the planet.

The International Convention for the Prevention of Pollution from Ships (MARPOL) is the primary international treaty governing the prevention of maritime environment pollution by ships due to operational or unintentional reasons. Annex II covers Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk, which details the discharge criteria and measures for controlling pollution by noxious liquid substances carried in bulk (Abhishek, 2020). The discharge of their residues is allowed only to reception facilities until specific concentrations and conditions (which vary with the category of substances) are complied with. No discharge of residues containing noxious substances is permitted within 12 miles of the nearest land.

Concerning policy in Malaysia governing the issue of bilge dumping, it is lightly covered in the Environmental Quality Act 1974 under sections 27 and 29, which provide the prohibition of discharge of oil (s27) and waste (s29), respectively, into Malaysian waters. However, the punishment for each offence is, in our view, inadequate when it comes to being a deterrent to bilge dumping. Section 27 states that spilling oil into Malaysian waters will only result in a maximum fine of RM25,000 and a possible sentence of 2 years in jail. Similar penalties apply under Section 29 of the law, stipulating that anyone found guilty of discharging wastewater into Malaysian seas will only be subject to a maximum fine of RM25,000. In conclusion, the policy regarding handling bilge dumping in Malaysia is inadequate.

There are successful examples of policy implementations that can serve as models for combating bilge dumping. For instance, Australia's national approach includes stringent penalties coupled with public-private partnerships for environmental monitoring, which has decreased illegal discharge incidents. Similarly, Norway's integration of eco-friendly shipping policies with financial incentives for compliant vessels showcases how balanced regulatory measures can promote adherence to environmental standards. Highlighting these policy successes provides a blueprint for other nations looking to strengthen their maritime environmental policies.

Therefore, the government of Malaysia must make necessary amendments to the Act to strengthen the existing policy so that Malaysian waters can be protected from further pollution through bilge dumping and less energy will be utilised in the clean-up process.

Policy recommendations should focus on technological and collaborative innovations to combat bilge dumping effectively. Implementing real-time satellite surveillance systems and leveraging partnerships with international maritime organisations can enhance detection and enforcement capabilities. Additionally, stricter penalties for non-compliance and incentives for adopting sustainable waste management technologies could encourage shipping companies to comply with regulations. Collaborations between nations could facilitate sharing resources and best practices, creating a unified front against maritime pollution. Such measures ensure that policies are punitive and preventive, fostering a culture of accountability and sustainability within the shipping industry.

### **Bilge Dumping Effects on the Environment.**

Bilge dumping could be considered a more minor but intentional oil spill. With that in mind, it would not be foolish to think that the effects that bilge dumping carries would be the same as if it were an oil spill. While the main focus of this topic is the effects of bilge dumping on the environment, it is best to illustrate its effects on people as well.

As previously discussed, oil spills and bilge dumping can affect the environment by damaging ocean habitats such as seagrass. It can also affect mangroves, which are essentially massive carbon stores, and with them destroyed, the amount of carbon released into the air can be very damaging to the climate. Not only that, but mangrove forests along shorelines are also capable of protecting coasts from tsunamis. For example, Hawaii had planted mangrove belts that spanned kilometres to protect the island of Molokai from tsunamis (Fisher et al., 2023). This can also be seen in Bangladesh, where thousands of hectares of mangrove forests were cleared along the coasts, which exposed Bangladesh to storms and wave forces (Halder & Pereira, 2024). This is something that may apply to Malaysia as well. Malaysia is a country with an abundance of mangrove forests, but it also hosts much rain. Malaysia's annual rainfall measures between 2500 and 3500, depending on which part of Malaysia is being referred to. Due to this, Malaysia has suffered through many floods. Floods that may occur include flash floods, river floods and monsoon floods. It is common knowledge of the disastrous effects of tsunamis and floods on people and the environment.

Regarding wildlife, aquatic birds are among the animals most affected by oil slicks and bilge dumping. Birds come in contact with oil when hunting for food or floating atop the water surface. This is dangerous because the oil can get on their feathers, affecting their buoyancy negatively. Also, since their feathers are dirty, they will try to clean themselves by preening, which will cause them to ingest the oil. The toxins released from oil spills and dumping are hazardous to the ocean environment. The vapours from the oil itself can be hazardous, as they can damage susceptible animals' nervous systems and internal organs. Ingesting it is worse due to its damaging effect on digestive tracts, which could cause the animals to eat less (Chilvers et al., 2020). Even if these animals do not come into direct contact with the oil, they can still be affected. If predators were to eat animals caught in oil slicks, they would still end up ingesting said oil. Sometimes, the predators refuse to eat their prey because of the unpleasant taste and smell produced by those bathed in oil and wastewater.

## Upstream and Downstream of Bilge Dumping

Bilge dumping has long been an intriguing form of pollution and is difficult to monitor reliably because it occurs at sea. Many are blind as to the cause and consequences of such forms of pollution.

It is expensive for ocean vessels to clean their effluent, necessitating an upfront investment in an on-board treatment system or payment for treatment at a port facility. Each choice can cost tens of thousands annually, depending on the travel and gasoline utilised. Utilising proper methods of treating oily effluent and the exposure to high penalties, there is a high probability that ocean vessels will continue to pollute the ocean intentionally.

In some instances, ocean vessels that do not have oil-water separator equipment that needs first to empty their hull of these oils' waste may probably decide to skip the extra trip needed to reach any port facility with the required facilities to carry out the task by just dumping the wastewater in the open sea.

Investigating the possible significance of extensive bilge dumping, we might first examine the pollutants in oily bilge waste. Depending on the type of ship, bilge water may contain large amounts of hazardous chemicals, including but not limited to oil, detergents, solvents, and similar. According to a study by Corti-Monzón et al. (2021), oily bilge wastewater contains pollutants such as lubricants, grease, and cleaning fluids, as well as hazardous or toxic elements such as arsenic, cadmium, chromium, lead, and selenium, some of which are known or probable carcinogens. Organic compounds, including benzene, chloroform, hexachlorocyclohexane isomers, and naphthalene, can also be found in bilge water.

The United Arab Emirates has experienced the detrimental impacts of bilge dumping. One of the emirates, Fujairah, saw three oil spills in only two months in 2017. Locals reported a significant drop in hotel reservations, dead fish, and black oil on the beach ("Fujairah Beaches Cleared of Oil Slick," 2017). In 2019, there were several unexplained incidents of oil washing up on beaches in nine Brazilian states and on 132 beaches (Elizondo, 2019). The considerable scientific literature on the impacts of large-scale historical oil spills, most notably the BP Deepwater Horizon and the Exxon Valdez, may provide insight into the potential consequences of bilge dumping. Oil in the water harms marine life, causing acute to chronic illnesses. Furthermore, a multi-state natural resource impact study indicates that the Deepwater Horizon disaster killed or injured up to 102,000 birds. Mangroves and coral reefs in Brazil, Panama, and Singapore have been harmed by oil in the water. Human health might also suffer, including cancer (Özkaynak & İçemer, 2021). People who lived along the shore reported eye, skin, and respiratory health difficulties, according to one survey done following an oil leak in Pakistan in 2003 (Janjua et al., 2006). Worse, years after an oil spill off the coast of Spain, some cleanup workers revealed symptoms of genetic changes in their blood, which might be precursors to more serious diseases. Not only that, but these birds could also end up transferring their oil to their young, which is likely fatal to them, or it could even cause female birds to reduce the number of eggs laid or stop them from laying eggs altogether.

## REMEDY TOWARDS BILGE DUMPING

According to the National Oceanic and Atmospheric Association, oil spills are three main ways and, by extension, bilge dumping is treated.

### Burning

The first method is through burning the oil slick. That said, the slick must be at least 3 millimetres deep and was used to remove oil from the ocean during the Gulf War. This works by two boats with a collection boom connected to each one. They then round up the oil to ensure it is all in one concentrated space. The authorities will usually do their best to prevent the smoke from adversely affecting nearby people and wildlife. However, these adverse effects can sometimes be minimised instead of circumvented.

If we were to look at what is needed to clean oil slicks by burning, several things come to one's attention. There are times when two boats are required to clean up the mess caused by one. Almost anything humans do

during their day-to-day lives affects the environment and contributes to greenhouse gases released into the air. Generally speaking, most things will have their drawbacks, and the idea is to decide whether the benefit outweighs the cost or vice versa. An example would be coal. Coal is abundant worldwide and usually produced and consumed in its place of origin, but it still poses a threat to the environment through ambient air pollution.

If we were to look through the perspective of energy usage, we would be able to see that a lot of fuel energy would need to be used in order to have those two boats make their way to the oil slick, to keep it running as they collect the oil and burn it before making the trip back to shore. From there, it could be seen that much energy can be used to clean an oil slick.

### **Skimming**

Skimming starts like burning, where two boats with a collection boom try to move all the oil into a concentrated area. As opposed to burning, skimming is considered the more environmentally friendly method, as it usually uses air as a power source or a hydraulic power pack could be used. The skimmer collects the oil-water and separates both substances before releasing the water into the ocean. That oil has to be stored somewhere, though, and that somewhere is a storage tank or barges.

Like burning the oil slick, the energy used is still relatively high because the two ships must go to the oil spill site and the return trip. Not to mention that depending on the amount of oil collected, it could mean that much weight would be added to the ship thanks to oil collected in the tanks. This would mean the ships would use more fuel energy to maintain their speed as they return.

If the response is quick enough, the retrieved oil could be used to power refineries, power stations, cement plants, etc., after reprocessing. The idea of reusing waste is typically encouraged in the push for an environmentally friendly tomorrow.

### **Chemicals**

The third method is with chemicals. The chemical dispersants are released into the water and break down the oil slick, turning them into oil droplets. These oil droplets will sink into the ocean and will be able to be eaten by microbes, which will turn them into less harmful compounds.

While this does sound very beneficial, the amount of energy used will still be a lot if the chemical dispersants are brought to the oil slick through a boat or plane. Both would use a lot of fuel and energy to make the trip to and back from the oil slick.

Advancements in monitoring technology, such as AI-powered satellite imagery and automated reporting systems, have proven effective in detecting and tracking bilge dumping incidents in real time. These innovations can significantly improve the ability of maritime authorities to respond promptly and hold offenders accountable. Policymakers can enhance surveillance and regulatory enforcement by investing in such technologies, creating a stronger deterrent against illegal dumping.

### **Underestimating Bilge Dumping: A Hidden Environmental Threat**

One of the main issues with bilge dumping is that it is not being treated as a more significant issue. When put, bilge dumping is essentially a more minor but intentionally done oil spill. As previously discussed, oil spills take a lot of energy and power to clean.

When this issue is not taken as seriously as it should be, it creates the problem of a lack of surveillance. That, mixed with the discrete nature of bilge dumping, means hardly any concrete numbers can be displayed. Groups like Sky Truth do their best to monitor for potential bilge dumping, and their data has been able to help find hundreds of bilges dumping incidents in 2021. However, those numbers are minimal compared to the possible amount because their satellites cover less than one-fifth of the world's oceans.



The inability to get concrete numbers means that arguments favouring more action being taken against bilge dumping can be dismissed. Furthermore, it will lead to injustice to members of the public for failure to be adequately informed of the gravity of this issue and how it will impact the environment.

## CONCLUSION

In conclusion, bilge dumping signifies a dire environmental mitigating approach through immediate attention and concerted action. Despite the ongoing implementation of policy towards environmental protection and the amount of energy it will take to address bilge dumping, it remains an overlooked and underestimated matter. The absence of adequate surveillance and enforcement mechanisms deepens the challenge, thus encouraging perpetrators to continue engaging in illegal dumping practices with liberty. Moreover, the existing legal framework, which does not adequately provide effective prevention and deterrence mechanisms, poses another additional barrier. The systemic failure to address such a pressing issue would endanger marine ecosystems' health and sustainability and weaken global attempts to achieve sustainability goals and energy conservation.

The effects of unhindered bilge dumping go far beyond environmental degradation. The marine ecosystem affected by these immoral activities has a multi-layered negative impact on species and commercially valuable fish. The marine ecosystems affected by these illicit activities serve as critical habitats for many species, including commercially valuable fish reserves. The biodiversity loss and disruption towards ecosystem dynamics not only jeopardise the livelihood of coastal communities but definitely will compromise the resilience and stability of global marine ecosystems. This energy-intensive nature of remediation efforts would undermine the broader energy implications of bilge dumping, emphasising the constant need for more significant sustainable and accountable practices within the maritime industry.

Addressing the issue of bilge dumping indeed requires a multifaceted approach that encompasses enhanced surveillance and enforcement, a strengthened regulatory framework, and greater international cooperation. Efforts must not just focus on raising awareness mainly on the environmental and energy implications of bilge dumping but also on promoting a culture of accountability among ship operators and the need to empower every affected community to participate in all possible decision-making processes. By taking these practical measures in addressing bilge dumping and promoting environmental justice, we can hope to attain a more sustainable and equitable future for both present and future generations, as stated by Plato, who believed that justice is not only about the laws but about the harmony and balance within society and nature.

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