MPP INA SDGs

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Assessing Indonesia's Environmental Laws Pertaining to the Abatement of Marine Plastic Pollution: A Euphemism?

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ABSTRACT

The predominance of irresponsible and unsustainable plastic usage in Indonesia poses an urgent and alarming danger to the ecosystem. This paper discussed the legislative and regulatory mechanism in place in Indonesia to manage marine plastic pollution, the limitations and obstacles it faces, and the possibility of remedies being implemented to resolve Indonesia's marine plastic pollution predicament. The ecological approach, sustainable development goals, human right to a healthy environment, and sociopolitical context will all be used to advise this research. The findings demonstrate both top-down and bottom-up initiatives to marine plastic pollution law and regulations are ineffectual. If not adequately regulated, the government, political, and economic structural proclivities would most likely favor economic expansion at the expense of appropriate protection of the environment. Indonesia has to consider not just more comprehensive law and regulation to handle the complex concerns of marine plastic pollution, but it also sought to acknowledge other drivers that hamper the success of efforts to conserve the marine ecosystem. As a result, it is suggested that Indonesia initially focus on short-term measures prior to progressing on to long-term remedies, with effective cohesion across all approaches and collaboration with all involved parties.

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1. Introduction

Human actions have the potential to modify Earth's natural functionality in manners that increase worldwide hazards to humanity.[1] The creation, use, and waste of plastics is amongst the most obvious.[2] Plastic[3] as a product has advanced tremendously in the

1 Vikas, M., & Dwarakish, G. S. (2015). Coastal Pollution: A Review. *Aquatic Procedia*, 4(ICWRCOE 2015), 388. doi: https://doi.org/10.1016/j.aqpro.2015.02.053

2 Villarrubia-Gómez, P., Cornell, S. E., & Fabres, J. (2018). Marine plastic pollution as a planetary boundary threat – The drifting piece in the sustainability puzzle. *Marine Policy*, 96(December 2017), 213. doi: https://doi.org/10.1016/j.marpol.2017.11.035

previous seventy years, and its use has become pervasive in our daily way of living. Plastic innovation has resulted in low-priced, enduring, and versatile types of plastic, with an endless number of end-use applications. Ever since 1950s, the manufacturing of plastic has outpaced practically all other substances, resulting in around 141 million tons of plastic pollution, often from products and packaging, in 2015.[4] Plastics have risen to become a major source of global oceanic pollutants (the marine plastics pollution or MPP) as a result of their high-intensity usage with poor "end of life" management.[5] The amount of plastic in the waters is influenced by human actions and legislation on shore. Illegal dumping and trash management that is just not up to par,[6] stormwater outflow, Torrential rains and landslides for example, are key land-based contributors of ocean pollution.[7] As plastic fragments enter the marine ecology, they are dispersed throughout the planet by airstream and oceanic currents.[8]

The harm posed by MPP is not overestimated.[9] For its immense magnitude, complexities, and essentially permanent ecological repercussions, MPP is an alarming issue.[10] It plagues a large number of countries, particularly in the Asia-Pacific region, and is mostly caused by terrestrial sources. There are five Asian nations. (i.e., People's

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3 The name plastic comes from a Greek word *plastikos*, which means it may be created in a variety of methods. Plastics are made up of long-chain polymer molecules that are recovered as a by-product of petroleum, coal, and natural gas. *See*, Rajmohan, K. V. S., Ramya, C., Viswanathan, M. R., & Varjani, S. (2019). Plastic Pollutants: Effective Waste Management for Pollution Control and Abatement. *Current Opinion in Environmental Science & Health*, *12*(December 2019), 72. doi: https://doi.org/10.1016/j.coesh.2019.08.006

4 United Nations Environment Programme. (2018). Single-Use Plastics: A Roadmap for Sustainability. In *Single-use Plastic: A Roadmap for Sustainability*. International Environmental Technology Centre (IETC).

5 Most of those plastics we utilize are designed to be thrown just after one use, thus the term "single-use." As a result, packaging materials accounts for almost 50 percent of all plastic trash worldwide. The majority of this trash comes from Asia. The majority of plastics do not decompose. These tough substances can endure microbial degradation and traverse hundreds of kilometers on marine current flow. Conversely, they break down into smaller pieces termed as microplastics over time. According to studies, expanded polystyrene foam (often called as "styrofoam") plastic containers can take centuries to degrade, contaminating soil and water. *See*, Henderson, L., & Green, C. (2020). Making Sense of Microplastics? Public Understandings of Plastic Pollution. *Marine Pollution Bulletin*, *152*(1), 110909. doi: https://doi.org/10.1016/j.marpolbul.2020.110909

6 Due to the sheer endurance, resilience to microbial degradation, and widespread use of plastics, an outbreak has erupted, putting our ecology at jeopardy owing to improper waste management. Plastics are being released into the water in such large quantities that the World Economic Forum predicted in 2016 that by 2050, plastics would outnumber fish in the ocean. *See*, Schmaltz, E., Melvin, E. C., Diana, Z., Gunady, E. F., Rittschof, D., Somarelli, J. A., Virdin, J., & Dunphy-Daly, M. M. (2020). Plastic Pollution Solutions: Emerging Technologies to Prevent and Collect Marine Plastic Pollution. *Environment International*, *144*(August), 106067. doi: https://doi.org/10.1016/j.envint.2020.106067

7 Axelsson, C., & van Sebille, E. (2017). Prevention through Policy: Urban Macroplastic Leakages to the Marine Environment During Extreme Rainfall Events. *Marine Pollution Bulletin*, *124*(1), 211. doi: https://doi.org/10.1016/j.marpolbul.2017.07.024

8 Abreu, A., & Pedrotti, M. L. (2019). Microplastics in the Oceans: The Solutions Lie on Land. *Field Actions Science Reports*, *19*(1), 63. doi: https://doi.org/10.1126/science.1260352

9 Microplastics and oceanic debris are already leading academic studies to the point where there is fear that the blooming subject of "plastics" could be displacing less sensational but much more important issues. *See*, Borja, A., & Elliott, M. (2019). So When Will We Have Enough Papers on Microplastics and Ocean Litter? *Marine Pollution Bulletin*, *146*, 315. doi: https://doi.org/10.1016/j.marpolbul.2019.05.069; Meanwhile, a 2017 research from the UK Government Office for Science estimates that ocean pollution would quadruple in a decade except if marine contamination is reduced, making this a critical problem. *See*, UK Government Office for Science. (2018). *Foresight Future of the Sea: A Report from the Government Chief Scientific Adviser*. https://www.gov.uk/government/publications/future-of-the-sea--2

10 *Op. Cit.* Villarrubia-Gómez, P., Cornell, S. E., & Fabres, J., 214.

Republic of China, Indonesia, the Philippines, Vietnam, and Sri Lanka) have already been designated the world's biggest MPP generators. People's Republic of China and Indonesia, the world's two greatest polluters, have comparable challenges in coping with plastic waste. They possess ineffectual legal and institutional systems in place to tackle MPP. The burgeoning use of plastics for both developed and developing economies, as well as the widespread negative effects on the ecosystem and public health, highlight the significance of this research.[11]

The Association of Southeast Asian Nations (ASEAN) Conference on Reducing Marine Debris in the ASEAN Region in November 2017 emphasized the immediate need for ASEAN countries to resolve this concern via multilateral coordination to reduce plastic pollution at its source (specifically, to prevent land-based pollution from entering the waters in the first place).[12] People must act now, and therefore we must act quickly, since the oceanic environment is now threatened by pollutants, overfishing, biodiversity loss, and global warming. Degradation of marine biota reduces the waters abilities to provide ecologically valuable necessities such as sustenance and water to the world's growing populace, as well as its capacity to recover from anthropogenic disruptions.[13]

Presume that MPP is a globally calamity that needs a global solution to overcome,[14] This paper offers valuable insights into and from the perspective of Indonesians. This research illustrates that addressing MPP requires an all-hands-on-deck attitude, necessitating multi-level and multi-actor initiatives, as well as tailored governing and non-regulatory strategies. Nevertheless, the writer's findings indicate that the majority of actions should be directed at the local community level, which is where the situation originates. Based upon the results garnered from the existing literature, this paper suggests numerous legal and regulatory recommendations that might help to alleviate the global MPP dilemma. Reflecting on the rise in global environmental law study that aims to go further than state-centric measures to solve the worldwide ecological issues,[15] As per this analysis, sub-national[16] (like state/provincial) and local authorities have key regulatory competencies, particularly in waste disposal, that will be critical in providing an appropriate MPP resolution.

We are presently unable to cope with the amount of spare plastics we make, necessitating a rethinking as to how we manufacture, utilize, and manage plastics. In order to address one of our generation's biggest ecological plague, officials will need to govern, businesses will need to think outside the box, and individuals will need to participate. This study contains current thinking about how we might achieve such. It

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[11] Garcia, B., Fang, M. M., & Lin, J. (2019). Marine Plastic Pollution in Asia: All Hands on Deck! *Chinese Journal of Environmental Law*, 3(1), 12. doi: https://doi.org/10.1163/24686042-12340034

[12] Association of Southeast Asian Nations. (2017). *ASEAN Cooperation on Environment at A Glance*. The ASEAN Secretariat. https://asean.org/wp-content/uploads/2018/02/30.-December-2017-ASEAN-Cooperation-on-Environment-At-A-Glance.pdf

[13] *Op. Cit.* Henderson, L., & Green, C., 110908.

[14] Laffoley, D., Baxter, J. M., Amon, D. J., Currie, D. E. J., Downs, C. A., Hall-Spencer, J. M., Harden-Davies, H., Page, R., Reid, C. P., Roberts, C. M., Rogers, A., Thiele, T., Sheppard, C. R. C., Sumaila, R. U., & Woodall, L. C. (2020). *Eight Urgent, Fundamental and Simultaneous Steps Needed to Restore Ocean Health , and the Consequences for Humanity and the Planet of Inaction or Delay*. 30(1), 201. doi: https://doi.org/10.3002/aqc.3182

[15] *Op. Cit.* Garcia, B., Fang, M. M., & Lin, J., 14.

[16] Indonesia's bureaucracy is divided into five tiers: national, provincial, district and municipal, sub-district, and village. The bureaucratic entities of these multiple tiers of governance beneath the national level are referred to as 'sub-national governments' in this paper.

investigates how governments, businesses, and people have been able to limit further use of single-use plastics at the national and regional levels. It presents strategies that governments considering regulating the manufacture and use of single-use plastics may find useful.

To put emphasis on this study, the researcher starts by explaining how prevalent MPP is in Indonesia, as well as the country's national legislative and judicial toolset for oceanic ecological preservation, in light of the Sustainable Development Goals (SDGs) and the Human Right to a Healthy Environment (HRHE). Then the researcher outlines the limitations and challenges in addressing the predicament of MPP in Indonesia. Finally, the researcher provides Indonesia's short- and long-term strategies for combating MPP.

2. Method

This study is juridical-normative (or doctrinal legal research), which itself is judicial study into the present laws and regulations that regulate the character and significance of this analysis in connection to a real and pressing societal issue. This research used the legislative methods and the techniques to answer questions to put the situation into perspective on the much greater scale. A literature study is used to gather secondary data by undertaking a comprehensive assessment of existing scholarly publications on the particular subject as well as legislative or regulatory responses. Secondary data was acquired from internationally accepted pieces of literature in order to build a global repertoire on the issue of MPP, which itself was supported by an Indonesian contextual standpoint. The secondary data is then studied via qualitative analytical methodologies to produce a thorough description of what policies and regulations would be advantageous and feasible to enact in Indonesia.

3. Analysis and Results

3.1. Indonesia's Marine Plastic Pollution Predicament

Judging by the current scenario in Indonesia, the MPP crisis presents a challenge which is not unlike to those of other emerging economies. When examined more thoroughly, the primary source of ocean litter is plastic garbage, which is classified as a hazardous waste of human activities and is commonly referred to as marine anthropogenic litter.[17] The omnipresent MPP has evolved into a tremendously significant concern for governments, specialists, non-governmental groups, and individuals all around the globe in the recent several decades as a cautionary tale to the ecology. Year after year, plastics pollute the oceans. Upwards of 80 percent of oceanic plastic litter comes from land-based origins, such as improperly managed plastic waste that streams in to the oceans.[18] Plastics are also exceptionally complicated to handle with since they are becoming so important in today's economy and lifestyles.[19]

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[17] Hermawan, S. (2019). Law and Economic Approach to Reduce Marine Plastic Litter in Indonesia. *3rd International Conference on Globalization of Law and Local Wisdom (ICGLOW 2019)*, 358(Advances in Social Science, Education and Humanities Research), 218. doi: https://doi.org/10.2991/icglow-19.2019.56

[18] *Op. Cit.* Garcia, B., Fang, M. M., & Lin, J., 15.

[19] Critchell, K., Benham, C., Berry, K., Eagle, L., Hamann, M., Hussey, K., & Ridgway, T. (2019). *Plastic Pollution in the Coastal Environment : Current Challenges and Future Solutions.* In E. Wolanski, J. W. Day, M. Elliott, & R. Ramachandran (Eds.), *Coasts and Estuaries: The Future.* Amsterdam: Elsevier Inc., p. 606

Plastic waste that finds its way into the oceans has a cascade of long-term effects on public health, marine life, as well as certain economic sectors and navigation. The hazards that plastic trash poses to marine life, in particular, come in a variety of sorts. Plastics can be swallowed by sea organisms, causing life-threatening conditions such as obstruction of their gastrointestinal tracts. Moreover, wildlife might become entangled in plastic trash, and it can be fatal or resulted in a myriad of life-threatening consequences.[20] In aquatic habitats, such as coral reefs, plastic rubbish might offer "potential physiological and toxicological dangers."[21] Plastic does the most harm along coastlines since ecological variability and species density are higher therein.[22]

There is growing evidence that plastic trash[23] (macro-plastics and micro-plastics).[24] If ingested by fishes or even other marine creatures, it enters the human food chain unintentionally.[25] Despite the fact that there is still a lack of knowledge and research on

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[20] Wildlife entangled in marine plastic debris are at risk of malnutrition, asphyxia, damage, infections, lower reproduction rates, and fatality. *See*, Xanthos, D., & Walker, T. R. (2017). International Policies to Reduce Plastic Marine Pollution from Single-Use Plastics (Plastic Bags and Microbeads): A Review. *Marine Pollution Bulletin*, *118*(1–2), 18. doi: https://doi.org/10.1016/j.marpolbul.2017.02.048

[21] *Op. Cit.* Garcia, B., Fang, M. M., & Lin, J., 16.

[22] *Op. Cit.* Axelsson, C., & van Sebille, E., 211; Wilcox, C., Van Sebille, E., & Hardesty, B. D. (2015). Threat of Plastic Pollution to Seabirds is Global, Pervasive, and Increasing. *Proceedings of the National Academy of Sciences of the United States of America*, *112*(38), 11901. doi: https://doi.org/10.1073/pnas.1502108112; Sherman, P., & Van Sebille, E. (2016). Modeling marine surface microplastic transport to assess optimal removal locations. *Environmental Research Letters*, *11*(1), 3. doi: https://doi.org/10.1088/1748-9326/11/1/014006; Schuyler, Q. A., Wilcox, C., Townsend, K. A., Wedemeyer-Strombel, K. R., Balazs, G., van Sebille, E., & Hardesty, B. D. (2016). Risk Analysis Reveals Global Hotspots for Marine Debris Ingestion by Sea Turtles. *Global Change Biology*, *22*(2), 568. doi: https://doi.org/10.1111/gcb.13078

[23] Microplastics and macroplastics make up plastics. Thompson and colleagues coined the term "microplastic" in 2004. Macroplastics (>5 mm) enter the marine environment as a result of improper waste handling or disposal. *See*, Thompson, R. C., Olsen, Y., Mitchell, R. P., Davis, A., Rowland, S. J., John, A. W. G., McGonigle, D., & Russell, A. E. (2004). Lost at Sea: Where Is All the Plastic? *Science*, *304*(5672), 838. doi: https://doi.org/10.1126/science.1094559; Pettipas, S., Bernier, M., & Walker, T. R. (2016). A Canadian Policy Framework to Mitigate Plastic Marine Pollution. *Marine Policy*, *68*, 118. doi: https://doi.org/10.1016/j.marpol.2016.02.025. Whereas the National Oceanic and Atmospheric Administration (NOAA) defines microplastics as debris with a width of less than 5 mm, other studies use a width of less than 1 mm as a criterion. *See*, Seltenrich, N. (2015). New Link in the Food Chain? Marine Plastic Pollution and Seafood Safety. *Environmental Health Perspectives*, *123*(2), 38. doi: https://doi.org/10.1289/ehp.123-A34; Barboza, L. G. A., & Gimenez, B. C. G. (2015). Microplastics in the Marine Environment: Current Trends and Future Perspectives. *Marine Pollution Bulletin*, *97*(1–2), 8. doi: https://doi.org/10.1016/j.marpolbul.2015.06.008; Goldstein, M. C., Rosenberg, M., & Cheng, L. (2012). Increased Oceanic Microplastic Debris Enhances Oviposition in an Endemic Pelagic Insect. *Biology Letters*, *8*(5), 818. doi: https://doi.org/10.1098/rsbl.2012.0298; Primary microplastics (such as microbeads) and secondary microplastics (made from deteriorated macroplastics) are two types of microplastics (e.g., plastic containers). *See*, Ivar do Sul, J. A., & Costa, M. F. (2014). The Present and Future of Microplastic Pollution in the Marine Environment. *Environmental Pollution*, *185*, 352. doi: https://doi.org/10.1016/j.envpol.2013.10.036; Napper, I. E., Bakir, A., Rowland, S. J., & Thompson, R. C. (2015). Characterisation, Quantity and Sorptive Properties of Microplastics Extracted from Cosmetics. *Marine Pollution Bulletin*, *99*(1–2), 180. doi: https://doi.org/10.1016/j.marpolbul.2015.07.029.

[24] Microbeads (micro-plastics) are often whitish or hazy in color, and a research found that many surface-feeding species of fish mistake microbeads as plankton. One of most noticeable adverse biological consequences on the maritime ecology is the digestion of plastics by sea life. *See*, Baulch, S., & Perry, C. (2014). Evaluating the Impacts of Marine Debris on Cetaceans. *Marine Pollution Bulletin*, *80*(1–2), 221. doi: https://doi.org/10.1016/j.marpolbul.2013.12.050

[25] Microplastics are attracting a lot of concern because they may enter the human food chain through devouring fish, shellfish, and filter feeders, posing a risk to public wellbeing. Microplastics have indeed been found in the guts of filter-feeding mussels. The toxicological risks, on the other hand, are

this health concern,[26] MPP has been shown to put food supply, food hygiene, and public health at jeopardy. Plastics in the ocean may also travel vast distances and act as transmitters for a variety of petrochemical contaminants.[27] MPP may also have a negative impact on the economic development, particularly in the fishery, transportation, and tourism industries.[28] The more a country's or region's reliance on waterfront tourism[29] or fish catching, the more vulnerable they are. Plastic pollution causes damage to the economy, such as lost revenue and the expenditure for beach clean-ups to remove pollutants that are both expensive and inefficient.[30] A vaguely inconspicuous influence of MPP is on seafaring.[31] Just that little proportion of oceanic plastic garbage, such as abandoned fishing gear, could ensnare anchors and snag ship rotors, causing vehicular failures and decreasing fish capture rates and yields,[32] and, in

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hardly studied and provide a substantial research issue in the future. See, Miranda, D. de A., & de Carvalho-Souza, G. F. (2016). Are We Eating Plastic-Ingesting Fish? *Marine Pollution Bulletin*, *103*(1–2), 110. doi: https://doi.org/10.1016/j.marpolbul.2015.12.035; Mathalon, A., & Hill, P. (2014). Microplastic Fibers in the Intertidal Ecosystem Surrounding Halifax Harbor, Nova Scotia. *Marine Pollution Bulletin*, *81*(1), 69. doi: https://doi.org/10.1016/j.marpolbul.2014.02.018; Chang, M. (2015). Reducing Microplastics from Facial Exfoliating Cleansers in Wastewater through Treatment Versus Consumer Product Decisions. *Marine Pollution Bulletin*, *101*(1), 333. doi: https://doi.org/10.1016/j.marpolbul.2015.10.074; Besseling, E., Foekema, E. M., Van Franeker, J. A., Leopold, M. F., Kühn, S., Bravo Rebolledo, E. L., Heße, E., Mielke, L., IJzer, J., Kamminga, P., & Koelmans, A. A. (2015). Microplastic in a Macro Filter Feeder: Humpback Whale Megaptera Novaeangliae. *Marine Pollution Bulletin*, *95*(1), 250. doi: https://doi.org/10.1016/j.marpolbul.2015.04.007; *Op. Cit.* Seltenrich, N., 38.

[26] Law, K. L., & Thompson, R. C. (2014). Microplastics in the Seas. *Science*, *345*(6193), 145. https://doi.org/10.1126/science.1254065; *Op. Cit.* Miranda, D. de A., & de Carvalho-Souza, G. F., 111; *Op. Cit.* Seltenrich, N., 38.

[27] Teuten, E. L., Saquing, J. M., Knappe, D. R. U., Barlaz, M. A., Jonsson, S., Björn, A., Rowland, S. J., Thompson, R. C., Galloway, T. S., Yamashita, R., Ochi, D., Watanuki, Y., Moore, C., Viet, P. H., Tana, T. S., Prudente, M., Boonyatumanond, R., Zakaria, M. P., Akkhavong, K., … Takada, H. (2009). Transport and Release of Chemicals from Plastics to the Environment and to Wildlife. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *364*(1526), 2028. doi: https://doi.org/10.1098/rstb.2008.0284; *Op. Cit.* Xanthos, D., & Walker, T. R., 18.

[28] McIlgorm, A., Campbell, H. F., & Rule, M. J. (2011). The Economic Cost and Control of Marine Debris Damage in the Asia-Pacific Region. *Ocean and Coastal Management*, *54*(9), 644. https://doi.org/10.1016/j.ocecoaman.2011.05.007

[29] The presence of plastic trash on shorelines has an influence on the tourism business. Oceanic macroplastics are unsightly and reduce the intrinsic appeal of the world's waterfront areas. Plastic pollution in coastal and maritime settings has a significant influence on the environment's visual appeal, natural beauty, and safety. As a result of the decreased aesthetic and economic worth of coastal beach regions and marine habitats, the overall number of visitors has decreased dramatically. See, *Op. Cit.* Axelsson, C., & van Sebille, E., 211; Thushari, G. G. N., & Senevirathna, J. D. M. (2020). Plastic Pollution in the Marine Environment. *Heliyon*, *6*(8), e04717. doi: https://doi.org/10.1016/j.heliyon.2020.e04709.

[30] Karlsson, T. M., Arneborg, L., Broström, G., Almroth, B. C., Gipperth, L., & Hassellöv, M. (2018). The Unaccountability Case of Plastic Pellet Pollution. *Marine Pollution Bulletin*, *129*(1), 53. doi: https://doi.org/10.1016/j.marpolbul.2018.01.041

[31] *Op. Cit.* Henderson, L., & Green, C., 110908.

[32] Ghost fishing is one of several possibilities that MPP might deplete fish supplies. Ghost fishing occurs when discarded fishing hardware, such as monofilament wires and nylon nets, floats at different depths. A few of the adverse repercussions on the professional fisheries industry has been identified as ghost entrapment fishing (unintended fish catching by tossed away and missing fishing equipment). Ghost fishing has a tremendous impact on fish populations, which are important for both private and commercial fisheries. See, *Op. Cit.* Thushari, G. G. N., & Senevirathna, J. D. M., e04716.

extreme cases, human casualties.[33] This indicates the importance of seafaring safety and contains expenditures for equipment fixing and servicing.[34]

Numerous instances have emerged in Indonesia as a result of the seriousness of the MPP concerns in some other country. After People's Republic of China, Indonesia has now been deemed the world's second-largest producer of MPP. Indonesia is estimated to create 3.2 million tonnes of mismanaged plastic trash per year, among which 1.29 million wash up in the oceans, accounting for 16 percent of global MPP.[35] First and foremost, ever since late 1960s, Indonesia's swift and sustained economic expansion has accelerated industrialization and urbanization. Indonesia is the fourth most populous country in the world, having 270 million inhabitants, and over 74 percent of its population inhabits along the shorelines.[36] Although Indonesia's yearly use of plastic is 17 kg, which is far lesser than those of other countries, the country's waste treatment and control system has declined with time.[37]

The MPP crisis in Indonesia has its own features, therefore merited thorough analysis as well as the development of specific solutions that take these individual characteristics into consideration. It is important to emphasize that any toolkit for addressing MPP must take local heterogeneity into account, since there is doubtful to be a "one-size-fits-all" solution. Firstly, considering Indonesia is located in the center of many of the world's busiest sea lanes and shares borders with multiple other maritime countries,[38] many countries in the region are projected to have an impact on Indonesia's coastal environment. These occurrences are seldom referred to as 'foreign litter,' implying that oceanic currents may transport plastic pollution from some other shores hundreds of kilometers apart to Indonesian seas.[39] Since for a result, Indonesian should seek cooperation with some of its neighboring countries to control and reduce plastic wastes in the oceans, as its own efforts would not suffice to battle the 'foreign litter.' In the context of Indonesia, the need of regional coordination to combat MPP cannot be overstated. Regulations are meaningless unless they are based on appropriate sociocultural principles.[40]

Second, Indonesia's reliance on tourist industry is demonstrated by the industry's immediate share in GDP, which exceeded US$19.4 billion in 2017 and accounted for 1.9 percent of the country's total GDP. Tourism is predicted to reach US$37 billion by 2028, accounting for 2.1 percent of total GDP (notwithstanding the global pandemic

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33 *Op. Cit.* Henderson, L., & Green, C., 110920.

34 *Op. Cit.* Garcia, B., Fang, M. M., & Lin, J., 18.

35 Jambeck, J. R., Geyer, R., Wilcox, C., Siegler, T. R., Perryman, M., Andrady, A., Narayan, R., & Law, K. L. (2015). Plastic Waste Inputs from Land into the Ocean. *Science*, *347*(6223), 769. doi: https://doi.org/10.1126/science.1260352

36 Zikra, M., Suntoyo, & Lukijanto. (2015). Climate Change Impacts on Indonesian Coastal Areas. *Procedia Earth and Planetary Science*, *14*(1), 58. doi: https://doi.org/10.1016/j.proeps.2015.07.085

37 In comparison, Malaysians annual consumption of plastics weigh around 35 kilograms, Thais and Singaporeans weigh around 40 kilograms, while Western Europeans weigh over 100 kilograms. This indicates the scope of potential development in Indonesia's consumption-led economy, as personal income continues to rise. See, British Plastics Federation. (2015). *Plastics Industry in Indonesia BPF Report 2015*. Indonesia Report 2015. https://bpf.co.uk/exporters_toolbox/indonesia-report-2015.aspx

38 These include Australia, Brunei Darussalam, Cambodia, China, Malaysia, Myanmar (Burma), Papua New Guinea, Thailand, the Philippines, Singapore, Timor-Leste, and Vietnam.

39 *Op. Cit.* Garcia, B., Fang, M. M., & Lin, J., 29.

40 Carman, V. G., Machain, N., & Campagna, C. (2015). Legal and Institutional Tools to Mitigate Plastic Pollution Affecting Marine Species: Argentina as a Case Study. *Marine Pollution Bulletin*, *92*(1–2), 132. doi: https://doi.org/10.1016/j.marpolbul.2014.12.047

situation).[41] Growth of tourism may fuel consumption of plastics, which is likely to result in further plastic pollution. Indonesia must figure out how to effectively control and eliminate MPP resulting from the tourist industries.[42]

Third, underfunding, particularly among sub-national administrations, has exacerbated the problem of plastic trash. Indonesian administration spending on ecological preservation is utterly pathetic when compared to certain other Asian countries. Funding cuts are much more severe for Indonesia's sub-national governments. Whenever the national administration struggles to allocate appropriate money to local authorities, they are left with even fewer resources to cope with environmental challenges. The inability of local councils to handle MPP is mostly given the lack of financing.[43]

Eventually, Indonesia, much like remainder of the globe, has been devastated by a pandemic caused by a novel coronavirus (SARS-CoV-2). Upon first glance, the COVID-19 pandemic makes it seem to be indirectly leading to the UN 2030 Sustainable Development Goals (especially SDGs 11, 12, 13, and 15) by enhancing the general city health and well-being by reducing carbon emissions, air pollution, environmental noise levels, and soil and biodiversity stress. Yet, it ignores bad quality of indoor air, extended utilization patterns of single-use plastics (especially PPE and single-use containers), and a slipping focus on rubbish disposal, all of which are harmful to the environment's sustainability (particularly the green and circular economies). Whereas the beneficial effects of COVID-19 on the ecosphere are really the result of a "postponed" human-related exertion which will eventually arise as a consequence of the pandemic scenario, the negative effects will instantaneously compound the existing ecological issues, aggravating their adverse effect on the natural ecosystem which is already deteriorating and maligning potential mitigation/remediation strategies.[44]

3.2. Indonesian National Legal and Institutional Framework for Marine Environmental Protection

Multiple legislation relevant to MPP have been passed by the Indonesian legislature and national government, including Law Number 11 of 2020 regarding Job Creation which amends the Law Number 32 of 2009 regarding Protection and Management of Environment, Law Number 32 of 2014 regarding the Sea, Law Number 18 of 2008 regarding Waste Management, and Government Regulation Number 19 of 1999 regarding Control of Marine Pollution and Destruction. Unfortunately, neither of these statutes have provisions that specifically target MPP.[45] In Indonesia, there is a regulation that specifically covers the MPP concern, namely the Presidential Regulation Number 83 of 2018 regarding Marine Litter Management, which in the Indonesian legislation and regulatory hierarchy, this is a significantly lower-tier rule.

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41 World Travel & Tourism Council. (2018). *Travel & Tourism Economic Impact 2018 Indonesia*. https://www.healthy-resort.com/wp-content/uploads/2019/02/Indonesia2018.pdf

42 *Op. Cit.* Garcia, B., Farg, M. M., & Lin, J., 29.

43 Vincent, J. R., Aden, J., Dore, G., Adriani, M., Rambe, V., & Walton, T. (2002). Public Environmental Expenditures in Indonesia. *Bulletin of Indonesian Economic Studies*, 38(1), 70. doi: https://doi.org/10.1080/00074910252636284

44 Silva, A. L. P., Prata, J. C., Walker, T. R., Duarte, A. C., Ouyang, W., Barcelò, D., & Rocha-Santos, T. (2021). Increased Plastic Pollution Due to COVID-19 Pandemic: Challenges and Recommendations. *Chemical Engineering Journal*, 405(July 2020), 126684. doi: https://doi.org/10.1016/j.cej.2020.126683

45 *Op. Cit.* Garcia, B., Farg, M. M., & Lin, J., 30.

Similarly, Law Number 11 of 2020 regarding Job Creation which amends Law Number 32 of 2009 regarding Protection and Management of Environment, the holistic legislation does not specifically reference MPP or plastic pollution, but rather incorporates broad ecological preservation and management concepts. Article 13 paragraph (2) asserts that environmental conservation and contamination issues must include preventive, abatement, and rehabilitation. Ecological risk assessments and other approaches must be used to limit maritime contamination. The statutes provide general direction, but they are insufficient to justify special measures to regulate MPP. Furthermore, current regulations are not enforced effectively given the lack of human and material resources, as well as insufficient institutional capacities.[46] Article 60 deems it unlawful to release rubbish or chemicals into the environment without first obtaining a permit. Criminal measures against individuals and businesses bolster the condemnations.[47] Article 15 indicates that subnational administrations are competent of conducting Strategic Ecological Assessments.[48] Unfortunately, there have been no clear rules to assist subnational governments.

Law Number 32 of 2014 regarding the Sea is the underlying legal structure for regulating maritime affairs. Article 55 paragraph (1) of this statute declares that the central and subnational authorities must make a system for preventing or reducing pollution and ecological devastation in the oceans. Article 56 grants the national administration responsibility for preserving and maintaining the aquatic systems via pollution control, abatement, and administration. The precautionary principle as well as the polluter pays rule are used to settle polluting occurrences and oceanic pollution sanctions.[49]

The key national legislation to resolve Indonesia's garbage problem is Law Number 18 of 2008 on Waste Management, which was enacted in May 2008.[50] It gives central and subnational governments the authority to cope with waste disposal, with the subnational authority having given a much more pivotal role.[51] The Act aims to enhance public wellness and natural sustainability, as well as the use of trash as a form of energy. This legislation divides trash into three categories: household waste, household-like waste, and special garbage.[52] Everybody is expected by law to reduce trash and handle it in an ecologically friendly manner. For infractions of the law,

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[46] *Ibid.*

[47] These criminal sanctions can be found in Articles 97 to 120 of Law Number 32 of 2009 regarding Protection and Management of Environment.

[48] Strategic Environmental Studies or *Kajian Lingkungan Hidup Strategis* (KLHS) is a set of systematic, inclusive, and participatory analyses to assure that the principles of sustainable development have been embedded, become the foundation, and are integrated into all regional development, policy-making, and governmental programme.

[49] Art 52 para (3) of Law Number 32 of 2014 regarding the Sea (Indonesia).

[50] Law Number 18 of 2008 regarding Waste Management (Indonesia) includes matters extending from public service principles, waste management for specific, domestic/household, and household-like waste, including community-based waste management, private sector participation, distribution of authority between national and subnational governments in waste management, license, and sanctions for non-compliance.

[51] Moidiana, C., & Gamse, T. (2011). The New Waste Law: Challenging Opportunity for Future Landfill Operation in Indonesia. *Waste Management and Research*, 29(1), 21. doi: https://doi.org/10.1177/0734242X10384013

[52] Art 2 para (1) of Law Number 18 of 2008 regarding Waste Management (Indonesia).

national and subnational authorities can impose fines and penalties.[53] However, this law does not expressly include plastic pollution.

Presidential Regulation Number 83 of 2018 regarding Marine Litter Management is a follow-up to Indonesian President Joko Widodo's pledge at the G20 Summit in Germany in 2017 to devote US$1 billion yearly to lowering Indonesia's plastic as well as other oceanic trash by 70 percent by 2025.[54] This executive order establishes the National Ocean Policy, which includes the National Strategy on Marine Plastic Litter Control, for an eight-year period from 2018 to 2025. MPP will be addressed in four phases by this plan: creating awareness, controlling terrestrial and coastal plastic wastes, governing aquatic pollution, and obtaining funds and organizational assistance. This demonstrates that the central government recognizes the importance of managing MPP. However, the author contends that merely having plans of action "on the books" is insufficient. These initiatives announced by the government must be implemented. Unfortunately, this executive order outlines the national government's plans of action with hardly any emphasis on state and local authorities.

The Indonesian authorities has also used a wide range of non-legislative methods to reduce plastic trash. In 2016, Indonesia implemented a plan in 23 metropolitan areas that charges IDR 200 (1.4¢) for the use of plastic packaging, resulting in a 55 percent decline in waste plastic over just a three-month probationary period. Following the probation period, merchants condemned the policy's continuance, claiming that it was detrimental and lacking a legal foundation for execution. Ecologists, on the other side, argued that the rate set for plastic containers was too low to have any substantial deterring impact.[55] Ever since, the central government has also been pondering imposing a charge on single use plastics consumption beginning in 2019 to encourage companies to adopt ecofriendly plastic containers.[56]

Amidst the passage of a law, governmental regulations, and strategic plan, Indonesia's MPP crisis is still not adequately handled throughout the decades. This phenomenon can be attributed to a number of factors. There are no formal nationwide laws dealing with MPP, and Indonesian legal enforcement is generally ineffective. There are several reasons for failure of enforcement. In Indonesia, for example, the judicial branch lacks the authority to carry out its decisions immediately. Furthermore, it is arguable whether concurrent jurisdiction at the provincial, municipal, and local level creates ambiguity about the administrative breadth. Considering the voids in current legislation and enforcement issues in Indonesia, various parties like as businesses, NGOs, religious communities, and the people are critical to the effective management

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[53] *Ibid.* Art 29.

[54] Langenheim, J. (2017). *Indonesia Pledges $1 Billion a Year to Curb Ocean Waste.* The Guardian. https://www.theguardian.com/environment/the-coral-triangle/2017/mar/02/indonesia-pledges-us1-billion-a-year-to-curb-ocean-waste

[55] Activists such as Sumardia Ariansyah of Greenpeace, for instance, believe the added expense is just too low and it has not shown to be as effective as planned. Yew-Kwang Ng, Albert Winsemius Chair economics professor at Singapore's Nanyang Technological University, shares Ariansyah's worries, believing that "the mandatory prices on plastic containers will be useful if necessary at realistic levels, specifically with some communication to the people." Furthermore, the IDR 200 (1.4) looks to be too cheap; IDR 1,000-2,000 (6.9-14) would be preferable." See, Black, E. (2016). *Indonesia's Plastic Bag Tax Not Enough, Say Experts.* South East Asia Globe. https://southeastasiaglobe.com/indonesia-plastic-bag-tax/

[56] *Op. Cit.* Garcia, B., Fang, M. M., & Lin, J., 32.

of MPP.[57] The incredible amount and proliferation of plastic trash in the seas necessitate taking precautionary measures, since there are many unknown variables and the likelihood for significant harm to the fragile ecology.[58]

3.3. Sustainable Development and the Human Rights to a Healthy Environment (HRHE) in Indonesia's Legal System

The UN Sustainable Development Goals (SDGs) outline a plan that includes goals to restrict and, more importantly, reduce marine litter of all kinds, including naval contamination. Such a change in sustainability is context-dependent,[59] non-linear, triumphs and losses will be part of a transformational approach. It necessitates collaboration across numerous participants throughout sectors and sizes, as well as negotiating with opposing opinions and beliefs. Marine plastic trash is addressed in four of the Sustainable Development Goals. These objectives include unprocessed wastewater, wastewater treatment in urban sustainability, waste treatment during its life span (with a focus on limitation, reduction, recycling, and reuse), and responsible maritime oversight.[60] Goal 14 of the United Nations 2030 Agenda for Sustainable Development (SDG) addresses marine waste and pollution, focusing on sources from land-based operations. Goals 6, 11, and 12 are also concerned with unprocessed wastewater, regional as well as other waste treatment, ecologically sound surveillance of chemicals and rubbish throughout their life cycles, and general minimization of waste.[61]

If international accords are translated to national and subnational levels, they provide a solid foundation for global strategies, like the SDGs. There are substantial worldwide differences in the challenges of plastic trash, both on land and at sea, and responses will be effective when they are context-specific and fully reflect local conditions.[62] The lack of adequate nationwide and subnational initiatives to combat marine contamination is a significant hindrance to the implementation of the circular economy in Indonesia. It might jeopardize the efforts begun by the government and development partners to achieve the Sustainable Development Goals (SDGs).[63]

A plethora of constitutional rules suited for supervising the interaction between the ecology as well as the population characterize Indonesia's constitutional setup.

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57 *Ibid.*

58 Eriksen, M., Borgogno, F., Villarrubia-Gómez, P., Anderson, E., Box, C., & Trenholm, N. (2020). Mitigation Strategies to Reverse the Rising Trend of Plastics in Polar Regions. *Environment International*, 139(March), 105708. doi: https://doi.org/10.1016/j.envint.2020.105704

59 The Nigeria Infectious Disease Bill, such as the Nigeria Plastic Bags Prohibition Bill, was enacted by the Nigerian legislature and is based on the 1977 Singapore Infectious Disease Act. The majority of Nigerian statute is not made in the country, which has an impact on the outcome and impact of laws and policies adopted from abroad since they lack Nigerian societal, historical, and economical sensitivities. See, Nwafor, N., & Walker, T. R. (2020). Plastic Bags Prohibition Bill: A Developing Story of Grass Legalism Aiming to Reduce Plastic Marine Pollution in Nigeria. *Marine Policy*, 120(April), 104163. doi: https://doi.org/10.1016/j.marpol.2020.104160

60 Löhr, A., Savelli, H., Beunen, R., Kalz, M., Ragas, A., & Van Belleghem, F. (2017). Solutions for Global Marine Litter Pollution. *Current Opinion in Environmental Sustainability*, 28, 91. doi: https://doi.org/10.1016/j.cosust.2017.08.009

61 Jambeck, J., Hardesty, B. D., Brooks, A. L., Friend, T., Teleki, K., Fabres, J., Beaudoin, Y., Bamba, A., Francis, J., Ribbink, A. J., Baleta, T., Bouwman, H., Knox, J., & Wilcox, C. (2018). Challenges and Emerging Solutions to the Land-Based Plastic Waste Issue in Africa. *Marine Policy*, 96(October 2017), 259. doi: https://doi.org/10.1016/j.marpol.2017.10.041

62 *Op. Cit.* Löhr, A., Savelli, H., Beunen, R., Kalz, M., Ragas, A., & Van Belleghem, F., 95.

63 *Op. Cit.* Jambeck, J., Hardesty, B. D., Brooks, A. L., Friend, T., Teleki, K., Fabres, J., Beaudoin, Y., Bamba, A., Francis, J., Ribbink, A. J., Baleta, T., Bouwman, H., Knox, J., & Wilcox, C., 260.

Sustainable development and the Human Right to a Clean and Healthy Environment (HRHE) are two of the most important of these. Both values were guaranteed by the constitution in the second and fourth amendments, respectively, in 2000 and 2002, illustrating the progression of what academics have dubbed "sustainable constitutionalism" and "ecological constitutionalism." In this document, the constitutionalizing of the sustainable development standard is detailed in Article 33 paragraph (4)[64] and the HRHE in Article 28H paragraph (1)[65] is the intended advancement that can close some voids in the old constitutional model. In the context of Indonesian constitutionalism, this article provides a succinct review of key discussions on sustainable development and the HRHE.

Sustainable development is a key concept that allows authorities to achieve sustainable desired objectives while balancing economic, environmental, and societal factors.[66] Ecology and natural resource governance is a particular context wherein economic, environmental, and societal concerns might collide. In such settings, the harmony that sustainable development aims in among its three key pillars (economic, environmental, and societal) is not always a reality.[67] The idea of sustainable development occupies a prestigious legitimate way in Indonesia's legal system as being one of the country's most important national ideals and governance principles stated in Article 33 paragraph (4) of the 1945 Indonesian Constitution. Sustainability, like other national ideals and governance practices, ties all government apparatus, state officials, elected authorities, as well as every individual. Though there is no doubt that human standards are justified, sustainability has been viewed as a juristic criterion that requires the state to provide public participation in environmental decision-making and necessitates the unconstitutionality of administrative actions that violate the idea.[68] The notion of sustainable development includes a constitutional mandate for both governmental and non-governmental entities to achieve ecologically sustained growth.[69]

The idea of sustainability asserts that both are a source of state obligations and an equitable standard for determining the legitimacy of governmental policies affecting the environment. This viewpoint backs up Kotzé's claim that, as a constitutionalized presupposition, environmental sustainability is now one of the very few standards that may overrule ordinary laws and embody Indonesian current societal essential moral

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64 "The country's economy is arranged focusing on financial democracy with the precepts of camaraderie, reasonable and just efficiency, ecologically sound autonomy, and by striking a balance of development and country's economic harmony." according to Article 33 paragraph (4) of the 1945 Indonesian Constitution.

65 "Everybody has the right to be alive in physically and spiritually splendor, to have a space to dwell, to have a pleasant and healthy living conditions, and to get health care," according to Article 28H paragraph (1) of the 1945 Indonesian Constitution.

66 Mwanza, R. (2020). The Relationship Between the Principle of Sustainable Development and the Human Right to a Clean and Healthy Environment in Kenya's Legal Context: An Appraisal. *Environmental Law Review*, 22(3), 186. doi: https://doi.org/10.1177/1461452920952584

67 The appeal of economic growth and income generation via oil and gas production, for example, explains why techniques like fracturing or other unconventional power production technologies are accepted, despite growing understanding of their catastrophic long-term effects on the environment and human well-being. See, Short, D., Elliot, J., Norder, K., Lloyd-Davies, E., & Morley, J. (2015). Extreme Energy, 'Fracking' and Human Rights: A New Field for Human Rights Impact Assessments? *International Journal of Human Rights*, *19*(6), 722. doi: https://doi.org/10.1080/13642987.2015.1019219

68 *Op. Cit.* Mwanza, R., 191.

69 *Ibid.*

ideals at a higher judicial level, as well as an expression of civic sovereignty.[70] Sustainability, as a constitutional concept, aids in the formation of the corpus of environmental protections, particularly by energizing "the construction of environmental protection statutes that might support real ecologically concerns."[71] Nonetheless, there really is inadequate evidence that now the notion of sustainable growth has influenced the functional scope and corpus of Indonesian ecological standards. The awareness of the duty to achieve ecologically sound growth answers to the plea for a plan that ensures that progress does not disrupt or destroy natural processes that support all existence.[72]

Moving on to the HRHE, its constitutionalization has been overwhelmingly endorsed, owing to evidence linking it to the progression of stronger national protection of the environment and ecological outcomes.[73] Since a HRHE is the one of the fundamental rights recognized in the constitution, it also aligns with one of the country's values and governing concepts. The HRHE compels all government entity, governmental agency, public authority, and anyone involved in implementing or reading the constitution and laws, enacting the law, or establishing and conducting policymaking, just like the concept of sustainable development. As a result, it epitomizes the standards that should be applied to the legislature when drafting environmental legislation, the judicial system when applying or interpreting the constitution and relevant environmental rules, and the administration when developing and implementing environmentally policies.[74]

The previous examination showed that Indonesian legal advancement has been responsive to criticism aiming at ecological sustainability and social human rights, which has yet to be realized in practice. The research also shows that the two standards are inextricably linked. Although using different tactics, the HRHE and the notion of environmental sustainability have the same goal of enhancing environmental preservation. On the one hand, the HRHE's concern for environmental conservation is motivated by the primary aim of protecting human well-being from the negative consequences of environmental damage. The importance of the concept of sustainable development to ecological preservation, on either hand, is demonstrated by the fact that ecology conservation is among its three main pillars. They are preferable to conventional rules because of their status as fundamental standards. As a result, they shape the scope and substance of environmental legislation, as well as other associated ordinary statutes, and serve as neutral standards for determining the constitutionality of environmental regulation activity. They provide a strong legal framework for examining laws, rules, and behavior that is unsustainable (being activities that favor economic development at the expense of environmental and societal values) and insensitive to environmental objectives by the government or private entities. This opportunity may be used to make legislation that are sympathetic *vis-à-vis* to the need for true sustainability.

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[70] Kotzé, L. J. (2013). *Sustainable Development and the Rule of Law for Nature: A Constitutional Reading*. In C. Voigt (Ed.), *Rule of Law for Nature: New Dimensions and Ideas in Environmental Law*. Croydon: Cambridge University Press, p. 143

[71] *Ibid.*, p. 136.

[72] *Op. Cit.* Mwanza, R., 192.

[73] Boyd, D. R. (2012). *The Environmental Rights Revolution: A Global Study of Constitutions, Human Rights, and the Environment*. Vancouver: UBC Press, p. 233

[74] *Op. Cit.* Mwanza, R., 192.

3.4. Limitations and Challenges

Policies must be formulated officially by the administration. Despite the obvious benefits, there might be roadblocks when it comes to strategy formulation. These roadblocks obstruct the creation of new policies and also the implementation of existent policies. In order to establish a much more effectual policy in the future, it is critical to identify these limitations and challenges.[75]

a. Legal and Political

There are significant hurdles to policy-making to reduce plastic spillages within the political system. The state or sub-national government sometimes provides only modest support. The author looks at the subnational authorities' inadequate intentions and the central government's basic directives. Without such assistance of a committed government, a city may have difficulty obtaining the necessary money for programs and getting the legal authority to carry out critical reforms. Subnational governments do not have the jurisdiction to outright prohibit the use of plastics. This activity could surely be boosted by a little more legislative control over plastics' consumption, manufacture, and dumping. As a result, there is a clear impediment to the capacity to enact effective legislation. In much more micro-state cities, like Singapore, where local administration is more closely aligned with the central government, similar issues are less significant. The majority of cities, unfortunately, concede to this lack of legal authority (including Indonesia).[76] It really is worthy to note that, because power is dispersed among numerous national and subnational governments, economic and political concerns have repeatedly overridden coastal conservation plans. Making it more difficult to cram in the voids.[77]

b. Economical

Policy that protects seashore regions from plastic pollution is limited not just by political nuances, but also by economics. Because not all plastics are easily recyclable, the effort to develop widespread recyclability is hampered. Despite their widespread availability, collecting lightweight plastics with hardly any value necessitates a significant investment. Equivocation in the future foster socioeconomic skepticism about the program's efficacy. With such a constantly changing world and fluid demography, it is difficult to establish initiatives far beyond the existing 20 to 50-year targets.

c. Sociological

People must be consulted throughout the policy-making process.[78] If people refuse to bear responsibility for addressing plastic pollution concerns, strategy will become impractical. Municipalities may compensate for their lack of funds and competence to restrict all plastic consumption by involving residents. Furthermore, involving

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75 *Op. Cit.* Axelsson, C., & van Sebille, E., 221.

76 *Ibid.*

77 Dauvergne, P. (2018). Why is the Global Governance of Plastic Failing the Oceans? *Global Environmental Change*, *51*(April), 22. doi: https://doi.org/10.1016/j.gloenvcha.2018.05.002; *Op. Cit.* Schnaltz, E., Melvin, E. C., Diana, Z., Gunady, E. F., Rittschof, D., Somarelli, J. A., Virdin, J., & Dunphy-Daly, M. M., 106068.

78 The major takeaway from West Africa is that when there is a lack of general devotion and sensitization of the public to the legislation and regulation as a result of top-down policy initiatives, the people are commonly misinformed about the plastic restrictions. See Adam, I., Walker, T. R., Bezerra, J. C., & Clayton, A. (2020). Policies to Reduce Single-Use Plastic Marine Pollution in West Africa. *Marine Policy*, *116*(February), 103935. doi: https://doi.org/10.1016/j.marpol.2020.103928

the community changes the way people think about plastic in everyday life, with the goal of reducing the amount of plastic that winds up in the trash.[79] Furthermore, producing policy that is acceptable to lawmakers, residents, and companies frequently limits the policy's efficacy if such parties are not included in the problem-solving process. Cities intend to rely on social policing to change consumers behavior when it comes to plastic. Individuals are most likely to pick up garbage, recycle their plastic containers, and repurpose plastic wrapping if they believe it is the normal expectation, and they are aware that their peers are looking and judging them. Despite this, there are always those in a community who may not follow the rules, either out of ignorance or defiance.

As a result, laws, fines, and policing remain necessary. Having a punishment in existence is a good tactic, and if its not enforced properly, this remains a society's decision to impose it themselves. Furthermore, policies differ from area to area, rendering it difficult for these people to familiarize themselves with old habits. If knowledge is difficult to convey, like in Indonesia, in which it is sporadically dispersed and differentiated, intensive involvement with communities becomes complicated. People may be ignorant of the problem of nearshore marine plastic in their daily lives. Thousands of residents in beachfront areas do not venture out to the seashore to witness the problem themselves.[80] It really is tempting to misguide plastic container garbage on the sidewalk with a dumped bottle harming sea life if you have not seen the problem beforehand.[81] Although there is a substantial body of scholarship into 'the public' and the ocean ecosystems, it typically focuses on 'gaps in knowledge' (e.g., the public underestimates the importance of marine situations to the society), with the implicit assumption that make people aware will contribute to a change in behavior.[82]

However, it is now widely recognized that the fight to protect marine ecosystems demands multidisciplinary approaches, particularly joint research with biopsychosocial specialists as well as other actors.[83] The ecology is interconnected, yet a person's lifestyle may not encompass the ecosphere, leaving it difficult to create a sense of gravity for situations that are just not visible. Furthermore, despite all the teaching and cleanup efforts, there will not be a breakthrough without such help of financial rewards or arbitrarily imposed sanctions. Whereas the state

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[79] Because human behavior is thought to be the direct culprit of ocean pollution, changing people's perceptions and behaviors is critical to preventing contamination in the ecological mechanism. *See*, Pahl, S., Wyles, K. J., & Thompson, R. C. (2017). Channelling Passion for the Ocean Towards Plastic Pollution. *Nature Human Behaviour*, *1*(10), 697. doi: https://doi.org/10.1038/s41562-017-0204-4

[80] *Op. Cit.* Axelsson, C., & van Sebille, E., 223.

[81] It is interesting to note that plastics account for around 75 percent of marine rubbish, with land-based sources accounting for 80 percentage of maritime pollution. *See*, *Op. Cit.* Henderson, L., & Green, C., 110909.

[82] McKinley, E., & Fletcher, S. (2012). Improving Marine Environmental Health through Marine Citizenship: A Call for Debate. *Marine Policy*, *36*(3), 840. doi: https://doi.org/10.1016/j.marpol.2011.11.001; Winton, D. J., Anderson, L. G., Rocliffe, S., & Loiselle, S. (2020). Macroplastic Pollution in Freshwater Environments: Focusing Public and Policy Action. *Science of the Total Environment*, *704*, 135249. doi: https://doi.org/10.1016/j.scitotenv.2019.135242

[83] Jefferson, R., McKinley, E., Capstick, S., Fletcher, S., Griffin, H., & Milanese, M. (2015). Understanding Audiences: Making Public Perceptions Research Matter to Marine Conservation. *Ocean and Coastal Management*, *115*, 68. doi: https://doi.org/10.1016/j.ocecoaman.2015.06.014; Pahl, S., & Wyles, K. J. (2017). The Human Dimension: How Social and Behavioural Research Methods Can Help Address Microplastics in the Environment. *Analytical Methods*, *9*(9), 1405. doi: https://doi.org/10.1039/c6ay02647h; *Op. Cit.* Villarrubia-Gómez, P., Cornell, S. E., & Fabres, J., 217.

intervention may be viewed as a way for lawmakers to restructure people's behavior when it comes to using plastic. people's behavior could be the most significant obstacle to the law itself.[84]

d. Industrialist

Industrialists typically exert influence on governments when it comes to policy formulation. Plastics producers have a personal interest in this agenda and, as a result, are a powerful lobbyist whenever laws and regulations are being drafted. Although plastics makers are not necessarily adversaries in the fight against marine pollution, the policy that targets companies rather than individuals attract greater scrutiny from this powerful sector. The decision-making processes might be influenced by other important enterprises. A state's capacity to implement strict legislation on plastics management is potentially limited by businesses' demand for non-restrictive law and regulation. Defiance of new restrictions or efforts by powerful plastic producers is another source of concern that will be difficult to overcome.[85]

e. Unintegrated, Lax, and Peripheral Action Plans

Despite these regulatory initiatives by governments throughout the world, the prevalence of plastic trash continues to rise.[86] International regulations, governmental policies, non-state norms, and consumption patterns are insufficiently dependable or comprehensive to protect the ecosystem internationally. As a result, synergy is crucial.[87] Admittedly, the oceans are our shared inheritance, and it pertains to everyone.[88] Capitulation analysis reveals that more stringent and innovative policy measures are required at many stages of socioeconomic strata, with a focus on regulating particular sources of pollutants as primary origins rather than obscuring nonpoint sources of pollutants.[89] We are barely putting a dent with our disjointed efforts. Prior studies have shown that coordinated approaches are by far the most effective in reducing marine pollution. Pollution rates were reduced more effectively by an interconnected planning than by a single-term approach.[90] These comprehensive mitigation strategies, taken together, form a proactive strategy to reducing the effect of plastic waste and directing future pollution towards the ocean.[91] Only through these collaboration and commitment could the

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[84] *Op. Cit.* Axelsson, C., & van Sebille, E., 223.

[85] Viera, J. S. C., Marques, M. R. C., Nazareth, M. C., Jimenez, P. C., & Castro, Í. B. (2020). On Replacing Single-Use Plastic with So-Called Biodegradable Ones: The Case with Straws. *Environmental Science and Policy*, 106(November 2019), 180. doi: https://doi.org/10.1016/j.envsci.2020.02.007

[86] *Op. Cit.* Schmaltz, E., Melvin, E. C., Diana, Z., Gunady, E. F., Rittschof, D., Somarelli, J. A., Virdin, J., & Dunphy-Daly, M. M., 106068.

[87] Nigeria's Plastic Bag (Prohibition) Bill, for instance, focuses on single-use plastic containers but fails to fully solve the real problem of plastic pollution or establish a viable plastic pollution and environmental action plan. As a result, the law fails to consider the larger mechanics of waste generation and disposal. *See, Op. Cit.* Nwafor, N., & Walker, T. R., 104166.

[88] DeSombre, E. R. (2018). *Ocean Governance*. In P. Dauvergne & J. Alger (Eds.), *A Research Agenda for Global Environmental Politics*. Massachusetts: Edward Elgar Publishing, p. 118

[89] *Op. Cit.* Laffoley, D., Baxter, J. M., Amon, D. J., Currie, D. E. J., Downs, C. A., Hall-Spencer, J. M., Harden-Davies, H., Page, R., Reid, C. P., Roberts, C. M., Rogers, A., Thiele, T., Sheppard, C. R. C., Sumaila, R. U., & Woodall, L. C., 201.

[90] Willis, K., Maureaud, C., Wilcox, C., & Hardesty, B. D. (2018). How Successful are Waste Abatement Campaigns and Government Policies at Reducing Plastic Waste into the Marine Environment? *Marine Policy*, 96(December 2017), 248. doi: https://doi.org/10.1016/j.marpol.2017.11.037

[91] *Op. Cit.* Eriksen, M., Borgognо, F., Villarrubia-Gómez, P., Anderson, E., Box, C., & Trenholm, N., 105708.

threat of plastic pollution to humanity and the environment be successfully mitigated.[92]

3.5. Short-term Solutions: New Normative or Regulative Strategies Pertinent to Marine Plastic Pollution in Indonesia

a. Plastic Bag Legislation, Regulation, and Policies

Because the law and regulations governing plastic waste in Indonesia are still hazy, it really is critical to establish a multi-governance system, and governments at all tiers, including national and subnational ecologic authoritative bureaus, should develop detailed surveillance identifiers, designs, and guidelines for the emission of plastic wastes during the industrial production and use of plastic items in both marine and inland areas.[93] The breadth and depth of actions to reduce the use of plastic containers have been varied. Government all throughout the globe have rules prohibiting the sale of lightweight bags, charging customers for them, and taxing retailers that provide them.[94] Numerous local councils in North America, Australia, and the United Kingdom, for example, have enacted restrictions, limited bans, and levies. In several European countries, when actions are widespread, a fee per bag is imposed. In 1991 and 1994, Germany and Denmark were pioneers of plastic bag prohibitions for most local retailers. From 2002, nations in Africa, Asia, and Europe have suggested plastic bans (South Africa, Bangladesh, and India), as well as surcharges (Ireland). Plastic containers have been forbidden across several African and Asian countries.[95] Furthermore, a number of African, Asian, and European countries have imposed levies on the usage of plastic containers.[96]

Further comprehensive bans and obligations, particularly at the national scale, must be implemented. Some stores have begun to provide reusable totes as a complementary method to reducing lightweight plastic carriers.[97] Indonesia has no choice but to take measures. Countries with beachfront boundaries, according to Jambeck, discharge waste into the oceans, with the biggest volumes likely to come from fast growing countries.[98] Although this may look impossible to do in Indonesia due to the extensive usage of plastic containers, particularly amongst street vendors and small retailers.[99] For this endeavor, the Indonesian nationwide government must make the official rule on plastic containers as excisable items, which has been incomplete from 2019, a priority and publicize it as soon as possible.[100] Charges and

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92 *Op. Cit.* Critchell, K., Benham, C., Berry, K., Eagle, L., Hamann, M., Hussey, K., & Ridgway, T., 606.

93 Wang, J., Zheng, L., & Li, J. (2018). A Critical Review on the Sources and Instruments of Marine Microplastics and Prospects on the Relevant Management in China. *Waste Management and Research*, 36(10), 906. doi: https://doi.org/10.1177/0734242X18793534

94 *Op. Cit.* Xanthos, D., & Walker, T. R., 19.

95 Dikgang, J., Leiman, A., & Visser, M. (2012). Analysis of the Plastic-Bag Levy in South Africa. *Resources, Conservation and Recycling*, 66, 60. doi: https://doi.org/10.1016/j.resconrec.2012.06.009

96 Poortinga, W., Whitmarsh, L., & Suffolk, C. (2013). The Introduction of a Single-Use Carrier Bag Charge in Wales: Attitude Change and Behavioural Spillover Effects. *Journal of Environmental Psychology*, 36, 245. doi: https://doi.org/10.1016/j.jenvp.2013.09.001

97 *Op. Cit.* Xanthos, D., & Walker, T. R., 19.

98 *Op. Cit.* Jambeck, J. R., Geyer, R., Wilcox, C., Siegler, T. R., Perryman, M., Andrady, A., Narayan, R., & Law, K. L., 770.

99 *Op. Cit.* Xanthos, D., & Walker, T. R., 21.

100 This government rule, which has been in the works since 2019, aims to impose an excise levy on plastic containers with a thickness of less than 75 microns (0.075 centimetres). The business that creates the plastic container or the importer that buys the plastic container is obliged for carrying and paying the excise charge. Moreover, the Ministry of Finance of the Republic of Indonesia give new requirements on the implementation scheme and the right to designate the amount of excise tariffs to be

levies may not be enough to address the problem of urban plastic, but they are important for reducing its usage.[101]

Despite the lack of scientific reports examining the performance of suggested solutions for single-use plastics, considerable study on the impact of single-use plastic bag restrictions or taxes has been undertaken.[102] The 2002 levy (€0.15 or 18¢)[103] in Ireland concluded in a dramatical drop (~90%) in plastic container consumption. In Wales, single-use plastic container consumption fell by 71 percent between 2011 and 2014 as a result of a five-pence (6.8¢) levy was imposed in October 2011. Following the launch of the five-pence levy in England, plastic container usage at seven major grocers fell by 85 percent.[104] The levy on carrier containers, apart from deposit schemes, is non-refundable and instantly charges cost to consumers.[105] The underlying idea behind billing for single-use plastic is that individuals respond to pricing and profitability by maximizing their own subconscious, and that changing the levy would change behavior. Proponents claim that this regulated reasoning perceives environment issues and that restrictions provide short-term solutions but are unable to address protracted issues, making them ineffective.[106] However, we should bear in mind that plastic container levies (taxes) are quite effective in reducing plastic-based products' consumption. Yet, given time, consumers may include the levy into their projected spending, leading to a resurgence in the use of plastic bags.[107]

To effectively control the extensive use of plastic, the government must differentiate between necessary and non-essential plastic goods for daily consumption. The authorities should next impose a tax or fee on 'necessary' plastic goods whilst making 'non-essential' plastic goods illegal.[108] The lists must be tailored to each region, as residents may consider plastic containers to be vital for one area and not

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implemented, that must be announced in a ministerial regulation. The levy (or, in this case, excise duty) on plastic containers is non-refundable, unlike deposit systems. Although having imposed on plastic bag manufacturers, it is a direct cost to the user. *See, Op. Cit.* Axelsson, C., & van Sebille, E., 219; Indonesian regulators must exercise caution. Frequently, the form of regulation limits single-use plastics to those with a thickness of less than a certain quantity. This means that single-use plastics will continue to be produced, but with a somewhat higher thickness (and expense), which will not help to reduce the amount of plastic wastes. *See*, Martin-Lara, M. A., Godoy, V., Quesada, L., Lozano, E. J., & Calero, M. (2021). Environmental status of marine plastic pollution in Spain. *Marine Pollution Bulletin*, *170*, 112692. doi: https://doi.org/10.1016/j.marpolbul.2021.112677

101 *Op. Cit.* Axelsson, C., & van Sebille, E., 214.

102 In South Africa, however, insufficient regulation of packaging materials consumption led in an ineffective plastic waste prevention strategy; the fee was too low. Plastic containers reductions from time to time then are being phased out. *See, Op. Cit.* Dikgang, J., Leiman, A., & Visser, M., 61.

103 Due to various temporary increases in per capita plastic consumption during the same period, the charge was hiked to €0.22 (26) in 2007 and then quadrupled to €0.44 (52) in 2009. The bag tax revenue was transferred to an environmental fund.

104 *Op. Cit.* Xanthos, D., & Walker, T. R., 22.

105 *Op. Cit.* Axelsson, C., & van Sebille, E., 219.

106 Nielsen, T. D., Holmberg, K., & Stripple, J. (2019). Need a Bag? A Review of Public Policies on Plastic Carrier Bags – Where, How and to What Effect? *Waste Management*, *87*(March), 431. doi: https://doi.org/10.1016/j.wasman.2019.02.025

107 *Op. Cit.* Axelsson, C., & van Sebille, E., 219.

108 It has not been advertised as a "one-and-done" method to phase out "preventable" or "unnecessary" plastic items. Conversely, because plastic container accounts for a significant portion of plastic pollution, it is a crucial starting point. *See*, Avery-Gomm, S., Walker, T. R., Mallory, M. L., & Provencher, J. F. (2019). There is Nothing Convenient about Plastic Pollution: Rejoinder to Stafford and Jones "Viewpoint – Ocean Plastic Pollution: A Convenient But Distracting Truth?" *Marine Policy*, *106*(March), 107. doi: https://doi.org/10.1016/j.marpol.2019.103552

in another. Eco friendly communities are becoming increasingly appealing to investors. To maintain a strategic edge, governments push one another to meet higher environmental standards. In summary, regulation must, among other things, decrease the risk of plastic being ocean plastic contaminants and microplastic by calculating in production projections, establishing worldwide design standards, protecting end-markets, and actively encouraging the 6R technique of reduce, redesign, refuse, reuse, recycle, and recover, and strategic planning toolkits must be developed to move forwards with advancement, from producing to dismantling.[109]

b. Incentives

People are motivated mostly by monetary considerations. Although there is always a segment of the population that advocates tirelessly for the environment, the majority of folks are motivated by financial reasons.[110] The Indonesian nationwide authorities should establish tax breaks and subsidies for enterprises and start-ups pursuing innovations that clean up plastic wastes or indulge in eco-friendly endeavors to help clean up the nation's beaches and seas (e.g., biodegradable plastic manufacture, sustainable alternative substances, facilities that convert surplus plastic into energy, plastic recycling facilities or waste disposal, waste treatment systems, and algae-based bioplastic synthesis).[111] This would encourage citizens to participate in clean-up efforts and relieve the Indonesian authorities of their responsibilities to find every answers. Incentive schemes might also entice companies[112] to invest in recyclable solutions, restructure industrial operations and supply networks so that recyclable components may be used, and adopt a zero-waste strategy to eliminate single-use plastic goods.[113] Since plastic are such an important part of modern life, it is critical to develop improved goods with the possibility for safer use.[114] The authorities can help by offering funds and rewards for research and development to address the problem.

c. Better Waste Management

Better waste management is a major priority in the worldwide effort to reduce the amount of plastic in the environment.[115] The development of effective MPP alleviation solutions necessitates a better understanding of the nature and

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[109] *Op. Cit.* Eriksen, M., Borgogno, F., Villarrubia-Gómez, P., Anderson, E., Box, C., & Trenholm, N., 105708.

[110] *Op. Cit.* Axelsson, C., & van Sebille, E., 223.

[111] Algae have been discovered to colonize treated wastewater on a synthetic substrate such as polythene surfaces, and these colorizing algae were found to be less dangerous and non-toxic. The biodegradation process will be started by the algae just on surface, and their production of ligninolytic and exopolysaccharide enzymes is the key to polyethylene degradation process. Many researchers came up with an environmentally acceptable approach to decompose PET using microalgae and synthetic biology. Algae may be used to make bioplastics as well. Bioplastics are polymers that are created fully or partially from biomass or renewable resources, such as food crops, and have qualities similar to petroleum-based plastics. *See*, Chia, W. Y., Tang, D. Y. Y., Khoo, K. S., Lup, A. N. K., & Chew, K. W. (2020). Nature's Fight Against Plastic Pollution: Algae for Plastic Biodegradation and Bioplastics Production. *Environmental Science and Ecotechnology*, *4*(October), 100065. doi: https://doi.org/10.1016/j.ese.2020.100065

[112] Through taxing methods, the administration may provide economic rewards to enterprises who create and adopt nonplastic, environmentally friendly packaging. *See*, *Op. Cit.* Laffoley, D., Baxter, J. M., Amon, D. J., Currie, D. E. J., Downs, C. A., Hall-Spencer, J. M., Harden-Davies, H., Page, R., Reid, C. P., Roberts, C. M., Rogers, A., Thiele, T., Sheppard, C. R. C., Sumaila, R. U., & Woodall, L. C., 201.

[113] *Op. Cit.* Martin-Lara, M. A., Godoy, V., Quesada, L., Lozano, E. J., & Calero, M., 112693.

[114] *Op. Cit.* Rajmohan, K. V. S., Ramya, C., Viswanathan, M. R., & Varjani, S., 80.

[115] *Op. Cit.* Axelsson, C., & van Sebille, E., 212.

effectiveness of the unstructured litter disposal industry.[116] Precipitation and sewage outflows are discharged into waterways or the ocean in many of the world's coastline communities and metropolitan regions.[117] As a result, poorly regulated landfills may introduce contaminants into the environment.[118] This figure explains how urban plastic pollution diffuse to the freshwater environment, that subsequently transports microplastic fragments to the ocean, wherein plastic currently flows yearly from the nation's hydrological network into the oceans. According to Lebreton et al., Indonesia is a major producer to plastic waste on the Asian continent, having four Javanese rivers considered particularly hazardous. The Brantas, Solo, Serayu, and Progo Rivers sequentially discharging an estimated 38,900 (range 32,300–63,700), 32,500 (range 26,500–54,100), 17,100 (range 13,300–29,900), and 12,800 (range 9,800–22,900) tonnes of plastics waste annually. In total, a median annual outflow of 200,000 tonnes (14.2% of global total) from Indonesian waterways, namely those on the islands of Java and Sumatra. Considering that the permeability of these catchment areas is two to three times below other big contributory waterways on the list, this finding emphasizes the area's population density and waste disposal are important factors.[119]

d. Education and Outreach Program

To change behavior, public awareness and community outreach must be developed.[120] Bringing oceanic learning, pollution, and waste disposal together in the classroom might be quite beneficial. Children's education and behavioral transformation are critical because they have a significant societal effect on their classmates, families, and community.[121] With festivities like World Oceans Day, engaging youth as well as other actors (e.g., people, authorities, corporations, and NGOs) is a strong way to encourage tangible transformation and raise awareness.[122] Owing to the belligerence of the market scenario, which includes the ubiquity of single-use plastic, a lack of long-term devotion to the issue, and irresponsible habits and prejudices, people will not change their behavior.[123] Authorities should develop and expand educational and awareness programs to combat individuals' lack of responsibility to the plastics crisis. These advertisements might be directed at

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[116] Abbott, J. K., & Sumaila, U. R. (2019). Reducing Marine Plastic Pollution: Policy Insights From Economics. *Review of Environmental Economics and Policy*, *13*(2), 332. doi: https://doi.org/10.1093/reep/rez007

[117] Critchell, K., Bonham, C., Berry, K., Eagle, L., Hamann, M., Hussey, K., & Ridgway, T. (2019). *Plastic Pollution in the Coastal Environment : Current Challenges and Future Solutions*. In E. Wolanski, J. W. Day, M. Elliott, & R. Ramachandran (Eds.), *Coasts and Estuaries: The Future*. Massachusetts: Elsevier Inc., p. 598

[118] Napper, I. E., & Thompson, R. C. (2019). *Marine Plastic Pollution: Other Than Microplastic*. In T. M. Letcher & D. A. Vallero (Eds.), *Waste* (2nd ed.). Massachusetts: Elsevier Inc., p. 437

[119] Lebreton, L. C. M., Zwet, J. Van Der, Damsteeg, J., Slat, B., Andrady, A., & Reisser, J. (2017). River Plastic Emissions to the World's Oceans. *Nature Communications*, *8*, 4. doi: https://doi.org/10.1038/ncomms15611

[120] Kershaw, P., Katsuhiko, S., Lee, S., Samseth, J., Woodring, D., & Smith, J. (2011). *Plastic Debris in the Ocean*. In *UNEP Year Book 2011*. p. 32

[121] Hartley, B. L., Thompson, R. C., & Pahl, S. (2015). Marine Litter Education Boosts Children's Understanding and Self-Reported Actions. *Marine Pollution Bulletin*, *90*(1–2), 214. doi: https://doi.org/10.1016/j.marpolbul.2014.10.049

[122] *Op. Cit.* Pettipas, S., Bernier, M., & Walker, T. R., 118.

[123] McNicholas, G., & Cotton, M. (2019). Stakeholder Perceptions of Marine Plastic Waste Management in the United Kingdom. *Ecological Economics*, *163*(March), 86. doi: https://doi.org/10.1016/j.ecolecon.2019.04.022

popular places where inhabitants are most likely to be interested in the initiative. The increased visibility of these advertising has the potential to pervade ordinary routines and judgements.

Research also found that educational and consciousness efforts are linked to lower levels of seashore waste. As a result, accelerating education and information to induce behavioral alterations, as well as creating a platform for exchanging academic resources and practices, might reduce contaminant leakage into the environment. Partnering with manufacturers, distributors, and merchants to improve understanding of the effects of plastic on the environment might help identify and reduce leakage points.[124]

e. Meticulous Law Enforcement

If ordinances cannot be enforced, the goals stated by them will remain 'on paper' and would not result in any improvements. There is indeed a desire for more authority in order to justify enforcement. On a national level, enforcement mechanisms are even more powerful since authorities can utilize state sovereignty judiciary rules to cope with disobedience.[125] Nevertheless, the central administration should not be complacent and should ensure that provincial and district agencies undertake equivalent watchful measures.

3.5. Long-term Solutions: The Indonesia Circular Economy Initiative, All Hands-On-Deck!

Numerous instances demonstrate the value of market-based tools, rules, and regulations, including pollution management methods, product restrictions, or a plastic bag levy (or excise).[126] Unfortunately, due of insufficient implementation and supervision, there are concerns regarding the effectiveness of certain measures. Furthermore, customers may get lax over time, resulting in a resurgence of single-use plastic consumption.[127] Furthermore, owing to political meddling and inadequate engagement from market players, it is usually difficult to put regulatory structures in place, and voluntary measures that are easier to implement may fail to offer a pragmatic solution.[128] Until plastic manufacturing and use are halted, a major transformation of the plastic market to a circular design, in which end-of-life plastic objects are valued rather than discarded, is required.[129] According to Arthur Huang, a

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[124] *Op. Cit.* Jambeck, J., Hardesty, B. D., Brooks, A. L., Friend, T., Teleki, K., Fabres, J., Beaudoin, Y., Bamba, A., Francis, J., Ribbink, A. J., Baleta, T., Bouwman, H., Knox, J., & Wilcox, C., 262.

[125] Wysocki, I. T., & Billon, P. Le. (2019). Plastics at Sea: Treaty Design For a Global Solution to Marine Plastic Pollution. *Environmental Science and Policy*, *100*(February), 102. doi: https://doi.org/10.1016/j.envsci.2019.06.005

[126] *Op. Cit.* Dikgang, J., Leiman, A., & Visser, M., 61; *Op. Cit.* Xanthos, D., & Walker, T. R., 22; *Op. Cit.* Löhr, A., Savelli, H., Beunen, R., Kalz, M., Ragas, A., & Van Belleghem, F., 95.

[127] Gold, M., Mika, K., Horowitz, C., Herzog, M., & Leitner, L. (2014). Stemming the Tide of Plastic Marine Litter: A Global Action Agenda. *Tulane Environmental Law Journal*, *27*(2), 165. doi: https://journals.tulane.edu/elj/article/view/2328; Iñiguez, M. E., Conesa, J. A., & Fullana, A. (2016). Marine Debris Occurrence and Treatment: A Review. *Renewable and Sustainable Energy Reviews*, *64*, 400. doi: https://doi.org/10.1016/j.rser.2016.06.031

[128] Rakestraw, A. (2012). Open Oceans and Marine Debris: Solutions for the Ineffective Enforcement of MARPOL Annex V. *Hastings International and Comparative Law Review*, *35*(2), 403. doi: https://repository.uchastings.edu/hastings_international_comparative_law_review/vol35/iss2/3/

[129] Borrelle, S. B., Ringma, J., Law, K. L., Monnahan, C. C., Lebreton, L., McGivern, A., Murphy, E., Jambeck, J., Leonard, G. H., Hilleary, M. A., Eriksen, M., Possingham, H. P., Fromd, H. De, Gerber, L. R., Polidoro, B., Tahir, A., Bernard, M., Mallos, N., Barnes, M., & Rochman, C. M. (2020). Predicted

Taiwanese structural engineer and architect, circularity is humanity's only chance and our only means to survive.

Long-term solutions involve moving away from just a linear economy and toward a truly circular economy.[130] Waste minimization, better sustainable production, and consumption habits are all part of the circular economy concept.[131] Then again, the problem of ocean pollution may serve as a catalyst for a shift toward better sustainable economies and behaviors.[132] Advancement toward truly sustainable societies may need increased awareness among all stakeholders in the society, necessitating all hands on deck. The nationwide and subnational governments may employ laws and other strategies to reduce and limit the utilization of single-use plastics in all sectors.[133] Including the Sustainable Development Goals (SDGs) in all sectors of government and lawmaking.

In order to solve contamination, emission, and waste disposal, corporations and academics may develop and seek innovative technological devices (there are many recycling options based on the waste's characteristics).[134] Most studies emphasize the importance of public knowledge, in keeping with the concept that collaboration between diverse actors is essential.[135] Here is where education programs and outreach efforts play a critical role in attempting to change human behavior for the sake of the planet.[136] In this case, it really is possible that subnational governments will be

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Growth in Plastic Waste Exceeds Efforts to Mitigate Plastic Pollution. *Science*, 369(6510), 1517. doi: https://doi.org/10.1126/science.aba3656

[130] Plastics policy in the EU are evolving to a more united approach. This entails a broader set of strategies than simple restrictions and pricing systems aimed exclusively at reducing the use of plastics. Progressing from a linear "take-make-consume-throw away" paradigm to a closed system in which products are constantly reused and recycled rather than destroyed at the conclusion of their existence is a key assumption of a circular plastic economy. The combination of multiple stages in the life cycle of plastic is a critical element in the transition to a circular economy. *See, Op. Cit.* Nielsen, T. D., Holmberg, K., & Stripple, J., 432.

[131] The circular economy is a plan to promote resource usage that is both responsible and cycled. The circular economy notion is based on natural cycles, such as those involving water and nutrients, in which waste becomes a resource for others. A circular economy would turn materials that have outlived their usefulness into supplies for others, completing loops in economic systems and lowering waste. Because it replaces fabrication with sufficiency, it changes economic rationale: reuse whenever feasible, recycle what cannot be reused, mend what is faulty, remanufacture what cannot be fixed. In a circular economy, recycling products and materials provides jobs and consume less energy while reducing resource use and pollution. *See,* Moraga, G., Huysveld, S., Mathieux, F., Blengini, G. A., Alaerts, L., Van Acker, K., de Meester, S., & Dewulf, J. (2019). Circular Economy Indicators: What Do They Measure? *Resources, Conservation and Recycling*, 146(November 2018), 452. doi: https://doi.org/10.1016/j.resconrec.2019.03.045; Stahel, W. R. (2016). The Circular Economy. *Nature*, 531(1), 436. doi: https://doi.org/10.1038/531435a

[132] Veiga, J. M., Vlachogianni, T., Pahl, S., Thompson, R. C., Kopke, K., Doyle, T. K., Hartley, B. L., Maes, T., Orthodoxou, D. L., Loizidou, X. I., & Alampei, I. (2016). Enhancing Public Awareness and Promoting Co-responsibility for Marine Litter in Europe: The Challenge of MARLESCO. *Marine Pollution Bulletin*, 102(2), 314. doi: https://doi.org/10.1016/j.marpolbul.2016.01.031

[133] *Op. Cit.* Löhr, A., Savelli, H., Beunen, R., Kalz, M., Ragas, A., & Van Belleghem, F., 95.

[134] Huysman, S., De Schaepmeester, J., Ragaert, K., Dewulf, J., & De Meester, S. (2017). Performance Indicators for a Circular Economy: A Case Study on Post-Industrial Plastic Waste. *Resources, Conservation and Recycling*, 120, 48. doi: https://doi.org/10.1016/j.resconrec.2017.01.013

[135] *Op. Cit.* McKinley, E., & Fletcher, S., 840; *Op. Cit.* Pahl, S., Wyles, K. J., & Thompson, R. C., 698; *Op. Cit.* Winton, D. J., Anderson, L. G., Rocliffe, S., & Loiselle, S., 135249.

[136] van der Velde, T., Milton, D. A., Lawson, T. J., Wilcox, C., Lansdell, M., Davis, G., Perkins, G., & Hardesty, B. D. (2017). Comparison of Marine Debris Data Collected by Researchers and Citizen Scientists: Is Citizen Science Data Worth the Effort? *Biological Conservation*, 208, 133. doi: https://doi.org/10.1016/j.biocon.2016.05.025; Kiessling, T., Salas, S., Mutafoglu, K., & Thiel, M. (2017).

assigned with this responsibility. According to research on the individual and societal drivers of pro-environmental motivation and behavior, people who have a thorough awareness of the ecology, its issues, and potential solutions are more likely to empathize with the ecology and engage in pro-environmental behavior.[137]

MPP is a complex environmental problem with several land- and sea-based sources and very few obvious remedies.[138] There is a lot of argument regarding whether acts and responses are most effective in different situations, and there are a lot of proposals thrown around in governmental discourse, including other things. It is becoming clear that, regardless of plan or intention, the situation would only worsen if no additional waste management measures are made. There are several measures, projects, programs, and policies aimed at reducing and preventing ocean litter. Short-term approaches that focus on streamlined waste management have the potential to be substantial. Long-term answers lead to large structural reforms, such as the move to a circular economy and behavioral shifts. Again, this demonstrates that developing and implementing long-term remedies is far from simple. Efficient MPP-fighting activities need comprehensive coordination among public and private stakeholders, throughout sectors, and across all stages from regional to central to multinational. Furthermore, the scope, timeline, and dynamism of all these acts are vastly diverse, and organization at each step in close cooperation with others is currently insufficient. That is why Indonesians must work together to improve their situation. Regardless of the fact that it is a collaborative initiative, the Indonesian government must lead the charge and implement realistic rules, guidelines, and measures to make this audacious project for sustainable development, the circular economy, a reality.

MPP at sea, contrary to popular belief, may also originate from sea-based sources like from naval vessels.[139] Furthermore, plastics at ocean have the potential to move outside geographical borders and governments, highlighting MPP as an universal and transnational issue. As a result, global cooperation and treaties will be necessary to fully solve this dilemma. The current global MPP management relies on a variety of legal tools and political objectives, but it lacks a coherent structure and a legally enforceable global accord. This is something that we, as a world community, must correct.[140] It is critical to enhance and strengthen a plastic waste management system by encouraging partnership and assistance aligned with global and regional aspirations to resolve MPP, nurture conversations on benchmarks, market-based techniques, and enhance a plastic waste control system.[141]

Who Cares About Dirty Beaches? Evaluating Environmental Awareness and Action on Coastal Litter in Chile. *Ocean and Coastal Management*, *137*(1), 91. doi: https://doi.org/10.1016/j.ocecoaman.2016.11.029; *Op. Cit.* Pettipas, S., Bernier, M., & Walker, T. R., 119.

137 Gifford, R., & Nilsson, A. (2014). Personal and Social Factors that Influence Pro-environmental Concern and Behaviour: A Review. *International Journal of Psychology*, *49*(3), 151. doi: https://doi.org/10.1002/ijop.12034

138 *Op. Cit.* Löhr, A., Savelli, H., Beunen, R., Kalz, M., Ragas, A., & Van Belleghem, F., 96.

139 Ryan, P. G., Dilley, B. J., Ronconi, R. A., & Connan, M. (2019). Rapid Increase in Asian Bottles in the South Atlantic Ocean Indicates Major Debris Inputs from Ships. *Proceedings of the National Academy of Sciences of the United States of America*, *116*(42), 20896. doi: https://doi.org/10.1073/pnas.1909818116

140 Ferraro, G., & Failler, P. (2020). Governing Plastic Pollution in the Oceans: Institutional Challenges and Areas for Action. *Environmental Science and Policy*, *112*(April), 454. doi: https://doi.org/10.1016/j.envsci.2020.06.015

141 *Op. Cit.* Wang, J., Zheng, L., & Li, J., 907.

A few of the issues of MPP abatement might be overcome by a legally enforceable document at the global scale. The consent of governments to an accord is the foundation of international treaties. The treaty-making mechanism, on the other hand, allows nations to weigh the benefits and obligations of participation, as well as to explore, clarify, and occasionally expose their interests. Convention design is a key component of environmental regulatory regime success. Treaties that are well-designed encourage collaboration, reward conformity, and deter non-compliance between treaty parties. Throughout talks, the design style may also favorably affect nations and encourage changes in national perspectives and objectives.[142] Given its complexity, an administration's sustainability mindset throughout the treaty-making procedure may be depended on that to conserve the entire planet on a worldwide scale if it has optimized national initiatives. In conclusion, current initiatives to minimize MPP have failed owing to the unique restrictions and problems of MPP control. At the municipal, national, regional, and international levels, steps were taken, involving consensual and legally enforceable rules. Despite this, the intricacy of MPP management needs approaches that take into account all viable techniques at the same time.[143]

Creating legally enforceable worldwide institution to oversee MPP will undoubtedly take time, since it will rely on agreement among governments with varying degrees of expertise, funds, and waste treatment facilities.[144] As a result, it is solely feasible as a long-term remedy. Following the adoption of international accords, the application of domestic measures has a significant impact on national conformance with their obligations. Only if global responsibilities are consciously incorporated into national laws, executed, and maintained in the area and territories that fall under government supervision can they fix the problems they confront.[145]

4. Conclusion

Indonesia cannot ignore MPP and plastic pollution intrusion into the ocean, given projected expansion in economy, population explosion, and plastic consumption. There are infrastructural advances that might be used to combat plastic pollution into the environment. Considering the innovation that develops from need, different innovative, cooperative ways to solve this developing environmental catastrophe that has developed into humankind's twenty-first-century disaster will undoubtedly be employed. The MPP is a life-or-death situation that requires anyone's help. This study lists five constraints and problems that must be solved in order to assist avoid an impending marine ecological disaster. Given our present comprehension of the ocean, the difficulties may look insurmountable; yet, if we react now, a hopeful and sustainable future for the oceans is achievable. Our top objective must be to move swiftly and seriously, with a significant rise in ambitions.

Successful initiatives aimed at a wide range of objectives, including changing human behavior, introducing contemporary technology, organizing, implementing, and

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142 *Op. Cit.* Wysocki, I. T., & Billon, P. Le., 94.
143 *Ibid.*, p. 99.
144 *Op. Cit.* Ferraro, G., & Failler, P., 455.
145 Vince, J., & Hardesty, B. D. (2017). Plastic Pollution Challenges in Marine and Coastal Environments: From Local to Global Governance. *Restoration Ecology*, 25(1), 124. doi: https://doi.org/10.1111/rec.12388

executing a plethora of strategies, regulations, and legislation, full-scale improvement of current production techniques, and waste treatment. This implies that customers, manufacturers, politicians, governments, communities, visitors, businesses, companies, and a variety of other stakeholders take an involved role. A transition towards more sustainable and inclusive economies may necessitate more awareness and coordination among all parties. In a nutshell, this is all hands on deck!

The first goal, above all others, is to establish short-term remedies that aggressively combat MPP. A series of replies and proposals are offered below that could significantly reduce plastic trash in the marine environment. The answer, in the author's perspective, extends past recycling and reuse strategies. It surely necessitates a reduction in the utilization of single-use plastics as well as a drastic reduction in their worldwide manufacturing. To achieve long-term efficiency, it will be necessary to adopt a circular economy across the country in order to limit the outflow of plastic garbage into the oceans on a larger scale. This paper argued that by adopting the recommendations, the Indonesian authorities may effectively overcome the barriers to strategy targeting MPP and reap the advantages. Nonetheless, each locality is unique, and this paper should only be used as a guide. We do not have much time, so we need to act quickly.

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