Indonesia Law Review

Volume 10 | Number 1 Article 6

4-30-2020

LEGAL ISSUES ON INDONESIAN MARINE PLASTIC DEBRIS POLLUTION

Zhen Jing
"Department of Environment and Natural Resources Protection Law, Northeast Forestry University (NEFU), China"

Sutikno Sutikno
"Department of Environment and Natural Resources Protection Law, Northeast Forestry University (NEFU), China ", sutikno@nefu.edu.cn

Recommended Citation

Jing, Zhen and Sutikno, Sutikno (2020) "LEGAL ISSUES ON INDONESIAN MARINE PLASTIC DEBRIS POLLUTION," *Indonesia Law Review*: Vol. 10 : No. 1 , Article 6.
DOI: 10.15742/ilrev.v10n1.592
Available at: https://scholarhub.ui.ac.id/ilrev/vol10/iss1/6

Indonesia Law Review (2020) 1: 87-110
ISSN: 2088-8430 | e-ISSN: 2356-2129

LEGAL ISSUES ON INDONESIAN MARINE PLASTIC DEBRIS POLLUTION

Zhen Jing* & Sutikno*

* Department of Environment and Natural Resources Protection Law, Northeast Forestry University (NEFU), China

Article Info

Received : 14 January 2020 | **Received in revised form :** 10 March 2020 | **Accepted :** 14 April 2020

Corresponding author's e-mail : sutikno@nefu.edu.cn

Abstract

Various problems related to marine plastic debris pollution have yet to be resolved. Therefore, the definition, categorization, origin, and degradation of marine plastic debris must be thoroughly investigated to gain a comprehensive understanding of the related issues. The presence of marine plastic debris has significant implications on marine environments, including ecological, biodiversity, health, and economic impacts. Marine plastic debris originates from both land- and ocean-based sources, and there have been efforts to prevent or reduce its introduction and accumulation in the marine environment. In Indonesia, such a problem must be solved through the implementation of more effective, efficient, and specific regulations, especially because it is the second-largest contributor of plastic debris in the marine environments throughout the world. In order to reduce 70% of such debris by 2025, the Government of Indonesia established the National Coordination Team of Marine Debris Management, which is tasked to draft policies and carry out coordination, control, and evaluation related to marine plastic debris pollution. The law enforcement in marine plastic debris pollution is known as the legal system, which comprises the substance of the law, facilities, society and culture, and the officers enforcing the law. The effectiveness of law enforcement refers to the ideal combination of these aforementioned elements.

Keywords: *marine plastic debris, law enforcement, national coordination team, marine environment, Indonesia*

Abstrak

Masalah polusi sampah plastik laut belum terpecahkan. Oleh karena itu, definisi, kategorisasi, asal, dan degradasi sampah plastik laut perlu dijelaskan untuk pemahaman yang menyeluruh. Sampah plastik laut menghasilkan implikasi yang signifikan bagi lingkungan laut, seperti dampak ekologi, dampak keanekaragaman hayati, dampak kesehatan, dan dampak ekonomi. Sampah plastik laut berasal dari sumber berbasis darat dan sumber berbasis laut; upaya untuk mencegah atau mengurangi introduksi dan akumulasi di lingkungan laut perlu menyelesaikan masalah ini melalui regulasi yang lebih efektif, efisien, dan spesifik yang diterapkan di Indonesia. Indonesia adalah negara terbesar kedua di dunia sebagai penyumbang sampah plastik di lingkungan laut. Untuk mengurangi 70 persen dari sampah plastik sampai pada tahun 2025, Pemerintah Indonesia membentuk Tim Koordinasi Nasional Pengelolaan Sampah Laut yang bertugas membuat kebijakan, koordinasi, kontrol, dan evaluasi terkait dengan sampah plastik laut. Penegakan hukum dalam pencemaran sampah plastik laut mengacu pada yang dikenal sebagai sistem hukum yaitu substansi hukum, fasilitas, masyarakat dan budaya, dan aparat penegak hukum. Efektivitas penegakan hukum mengacu pada kombinasi substansi hukum, fasilitas, masyarakat dan budaya, dan aparat penegak hukum.

Kata kunci*: sampah plastik laut, penegakan hukum, tim koordinasi nasional, lingkungan laut, Indonesia*

DOI : http://dx.doi.org/10.15742/ilrev.v10n1.592

I. INTRODUCTION

The Republic of Indonesia is a country located in Southeast Asia and Australasia/ Oceania. The Indonesian territory is 3,977 miles between the Pacific Ocean and Indian Ocean, and has a land and sea area of 5,180,053 km2. It is the country that has the most number of islands in the world, with 17,508 islands, the largest of which is Borneo Island. According to the Central Bureau of Statistics, the population stands at 237,641,326 people,[1] making it the fourth largest population in the world.[2]

The term "Archipelagic Country" is regulated in Article 46 of the UNCLOS 1982[3] and the Indonesian Waters Act (No. 6/1996).[4] An archipelagic country is a country that consists entirely of one or more islands and can include other islands.

Marine plastic debris is introduced via land- and ocean-based sources,[5] which cover two-thirds of Indonesia's total area. The problem of marine debris pollution has worsened over the years and has had an extraordinary impact on the marine ecosystem. Aside from polluting the marine environment, marine plastic debris also causes the death of marine animals. At present, Indonesia is ranked second in the world in terms of producing plastic debris in the marine environment, generating a staggering 187.2 million tons.[6]

According to recent research, plastic debris can flow into the marine environment due to several factors, including sea activity, river flow, and population density. An estimated 52.5 trillion tons of marine plastic debris are floating in the marine environment.[7] In his research, McKinsey reported that there are two main triggers for the leakage of plastic debris: plastic debris that is not collected and the production of low-quality plastic.[8]

The widespread use of plastic materials in daily life can be attributed to its advantages, such as its light weight, strength, durability, and cheap cost. However, as a major contaminant, plastic is also very dangerous for the marine environment. Furthermore, plastic cannot be easily decomposed on soil or water, which means it can settle and accumulate for a long time.

---

[1] Badan Pusat Statistik, "Sensus Penduduk 2010-Indonesia," https://sp2010.bps.go.id, accessed 10 September 2019.

[2] United Nations, Department of Economic and Social Affairs, *World Population Prospects 2019,* (August 2019).

[3] The United Nations Convention on the Law of the Sea (UNCLOS), has another name, the Law of the Sea Treaty or the Law of the Sea Convention.

[4] Indonesia, *Undang-Undang tentang Perairan Indonesian* (*Law regarding Indonesian Waters*), UU No. 6 Tahun 1996, LN No. 73 Tahun 1996 (Law Number 6 Year 1996, SG No. 73 Year 1996), art. 1.

[5] Elena, Hengstmann, Dennis Gräwe, Matthias Tamminga, and Elke Kerstin Fischer, "Marine Litter Abundance and Distribution on Beaches on the Isle of Rügen Considering the Influence of Exposition, Morphology and Recreational Activities," Marine Pollution Bulletin 115, no. 1–2 (2017): 297–306, accessed 10 September 2019, https://doi.org/10.1016/j.marpolbul.2016.12.026.

[6] Jenna Jambeck, "Plastic Waste Inputs from Land into the Ocean United Nations Open-Ended Informal Consultative Process on Oceans and the Law of the Sea," (June 2016): 769, accessed 10 September 2019, https://doi.org/10.1126/science.1260352.

[7] Dirk, Xanthos, and Tony R. Walker, "International Policies to Reduce Plastic Marine Pollution from Single-Use Plastics (Plastic Bags and Microbeads): A Review," Marine Pollution Bulletin 118, no. 1–2 (2017): 17–26, accessed 10 September 2019, https://doi.org/10.1016/j.marpolbul.2017.02.048.

[8] McKinsey, "Stemming the Tide : Land-Based Strategies for a Plastic- Free Ocean," (2015), accessed 11 September 2019, http://www.oceanconservancy.org/our-work/marine-debris/stop-plastic-trash-2015.html.

Marine plastic debris pollution originates from the waste produced by humans who directly dispose of plastic debris into the marine environment. The amount of marine plastic debris has continued to increase over the years, making up almost 60%–80% of all marine debris.[9]

II. MARINE PLASTIC DEBRIS PROBLEMS IN INDONESIA

At present, Indonesia is experiencing a severe problem with marine debris pollution, especially plastic. There are several ways plastic debris can enter the marine environment, such as through illegal dumping into the sea, through streams, plastic debris produced in coastal areas, and trough industrial and fishing activities.[10] The accumulation of plastic debris is the biggest marine debris problem in Indonesia—one that continues to show a trend of increasing damage to the marine environment each year. Unfortunately, plastic debris management in Indonesia remains inadequate. Moreover, the majority of Indonesian people have adopted a "throwaway culture" in everyday life, as can be seen in the use of plastic in food and drink packaging.

Marine debris pollution is a problem faced by the country in relation to its goal of protecting the marine environment and achieving sustainable development in the future. The Director of the Association of Southeast Asian Nations Cooperation of the Indonesian Ministry of Foreign Affairs, Jose Tavares,[11] said that plastic debris originating from the land and dumped into the waters amounts to 80% of the total debris in the marine environment. Unmanaged plastic debris and the pattern of people carelessly throwing debris into the rivers or coastal areas have worsened the pollution. Surface water, both flowing and inundated (e.g., lakes, reservoirs, and swamps), and some subsurface water (rivers) combine to form the main rivers that carry all surface water around the watershed to the marine environment. Indonesia's coastal areas make up 50% of the land area in which a total of 87.2 million people live.[12] These are the main reasons why plastic debris is accumulated in the marine environment.

The contamination of marine plastic debris is a major issue not only because of the ecological impacts, but also because of the impacts on human health, food security, and food safety.[13] Plastic can be fragmented in small sizes and can thus be easily consumed by marine biota, even by small invertebrates. A study conducted in 2015 at the deep marine in the southwest Sumatra concluded that plastic material can be found in 8 of the 10 sampling locations. Although plastic particles are mostly found at depths

[9] Noir P. Purba, Dannisa I.W. Handyman, Tri D. Pribadi, Agung D. Syakti, Widodo S. Pranowo, Andrew Harvey, and Yudi N. Ihsan, "Marine Debris in Indonesia: A Review of Research and Status," Marine Pollution Bulletin 146, (May2019): 134–44, accessed 11 September 2019, https://doi.org/10.1016/j.marpolbul.2019.05.057.

[10] W. C. Li, H. F. Tse, and L. Fok, "Plastic Waste in the Marine Environment: A Review of Sources, Occurrence and Effects," Science of the Total Environment 566–567 (2016): 333–49, accessed 12 September 2019, https://doi.org/10.1016/j.scitotenv.2016.05.084.

[11] M Ambari, "Sampah Plastik Semakin Ancam Laut Indonesia, Seperti Apa?," https://www.mongabay.co.id/2017/09/18/sampah-plastik-semakin-ancam-laut-indonesia-seperti-apa/, accessed 12 September 2019.

[12] Jambeck, "Plastic Waste Inputs"

[13] Luís Gabriel Antão Barboza, A. Dick Vethaak, Beatriz R.B.O. Lavorante, Anne Katrine Lundebye, and Lúcia Guilhermino, "Marine Microplastic Debris: An Emerging Issue for Food Security, Food Safety and Human Health," Marine Pollution Bulletin 133, (January 2018): 336–48, accessed 19 September 2019, https://doi.org/10.1016/j.marpolbul.2018.05.047.

less than 500 meters, this study found that plastic has also penetrated pristine areas at a depth of 2000 meters.[14] It can be said that, today, we have lived with plastic that has spread globally. Plastic materials have already been fragmented into micro-sized and nano-sized ones and have spread to the seabed, making it virtually impossible to collect all the accumulated marine plastic debris.

A. Definition of Marine Plastic Debris Pollution

The term "marine plastic debris" refers to man-made materials that have been discarded, disposed of, or abandoned in the marine environment. Marine plastic debris is definitely characterized as man-made plastic waste that has deliberately or accidentally become afloat in the marine environment.

Plastic debris/litter and microplastics are ubiquitous in the ocean, occurring on remote shorelines, in coastal waters, the seabed of the deep ocean and floating on the sea surface; the quantity observed floating in the open ocean in mid-ocean gyres appears to represent a small fraction of the total input.[15]

B. Categorization of Marine Plastic Debris Pollution

Marine plastic debris pollution can be subdivided into three categories: (1) *macroplastics*, (2) *microplastics*, and (3) *nanoplastics*.[16] Macroplastics are large (>20 mm) plastic debris, such as plastic bottles, Styrofoam, and fishing nets, which are found in the marine environment

Microplastics are small plastic fragments that are typically less than (<10 mm) and are derived from the breakdown of macroplastic.[17] Several studies have reported that there are differences related to microplastic size, ranging in diameters of <1 mm,[18] <2 mm,[19] 2–6 mm,[20] <5 mm,[21] and <10 mm.[22] Such differences make it difficult to compare

[14] Muhammad Reza Cordova, "Microplastic in the Deep-Sea Sediment of Southwestern Sumatera Waters," (2016): 27–35, accessed 19 September 2019, https://doi.org/10.14203/mri.v41i1.99.

[15] Peter J Kershaw, "Marine Plastic Debris. Global Lessons and Research to Inspire Action," Unep, (2016): 1–192, accessed 25 September 2019, https://doi.org/10.1017/CBO9781107415324.004.

[16] Joanna Vince, and Peter Stoett, "From Problem to Crisis to Interdisciplinary Solutions: Plastic Marine Debris," Marine Policy 96, (May 2018): 200–203, accessed 25 September 2019, https://doi.org/10.1016/j.marpol.2018.05.006.

[17] Matthew Cole, Pennie Lindeque, Claudia Halsband, and Tamara S. Galloway, "Microplastics as Contaminants in the Marine Environment: A Review," Marine Pollution Bulletin 62, no. 12 (2011): 2588–97, accessed 25 September 2019, https://doi.org/10.1016/j.marpolbul.2011.09.025.

[18] Michiel Claessens, Steven De Meester, Lieve Van Landuyt, Karen De Clerck, and Colin R. Janssen, "Occurrence and Distribution of Microplastics in Marine Sediments along the Belgian Coast," Marine Pollution Bulletin 62, no. 10 (2011): 2199–2204, accessed 26 September 2019, https://doi.org/10.1016/j.marpolbul.2011.06.030.

[19] Peter G. Ryan, Charles J. Moore, Jan A. Van Franeker, and Coleen L. Moloney, "Monitoring the Abundance of Plastic Debris in the Marine Environment," Philosophical Transactions of the Royal Society B: Biological Sciences 364, no. 1526 (2009): 1999–2012, accessed 26 September 2019, https://doi.org/10.1098/rstb.2008.0207.

[20] José G.B. Derraik, "The Pollution of the Marine Environment by Plastic Debris: A Review," Marine Pollution Bulletin 44, no. 9 (2002): 842–52, accessed 26 September 2019, https://doi.org/10.1016/S0025-326X(02)00220-5.

[21] Kellyn Betts, "Why Small Plastic Particles May Pose a Big Problem in the Oceans," Environmental Science and Technology 42, no. 24 (2008): 8996, accessed 26 September 2019, https://doi.org/10.1021/es802970v.

[22] Erin R. Graham, and Joseph T. Thompson, "Deposit- and Suspension-Feeding Sea Cucumbers (Echi-

data related to microplastic. Microplastics are not soluble in water but can be easily mixed in water and consumed by aquatic organisms.

Nanoplastics are tiny plastic fragments that are typically less than (<100 mm) that are derived from the breakdown of microplastics. Nanoplastic particles are initially absorbed by marine plants, such as algae, then eaten by small fish planktons, and eventually consumed by large fishes (from anchovies to whales) and then eaten by humans.[23] Nanoplastics have several severe effects, including those on bacteria, algae, echinoderms, rotifers, mollusks, and arthropods.[24]

C. Origin of Marine Plastic Debris Pollution

Marine plastic debris pollution can be divided into two categories. (1) The first consists of debris from land-based sources, which is the most significant source of marine plastic debris in the marine environment. Such marine plastic debris commonly originates from waterfront areas, including riverbanks, piers, beaches, marinas, harbors, and docks. Land-based sources of marine plastic debris include the following: stormwater discharges, combined sewer overflows, littering, solid waste disposal, and landfills, and industrial activities.[25] (2) The second category consists of debris from ocean-based sources of marine plastic debris pollution, which can flow into the marine environment from various sources. Ocean-based sources of marine plastic debris include the following: commercial fishing, recreational boaters, merchants, military and research vessels, and offshore oil and gas platforms and exploration.

Indonesia, as an archipelagic country, is in the flow of the world. Marine plastic debris may come from two sources. The first is debris generated by human activities, which is thrown into the marine directly or carried by rivers. Nearly 10% of the total plastics produced are discharged into the river and lead to one point: the marine environment. The second is marine plastic debris from other countries carried through the waters and trapped in the marine environment. Hence, the amount of plastic debris increasingly settles in the Indonesian marine environment.

D. Degradation Resulting from Marine Plastic Debris Pollution

Marine plastic debris can naturally become transformed into smaller ones, because there are factors from the ultraviolet (UV) light activity and the abrasion resulting from a wave action. Hence, the plastic debris that empties out into the vast seas will be degraded to particles measuring less than 1 micrometer (microplastic).[26]

---

nodermata) Ingest Plastic Fragments," Journal of Experimental Marine Biology and Ecology 368, no. 1 (2009): 22–29, accessed 26 September 2019, https://doi.org/10.1016/j.jembe.2008.09.007.

[23] Hamzah Lubis, " Ketika Nano Plastik Masuk Ke Pembuluh Otak," https://nuecoreligioncenter.blogspot.com/2018/02/ketika-nano-plastik-masuk-ke-pembuluh.html, accessed 27 September 2019.

[24] Inês Ferreira, Cátia Venâncio, Isabel Lopes, and Miguel Oliveira, "Nanoplastics and Marine Organisms: What Has Been Studied?," Environmental Toxicology and Pharmacology 67, (January 2019): 1–7, accessed 27 September 2019, https://doi.org/10.1016/j.etap.2019.01.006.

[25] Michelle Allsopp, Walters Adam, Santillo David, and Johnston Paul-Greenpeace, "Plastic Debris in the World's Oceans," (2012), accessed 27 September 2019, http://www.greenpeace.to/greenpeace/wp-content/uploads/2011/05/plastic_ocean_report.pdf

[26] Richard C Thompson, Ylva Olsen, Richard P Mitchell, Anthony Davis, Steven J Rowland, Anthony W G John, Daniel Mcgonigle, and Andrea E Russell, "Lost at Sea: Where Is All the Plastic?," 304, (May2004): 2004, accessed 7 October 2019, https://doi.org/DOI: 10.1126/science.1094559.

Microplastics are small plastic particles that are less than 1 mm.[27] These have a density lower than that of water, which causes them to float in the marine environment. The influence of microorganisms and other particles can cause these microplastics to sink.[28]

As they can be eaten by marine animals, microplastics have the potential to adversely affect such animals.[29] One study explained that microplastics are formed due to the influence of sun exposure, the presence of currents, and the influence of microbes that can cause degradation. Microplastics with high density tend to settle down and accumulate in marine sediments, while those with low density tend to float in the sea environment.

III.IMPACTS OF MARINE PLASTIC DEBRIS POLLUTION ON INDONESIA

A. Impact of Marine Plastic Debris on the Ecology

Indonesia is a country with a rich and diverse marine biodiversity. The area includes three biogeographical regions and is a sanctuary for marine life consisting of species of corals, mangroves, and vast seagrass beds.

The negative impacts of marine debris, particularly plastics, on wildlife and ecosystems are well-documented. Marine debris also affects livelihoods, such as fisheries, and public health, such as the ingestion of pollutants indirectly through the consumption of fishes that consume debris.[30]

Unfortunately, the Indonesian ecosystem is in jeopardy as waste materials continue to be dumped and leaked into these areas. Along with population growth in coastal areas and the rapid pace of urbanization, the level of pollution that penetrates and damages various ecosystems can also increase in the coming years, thud worsening the existing conditions. Marine plastic debris can directly affect marine ecosystems, such as beaches, wetlands, coral species, and wildlife. The impact of marine plastic debris depends on the marine plastic debris type, category, and location.

B. Impact of Marine Plastic Debris on Biodiversity

Several factors have a declining impact on biodiversity in Indonesia: 1. Rapid population growth and poverty in coastal areas. 2. Lack of implementation policy and weak enforcement. 3. Lack of awareness of the strategic importance of coastal and marine resources for sustainable economic development. 4. Lack of political will to

[27] Mark Anthony Browne, Phillip Crump, Stewart J Niven, Emma Teuten, Andrew Tonkin, Tamara Galloway, and Richard Thompson, "Accumulation of Microplastic on Shorelines Woldwide: Sources and Sinks," (2011): 9175–79, accessed 7 October 2019, https://doi.org/dx.doi.org/10.1021/es201811s.

[28] Lucy C Woodall, Anna Sanchez-vidal, Gordon L J Paterson, Rachel Coppock, Victoria Sleight, Antonio Calafat, Alex D Rogers, Bhavani E Narayanaswamy, and Richard C Thompson, "The Deep Sea Is a Major Sink for Microplastic Debris Subject Category: Subject Areas: Author for Correspondence:," (2014), accessed 7 October 2019, https://doi.org/http://dx.doi.org/10.1098/rsos.140317.

[29] Stephanie L Wright, Richard C Thompson, and Tamara S Galloway, "The Physical Impacts of Microplastics on Marine Organisms: A Review," Environmental Pollution 178 (2013): 483–92, accessed 9 October 2019, https://doi.org/10.1016/j.envpol.2013.02.031.

[30] Christine Sur, Jessica M. Abbott, Rohani Ambo-Rappe, Nenni Asriani, Sarah O. Hameed, Brittany M. Jellison, Hasriani A. Lestari, et al., "Marine Debris on Small Islands: Insights from an Educational Outreach Program in the Spermonde Archipelago, Indonesia," Frontiers in Marine Science 5, (February 2018): 1–5, accessed 15 October 2019, https://doi.org/10.3389/fmars.2018.00035.

apply sustainable development principles in marine resource utilization. 5. Lack of recognition of "adat" (local tradition) rights and indigenous knowledge, community-based participation, and empowerment to local government. 6. Lack of integrated approaches in coastal and marine resource development. 7. Lack of capable human resources. 8. Lack of information as a basis for rational and optimal marine resource management, and weak system to access available information.[31]

In a study conducted by Rochman, several types of marine plastic debris have been found in marine biota. This type of microplastic, consisting of 60% fragments, 37% foam, 2% films, and 1% monofilament, was observed using a microscope at certain magnifications and was found in several species of fish and seafood.[32] On November 19, 2018, a dead sperm whale was found in the marine area of Kapota Island, Wakatobi Regency, Southeast Sulawesi, Indonesia.[33] According to the identification of the Wakatobi Marine and Fisheries Community Academy, the whale's stomach contains plastic debris of various types with a total weight of 5.9 kilograms.[34]

In this case, microplastics can be more dangerous than larger plastic debris. It is because such microplastics can be digested by marine biota and can accumulate in their bodies. Due to their tiny size, microplastics are mistaken for food by marine biota.[35] They float in the waters and are indirectly swallowed by zooplanktons and biota, such as fish.

C. Impact of Marine Plastic Debris on Health

Plastics are contaminants that have been globally distributed throughout the marine environments because they are durable and can easily float. The existence of microplastics on the ecosystem has a harmful impact on the biota and consumers.[36] Mainly, the consumption of plastic can cause marine biota to experience metabolic disorders, irritation of the digestive system, and even death.

According to a study conducted by the Ocean Conservancy, about 28% of fishes found in Indonesian waters have ingested plastic.[37] As plastics can easily absorb toxins and chemicals that are in the environment, they can be indirect sources of

[31] Malikusworo Hutomo, and Mohammad Kasim Moosa, "Indonesian Marine and Coastal Biodiversity: Present Status," Indian Journal of Marine Sciences 34, no. 1 (2005): 88–97, accessed 18 October 2019, https://www.researchgate.net/publication/240629853_Indonesian_marine_and_coastal_biodiversity_Present_status.

[32] Chelsea M Rochman, Akbar Tahir, Susan L Williams, Dolores V Baxa, Rosalyn Lam, Jeffrey T Miller, Foo-ching Teh, Shinta Werorilangi, and Swee J The, "Anthropogenic Debris in Seafood: Plastic Debris and Fibers from Textiles in Fish and Bivalves Sold for Human Consumption," Nature Publishing Group, (August 2015): 1–10, accessed 18 October 2019, https://doi.org/10.1038/srep14340.

[33] https://www.reuters.com/article/us-indonesia-whale/sperm-whale-washed-up-in-indonesia-had-plastic-bottles-bags-in-stomach-idUSKCN1NP11F, accessed 18 October 2019.

[34] https://www.thejakartapost.com/news/2018/11/20/6-kg-of-garbage-found-in-dead-whales-stomach-in-wakatobi.html, accessed 18 October 2019.

[35] Lisbeth Van Cauwenberghe, Ann Vanreusel, Jan Mees, and Colin R Janssen, "Microplastic Pollution in Deep-Sea Sediments," Environmental Pollution 182 (2013): 495–99, accessed 19 October 2019, https://doi.org/10.1016/j.envpol.2013.08.013.

[36] Madeleine Smith, David C. Love, Chelsea M. Rochman, and Roni A. Neff, "Microplastics in Seafood and the Implications for Human Health," Current Environmental Health Reports 5, no. 3 (2018): 375–86, accessed 19 October 2019, https://doi.org/10.1007/s40572-018-0206-z.

[37] Trash Free Seas Alliance, "Mobilize public, private and philanthropic resources to reduce the amount of plastic flowing into the ocean," https://oceanconference.un.org/commitments/?id=18166, accessed 18 October 2019.

food contaminants. Moreover, microplastics can increase the accumulation and transfer of several pollutant compounds,[38] including phthalates,[39] bisphenol A (BPA),[40] polycyclic aromatic hydrocarbons, polychlorinated biphenyls (PCB), nonylphenol, and dichlorodiphenyltrichloroethane (DDT). These pollutant compounds in the body of marine biota can enter the human body through the food chain. This can occur if consumers directly or indirectly consume seafood that contaminated with microplastic.[41]

D. Impact of Marine Plastic Debris on Economic

Aside from its ecological, biodiversity, and health impacts, marine plastic debris also has highly significant economic impacts. Although comprehensive economic assessments have yet to be made, data on certain cases are already available.

Marine plastic debris can affect economic losses directly, such as tourism, damaged vessels, loss of fishing gear, losses in catch revenues, and human injuries. In Indonesia, marine plastic debris pollution has caused revenue losses of up to US$140 million in the tourism sector and US$31 million in the fishing sector, for a combined total of US$171 million.[42] On a global scale, the economic losses due to marine plastic debris reached US$2.5 trillion per year.[43]

Luhut Binsar Pandjaitan, the Maritime Coordinating Minister, recently stated that Indonesian marine plastic debris as a whole had caused considerable losses of up to US$1.2 billion for "losses in the fields of fisheries, shipping, tourism, and insurance business." This certainly has a significant impact on Indonesia, which is an archipelagic country that is very dependent on the presence of marine and marine products.[44]

---

[38] Christopher Blair Crawford, and Brian Quinn, "The Interactions of Microplastics and Chemical Pollutants," Microplastic Pollutants, (2017): 131–57, accessed 22 October 2019, https://doi.org/10.1016/b978-0-12-809406-8.00006-2.

[39] Marcia Wade, "What Are Phthalates?," https://www.webmd.com/a-to-z-guides/features/what-are-phthalates#1, accessed 22 October 2019.

[40] Brent A. Bauer, M.D., "What is BPA, and what are the concerns about BPA?," https://www.mayoclinic.org/healthy-lifestyle/nutrition-and-healthy-eating/expert-answers/bpa/faq-20058331, accessed 22 October 2019.

[41] Outi Setälä, Vivi Fleming-Lehtinen, and Maiju Lehtiniemi, "Ingestion and Transfer of Microplastics in the Planktonic Food Web," Environmental Pollution 185 (2014): 77–83, accessed 22 October 2019, https://doi.org/10.1016/j.envpol.2013.10.013.

[42] Nanda Aria Putra, "Indonesia kehilangan pendapatan US$171 juta akibat sampah plastic," https://www.alinea.id/bisnis/indonesia-kehilangan-pendapatan-us-171-juta-akibat-sampah-plastik-b1Xjg9lka, accessed 4 November 2019.

[43] Rossi Handayani, "Polusi Plastik Sebabkan Kerugian 2,5 Triliun Dolar AS," https://www.republika.co.id/berita/internasional/amerika/19/04/06/ppirum370-polusi-plastik-sebabkan-kerugian-25-triliun-dolar-as, accessed 4 November 2019.

[44] M Ambari, "Indonesia Siapkan Dana Rp13,4 Triliun untuk Bersihkan Sampah Plastik di Laut," https://www.mongabay.co.id/2017/10/23/indonesia-siapkan-dana-rp134-triliun-untuk-bersihkan-sampah-plastik-di-laut/, accessed 4 November 2019.

IV. INSUFFICIENT LEGISLATION ON INDONESIAN MARINE PLASTIC DEBRIS POLLUTION

A. Indonesian Constitution of 1945

Regulations regarding the protection and management of the environment must be stated explicitly in the constitution, considering that the issues and interests regarding the critical environment due to development activities will add to the damage and pollution sustained by such an environment. Regulations in this constitution will serve as the basis for the legislation below so that all regulations will come from the constitution, which is oriented toward the preservation of the green constitution.[45]

Every person has the right to live in physical and spiritual prosperity, to live, and to get a good and healthy environment and the right to receive health services.[46]

In accordance with the development of global environmental problems and their placement in the constitution, the development of international environmental law concerning state responsibility for environmental protection and management is stated in Article 2 of the 1992 Rio Declaration.

States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental and developmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction.[47]

B. Protection and Management of the Environment Act (No. 32/2009)

In order to maintain the sustainability of the Indonesian marine environment, further sustainable development[48] must be carried out thoroughly while considering the needs of the present and future generations. Moreover, to ensure legal certainty so that people have the awareness and become motivated to participate in preserving the marine environment, the government has prepared legal instruments, especially environmental law, to ensnare pollutants and environmental destroyers. The law in question is Law Number 4 of 1982, which concerns the environment, as well as Law Number 23 of 1997, which is about environmental management. The latter has been refined with the latest law, namely Law Number 32 of the Year 2009, which concerns environmental protection and management.

Every compilation of laws and regulations at the national and regional levels must pay attention to the protection of environmental functions and the principles of environmental protection and management by the provisions stipulated in this Law.[49]

---

[45] Sekar Anggun Gading Pinilih, "The Green Constitution Concept in the 1945 Constitution of the Republic of Indonesia," Mimbar Hukum - Fakultas Hukum Universitas Gadjah Mada 30, no. 1 (2018): 200, accessed 5 November 2019, https://doi.org/10.22146/jmh.28684.

[46] Indonesia, *Undang-Undang Dasar Negara Repubik Indonesia Tahun 1945* (*Indonesian Constitution of 1945*), art. 28H (1).

[47] *1992 Rio Declaration on Environment and Development*, Rio de Janeiro, 14 June 1992, *United Nations Conference*, art. 2.

[48] Sustainable development is a concept that aims to creating balance between dimensions development, such as economic, social and environment.

[49] Indonesia, *Undang-Undang tentang Perlindungan dan Pengelolaan Lingkungan Hidup* (*Law regarding Protection and Environmental Management*), UU No. 32 Tahun 2009, LN No. 140 Tahun 2009 (Law Number 32 Year 2009, SG No. 140 Year 2009), art. 44.

Based on these rules, the entire formation of legislation, starting from the central government level to the regional government level, must be based on the principles of environmental protection and management. This is because environmental protection and management demands the development of an integrated system in the form of a national policy on environmental protection and management, which must be carried out under the principles and the consequences from the central government level to the regional government level. In this regard, there exists a need to develop a legal system for environmental protection and management that is clear and comprehensive, in order to ensure legal certainty as a basis for the protection and management of natural resources and ensuring sustainable development.

C. Waste Management Act (No. 18/2008)

The problem of waste, especially plastic waste, has been discussed by all countries and various organizations related to environmental issues. Therefore, solid waste management has been following the methods and techniques of environmental management that do not harm public health and the environment. In Indonesia, waste has become a national problem that must be dealt with thoroughly in an integrated manner. One of the ways is by making policies and regulations related to waste, and the Indonesian government makes laws on waste management.

In explaining this law was made to: 1. Legal certainty for people to get good and environmentally sound waste management services. 2. Firmness regarding the prohibition of entering and/or importing waste into the territory of the Republic of Indonesia. 3. Order in Managing Waste Management. 4. Clarity of duties, authorities, and responsibilities of the Government and regional government in waste management. 5. Clarity between the definition of waste regulated in this law and the definition of waste as stipulated in the Law on Environmental Management.[50]

The definition of "waste management" is contained in Article 1, No. 5, of the Waste Management Act (No. 18 /2008) "Waste management is a systematic, comprehensive, and sustainable activity that includes the reduction and handling of waste." In Article 2 of the Waste Management Act (No. 18 /2008), the type of waste related to marine debris, especially marine plastic debris, is not explicitly mentioned. There are only three types of waste regulated in this law, namely, household waste,[51] one type of household waste,[52] and specific waste. In this case, the promulgation of this law does not accommodate marine plastic debris; hence, this has resulted in the suboptimal handling of marine plastic debris problems in the country.

D. Government Regulation of Managing Household Waste and One Type of Household Waste (No. 81/2012)

The Indonesian government has established the Government Regulation Number 81 Year 2012 concerning the management of Household Waste and One Type of Household Waste as the implementing regulations of the Waste Management Act (No.

[50] Indonesia, *Undang-Undang tentang Pengelolaan Sampah* (*Law regarding Waste Management*), UU No. 18 Tahun 2008, LN No. 69 Tahun 2008 (Law Number 18 Year 2008, SG No. 69 Year 2008).

[51] Household waste is waste originating from daily activities in the household that do not include specific feces and rubbish.

[52] One type of household waste is household waste originating from commercial areas, industrial areas, special areas, social facilities, public facilities, and / or other facilities.

18/2008). This regulation was created to preserve environmental functions, public health, and waste as a resource.[53]

The Household Waste and One Type of Household Waste classifications cover all kinds of rubbish on land. The management of debris on land needs to be carried out optimally and in an integrated manner so as to prevent them from entering the marine environment. As it is known that the origins of marine plastic debris come from land and the sea, waste that is not appropriately managed on land will flow to the sea through various methods through the river basin output areas, population densities, and maritime activities. There are three sources of leakage, namely, improper disposal of waste that has been collected, uncollected waste that is disposed of illegally on land, and uncollected waste thrown directly into the marine environment.

Based on Article 6 of Government Regulation No. 81 Year 2012, which concerns the management of the two types of waste mentioned earlier (Household Waste and One Type of Household Waste), the government issued implementing regulations, namely, the Presidential Regulation No. 97 Year 2017, which deals with the national policies and strategies for the management of household waste. This presidential regulation determines the direction of integrated and sustainable policies and strategies in the reduction and handling of household waste and similar household waste at the regional-level provinces as well as the regencies/cities.

E. Minister of Home Affairs of Managing Waste Management (No. 33/2010)

Prior to the Government Regulation No. 81 Year 2012 concerning the management of Household Waste and One Type of Household Waste, the Minister of Home Affairs issued Minister of Home Affairs of Managing Waste Management (No. 33/2010), which became the basis upon which local governments implemented waste management measure. Waste management must be carried out comprehensively on a national scale, starting from ministers, governors, regents, and mayors.

Based on Article 2 of The Minister of Home Affairs of Managing Waste Management (No. 33/2010), the local government prepares a plan for reducing and handling waste as outlined in the strategic plan and annual work plan of the local work units. These plans must at least contain the following: (1) targets for waste reduction; (2) targets for the provision of facilities and infrastructure for the reduction and handling of waste from waste sources to final disposal sites; (3) patterns of development of local cooperation, partnerships and community participation; and (4) financing needs borne by the local government.[54]

The substance of this regulation is more voluntary for local governments, so there are no sanctions or legal consequences for local governments if they do not implement these regulations, whereas good waste management is waste management that is started and implemented in each region. If waste management in the area is not carried out optimally, it is not possible to manage waste at a national level.

---

[53] Indonesia, *Peraturan Pemerintah tentang Pengelolaan Sampah Rumah Tangga dan Sampah Sejenis Sampah Rumah Tangga* (*Government Regulation of Managing Household Waste and One Type of Household Waste*), PP No. 81 Tahun 2012 (Government Regulation No. 81 Year 2012), art. 2.

[54] Indonesia, *Peraturan Menteri Dalam Negeri tentang Pedoman Pengelolaan Sampah* (*Minister of Home Affairs Regulation concerning Guidelines for Waste Management*). PM No. 33 Tahun 2010 (Minister Regulation No. 33 Year 2010), art. 2.

F. Minister of Environment Regulation of Operating Procedure for Reduce, Reuse, Recycle through Waste Banks (No. 13/2012)

Thus far, waste management has not applied the principles of reducing, reusing, and recycling, which has a negative impact on public health and the environment. Under these conditions, the government needs to implement the Minister of Environment Regulation No. 13 Year 2012 concerning the Operating Procedures for Reducing, Reusing, Recycling through waste banks.

Reduce, reuse, and recycle activities or limit waste, reuse debris and recycle debris after this referred to as 3R Activities are all activities which can reduce everything that can cause debris, reuse activities debris that is suitable for use for the same function or other functions, and waste processing activities for made a new product.[55]

The government has made efforts to undertake national-level waste management by issuing regulations that prioritize the 3R (reduce-reuse-recycle) principle as well as community participation and collaboration with related parties, the local government units, producers, associations, and funders. By applying the 3R principle through a waste bank,[56] the community's role in helping the government deal with the waste problem can be enhanced. The most essential component of this regulation is the implementation of the waste bank system, which has the primary purpose of encouraging the people and the local communities to play an active role in waste segregation, waste collection, submission to waste banks, and increasing the number of waste banks. Thus, the waste bank system can be used as a tool for social engineering, facilitating the formation of a better and more integrated waste management system in the community.

The Ministry of Environment implemented the waste bank system in almost all provinces, divided into six regions: Bali and Nusa Tenggara, Java, Kalimantan, Papua, Sulawesi, and Maluku, and Sumatra. Until 2018, a total of 7,488 waste bank units have been established, and this figure has increased five times compared to that in 2014 (1,172 units).[57]

G. Presidential Regulation of Marine Debris Management (No. 83/2018)

This regulation was issued and adopted on 17 September 2018 to follow up on the commitment of the Government of Indonesia to reduce marine plastic debris by 70% until 2025.[58] The Indonesian government also created a National Action Plan to provide strategic direction for ministries, the public, and businesses in accelerating the handling of marine debris for a period of eight years, from 2018 to 2025. The Presidential Regulation No. 83 Year 2018 covers overall Marine Debris Management, including the conduct of marine debris strategies, programs, and activities that are

[55] Indonesia, *Peraturan Menteri Lingkungan tentang Pedoman Pelaksanaan Reduce, Reuse, Recycle melalui Bank Sampah* (*Guidelines for Reduce, Reuse, Recycle through Waste Banks*). PM No. 13 Tahun 2012 (Minister Regulation No. 13 Year 2012), art. 1.

[56] The waste bank is a place for sorting and collecting garbage that can be recycled and / or reused which has economic value.

[57] Dwi Hadya Jayani, "Banyak Serap Tenaga Kerja, Ini Jumlah Bank Sampah di Indonesia," https://databoks.katadata.co.id/datapublish/2019/12/27/berapa-jumlah-bank-sampah-di-indonesia, accessed 15 December 2019.

[58] Abdul Rohman, "Penanganan Sampah Laut, Pemerintah RI Targetkan Tahun 2025 Berkurang 70%," https://portaljabar.net/web/24528/penanganan-sampah-laut-pemerintah-ri-targetkan-tahun-2025-berkurang-70.html, accessed 15 December 2019.

synergic, measurable, and directed toward decreasing the amount of marine debris, especially marine plastic debris, in the marine environment.

In accordance with the mandate of the Presidential Regulation of the Republic of Indonesia No. 83/2018 concerning handling of marine debris, the Chairman of the National Coordination Team for Marine Waste Management is also assigned as the Coordinating Minister for Maritime Affairs and Investment, with the Daily Chair being the Minister of Environment and Forestry. Meanwhile, the representatives and other members came from 17 ministries and included the Minister of Industry, the Minister of Maritime Affairs and Fisheries, the Minister of Home Affairs, the Minister of Foreign Affairs, the Minister of Finance, the Minister of Transportation, the Minister of Cooperatives, the Minister for Public Works and Human Settlements, the Minister of Health, the Minister of Education and Culture, the Minister of Research and Technology, the Minister of Development Planning, Minister of Tourism, the Cabinet Secretary, and the Head of the Sea Security Agency.

The National Coordination Team of Marine Debris Management will formulate policies and coordinate all kinds of activities among the ministries, non-ministerial government agencies, regional governments, communities, and business actors dealing with the marine waste handling activities. This Presidential Regulation concluded that one of the essential aspects that inhibit the implementation of measures to curb marine plastic debris pollution is that the legal regulation system is not optimal. Some problems that arise include irregular supervision, which is the government's obligation. Furthermore, the lack of information and data documentation and coordination among institutions in conducting supervision is another roadblock in the process. Another problem is that the support system for monitoring activities for marine plastic debris pollution is still not maximally developed.

V. PERFECTION MEASURES ON INDONESIAN MARINE PLASTIC DEBRIS POLLUTION

A. Agencies Responsible for Marine Plastic Debris Pollution

The Indonesian government established the National Coordination Team of Marine Debris Management, which reports directly to the president. The structure of the National Coordination Team for Marine Waste Management consists of the following: Chairman, Coordinating Minister for Maritime Affairs;[59] the Daily Chairman, the Minister of Environment and Forestry; the Members, namely, the Minister of Home Affairs, Minister of Foreign Affairs, Minister of Finance, Minister of Industry, Minister of Transportation, Minister of Maritime Affairs and Fisheries, Minister of Public Works and Public Housing, Minister of Health, Minister of Education and Culture, Minister of Research, Technology and Higher Education, Minister of Communication and Information, Minister of Cooperatives and Small and Medium Enterprises, Minister of Tourism, Cabinet Secretary, and Head of the Marine Security Agency; Secretary, Director General of Waste, Waste and Hazardous Toxic Management, Ministry of Environment and Forestry; and the Deputy Secretary: Assistant Deputy for Utilization of Maritime Science and Technology, Coordinating Ministry of Maritime Affairs.

The National Coordination Team of Marine Debris Management has the following

[59] Currently referred to as the Coordinating Ministry for Maritime Affairs and Investment based on Presidential Regulation No. 71 of 2019 concerning the Coordinating Ministry for Maritime and Investment Affairs.

tasks: (1) coordinate the activities of ministries, non-ministerial government institutions, local governments, communities, and business actors in marine waste management activities; (2) formulate policies for solving barriers and problems that arise in the implementation of handling marine debris; and (3) coordinate the monitoring and evaluation activities related to the implementation of the action plan.

In supporting the implementation of the tasks of the National Coordination Team of Marine Debris Management, a National Action Plan for Handling Marine Debris Management was formed. There are five strategies for implementing the National Action Plan for Marine Debris Management: (1) a national movement to increase awareness among the stakeholders; (2) the management of waste originating from land; (3) waste management in the coastal area and sea; (4) funding mechanisms, institutional strengthening, supervision, and law enforcement; and (5) research and development.[60]

Damage to the marine environment due to plastic debris pollution can have disastrous results in the present and in the future if not addressed optimally. Therefore, efforts to conserve the marine environment include the implementation of very strategic programs to reduce its ecological, economic, biodiversity, and health impacts. One of the key factors in solving the marine plastic debris pollution problem is the coordination and cooperation among the ministries involved.

A for the ministries that specifically handle and control plastic debris pollution, the institution has an essential function in managing a comprehensive marine plastic debris management system, including the issuance of regulations relating to marine plastic debris management systems. The National Coordination Team of Marine Debris Management has duties and functions in the management of the marine environment, including the assessement of the impacts caused by the process of making plastic and plastic products, which are unused and disposed of into the marine environment.

Cooperation among the ministries in reducing marine plastic debris from upstream to downstream is considered necessary, because plastic debris come in from land-based resources via rivers, beaches, and coastal areas and end up in the marine environment. As such, the coordination and integration between these ministries must be improved in carrying out plastic debris reduction efforts, and one such way to achieve this is through effective programs that save the marine environment from plastic debris pollution.

In relation to the establishment of the National Coordination Team of Marine Debris Management, the agenda for controlling the marine plastic debris pollution must clarify the specific ministry-level responsibilities. Primarily, the ministry cooperation framework for actions related to marine plastic debris must be explicitly included in the scope and mandate covered by legal regulations so that they can carry out their tasks effectively and achieve their goal of controlling plastic debris pollution problems in the Indonesian marine environment. Although the concern of these various ministries offers a cross-sector linkage, there is always an overlap in ministries' responsibilities and roles. In the long run, this hurts the efficiency and effectiveness of implementing mandates and the ministries' responsibilities.

[60] Indonesia, *Peraturan Presiden tentang Penanganan Sampah Laut* (*Presidential Regulation about Marine Debris Management*), PP No. 83 Tahun 2018, LN No. 168 Tahun 2018 (Presidential Regulation Number 83 Year 2018, SG No. 168 Year 2018), art. 5.

B. Law Enforcement of Marine Plastic Debris Pollution

The problem of marine plastic debris management cannot be separated from the law. In raising public awareness in marine plastic debris management, law enforcement is needed. Environmental law enforcement in the section of marine plastic debris management is an effort to implement positive law in people's lives so that the existence of the Presidential Regulation of the Republic of Indonesia No. 83/2018 concerning the handling of marine debris aims to maintain environmental conditions so that the citizens can have a good and healthy environment.

One of the government's efforts is through law enforcement. Law enforcement can be interpreted as an effort of certain law enforcement apparatuses to ensure that the rule of law runs as stipulated by its regulations. Law enforcement is a process that involves many things. Therefore the success of law enforcement will be influenced by some factors. As stated by Soerjono Soekanto,[61] the factors that influence law enforcement include the following.

1. The Substance of the Law

The better the substance of the law, the more easy it is to enforce it. Conversely, the lesser the quality of the substance of law, the more difficult it would be to enforce it. In general, good legal regulations are those that apply legally, sociologically, and philosophically. Moreover, the constraints on law enforcement can be due to the law itself, whether there is no legal regulation or the meanings of the words in the law are ambiguous. In the case of marine plastic debris, the present regulation is imperfect.

The government must also conduct harmonization between various regulations found in the National Policies and Strategies for Management of Marine Plastic Debris. All of these regulations need to be carried out by the central government as guidelines in preparing strategic planning documents and accelerating policies on handling marine waste. Harmonization is carried out in relation to the working mechanism, coordination, and achievement of the targets of each regulation so that they can support each other and not overlap one another.

Based on these problems, the legal regulation system concerning the comprehensive control of the marine plastic debris pollution must be improved. One such improvement is by making a specific regulation concerning the Control of Marine Plastic Debris Pollution in Indonesia. This specific regulation must revise the management of plastic waste, supervision, and law enforcement on marine plastic debris pollution, which must be carried out in a comprehensive and coordinated manner and has a real impact of positive change. The establishment of this new specific regulation is proposed to complete the vacuum of law related to marine plastic debris pollution and not to replace the existing Presidential Regulation of the Republic of Indonesia No. 83/2018. Moreover, the proposed regulation is proposed so that the inter-ministerial institutions related to marine plastic debris pollution act in mutual cooperation and coordination and do not run individually in carrying out the control of marine plastic debris pollution in Indonesian. In this way, the specific regulation concerning the control of marine plastic debris pollution can improve the imperfect law concerning the management of marine plastic debris pollution problems in Indonesia.

[61] Soerjono Soekanto, *Faktor-faktor yang Mempengaruhi Penegakan Hukum (*Jakarta: PT. Raja Grafindo Persada, 2007), p. 5.

2. Facilities of Law Enforcement

In the control of marine plastic debris, without adequate facilities, it is difficult for law enforcement to take place properly. The elements of law enforcement include, among others, highly educated and skilled human resources, good organization, adequate equipment, sufficient finance, and sophisticated technology. If these things are not included, then it would be difficult for law enforcement to achieve its objectives. Highly educated human resources are defined as qualified and qualified law enforcers who are able to serve and protect the community following their respective duties and fields.

Providing plastic debris handling facilities is believed to be one of the keys to accelerating the handling of marine plastic debris in Indonesia. These plastic debris handling facilities must be available from upstream to downstream, in order to prevent plastic debris use and disposal; encourage the reduction, reuse, and recycling of plastic debris; establish plastic debris disposal facilities; and produce plastic debris transportation equipment for final disposal.

Examples of sorting debris bins, One of the provisions of facilities is debris sorting. Here, debris is sorted into three types marked with different colors: green bins for organic debris, yellow bins for inorganic debris, and red bins for debris containing toxic and hazardous materials.[62] However, when transporting these three different types of debris, they are often mixed with other waste. In this case, the provision of debris sorting is not useful, because the action is not carried out in an integrated and sustainable manner.

3. The Society and Culture

The most important part of society that determines law enforcement is the community's legal awareness wherein the higher the level of community legal awareness, the better the law enforcement will be. Conversely, the lower the level of public awareness of the law, the more difficult it will be to implement good law enforcement.

One indicator of the effectiveness of the rule of law is its success in law enforcement. It is said to be successful because the laws that have been regulated as they should be and are carried out and obeyed by all elements of society. The absence and inadequate enforcement of the law can have implications for the credibility of the rule-makers, the implementers of the rules, and even the people affected by the rules themselves.

The culture of society is the environment in which the laws are applied. Law comes from the people and aims to achieve peace in life. Thus, the greater the match between the laws and the culture of the society, the easier it will be to enforce the former. Conversely, if a statutory regulation is incompatible or contrary to the culture of the society, it will be increasingly difficult to implement or enforce the intended law.

Meanwhile, the Indonesian people not only have the habit of burning trash but

[62] Tyas Titi Kinapti, "Jenis Sampah yang Harus Diketahui, Bisa Bantu Atasi Pencemaran Lingkungan," https://www.liputan6.com/citizen6/read/3920824/jenis-sampah-yang-harus-diketahui-bisa-bantu-atasi-pencemaran-lingkungan, accessed 20 December 2019.

also have the habit of "throwaway culture" in everyday life.[63] This behavior can be influenced by economic and educational factors. People from lower economic circles are associated with worse facilities and inadequate provision of waste services.[64] Thus, the success and failure of law can be observed from the extent to which the people understand, adhere to, and implement these provisions in their daily lives. The lack of public awareness to protect the marine environment from plastic debris is one of the problems that must be addressed by the government. It must be able to disseminate proper information so that the people can understand the concept and have greater public awareness arising from the importance of freeing the marine environment from plastic debris. Therefore, efforts to reduce marine plastic debris must be carried out continuously by the government.

For Indonesians, the effectiveness of law enforcement will determine the perception of the existence of law. If law enforcement is weak, people will perceive the law as non-existent. Conversely, if law enforcement is strong and carried out consistently, then the public would perceive the law as existing and will abide by its stipulations. In this context, the Indonesian people are still at the level of a society that is merely "afraid" of the law enforcement officer and cannot be categorized as a society that is "obedient" to the law.

4. The Officers Implementing Law Enforcement

One of the instruments to control debris pollution and environmental damage is by enforcing environmental law. The Waste Management Act (No. 18/2008) and Environmental Protection and Management Act (No. 32/2009) provide mandates to law enforcement officers, namely, the government agencies responsible for environmental protection and management, investigators, police, prosecutors, and judges who are authorized to utilize environmental law enforcement instruments, both through the application of administrative sanctions and the enforcement of civil law (litigation or non-litigation) and criminal law.

In order to optimize the utilization of environmental law enforcement instruments, particularly the enforcement of criminal law, a joint agreement was signed between the Minister of Environment, the Chief of Police, and the Attorney General on July 26, 2011, concerning the Enforcement of Integrated Environmental Law. The signing of this memorandum of understanding (MOA) aims to optimize the application of the "Integrated Criminal Justice System" in handling environmental criminal cases at both the stages of investigation and prosecution.[65]

Similarly, to improve the effectiveness of law enforcement through the court, a MOA between the Ministry of Environment and the Supreme Court was signed on

[63] Agung Dhamar Syakti, Rafika Bouhroum, Nuning Vita Hidayati, Chandra Joei Koenawan, Abdelaziz Boulkamh, Isdy Sulistyo, Stephanie Lebarillier, Syafsir Akhlus, Pierre Doumenq, and Pascal Wong-Wah-Chung, "Beach Macro-Litter Monitoring and Floating Microplastic in a Coastal Area of Indonesia," Marine Pollution Bulletin 122, no. 1–2 (2017): 217–25, accessed 20 December 2019, https://doi.org/10.1016/j.marpolbul.2017.06.046.

[64] Kementerian Koordinator Bidang Kemaritiman, "Laporan Sintesis Sampah Laut Indonesia," Public Disclosure Authorized, (April 2018): 1–49, accessed 20 December 2019, http://documents.worldbank.org/curated/en/642751527664372193/pdf/126686-INDONESIA-29-5-2018-14-34-5-SynthesisFullReportAPRILIND.pdf.

[65] Ajen Yoga Pradhana, "Penegakan Hukum Lingkungan Pidana," https://www.scribd.com/doc/258790045/Penegakan-Hukum-Lingkungan-Pidana, accessed 21 December 2019.

June 18, 2009, concerning Strengthening the Capacity of Environmental Judges, then through the Chief Justice of the Supreme Court on September 5, 2011, through the Environmental Judge Certification Program.[66]

Article 2, Paragraph 3 of the Presidential Regulation of the Republic of Indonesia No. 83/2018 does not clearly mention anything related to law enforcement officials, law enforcement mechanisms, and sanctions for polluters of marine plastic debris. As a result, there is a sense of mutual responsibility among the ministries. The law enforcement of marine plastic debris is an effort to achieve compliance with regulations and requirements in the provisions of marine plastic debris, which apply generally and individually, through the supervision and application of a range of administrative, criminal, and civil sanctions.[67]

In terms of law enforcement, inconsistent legal sanctions are imposed on marine plastic debris polluters (e.g., individuals and industrial organizations) that have been proven to commit environmental pollution. Other problems, such as activities in the marine environment (e.g., ships that dispose of debris into the waters) are not followed up with notice, and no legal sanctions are imposed. The existence of concessions in implementing sanctions has resulted in the lack of sanctions against polluters, and this is one of the problems of law enforcement.

Strengthening the enforcement of laws related to marine plastic debris can be done in a preventive and repressive manner. Preventive law enforcement, which is carried out through supervision and repression, is implemented through administrative sanctions. Hence, in law enforcement, the field of marine plastic debris does not have to directly provide administrative or criminal sanctions, but preventive efforts can be used as effective means of implementation. Preventive law enforcement is recommended because it builds greater public awareness of the importance of good marine plastic debris management.

In law enforcement, it is clear that the four factors mentioned above, in the reality of their relationship, will be closely interrelated with one another. This is because law enforcement elements can influence one another in the course of implementation. One weakness affects the other elements, because they must all work together as whole to obtain benchmarks of the effectiveness of law enforcement.

The implementation of the Presidential Regulation of the Republic of Indonesia No. 83/2018 is deemed to have not been done effectively. This can be proven by Indonesia being ranked as the second top contributor of marine plastic debris in the world.

VI. CONCLUSION

Indonesia is the largest maritime country in the world, because its marine area is larger than its land area. However, the vast and resource-rich seas have severe marine plastic debris pollution problems. The problem of marine plastic debris has increased over the years with an extraordinary impact on the Indonesian marine environment.

Marine plastic debris that enters and accumulates in Indonesian waters can originate from land-based sources, which are estimated to reach 80% of the total.

[66] Kominfo Jatim, "KLH Gelar Pelatihan Sertifikasi Hakim Lingkungan," http://kominfo.jatimprov.go.id/read/umum/36642, accessed 21 December 2019.

[67] Laode M.Syarif and Andri G.Wibisana, *Hukum Lingkungan Teori, Legislasi Dan Studi Kasus* (Jakarta: PT.Raja Grafindo Persada, 2010), p. 495.

Meanwhile, 20% of marine plastic debris comes from ocean-based sources. Marine plastic debris that floats or settles in the ocean can be degraded into several forms, namely, macroplastics, microplastics and nanoplastics. Marine plastic debris can cause environmental pollution and environmental damage, which has a terrible impact on the ecology, biodiversity, human health, and economy.

Several regulations are directly and indirectly related to marine plastic debris, and these include Law No. 32 of the Year 2009 concerning Protection and Environmental Management, Law No. 18 Year 2008 concerning Waste Management, Government Regulation No. 81 Year 2012 concerning the management of Household Waste and One Type of Household Waste, Minister of Home Affairs No. 33 Year 2010 concerning Managing Waste Management, Minister of Environment Regulation No. 13 Year 2012 concerning the Operating Procedures for Reducing, Reusing, Recycling through Waste Banks, and the Presidential Regulation No. 83 Year 2018 about Marine Debris Management. Some of these regulations were formed partially and did not support and complement one another. Given that the handling of marine plastic debris pollution problems are very complex, harmonious and integrated regulations are needed. Therefore, the Government of Indonesia must personalize these regulations and also make detailed and complete special regulations on marine plastic debris pollution.

Furthermore, the Indonesian government formed the National Coordination Team of Marine Debris Management in the hope of resolving marine plastic debris pollution problems. This Team consists of many ministries and has experienced several issues, including overlapping duties and responsibilities, difficulty in coordination and cooperation, and mutual responsibility when problems occur.

Finally, law enforcement is the key to the enforcement of a rule of law. Law enforcement is a legal system consisting of several subsystems, namely, the substance of the law, facility, society and culture, and the officer of law enforcement. The effectiveness of law enforcement is determined by the operation of each subsystem. Law enforcement aims to actualize regulations related to marine plastic debris in order to match the aspirations of the Indonesian government to reduce 70% of plastic waste by 2025. One indicator of regulations related to marine plastic debris is success in law enforcement. It is said to be successful if the laws that have been implemented are effectively enforced by the government and obeyed by the community.

BIBLIOGRAPHY

Legal Documents

Indonesia. *Peraturan Menteri Dalam Negeri tentang Pedoman Pengelolaan Sampah* (*Minister of Home Affairs Regulation concerning Guidelines for Waste Management*). PM No. 33 Tahun 2010 (Minister Regulation No. 33 Year 2010).

Indonesia. *Peraturan Menteri Lingkungan tentang Pedoman Pelaksanaan Reduce, Reuse, Recycle melalui Bank Sampah* (*Guidelines for Reduce, Reuse, Recycle through Waste Banks*). PM No. 13 Tahun 2012 (Minister Regulation No. 13 Year 2012).

Indonesia. *Peraturan Pemerintah tentang Pengelolaan Sampah Rumah Tangga dan Sampah Sejenis Sampah Rumah Tangga* (*Government Regulation of Managing Household Waste and One Type of Household Waste*). PP No. 81 Tahun 2012 (Government Regulation No. 81 Year 2012).

Indonesia. *Peraturan Presiden tentang Penanganan Sampah Laut* (*Presidential Regulation about Marine Debris Management*). PP No. 83 Tahun 2018, LN No. 168 Tahun 2018 (Presidential Regulation Number 83 Year 2018, SG No. 168 Year 2018).Indonesia. *Undang-Undang Dasar Negara Repubik Indonesia Tahun 1945* (*Indonesian Constitution of 1945*).

Indonesia. *Undang-Undang tentang Pengelolaan Sampah* (*Law regarding Waste Management*). UU No. 18 Tahun 2008, LN No. 69 Tahun 2008 (Law Number 18 Year 2008, SG No. 69 Year 2008).

Indonesia. *Undang-Undang tentang Perairan Indonesian* (*Law regarding Indonesian Waters*). UU No. 6 Tahun 1996, LN No. 73 Tahun 1996 (Law Number 6 Year 1996, SG No. 73 Year 1996).

Indonesia. *Undang-Undang tentang Perlindungan dan Pengelolaan Lingkungan Hidup* (*Law regarding Protection and Environmental Management*). UU No. 32 Tahun 2009, LN No. 140 Tahun 2009 (Law Number 32 Year 2009, SG No. 140 Year 2009).

1992 Rio Declaration on Environment and Development. Rio de Janeiro, 14 June 1992. *United Nations Conference*.

United Nations. Department of Economic and Social Affairs. *World Population Prospects 2019.* (August 2019).

Books

M.Syarif, Laode, and Andri G.Wibisana. *Hukum Lingkungan Teori, Legislasi Dan Studi Kasus*. Jakarta: PT.Raja Grafindo Persada, 2010.

Soekanto, Soerjono. *Faktor-faktor yang Mempengaruhi Penegakan Hukum.* Jakarta: PT. Raja Grafindo Persada, 2007.

Articles

Allsopp Michelle, Walters Adam, Santillo David, and Johnston Paul-Greenpeace. "Plastic Debris in the World's Oceans." (2012) Accessed 27 September 2019, http://www.greenpeace.to/greenpeace/wp-content/uploads/2011/05/plastic_ocean_report.pdf

Barboza, Luís Gabriel Antão, A. Dick Vethaak, Beatriz R.B.O. Lavorante, Anne Katrine Lundebye, and Lúcia Guilhermino. "Marine Microplastic Debris: An Emerging Issue for Food Security, Food Safety and Human Health." Marine Pollution Bulletin 133, (January 2018): 336–48. Accessed 19 September 2019, https://doi.org/10.1016/j.marpolbul.2018.05.047.

Betts, Kellyn. "Why Small Plastic Particles May Pose a Big Problem in the Oceans." Environmental Science and Technology 42, no. 24 (2008): 8996. Accessed 26 September 2019, https://doi.org/10.1021/es802970v.

Browne, Mark Anthony, Phillip Crump, Stewart J Niven, Emma Teuten, Andrew Tonkin, Tamara Galloway, and Richard Thompson. "Accumulation of Microplastic on Shorelines Woldwide: Sources and Sinks." (2011): 9175–79. Accessed 7 October 2019, https://doi.org/dx.doi.org/10.1021/es201811s.

Cauwenberghe, Lisbeth Van, Ann Vanreusel, Jan Mees, and Colin R Janssen. "Microplastic Pollution in Deep-Sea Sediments." Environmental Pollution 182 (2013): 495–99. Accessed 19 October 2019, https://doi.org/10.1016/j.envpol.2013.08.013.

Claessens, Michiel, Steven De Meester, Lieve Van Landuyt, Karen De Clerck, and Colin R. Janssen. "Occurrence and Distribution of Microplastics in Marine Sediments along the Belgian Coast." Marine Pollution Bulletin 62, no. 10 (2011): 2199–2204. Accessed 26 September 2019, https://doi.org/10.1016/j.marpolbul.2011.06.030.

Cole, Matthew, Pennie Lindeque, Claudia Halsband, and Tamara S. Galloway. "Microplastics as Contaminants in the Marine Environment: A Review." Marine Pollution Bulletin 62, no. 12 (2011): 2588–97. Accessed 25 September 2019, https://doi.org/10.1016/j.marpolbul.2011.09.025.

Cordova, Muhammad Reza. "Microplastic in the Deep-Sea Sediment of Southwestern Sumatera Waters." (2016): 27–35. Accessed 19 September 2019, https://doi.org/10.14203/mri.v41i1.99.

Crawford, Christopher Blair, and Brian Quinn. "The Interactions of Microplastics and Chemical Pollutants." Microplastic Pollutants, (2017): 131–57. Accessed 22 October 2019, https://doi.org/10.1016/b978-0-12-809406-8.00006-2.

Derraik, José G.B. "The Pollution of the Marine Environment by Plastic Debris: A Review." Marine Pollution Bulletin 44, no. 9 (2002): 842–52. Accessed 26 September 2019, https://doi.org/10.1016/S0025-326X(02)00220-5.

Ferreira, Inês, Ferreira, Cátia Venâncio, Isabel Lopes, and Miguel Oliveira. "Nanoplastics and Marine Organisms: What Has Been Studied?." Environmental Toxicology and Pharmacology 67, (January 2019): 1–7. Accessed 27 September 2019, https://doi.org/10.1016/j.etap.2019.01.006.

Graham, Erin R., and Joseph T. Thompson. "Deposit- and Suspension-Feeding Sea Cucumbers (Echinodermata) Ingest Plastic Fragments." Journal of Experimental Marine Biology and Ecology 368, no. 1 (2009): 22–29. Accessed 26 September 2019, https://doi.org/10.1016/j.jembe.2008.09.007.

Hengstmann, Elena, Dennis Gräwe, Matthias Tamminga, and Elke Kerstin Fischer. "Marine Litter Abundance and Distribution on Beaches on the Isle of Rügen Considering the Influence of Exposition, Morphology and Recreational Activities." Marine Pollution Bulletin 115, no. 1–2 (2017): 297–306. Accessed 10 September 2019, https://doi.org/10.1016/j.marpolbul.2016.12.026.

Hutomo, Malikusworo, and Mohammad Kasim Moosa. "Indonesian Marine and Coastal Biodiversity: Present Status." Indian Journal of Marine Sciences 34, no. 1 (2005): 88–97. Accessed 18 October 2019, https://www.researchgate.net/publication/240629853_Indonesian_marine_and_coastal_biodiversity_Present_status.

Jambeck, Jenna. "Plastic Waste Inputs from Land into the Ocean United Nations Open-Ended Informal Consultative Process on Oceans and the Law of the Sea." (June 2016): 13–17. Accessed 10 September 2019, https://doi.org/10.1126/science.1260352.

Kementerian Koordinator Bidang Kemaritiman. "Laporan Sintesis Sampah Laut Indonesia." Public Disclosure Authorized, (April 2018): 1–49. Accessed 20 December 2019, http://documents.worldbank.org/curated/en/642751527664372193/pdf/126686-INDONESIA-29-5-2018-14-34-5-SynthesisFullReportAPRILIND.pdf.

Kershaw Peter J. "Marine Plastic Debris. Global Lessons and Research to Inspire Action." Unep, (2016): 1–192. Accessed 25 September 2019, https://doi.org/10.1017/CBO9781107415324.004.

Li, W. C., H. F. Tse, and L. Fok. "Plastic Waste in the Marine Environment: A Review of Sources, Occurrence and Effects." Science of the Total Environment 566–567 (2016): 333–49. Accessed 12 September 2019, https://doi.org/10.1016/j.scitotenv.2016.05.084.

McKinsey. "Stemming the Tide : Land-Based Strategies for a Plastic- Free Ocean." (2015). Accessed 11 September 2019, http://www.oceanconservancy.org/our-work/marine-debris/stop-plastic-trash-2015.html.

Pinilih, Sekar Anggun Gading. "The Green Constitution Concept in the 1945 Constitution of the Republic of Indonesia." Mimbar Hukum - Fakultas Hukum Universitas Gadjah Mada 30, no. 1 (2018): 200. Accessed 5 November 2019, https://doi.org/10.22146/jmh.28684.

Purba, Noir P., Dannisa I.W. Handyman, Tri D. Pribadi, Agung D. Syakti, Widodo S. Pranowo, Andrew Harvey, and Yudi N. Ihsan. "Marine Debris in Indonesia: A Review of Research and Status." Marine Pollution Bulletin 146, (May 2019): 134–44. Accessed 11 September 2019, https://doi.org/10.1016/j.marpolbul.2019.05.057.

Rochman, Chelsea M, Akbar Tahir, Susan L Williams, Dolores V Baxa, Rosalyn Lam, Jeffrey T Miller, Foo-ching Teh, Shinta Werorilangi, and Swee J Teh. "Anthropogenic Debris in Seafood: Plastic Debris and Fibers from Textiles in Fish and Bivalves Sold for Human Consumption." Nature Publishing Group, (August 2015): 1–10. Accessed 18 October 2019, https://doi.org/10.1038/srep14340.

Ryan, Peter G., Charles J. Moore, Jan A. Van Franeker, and Coleen L. Moloney. "Monitoring the Abundance of Plastic Debris in the Marine Environment." Philosophical Transactions of the Royal Society B: Biological Sciences 364, no. 1526 (2009): 1999–2012. Accessed 26 September 2019, https://doi.org/10.1098/rstb.2008.0207.

Setälä, Outi, Vivi Fleming-Lehtinen, and Maiju Lehtiniemi. "Ingestion and Transfer of Microplastics in the Planktonic Food Web." Environmental Pollution 185 (2014): 77–83. Accessed 22 October 2019, https://doi.org/10.1016/j.envpol.2013.10.013.

Smith, Madeleine, David C. Love, Chelsea M. Rochman, and Roni A. Neff. "Microplastics in Seafood and the Implications for Human Health." Current Environmental Health Reports 5, no. 3 (2018): 375–86. Accessed 19 October 2019, https://doi.org/10.1007/s40572-018-0206-z.

Sur, Christine, Jessica M. Abbott, Rohani Ambo-Rappe, Nenni Asriani, Sarah O. Hameed, Brittany M. Jellison, Hasriani A. Lestari, et al. "Marine Debris on Small Islands: Insights from an Educational Outreach Program in the Spermonde Archipelago, Indonesia." Frontiers in Marine Science 5, (February 2018): 1–5. Accessed 15 October 2019, https://doi.org/10.3389/fmars.2018.00035.

Syakti, Agung Dhamar, Rafika Bouhroum, Nuning Vita Hidayati, Chandra Joei Koenawan, Abdelaziz Boulkamh, Isdy Sulistyo, Stephanie Lebarillier, Syafsir Akhlus, Pierre Doumenq, and Pascal Wong-Wah-Chung. "Beach Macro-Litter Monitoring and Floating Microplastic in a Coastal Area of Indonesia." Marine

Pollution Bulletin 122, no. 1–2 (2017): 217–25. Accessed 20 December 2019, https://doi.org/10.1016/j.marpolbul.2017.06.046.

Thompson, Richard C, Ylva Olsen, Richard P Mitchell, Anthony Davis, Steven J Rowland, Anthony W G John, Daniel Mcgonigle, and Andrea E Russell. "Lost at Sea: Where Is All the Plastic?" 304, (May2004): 2004. Accessed 7 October 2019, https://doi.org/DOI: 10.1126/science.1094559.

Vince, Joanna, and Peter Stoett. "From Problem to Crisis to Interdisciplinary Solutions: Plastic Marine Debris." Marine Policy 96, (May 2018): 200–203. Accessed 25 September 2019, https://doi.org/10.1016/j.marpol.2018.05.006.

Woodall, Lucy C, Anna Sanchez-vidal, Gordon L J Paterson, Rachel Coppock, Victoria Sleight, Antonio Calafat, Alex D Rogers, Bhavani E Narayanaswamy, and Richard C Thompson. "The Deep Sea Is a Major Sink for Microplastic Debris Subject Category: Subject Areas: Author for Correspondence:" (2014). Accessed 7 October 2019, https://doi.org/http://dx.doi.org/10.1098/rsos.140317.

Wright, Stephanie L Wright, Richard C Thompson, and Tamara S Galloway. "The Physical Impacts of Microplastics on Marine Organisms: A Review." Environmental Pollution 178 (2013): 483–92. Accessed 9 October 2019, https://doi.org/10.1016/j.envpol.2013.02.031.

Xanthos, Dirk, and Tony R. Walker. "International Policies to Reduce Plastic Marine Pollution from Single-Use Plastics (Plastic Bags and Microbeads): A Review." Marine Pollution Bulletin 118, no. 1–2 (2017): 17–26. Accessed 10 September 2019, https://doi.org/10.1016/j.marpolbul.2017.02.048.

Websites

Ambari, M. "Indonesia Siapkan Dana Rp13,4 Triliun untuk Bersihkan Sampah Plastik di Laut." https://www.mongabay.co.id/2017/10/23/indonesia-siapkan-dana-rp134-triliun-untuk-bersihkan-sampah-plastik-di-laut/. Accessed 4 November 2019.

Ambari, M. "Sampah Plastik Semakin Ancam Laut Indonesia, Seperti Apa?." https://www.mongabay.co.id/2017/09/18/sampah-plastik-semakin-ancam-laut-indonesia-seperti-apa/. Accessed 12 September 2019.

Badan Pusat Statistik. "Sensus Penduduk 2010-Indonesia." https://sp2010.bps.go.id. Accessed 10 September 2019.

Handayani, Rossi. "Polusi Plastik Sebabkan Kerugian 2,5 Triliun Dolar AS." https://www.republika.co.id/berita/internasional/amerika/19/04/06/ppirum370-polusi-plastik-sebabkan-kerugian-25-triliun-dolar-as. Accessed 4 November 2019.

https://www.thejakartapost.com/news/2018/11/20/6-kg-of-garbage-found-in-dead-whales-stomach-in-wakatobi.html. Accessed 18 October 2019.

https://www.reuters.com/article/us-indonesia-whale/sperm-whale-washed-up-in-indonesia-had-plastic-bottles-bags-in-stomach-idUSKCN1NP11F. Accessed 18 October 2019.

Jayani, Dwi Hadya Jayani. "Banyak Serap Tenaga Kerja, Ini Jumlah Bank Sampah di Indonesia." https://databoks.katadata.co.id/datapublish/2019/12/27/berapa-jumlah-bank-sampah-di-indonesia. Accessed 15 December 2019.

Kominfo Jatim. "KLH Gelar Pelatihan Sertifikasi Hakim Lingkungan." http://kominfo.jatimprov.go.id/read/umum/36642. Accessed 21 December 2019.

Lubis,Hamzah. " Ketika Nano Plastik Masuk Ke Pembuluh Otak." https://nuecoreligioncenter.blogspot.com/2018/02/ketika-nano-plastik-masuk-ke-pembuluh.html. Accessed 27 September 2019.

Kinapati, Tyas Titi Kinapti. "Jenis Sampah yang Harus Diketahui, Bisa Bantu Atasi Pencemaran Lingkungan." https://www.liputan6.com/citizen6/read/3920824/jenis-sampah-yang-harus-diketahui-bisa-bantu-atasi-pencemaran-lingkungan. Accessed 20 December 2019.

M.D., Brent A. Bauer. "What is BPA, and what are the concerns about BPA?." https://www.mayoclinic.org/healthy-lifestyle/nutrition-and-healthy-eating/expert-answers/bpa/faq-20058331. Accessed 22 October 2019.

Pradhana, Ajen Yoga. "Penegakan Hukum Lingkungan Pidana." https://www.scribd.com/doc/258790045/Penegakan-Hukum-Lingkungan-Pidana. Accessed 21 December 2019.

Putra, Nanda Aria. "Indonesia kehilangan pendapatan US$171 juta akibat sampah plastic," https://www.alinea.id/bisnis/indonesia-kehilangan-pendapatan-us-171-juta-akibat-sampah-plastik-b1Xjg9lka. Accessed 4 November 2019.

Rohman, Abdul. "Penanganan Sampah Laut, Pemerintah RI Targetkan Tahun 2025 Berkurang 70%." https://portaljabar.net/web/24528/penanganan-sampah-laut-pemerintah-ri-targetkan-tahun-2025-berkurang-70.html. Accessed 15 December 2019.

Trash Free Seas Alliance. "Mobilize public, private and philanthropic resources to reduce the amount of plastic flowing into the ocean." https://oceanconference.un.org/commitments/?id=18166. Accessed 18 October 2019.

Wade, Marcia. "What Are Phthalates?." https://www.webmd.com/a-to-z-guides/features/what-are-phthalates#1. Accessed 22 October 2019.