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RESEARCH ARTICLE

LAW AND POLICY IN ADDRESSING MARINE PLASTIC LITTER: INDONESIA RESPONSE AND RECENT DEVELOPMENT

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ABSTRACT

Marine plastic litter is one of the major problems that undermine the Indonesian Government's vision for making the sea as the future for the Indonesian nation. Marine areas of Indonesia are endangered by the massive plastic pollution, which is causing serious marine environmental problem. Indonesia is referred to as the biggest source of plastic waste in Southeast Asia and second biggest in the world. Indonesia government through Presidential Decree No. 7/2017 has established National Plan of Action (NPOA) on Marine Plastic Debris Management to strengthen the Indonesian commitment in reducing marine plastic litter. Furthermore, the Indonesian government also enacted Presidential Regulation No. 83/2018 on Handling Marine Litter. Thus, the present study argues that it is of paramount necessity to assess the impact of the legal framework regulating marine plastic litter in Indonesia in order to identify the lacuna in the existing legislative and policy framework for dealing with marine environmental pollution caused by marine plastic litter.

Keywords: Marine Environment Protection; Marine Plastic Litter; Indonesian Legal Framework; NPOA

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INTRODUCTION

The importance of the marine sector to the Indonesia is very significant. Indonesia is an archipelagic country that has the largest sea area and number of islands in the world. Having huge region, Indonesia has the

economic potential of both living and non-living marine resources. Indeed, nearly 65% of the Indonesia populations live in coastal areas. Therefore, the marine sector should be maintained and developed for the country's prosperity (Nurkholis, 2016).

With such great potential, President Joko Widodo "Jokowi" declared a new vision in the maritime sector that the sea is the future of the Indonesia and making Indonesia the Global Maritime Fulcrum (GMF). In a first presidential speech on 20 October-2014, President Jokowi asserted that it is time for Indonesia to return to its origin, from the sea and making the sea as the power of the nation. Maritime is expected to be the leading sector that supports the national economy. This vision carried by President Jokowi is not without foundation. The main foundation is that Indonesia is the largest archipelagic country and has the largest number of islands with the second longest coastline in the world. Indonesia is in a cross position between the Asian and Australian continents and between the Indian and Pacific oceans. In addition, the geo-economic and geo-political center of gravity of the world is shifting from west to eastern Asia. This momentum will be very good in supporting the ideals of Indonesia as the GMF (BPS, 2017).

However, there are certain obstacles such as overfishing, marine pollution, and illegal, unreported and unregulated fishing activities (IUUF) are the threats as well as the challenges to realize the government's vision on the maritime and fisheries sector. Marine plastic litter is also one of the issues and problems that undermine the Indonesian government's vision for making sea as the future of the Indonesia. Indonesian maritime areas have been subjected to this massive plastic pollution, which is causing serious environmental problem. In 2015, Indonesia had been referred to as the biggest source of plastic waste in Southeast Asia and second biggest in the world, with 3.2 million tons of plastic waste polluted in Indonesian waters (Jambeck, 2015). Addressing marine plastic litter in Indonesia has become a big challenge. Thus measures to reduce and curtail inputs of litter to the sea are urgently required to be taken.

There have been many research studies on the nature and impacts of marine plastic litter, both from macro or micro plastics that threaten the marine life such as entanglement and ingestion. This problem of marine plastic litter also happened in Indonesian waters. Currently, a number of instruments have been developed at international, regional and national levels to combating marine plastic litter that can be used as a guide by national or regional to address marine plastic litter problems, including Indonesia. In the context of developing countries like Indonesia, addressing marine plastic litter becomes the biggest challenge that is quite difficult to overcome and also becomes a legal and regulatory challenge for many

countries to provide procedures and standards to prevent, mitigate, and manage marine plastic litter.

Studies have shown that the threat to the damage of marine ecosystem from marine plastic litter, both macro and microplastic has a detrimental effect on the marine environment. Marine plastic litter is increasingly recognized as one of the greatest threats to global oceans, and the living creatures who depend on them. Both macro and microplastics have been found from small zooplankton to the largest whales, from worms burying in the seabed to seabirds feeding in the upper ocean (Kershaw, 2016). In recent study, microplastics particle has also been found in the sea salt, lake salt and rock salt (Gündoğdu, 2015).

Marine plastic research in Indonesia is currently developed (Purba, 2019). Marine micro plastics in Indonesia have been found in the seafood such as fishes and shellfish. Research studies in Indonesian stated that anthropogenic litter, particularly plastic was found in 28% of individual fish and 55% of all species in Makassar, Indonesia (Rochman, 2015). The presence of micro plastic which was found in Indonesian fish presents potential risk to the human health.

Marine plastic litter in Indonesia is not only on the sea's surface and beach, but also has been found in deep sea sediment ranging from 66.8 to 2182 M in southwestern Sumatra waters in the eastern Indian Ocean. Southwest Sumatra water is of an interest for studying micro plastic due the fact that it is a busy domestic and international shipping route. From 10 sampling location, marine microplastic has been found in 8 sampling location. This research states that 41 particles of microplastics in the forms of the granule (35 particles) and fibers (6 particles) (Muhammad Reza Cordova 2016). Microplastics also have been found in coastal sediments of Jakarta Bay (Manlu A.A, 2017) and Cilacap coast on the south coast of Java (Syakti, 2017).

The impact of marine plastic litters also extent to the coastal economies with the declines of tourism revenue and increased cost of coastal cleanup (Ocean Conservancy 2015). Although there is no specific research on the economies impact of marine plastic litter in Indonesia, but there have been research on it. The Asia-Pacific region for instant, reported losing US \$ 1.265 billion per year due to damage fishing, shipping, and marine tourism industries (APEC, 2009).

INDONESIA'S LAW ON THE PROTECTION OF MARINE ENVIRONMENT

Marine pollution, particularly from marine plastic litter is one of the major problems in Indonesia. Indonesia has already enacted legal framework to address marine pollution problem. The legal framework governing marine environment can be found in a number of laws on general marine environment protection law including Law No. 32 of 2014 on the Sea, Law No. 32 of 2009 on the Protection and Management of Environment, Government Regulation No. 19 of 1999 on Control of Marine Pollution/ Destruction, Government Regulation No. 21 of 2010 on Marine Environment Protection and Law No.18 of 2008 regarding Waste Management.

1. Law No.32 of 2014 on the Sea

Law No. 32 of 2014 is the umbrella legislation for marine-related undertakings. Article 1 defined marine environment protection as a systematic and integrated effort undertaken to conserve marine resources and prevent the occurrence of pollution and/or environmental damage in the Sea that includes Marine conservation, Sea pollution control, Marine disaster management, pollution prevention and mitigation, as well as damage and disasters. The sources of marine pollution in this law includes pollution from land, pollution from activities in the sea, and pollution from activities of the air which occur in the territorial waters, from outside the territorial waters or the territorial waters outside the territorial jurisdiction of Indonesia.

Article 50 of the 2014 Indonesia Law of the Sea stated that the government undertakes efforts to protect marine environment through; marine conservation, marine pollution control, marine disaster management, prevention and control of pollution, destruction and disasters. In addressing marine pollution problem, government should also work together, whether bilateral, regional, multilateral ways for implementing the prevention, reduction and control of marine pollution.

2. Government Regulation No.19 of 1999 on Control of Marine Contamination/ Damage

Increasing development activities on land and in the sea as well as the utilization of the sea and its natural resources may result in the contamination of and/ damage to marine environment. Therefore,

Indonesian government in 1999 enacted Government Regulation (GR) No. 19 of 1999 on Control of Marine Contamination/ Damage. Marine contamination shall be the entry or inclusion of living creatures, substances, energy and/or other components in the marine environment by human activities so that its quality deteriorates up to a certain level which shall make the marine environment incompatible to the quality standard and/or its function.

The quality standard of sea water shall be the measurement of the limit or content of living creatures, substances, energy and/ or other components which are or must be present and/or contaminating elements whose presence is tolerated in the sea water (Article 1 of GR No. 19/1999). This law stated that waste shall be the residue of an undertaking and/ or activity. Solid waste shall be the residue or by product of an undertaking and/or a solid form, including garbage.

Article 2 provides that the protection of marine quality shall encompass efforts or activities of controlling marine contamination and/or damage aimed at preventing or lessening the deterioration of marine quality and/or the damage of marine resources. Prevention of marine damage is carried out through prohibiting acts that could cause sea damage and require business activities to prevent and mitigate.

Marine contamination control/ damage shall be carried out by requiring business activities to restore sea quality, requiring business activities to bear the cost of pollution and compensation payments. As for the instrument that serves to control seawater pollution is through sea water quality standards, sea damage criteria, dumping permits, and also monitoring (Rahmadi 2015). The protection of seawater quality is carried out through research on seawater quality data, determination of sea quality status with reference to maritime environment damage standard criteria, and criteria of sea degradation (Article 3). The prevention of marine pollution shall be carried out through prohibiting actions which may cause marine pollution, require business to conduct marine pollution, oblige business activities to comply with seawater quality criteria, and also require business activities to process liquid waste and solid waste.

3. Law No.32 of 2009 on Environmental Protection and Management

Law No. 32 of 2009 on Environmental Protection and Management is a legal umbrella of environmental law regulation in Indonesia including marine environment protection. This Law contains general principles, national standards/criteria, and procedures regarding the protection and management of the environment in Indonesia. According to article 4, the protection and management of the environment includes planning,

utilization, control, supervision, and law enforcement. Environmental pollution control is implemented by the government, local government, and the person in charge of business in accordance with their respective authorities, roles and responsibilities. In this control, the instruments of pollution prevention and environmental degradation include environmental strategic studies, environmental impact assessments (EIAs), and the application of standard criteria for environmental damage.

Land-based waste is the largest source of marine plastic litter (Jambek 2015). A large population of Indonesia with high growth rates resulted in an increase in the volume of waste from land to the ocean. In addition, people consumption patterns contribute to create increasingly diverse types of garbage, among other things, dangerous packaging waste and difficult to disentangle by natural processes. Therefore, managing waste disposal became strategic measure in addressing marine plastic litter. Indonesian government has enacted Law No. 18 of 2008 on Waste Management.

4. Law No.18 of 2008 on Waste Management

Indonesia has also enacted Law No.18 of 2008 regarding Waste Management which aims to prevent the marine pollution from land-based pollution (Ramesh Ramachandran, 2014). The enactment of this law represents a milestone in Indonesian waste management legislation, particularly in relation to landfill operation and management. This law as the legal basis for waste management related activity, including land filling of municipal solid waste management (MSWM). Land filling is still the predominant method of MSWM in Indonesia. Therefore, passing of this law is very important step for the development, particularly with regard to landfill operation and management (Munawar, 2017).

This law requires MSWM authorities to integrated waste management through 3Rs (Reduce, Reuse Recycle) as the first priority, and the next priority is waste handling. This concept is considered as a new paradigm to replace the collect-transport-dispose concept, which is usually adopted in most Indonesian cities. The concept of 3Rs is the best available measure to reduce wastes, and active involvement on the part of the community and other was generation to reduce waste volumes are the key to the success of any waste management system (Damanhuri, 2014).

Municipal solid waste management in Indonesia, particularly in big cities, is one of the most challenging urban problems for city administrators. Population growth and ever increasing activities in major cities entails the increase of waste generation and all of the inherent consequences. It was estimated, that of the entire wastes generated in

2006, at most only around 60-70 % could be transported to final disposal by the institutions responsible in handling wastes and cleanness, such as City/ District Cleanliness divisions. The rest is handled by the community through their self-effort or unsystematically disposed all over the city (Damanhuri, 2014).

5. Government Regulation No 21 of 2010 on Marine Environment Protection

The sources of marine pollution including marine plastic also often come from sea based activities. To prevent and mitigate environmental pollution due to ship operation or port activities, it is deemed necessary to regulate the protection of the maritime environment as part of a shipping activity which constitutes a unified system comprising transportation in waters, ports, as well as safety and security in the waters. Indonesia therefore enacted Government Regulation No 21 of 2010 on Marine Environment Protection. The 2010 Maritime Environment Protection Regulation focused to address maritime environment protection in general. Article 3 stated that every ship's crew is required to prevent and manage with the occurrence of environmental pollution sourced from the vessel. This vessel environmental pollution may include, oil, toxic liquids, the contents of hazardous materials in the form of packaging, garbage, air, water, and / or dangerous goods and materials for the ship's environment. Any ship is prohibited from disposal of waste and other materials from the operation of the vessel to the waters.

The protection of the marine environment and its habitat from pollution and human activities were also adopted through various international instruments such as the United Nations Convention on the Law of the Sea (UNCLOS). UNCLOS provides the overarching legal framework for marine environmental protection. The London Convention on the Prevention of Marine Pollution by Dumping of Wastes and other Matter (London Convention) and MARPOL Annex V is a particular international instrument promoted by International Maritime Organization (IMO) specifically addressed marine pollution. Indonesia commitment is to actively participate in protecting the marine environment. Since 1985, Indonesia has ratified UNCLOS 1982 through Law No. 17 of 1985 on the Legalization of UNCLOS 1982. Indonesia has also ratified MARPOL 73/78 Annex I and Annex II in September 1986. Furthermore, through Regulation of President of the Republic Indonesia No. 29/2012, Indonesia ratified Annex III, Annex IV, Annex V and Annex VI of the International Convention for Prevention of Pollution from Ship 1973 as modified by protocol of 1978 (DGST 2017).

INDONESIA RESPONSE AND RECENT DEVELOPMENT OF LAW AND POLICY

1. Indonesia's National Plan of Action on Marine Plastic Debris (NPOA)

The issue of marine plastic litter has been the concern amongst scientists since 1950s. The first report of marine plastic pollution was appeared in the scientific report in early 1970s, but the issue of marine plastic became widely recognized and a global concern amongst decision-makers and the public in the 1990s, when the five massive gyres in the oceans that consist of plastic debris and microplastic were discovered (Finska 2018). The problem of marine plastic pollution became more widely recognized concern by global community since 2015 when Jambeck et al. published article on the plastic waste input from land into ocean. This research provides rank of the world's largest plastic wastes producer into the sea, where Indonesia is in the second rank.

With the status as the world's top contributor of marine plastic, Indonesian government has committed to reduce wastes through reduce-reuse-recycle- up to 30% until 2025, while targeting reduction of marine plastic litter as much as 70% by 2025. This commitment was delivered by President Joko Widodo at the Leaders Retreat G20 Summit in Hamburg, Germany on July 2017. Indonesian government in 2017 through Coordinating Minister for Maritime Affairs established National Plan of Action (NPOA) on Marine Plastic Debris (2017-2025). This Indonesia NPOA aimed to manage marine pollution problem from plastic waste and to overcome the waste of marine plastic to reduce up to 70% of plastic waste in 2025. Not only to overcome the downstream waste that concerns Indonesia, but the government also seeks to encourage cleaning of rivers and beaches.

Indonesia's NPOA for the first time was presented in a high-level panel at the Conference of Our Ocean, Malta on 6 October, 2017. This NPOA on Marine Plastic Debris was established through Presidential Regulation No. 16/2017 on Indonesia Ocean Policy. This Presidential Decree is a general guideline on maritime policy and implementation measures through programs and activities of ministries or non-ministerial government institutions in the area of maritime sector drawn up to accelerate the implementation of Global Maritime Fulcrum. Global Maritime Fulcrum is Indonesia's vision to be a sovereign, advanced, independent, as well as strong country, and be able to give positive

contribution to regional and global security and peace in accordance with national interest. The new policy outlines an action plan that comprises programs, strategies and desired outputs seen as crucial in realizing Global Maritime Fulcrum progress (Article 1 of President Regulation No. 16/2017).

Based on the Presidential Decree, this Indonesian Ocean Policy consists of two parts. First is National Document of the Indonesian Ocean Policy, which will serve as guideline for Ministerial and Non-Ministerial government institutions and local government in planning, implementing, monitoring and evaluating the development of maritime sector, and also as a reference for society in general and private sectors in participating in the maritime development for the realization of the Global Maritime Fulcrum (Marzuki, 2017).

The second part of Indonesian National Ocean Policy is Action Plan of Indonesia National Ocean Policy. Plan of Action of the Indonesian Ocean Policy is the work plan document to implement various programs and activities in ocean areas in accordance with the national development target. Essentially, the Action Plan translates the seven pillars into policy programs, complete with detailed outline of policy priorities, strategies, aims and objectives. It sets out the ministries and institutions responsible for programs implementation, relevant institutions and stakeholders, the timeframe and funding source (Marzuki, 2017).

Protection of marine environment is one of the pillars of this policy. The objective of marine environment protection policy is to conserve the marine resources and prevent any pollution and harm to the marine environment. The strategic policy of marine environment protection included the prevention, mitigation, and restoration of the impact marine environmental pollution and damages. The issue of the marine plastic litter in Indonesia will undermined the vision of the Indonesian government vision to make Indonesia as the Global Maritime Fulcrum. Protection of marine environment from pollution in particular with plastic pollution and waste management in general should become a top priority. President Joko Widodo at the G20 meeting in July 2017 expressed his commitment to reduce waste and decrease the waste of marine plastic. This target will be achieved through various applications, such as the National Solid Waste Management Program (NSWM), the National Marine Agenda and the National Plans Action for Marine Plastic Debris.

Indonesia NPOA has five main pillars in combating marine plastic litter. These five main pillars including National Movement for Improving Behavioral Change, Controlling Land-Based Leakage, Handling Coastal and Sea-Based Leakage, Enhancing Funding Mechanisms, Policy Reform and Law Enforcement, and Research and Development. National Movement for Improving Behavioral Change as the first main pillar will be done through

stakeholder engagement to lead an efficient and effective involvement in managing marine plastic litter. Collaborations amongst ministers for inclusion of non-government stakeholders and cross-sector collaborations nation has been initiated by Coordinating Ministry for Maritime Affairs.

Plastic litter could come from city streets or housings carried into the ocean. Therefore, controlling land-based leakage is the second main pillar in Indonesia NPOA. Handling Coastal and Sea-based Leakage as the third main pillar will be done through monitoring and collecting the plastic litter from the ocean employing relevant technologies to guarantee results. Improving of environmental awareness through education while also improving waste management facilities in ports, small islands and coastal areas would also be a big part of these management efforts.

The forth main pillar is Enhancing Funding Mechanisms, Policy Reform and Law Enforcement. Funding mechanisms for the NPOA is expected mainly coming from regional and national budgets, and supported by other programs such as polluters pay principle and innovations through the use environmentally friendly materials. Strategic funding from international organizations and partnering countries can be expected to finance the common efforts in controlling the marine plastic litter. Research and Development as the fifth main pillar of this NPOA play very important role to prevent and solve the problems from various ways including handling marine plastic litter from its source till on the ocean as well as alternative material for plastic and develop and innovation scheme for circular economy.

The Indonesian government regulates the action plan at the sub national level, national, international and even regional, as well as through the research and development community. At the sub national level or local governments level have function to strengthening capacity of human and financial resources, infrastructure management, and change of behavior. The local government also has action programs in developing an integrated coastal waste management projects. At the national level, Indonesian government is trying to promote paradigm change within the society towards solid waste and to respect the coastal areas. The strategies program at the national level including:

- a. Enhancement of stakeholder awareness through education curriculum and campaign;
- b. Conversion of waste into energy;
- c. Implementation of paid plastic bag policy;
- d. Utilization of plastic debris as asphalt mix for “plastic tar road”;
- e. Strengthen regulation on plastic debris management is seaport, shipping, and fishing lines

Marine plastic problem at the international level addressed through

bilateral cooperation with other countries and international organization. There are three plans of actions related to the transboundary marine debris over the sea, marine debris from sea transportation and international financial pledge or fund raising. The plan of action for Industrial sector is designed to encourage these manufacturers to use recycled plastics as input materials as much as possible, while at the same time producing more biodegradable plastics. Industrial sector has role to implement this plan through use of biodegradable plastic, recycled plastic usage, foreign investment and circular economy into the mix, with reduce, reuse, recycle principles, would complete the plastic waste management circle. Finally, the last strategic program is academic and community service organization (CSO). This plan of action includes research and development, campaign, and waste bank.

2. Indonesia's Implementation of Its NPOA

The previous parts have identified the Indonesia legal framework on marine environment protection including Law no 32 of 2014 on the sea (Indonesia Law of the Sea), Law No 32 of 2009 on the protection and management of marine environment, government regulation no. 19 of 1999 on control marine pollution/ destruction, government regulation No. 21 of 2010 on marine environment protection and law No. 18 of 2008 on waste management. These legal frameworks are the legal basis of the protection marine environment in Indonesia and there is no specific law in addressing marine plastic litter. Therefore, Indonesia has established National Plan of Action on Marine Plastic Litter through Presidential Decree No. 16/2017 on Indonesia Ocean Policy as described above.

In addition to the implementation of Indonesia's NPOA, Indonesia government on 2018 enacted Presidential Regulation No. 83/2018 on Handling Marine Litter. This Indonesian new regulation aims to follow up Indonesian commitment to reduce marine plastic litter. The new regulation provides the strengthening planning, budgeting and integrating organization. This regulation also aims to strengthen and provide guidance to the implementation of Indonesia's NPOA on marine plastic litter. Article 2 stated that it is necessary to set strategies, programmes, and activities that are synergistically, measurable, and directed to reduce the amount of marine litter, especially plastic waste, in the form of National Plan of Action for Marine Plastic Litter.

In order to implement the action plan, the National Coordination Team (NCT) of Marine Litter Management was formed, hereinafter referred to as the NCT, which is directly responsible to the president. The NTC has the duty to coordinate the activities of ministries, non-ministerial

government agencies, local governments, communities, and/or businesses in marine debris handling activities; Formulating barrier resolution policies and issues arising in the implementation of marine waste handling activities; and coordinate monitoring and evaluation activities on the implementation of the action plan.

Coordination between stakeholder to lead an effective and efficient involvement is the first main pillar of Indonesia’s NPOA on Marine Plastic Litter. This involves strengthening regulation and human resources in various sectors and institutions in addressing marine plastic litter. Collaborations amongst ministers for inclusion of non-government stakeholders and cross-sector collaborations nation has been initiated by Coordinating Ministry for Maritime Affairs. The NCT’s membership arrangements as intended consist of:

Head	Coordinating Minister for Maritime Affairs	
Daily Head	Minister of Environment and Forestry	
Members	1.	Minister of Home Affairs;
	2.	Minister of Foreign Affairs;
	3.	Minister of Finance;
	4.	Minister of Industry;
	5.	Minister of Transportation;
	6.	Minister of Marine Affairs and Fisheries;
	7.	Minister of Public Works and housing;
	8.	Minister of Health;
	9.	Minister of Education and culture;
	10.	Minister for Research, Technology and higher education;
	11.	Minister of Communication and Informatics;
	12.	Minister for National Development Planning/head of National
	13.	Minister of Cooperatives and small and medium enterprises;
	14.	Minister of Tourism;
	15.	Cabinet secretary
	16.	Head of the Marine Security Agency.
Secretary	Director general of Waste Management, sewage, and hazardous toxic materials, Ministry of Environment and Forestry.	
Deputy Secretary	Deputy assistant for the utilization of maritime science and Technology, Coordinating Ministry for the field of education.	

Indonesian government stated that controlling land-based leakage is the second main pillar of plan of action in addressing marine plastic litter. This is because plastic litter in Indonesia could come from city streets or housings carried into the ocean. Therefore, Indonesia government continues to reduce and manage waste. To that end, synergize with various parties, Ministry of Environment and Forestry through the Directorate General of Waste Management, and Hazardous Toxic Materials perform various strategies. In implementing this action plan, Indonesian government enacted Presidential Regulation No. 97/2017 on the Strategic Policy of Household and Waste Management of Similar Household Waste. The policy is translated into two major works: waste reduction and waste management (KLHK, 2018).

Waste reduction is done by waste restriction, reuse, and recycling. While handling of waste is done by the stages of sorting, collection, transportation, processing, until the final processing. Through this policy direction, Ministry of Environment and Forestry targets 30% waste reduction and waste handling 70% below the rate of waste generation under conditions without any reduction policy intervention until 2025. It is based on the percentage of waste generation that is managed and decreased for 5 years. From 2015 to 2019, the percentage of waste generation managed by 80% and the percentage of waste reduction reaches 20% (KLHK, 2018).

As mandated in Law no. 18 of 2008 on Waste Management and in order to implement waste reduction, a further major program needs to be developed is the reduction of waste in waste generation sources. In order to encourage community behavior to be more prudent in the use of plastic bags and awareness in efforts to reduce waste generation Ministry of Environment and Forestry issued a policy of Circular Letter Number: S.1230/PSLB3-PS/2016 on Pricing and Mechanism of Implementation of Paid Plastic Bags throughout Modern retail market outlets in Indonesia.

The results of that policy showed 25-30% reduction in the use of plastic bags, which had a direct impact on the reduction of plastic bags. Gradually there is a reduction of waste generation that burdens the environment, especially the final processing place, rivers and seas. In addition, from the retail business side there is efficiency through the decrease of retail operational cost in the provision of plastic shopping bags without reducing the amount of sales. From the results of monitoring and evaluation conducted, there are some findings that must be followed up, especially the need to conduct activities of communication, information and education to the public massively, systematically and extensively. Movement affects the community is very necessary given the considerable attention and public response with indications of 87.2% of the community

support and 91.6% of the public are willing to bring their own shopping bags from home.

In addition to the pilot program introducing charges for plastic bags, the Indonesian government is also implementing new waste management strategy. Indonesian government is emerging the application of technology turning discarded plastic into road-building material of asphalt road, so-called Plastic Tar Road. Indonesia has already carried out the Plastic Tar Road technology pilot project from July to December 2017 to several road locations for approximately 10 km, with a road width ranging from 7 Meters. Some successful pilot projects were applied at the Udayana University in Bali for 1.9 Km, Sultan Agung Street, Bekasi for 2.6 Km, Maros Street, Makassar, the 11 March University Road, Solo, Gempol Highway, Surabaya along the 1.1 Km, Cilincing Raya Street, North Jakarta, and the Tangerang – Merak toll road (Coordinating Minister for Maritime Affairs, 2017). Application of technology is important to control plastic litter. The application of technology including the application of science based management to control marine plastic problem. The significant importance of societal efforts to reduce, recycle, and reuse plastic litter to be advanced since early age also became the key important aspect to handling marine plastic litter in Indonesia (NPOA, 2017-2025).

Education, outreach, and awareness are also effective ways and key importance to promote change to limit indiscriminate disposal. Therefore, Indonesian government is giving more effort to increase the awareness of the Indonesian citizen on the marine plastic problem through environmental education. Environmental education is a process that allows individuals to explore environmental issues, engage in problem solving, and take action to improve the environment. As a result, individuals develop a deeper understanding of environmental issues and have skills to make informed and responsible decisions (EPA, 2018).

Environmental education and awareness is one of the five strategies program in combating marine plastic litter under the Indonesia's Plan of Action on Marine Plastic Litter. Promoting the marine environment education and awareness in schools would be an effective tool to mitigate plastic pollution. By targeting youth habits, practices can be fostered that may indirectly involve marine environment protection (Shauna Pettipas, Meagan Bernier, Tony R. Walker 2016). Improvement behavioral change have done by Indonesian Government by educating young people, increasing stakeholder awareness, intergovernmental collaboration, challenging of eliminating waste. Unfortunately, education of the marine environment protection has not been up to curriculum development in formal education such as junior and senior high school, environmental education is only done through seminars and training.

The waste problem in Indonesia has experienced the problem especially since tragedy of garbage slide at Leuwi Gajah Landfill on February 21, 2005. This tragedy caused 141 people died and 6 people were injured. This tragedy then celebrated as the national waste day which is held on 21 February every year. The purpose of this national waste day is to raise awareness and active role of Indonesian people, from personal, community, to nation in managing waste to realize clean Indonesia 2020 garbage. Besides that, this national waste day also aims to strengthen the commitment of Indonesia as a marine tourism destination country in the world (Circular letter of Ministry Environment and Forestry of Republic Indonesia, No SE/menlhksekjen/rokum/PLB.3/1/2017). During the year 2018 has registered 3,000 events, and 100 events among them were selected as 100 wonderful premiere events, including 20 events located in the national park.

3. Challenges and Barriers

There are still challenges and barriers in addressing marine plastic litter in Indonesia, including legal, waste management strategies, education and financial barriers. The first challenge in addressing marine plastic litter in Indonesia is the lack of specialized legislation on marine plastic litter. Although Indonesia has enacted legal basis of the protection of marine environment, but those law doesn't have specific law regarding to the marine plastic litter. Presidential Regulation No. 18/2018 also doesn't specifically address marine plastic litter. This regulation is more likely a guideline in handling marine plastic through Indonesia's NPOA. Therefore, these studies proposed Indonesian government to adopt specific legislation, policy and management measures to preventing, reducing and managing marine plastic litter.

Based on the hierarchy of waste management, preventive measures are the most strategically assessed measures and this step is focused on avoiding the generation of marine waste or preventing garbage from entering the sea. Measurements of this type include source reduction, waste reuse and recycling, waste-to-energy conversion, harbor receiving facilities, safety marks, debris at entry points to beneficiary waters and various land-based waste management initiatives.

For instant, Indonesia should develop and implement laws to ban land-based materials commonly found in marine litter. In this case plastic should be of particular concern, although plastic is not the only source of waste in the ocean, but this plastic is the most significant and one of the most dangerous for the environment, ecosystems and animals that are in the sea. Few countries such as United States, Spain, Portugal, Mexico and

Japan, have laws governing the production and use of land-based materials causing marine plastic litter. Prohibiting manufacture of nurdles (pre-production plastic) is one of the preventive measure that used in some countries to prevent plastic waste. Those countries have undertaken voluntary nurdle management efforts, but few legislative bodies have passed laws to govern nurdle manufacture or handling. In 2007, California passed a law requiring best management practices for companies that manufacture, handle, and transport nurdles (UNEP, 2016).

Banning plastic bags is also seen as the most appropriate step to handle this amount of plastic litter. In this regards, Bangladesh was the first country to ban plastic bags. Other countries that also agree on this plastic ban are South Africa, they banned plastic bags under 30 microns and imposed a 46-randcent levy on thicker bags. In June 2008, China issued law on banned the production, use and sale of ultrathin shopping bags (SC GO G [2008] No.72). Rwanda may have gone the farthest to banned the import of all such plastic bags (Law No 57/2008 Rwanda Management Authority). Violators face stiff penalties and fine. The law also requires everyone to request written permission to the Rwandan Environmental Management Authority if they wish to sell, use, import or manufacture plastics, along with the reason for the request and also the ways to carry out polyethylene waste (Kardis, 2014).

Basically Indonesian government through Ministry of Environment and Forestry issued a policy of Circular Letter Number: S.1230 / PSLB3-PS / 2015 on Pricing and Mechanism of Implementation of Paid Plastic Bags throughout modern retail market outlets in Indonesia. It has been carried out trial of the implementation of this policy on 21 February until May 2016 followed by 23 cities in Indonesia. The results of the pilot monitoring of the activity showed 25-30% reduction in the use of plastic bags, and there is a reduction of waste generation, especially the final processing place, rivers, and seas.

The Ministry of Environment and Forestry for the second time issued a Circular Letter concerning the application of paid plastic by circular No. SE-08 / PLSB3 / PS / PLB.0 / 5/2016 on June 8, 2016. The letter stated that the second trial will continue throughout 2016 until the government issues regulations governing the use of this plastic. However, until now the Indonesian government still has not issued regulations on this paid plastic bag. On the other hand, some big cities in Indonesia have enacted paid bag policy through Provincial Regulation. The Indonesian government in this case lacks the commitment to issue and enforce regulations on this paid plastic bag policy.

Further research concerning of the sources, fate, distribution, estimated quantities, and potential impacts of plastics in the marine

environment is imperative. The research should be focused at local, regional, and global scales, because sources, circumstances, capabilities, and mitigation strategies will vary each level. Apart from preventive measure, this research studies also suggests Indonesian government to continuously implementing removal measure to reduce marine plastic litter. This measure aims to remove marine plastic litter that already present in the marine environment. Behavior-changing measure also must be considered for Indonesia government which aims to influence behavior in such a way that people engage in activities that help reduce marine plastic litter.

CONCLUSION

Marine plastic litter is a complex problem in the marine environment and became big challenge for Indonesian government. Therefore, addressing marine plastic is hard to solve by single regulation or institutions. Coordination between regulations, institution and Indonesian citizen is definitely required. This studies have undertaken analysis of the Indonesia response and recent development of law and policy in addressing marine plastic litter. It considered a wide range of regulatory instruments and laws and Indonesian policy relating to the protection of marine environment in Indonesia such as Law no 32 of 2014 on the sea Law No 32 of 2009 on the protection and management marine environment, government regulation no. 19 of 1999 on control marine contamination/ damage, Government Regulation No. 21 of 2010 on marine environment protection and law No. 18 of 2008 on waste management. This studies also analysis of the current development of Indonesian policy on marine liter such as Presidential Decree No. 16/2017 on ocean policy and Presidential Regulation No. 18/2018 on Handling Marine Litter. With this policy, the presidential regulation mandated to the Coordinating Ministry for Maritime Affairs as the lead ministry to coordinate policy implementation, oversight and evaluation of the Maritime Policy, in May 2017, Indonesian government established National Plan of Action (NPOA) on Marine Plastic Debris (2017-2025)

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QUOTE

We are tied to the ocean. And
when we go back to the sea,
whether it is to sail or to watch, we
are going back from whence we
came.

John F. Kennedy