

# Preface

At present, the COVID-19 pandemic is still unstable. Due to COVID-19 pandemic across the world, almost all countries have travel restrictions. Most countries are still fighting the COVID-19 pandemic, so the technical committee decided to switch the 2021 12th International Conference on Environmental Science and Development (ICESD 2021) to a virtual conference. We used Zoom application which makes virtual format conference come true.

The virtual conference 2021 12th International Conference on Environmental Science and Development (ICESD 2021) dates were March 26-28, 2021. There were more than 60 participants in virtual format conference who come from China, Thailand, South Korea, Philippines, Japan, Latvia, Perú, Serbia, Singapore, Portugal, Saudi Arabia, Russia, Turkey, Czech, Indonesia, Lebanon, United States, Sri Lanka, Bulgaria, etc. ICESD 2021 was supported by the Hong Kong Chemical, Biological & Environmental Engineering Society (HKCBEEES) and the Environment and Agriculture Society (EAS).

ICESD 2021 is dedicated to issues related to Environmental Science and Development, which provides a scientific platform for international scientists, engineers and technologists who work in all aspects of Environmental Science and Development.

Internationally known experts from several countries were also invited to deliver keynote speeches at ICESD 2021. Each keynote speech contained 35 Minutes of Presentation and 5 Minutes of Question and Answer. The first keynote speaker was Prof. Yongping Li from Beijing Normal University, China with speech entitled “Synergetic Management of Energy-water Nexus under Multiple Uncertainties”; The second keynote speaker was Prof. James T. Anderson from West Virginia University, USA, with speech entitled “If We Build it, Will They Come? Wetland Mitigation in the Built Environment for Promotion of Wildlife Diversity”; The third keynote speaker was Prof. Hee-Je Kim from Pusan National University, South Korea with speech entitled “Solar Power Generation and ESS (Energy Storage System) Applications”.

Each regular oral presenter had about 12 Minutes of Presentation and 3 Minutes of Question and Answer. There were eight sub-sessions with different topics: UNDP Specialty Symposium on Energy, Water and Environment; Environmental Systems Analysis I; Environmental Systems Analysis II; Renewable Energy Development; Advances in Environmental Technologies I, Sustainable Regional Development I, Advances in Environmental Technologies II, Sustainable Regional Development II.

This volume of the proceedings presents a selection of papers submitted to the conference. ICESD 2021 received 46 full paper submissions and only 26 full papers were accepted to be included in this conference proceedings. All papers were subjected to peer-review by conference committee members and international reviewers. The papers were selected based on the criteria of high quality and relevance to the conference theme. We envision that the volume will provide an opportunity for readers to engage with a selection of refereed papers that were presented during the ICESD 2021 conference.

Virtual format conference can also provide ideal platform for people to share views and experiences in Environmental Science and Development. All participants enjoyed the virtual conference and it was highly successful.

We also express our sincere gratitude to the organizing committee, keynote speakers, session chairs, all participants and the volunteers who had dedicated their time and efforts in planning, promoting, organizing and helping the conference.

Conference Chair

Prof. James T. Anderson

West Virginia University, USA

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# Plastic Waste: Environmental Legal Issues and Policy Law Enforcement for Environmental Sustainability

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**Abstract.** The use of plastic products has been part of human life and daily activities. Since plastic can be harmful to the environment, solutions are required to limit, reduce, and minimize the use of this material for sustaining environmental preservation. However, it is difficult to change an entrenched habit of using plastics in society. Establishment of law enforcement policies is among the alternatives to the problem to protect the environment from an increase in the amount of plastic waste. This paper was aimed at exploring issues revolving around the habit of using plastic materials amidst society and investigating the concept of law enforcement as a solution to limit and reduce the use of plastic. The data of this empirical juridical research were examined descriptively. According to the result, law enforcement was essential to ensure the sustainability of environmental preservation.

## 1 Introduction

Plastic has become the need for everyone to perform daily tasks, starting from getting up in the morning and before going to sleep at night. The continuous use of plastic is because this material is ubiquitous: it is easy to use, and it is cheap. Many people use plastic for single-use, meaning that they will throw it after being used. This situation, however, can get worse due to the increase in the accumulation of plastic waste. On top of that, it takes years for plastic waste to decompose. Plastics are nonbiodegradable, meaning that this material cannot be broken down by microorganisms if it is buried. This, in turn, leads to declining mineral, both the organic and inorganic, in soil [1]. It spends 100 years for plastic waste to fully decompose [2]. Plastic waste management is among the main concerns in developing countries [3]. According to the data, Indonesia has placed second after China as a country with the highest single-use plastic consumption rate [4] from 2016 to 2019.

Data by the Ministry of Environment and Forestry reported that the rubbish pile in Indonesia weighs at 175,000 tons a day or 64 million tons a year (Suyanto; et al., 2015); 15% of the rubbish is plastic waste [5]. In 2016, the Ministry of environment and forestry reported that 9.85 billion of plastic bags were produced from around 90,000 modern retail stores within Indonesia [6]. It takes 20 to 500 years for plastic waste to decompose [7]. This situation is concerning, given the long-term impact of plastic waste on humans and other living creatures. Plastic pollution is a global problem, not only for those living in urban areas but also those in rural villages. For this reason, all stakeholders are urged to find solutions to the problem as it brings a negative impact on

the environment. The World Bank has estimated that 1.3 million plastic waste is produced from urban areas, and the number will increase to 2.2 million by 2025. In 2012, the Global Industry Analysis revealed that the use of plastic worldwide had reached 297 million tons by the end of 2015 [8].

As the 32nd province in Indonesia, Gorontalo has natural resources, including its sea, with tourism potential. Beautiful beaches, along with its marine biota, are invaluable assets holding potential as the source of foreign exchange if they are appropriately managed. Located in the Celebes Sea, in the middle of three countries, i.e., Indonesia, the Philippine, and Malaysia, is Tomini Bay. The bay is home to 27 species of corals, which is well-known as the Coral Triangle [9]. The attractive marine biodiversity underpins the tourism potential of a beach. Beaches are a popular tourism destination in Gorontalo. Such number of tourists contributes to the accumulation of waste in the coastal area. Consequently, waste management must be the priority to address the problem.

Leato Beach is among the most-visited beaches in Gorontalo. As many as four tons of plastic waste and other rubbish had been collected during the beach and coastal area cleanup held by Harbormaster's Office and Port Authority, Leato, Gorontalo, in cooperation with related government institutions [10]. Plastic waste is a severe threat to migratory birds in Limboto Lake and other 23 tributaries in Gorontalo that flow to the lake [11]. The data are the initial description based on the observation of media, and therefore an in-depth investigation is required to find out the solutions to the problems. This present study was conducted in the tourism area of Botutonuo, Bindalahe, and Olele as these areas are densely populated with rich marine biodiversity.

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Lies in the increase in tourist numbers is the rise in waste volume, including plastic waste, which is used by most people. The focuses of this empirical juridical research were issues in environmental law, specifically plastic waste, and law enforcement as the alternative to promote sustainable tourism. The solutions are essential to support development programs in the tourism sector with the potential to develop an eco-tourism concept.

## 2 Problem statements

- Environmental issues regarding plastic waste. people's habit, changing entrenched habits.
- Law enforcement at the empirical level.

## 3 Method

This present study was conducted in the tourism area of Botutonuo, Bindalahe, and Olele. All of the data were transcribed from an interview, which was conducted purposively. Further, the data were analyzed descriptively.

## 4 Discussion

### 4.1 Environmental issues: plastic waste

The 1945 Constitution of the Republic of Indonesia, in Article 28A and 28H, has stipulated that every person shall have the right to have a good and healthy environment. As a written constitution, the 1945 Constitution has been the highest legal authority in regulating policies on environmental protection. This notion suggests that the country has an obligation to fulfill the rights of its citizens to have access to a healthy environment. The constitutional mandate to protect the rights of every person is regulated in several laws, such as Law Number 2 of 2009 concerning the Protection and Management of Environment, specifically in Article 5, section (1) concerning the rights for a good and healthy environment. Furthermore, the constitutional mandate is also regulated in the preceding policies.

The participation of stakeholders is essential in establishing policies on the provision of the protection of environmental sustainability to ensure the fulfill the rights of citizens. By that, the policy must be designed for long-term goals. Among the issues of providing environmental protection is waste management. Issues revolving around waste have been regulated in Law Number 18 of 2008 Concerning Waste Management. Other preceding rules have also been established as a part inseparable from waste management law. As many as 60% to 70% of the waste produced by human is organic. The percentage of the inorganic waste is estimated at 30% to 40%, 14% of the garbage is plastic materials [12]. The data by the Ministry of Forestry and Environment reports that the waste produced by 100 retail stores (the members of the Indonesian Retailers' Association, henceforth APRINDO) has reached 10.95 million plastic bags in a year, which is equal to 65.7 ha of plastic [13].

Although the number of plastic waste is less than one-quarter of the total waste production, it does not signify that the number is insignificant. The use of plastics in modern life is quite significant, as this type of material is essential in today's era, where it favors speed and instant results. An example of plastic material that supports people's activity is plastic food packages. This type of food container has dominated the food industry in Indonesia. The percentage of the use of flexible food packaging measures at 80%, while the rigid packaging use reaches 53% [14]. Plastics are made of polymer. Almost all plastic materials are nonbiodegradable, and biodegradable materials are only less than 1%. This is because the synthetic polymer, the material of plastics, cannot be decomposed by natural decomposer [15]. It takes 300 to 500 years for plastic waste to decompose fully [16].

Some of the plastic products are labeled biodegradable. Decomposers can decompose plastics with this label. A result of a study has examined the capability of biodegradable plastic. Its findings reveal that this type of plastic remains in the soil for three years before it starts to decompose [17]. The study suggests the potential of the threat of biodegradable plastics to the environment.

The consumption of plastics, such as single-use plastic, in society, is tremendous that plastic waste can turn into a pile of garbage. Polymer, the material of plastic, is nonbiodegradable, meaning that it takes longer for plastic to decompose. Both conditions lead to the accumulation of plastic litter. The pile of plastic waste contaminates the environment in which it contributes to the loss of soil fertility. Some animal species have been documented consuming plastics, thus damaging the ecosystem.

Botutonuo Beach, Olele Marine Park, and Bindalahe are tourism destinations located in Gorontalo regency. Those areas are in Tomini Bay. The beauty of the scenery is among the potentials of these beaches. Olele is well-known for its stunning marine park that draws domestic and international visitors to enjoy incredible underwater experiences in the area. Cleanliness, maintained ecosystem, and biodiversity is among the factors that contribute to the natural beauty of the tourism destinations mentioned previously. Therefore, one needs to keep the areas clean and protect the ecosystem for attracting more tourists. Early preventive measures are essential to prevent damaged ecosystems and pollution due to plastic waste in the coastal area, ensuring the sustainability of tourism sites. The participation of society, specifically the coastal community and the visitors of a tourism site, is central to the preservation of the areas. The government has stipulated policies on the preservation of tourism sites through the Regional Regulation of Bone Bolango Regency Number 1 of 2015 Concerning Waste Management. The objectives of waste management, as stated in Article 4 letter (a), are to actualize a clean and healthy environment. Another example of the related regulation is the Regent Regulation Number 23 of 2018 Concerning Regional Policies and Strategies in Management of The policies are implemented through strategies of reducing the use of



plastic waste and waste management. This requires supports from all stakeholders, such as

- Restricting the use of single-use plastic packaging (food and beverages) for the coastal community and visitors.
- Practicing the habit of proper garbage disposal, i.e., providing trash bins, sorting types of waste (plastic waste and other waste).
- Banning all people from dumping litter at the beach.
- Imposing sanctions for those who violate the rules; this is considered as law enforcement approaches.

The above points are important since some report that areas, such as Botutonuo beach, Bindalahe, and Olele marine park needs attention from all stakeholders, including the coastal community and the visitors, to preserve the environmental sustainability of the area. The regional government has established environmental preservation programs, such as coastal cleanup and assigning bicycle community that is responsible for maintaining the cleanliness of the areas during certain events. Although those are yet implemented in some areas, all strategies represent the concern of the government in coping with waste management.

A report by the Department of Tourism, Bone Bolango regency, 2018, revealed that around 45,852 people visited Botutonuo beach in average, while the average tourists visiting Olele Marine Park and Bindalahe were 13,345 and 3106 people, respectively. The visitors were domestic and international tourists. It is expected that the number of visitors continues to increase. To put it simply, it suffices to say that the negative impact of plastic waste is prominent. This is due to the absence of accurate data of total plastic waste produced a day amidst the high frequency of visitors and the fact that strict regulations of plastic use for people and tourists; all of these concerns should not remain ignored. For this reason, anticipation through law enforcement is crucial for protecting the environment and biodiversity in the tourism sites. According to the interview, the following list is the common trashes that are commonly used and found nearby a garbage

- Mineral water packaging (bottle and glass)
- Food packaging, including snack and peanuts
- Plastic bags
- Single-use plastic food packaging

Preferences to use the above plastic packaging is because it is ubiquitous and practical, and therefore it fulfills the needs instantly. Before the utility of plastic materials became popular, many Gorontaloese people used to wrap food, such as yellow rice, using woka leaf (palm leaf). People also brought this leaf to cover the spices they bought at traditional markets. This trend has shifted as nowadays, many opt to use plastic materials.

Changing perspectives and behaviors of people to promote awareness of the threat of plastic waste is not an easy task. One example is to practice the habit of proper disposal and waste sorting. Still, some people favor the incineration of plastic waste. Dumps produced in the research sites, based on the interview, are mostly from the visitors and local community, and rubbish dumped in the ocean washing aground during the rainy season, adding up to the total volume of waste. Strategies and solutions to prevent and anticipate the issues are needed

to support the development of the coastal area and preserve the biodiversity in Tomini Bay, leading to the sustainability of the environment. Of the possible alternatives is law enforcement.

## 4.2 Law enforcement policies

Law serves to maintain standards for all people to act according to the regulation. In this context, it is an obligation to regard law as the instrument to maintain orders and establish regulation for people; this includes regulation of environmental issues, such as plastic waste, which has long been recognized as a threat to humans and the environment. Changing entrenched habits is not an easy task. The above discussion shows that the level of plastic consumption is still high, and it requires solutions to address the issue. The development of science and technology has changed people's lifestyles and attitudes. The changes can be positive or negative. Such a condition also applies to a high mobility lifestyle and demand for fast-moving habits. High mobility encourages more efficient and effective work, and it triggers the habit of instant results amidst society. This situation, however, also bring negative impacts, and this needs solutions to minimize the outcomes resulting from the impacts. Monitoring and control are required in order to ensure that a development program is on the right track. Law enforcement can serve as a medium to direct the program.

Changes in the lifestyle of those with high mobility and who are in demand for fast results have led to instant gratification. Plastic is among the commodity for many people with high mobility. On the other hand, the use of this material brings negative results, as it can pollute the environment due to its nonbiodegradable nature. Managing the behavior of people in terms of plastic consumption is, therefore, essential to keep the problem from getting worse. This can be done through the utilization of law as a medium. Implementing specific law system functions to maintain and minimize the use of plastic products to control waste production.

The notion above is well known as law as a tool of social engineering, which was proposed by Roscoe Pound [18]. The term social engineering is coined as a representation of dissatisfaction towards the present changes; this is to direct the changes to the actualization of a specific goal [19]. This concept needs to be implemented in the current situation, where the changes are maintained, preventing negative impacts on the environment. Law serves to secure the needs of people and, at the same time, to ensure that the high mobility lifestyle does not bring harm to the environment.

Law functions to plan, maintain and regulate changes in society, bringing the changes to positive direction accordingly [20]. An example of law as social engineering is the establishment of policies by the government. The policies refer to a form of anticipation, which is central to the protection of biodiversity and the environment. According to G. Peter Hofganel, policies on law enforcement have three characteristics, such as preventive, repressive, and persuasive (influencing people's perspective through the use of media) [21]. The

present article focuses on preventive and repressive approach.

Preventive approaches refer to attempts aimed at keeping undesirable results caused by a particular problem, such as pollution, before the [22] situation occurs. In this condition, preventive policies keep order to reduce the production of plastic waste and to prevent plastic pollution. Other legal policies include the restriction or limitation of plastic production and the regulation of plastic consumption among people. These policies have been stated in the regional regulation and regent regulation in the research sites. In addition, other programs, such as the provision of waste management service, called TPS3R, and coastal cleanup has been started to ensure the effectiveness of the policy. Strategies in controlling the distribution of plastic have been proven successful to lessen the rate of plastic consumption due to the limited production of plastic. Policies that shift the behavior of plastic consumption contribute to minimum demand for plastics. This will, in turn, reduce the use of plastic materials and the number of plastic wastes. All programs are by nature preventive, although its implementation requires ample time and preparation of all stakeholders.

A repressive law system or mitigation is carried out after something that is supposed to be avoided took place. This law system is in the form of consistent and consequential law enforcement attempts aimed at fighting pollution [23]. In the scope of environmental law, a repressive law system has been associated with the imposition of administrative sanctions to those who violate the rules [24]. The absence of imposing sanctions turns to be a problem in plastic waste reduction and management.

## 5 Conclusion

Plastic waste issues become crucial and thus requires special attention. To cope with the problems and to reduce the number of wastes, ensuring sustainable environmental protection in coastal areas is essential. Integrated law enforcement, therefore, needs to be implemented to promote awareness of people regarding the issues.

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