

CHAPTER II

THE DESCRIPTION OF PLASTIC DUMPS ISSUES IN BALI'S OCEAN AND COASTLINES

On this chapter, the writer would focus on the explanation about how plastic dumps in Bali, Indonesia became one of important issues and concern. The writer argued that was very needed to show a short information about Bali and the plastic dumps issues there. The existence of plastic dumps has caused my responds from both domestic and international community. Many people there have just realized that they are living in danger and this issue has to be risen and problem solving is necessary.

A. Bali Geographical Location

Bali is one of islands in Indonesia that is very popular among foreign tourists as a favorite destination to visit. Not only among foreign tourists, Bali is also a favorite place for domestic tourists. Enchanting beaches, cool mountains and a culture that was always preserved are attractions that makes tourists always wanted to come back. Bali Island is located between Java Island and West Nusa Tenggara Island. The island has an area of 5,636km². (Geost, 2019) The island of Bali in the east is bordered by the Lombok Strait and West Nusa Tenggara Island. In the West Bali is bordered by the Bali Strait and East Java Province, in the north it borders the Bali Sea and while in the south it borders the Indonesian Ocean.

Bali is known as a tropical paradise in Indonesia. Bali's climate is a tropical climate where the change of seasons was influenced by monsoons that change every 6 months. Just like the season that occurred in Indonesia in general, the Province of Bali experienced a rainy season in October-April and the dry season started from April to October. For average rainfall in Bali is 127mm / month. While the air temperature varies from 24 ° -38 ° C. Bali does not only consist of one large island, but

also several small islands. Among the small islands that are famous in Bali include Nusa Penida Island, Nusa Lembongan Island and several other islands. With this geographical wealth, it was no wonder that Bali had always been a favorite destination for tourists, because Bali also seemed to never run out to be explored. The diverse geographical conditions of the island of Bali ranging from the lowlands to the mountains made the region of Bali had a very diverse tourism potential as well. From this condition, it was also utilized by the government of Bali to develop tourist destinations as a source of foreign exchange.

The Earth's surface was covered over 70% by the oceans, complete about half of worldwide essential creation and bolster the best biodiversity on earth. (Costanza, 1999) The big source of food are coming from the ocean. Fish as the main protein source are consumed by billion people who live in coastal zones. The huge natural and cultural wealth possessed by Bali makes the tourism sector as the majority economic source of its people. However, coastal areas have grown rapidly without balanced conservation activities and conflicts between regions arose from competition over the use of natural resources. More than 1.1 million Balinese work in the tourism and agriculture sectors because of their natural beauty and fertile soil. This shows the Balinese people are very dependent on natural resources both land and sea. (Conservation International Indonesia, 2019)

B. Biodiversity in Bali's Ocean and Coastlines

Etymologically, biodiversity was the unity of two words, *bio* and *diversity*. Biodiversity was defined as diversity among living things, from a variety of sources including areas, oceans and aquatic ecosystem as well as the ecological complexity in which they are part. This included diversity within a species, between species and ecosystems. This official translation process took place automatically through Law No.

5 of 1994 concerning the United Nations Convention on Biological Diversity (UNCBD). The UNCBD was a global provision for the protection of diversity of animals - an international agreement to maintain the continuity of religious diversity, which was adopted in Brazil on June 5, 1992. At that time, a number of 157 countries be in the signatory or sign the UNCBD treaty - Indonesia is the eighth country to sign the agreement. After going through a cost-benefit analysis, finally the Government issued a Decree No. 5 of 1994 and officially acknowledged that Indonesia would be subject to all the oldest provisions in UNCBD along with its derivatives. Institutionally, the program of detail and further actions from UNCBD is administered by IUCN, the International Union for Conservation of Nature and Natural Resources. As a consequence of Law No. 5 of 1994, the Government of Indonesia and the Republic of Indonesia have a commitment to protect the livelihoods of biodiversity in Indonesia, both on land, freshwater and at sea. (Keanekaragaman Sumber Hayati Laut, 2012)

Tropical landscapes are one of the most common places of care for various organizations within the time span of evolution, from tens to millions of years. The reefs, on the seagrasses, the mangrove areas and the expanse of land cover are very diverse, exceeding all other marine areas. It is also in this region that scientific discovery is practiced every day. A few years ago, international researchers at the international level, together with experienced researchers from Indonesia and coordinated by international conservation agencies, conducted expeditions in the Raja Ampat region, Papua - including among others Gerald Allen, Rodney V. Saem, Emre Turak, Mark V. Erdmann and other researchers. The survey was conducted only for a week, including not finding out of 56 new species of fish, fish (a type) and charcoal. Of the new species, 50 species of which are endemic species in West Papua, not found elsewhere - they have found 600 types of hard

(Skleractinia), the number of which is estimated to be 75% of number of species of coral species in the world. The next survey was carried out in the Nusa Penida Bay Bali area, with an area of 20 meters (up to 20 m deep) of no more than 15,000 ha. Researchers believed this was found not less than 6 species of fish that were new in the science notes of knowledge. The expedition is continued to do the same thing in the Halmahera region.

Bali is part of the World Coral Triangle with a very high diversity of coral reefs, and reef fish. This triangle contains 20% of the world's coral reefs, and many new species are discovered each year. For example, there are 3000 species of fish, 800 species of nudibranches and 600 species of coral in this place such as steep slopes of 80 meters, clean bays, World War II shipwrecks are impressive floating dives, and many dung dives to find marine life. Bali is world famous with its underwater photography enthusiasts as one of the best dive sites in the world. In addition, diving in Indonesia is very impressive and inexpensive. Bali is surrounded by many volcanic steep slopes and more than 100 dives points.

In 10th of August 2010, *Indonesian Biodiversity Research Center/IBRC* was launched in Bali. This research center was established with cooperation with United State of America-Indonesia, such as *Department of Ecology and Evolutionary Biology University of California Los Angeles (UCLA)*, *Old Dominion University Virginia, USA*, Universitas Negeri Papua, Manokwari (UNIPA), Universitas Diponegoro, Semarang (UNDIP), and Universitas Udayana (UNUD). This research center was also supported by Smithsonian Institute, The National Museum of Natural History, USA. This research center was very strategic and funded by United States Agency for International Development (USAID) until 2012. As a country referred to as megabiodiversity, Indonesia was still lack of researchers and publications of its own marine wealth.

(Indonesia kini punya Pusat Penelitian Keanekaragaman Hayati di Bali , 2012)

C. The Impact of Plastic Dumps Issues

A study conducted by the Bali Partnership showed that waste management in Bali was still distracted. From the results of the study, almost 52 percent of waste in Bali was not managed properly. The study, which was conducted for five months from January to May 2019, was carried out in 57 Sub-districts throughout Bali. The aim was to find out how to arrange, as well as solve the problem of plastic waste originating from the mainland comprehensively.

From the results of the research, it was found that 48 percent of waste in Bali has been well managed, which is recycled and ends up at the Final Disposal Site (TPA), while the rest have not. The rubbish is only burned, thrown into the environment, thrown into waterways and ended up at sea. As a result, there are around 33 thousand tons of plastic waste from Bali dumped into the ocean each year.

This research was supported by the government and the private sector, aimed to support Indonesia's target of reducing 70 percent of marine trash. It was hoped that in the future, the smallest areas such as the Sub-district level were able to manage waste properly so that it would not end at the ocean. In the study, it was explained the importance of overcoming pollution of plastic waste in the sea for Bali. The reason is tourism is an economic driver that can be affected if this is not overcome.

Referring to data from the Bali Tourism Board (BTB) in 2018, more than 6.5 million international tourists visited Bali and increased by more than 10 percent from 2017. (Peneliti: 33 Ribu Ton/Tahun Sampah Plastik di Bali Terbuang ke Laut, 2019) Furthermore, the proper handling of plastic waste was expected to have a range of global implications. I Gede Hendrawan, the Bali Partnership research team explained

why waste management in Bali was still poor. Among them there were still many people in Bali that had not received good waste services. Especially people who were far from the reach of waste services, which are usually close to urban areas. Then there were still many people who did not have the careness to throw their trash into the environment (easier and cheaper). In addition, there was no law enforcement related to waste, even though in fact it was already regulated in several Regional Regulations (Perda) in Regencies or Cities in Bali.

It was expected that businesses would avoid using plastic in the product, and replace it with environmentally friendly materials. Also, people in Bali should be responsible for taking back the remaining plastic products produced in the community. While the community was expected to increase awareness, sorting household waste or sources, and trying to reduce the use of plastic in everyday life. The government was also expected to prepare regulations, law enforcement, prepare appropriate waste infrastructure based on data, and sufficient budget. Those three main pillars must move together and not partially.

Related to Governor Regulation (Pergub) Number 97 of 2018 Regarding the Limitation of Disposable Plastic Dumps, according to I Gede Hendrawan, in the data of the study can be used as preliminary data. (Peraturan Gubernur Bali Nomor 97 Tahun 2018 Tentang Pembatasan Timbulan Sampah Plastik Sekali Pakai, 2018) In the future, it can be used to evaluate changes that occur after Governor Regulation is effectively applied. The next plan was to do the same research next year or two more years to be able to see the impact of the Governor Regulation on the reduction of plastic waste in Bali.

1. Marine Ecosystems and Biota

The negative impact of plastic contamination on the marine environment and biota are becoming a global concern nowadays, including in Indonesia. The negative impact of

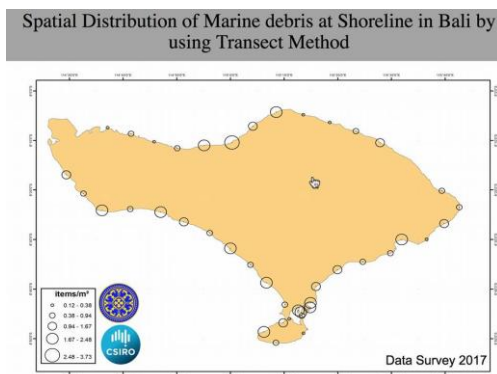
plastic contamination could be caused by plastic chemical components as well as other chemical contaminants which were bound as such organic and heavy metal contamination. Plastic contamination had the potential to cause damage marine ecosystems such as damaging coral reefs habitat, mangrove, and seagrass. Meanwhile, especially plastic trash could endanger marine organisms such as sea turtles, birds, marine mammals, fish, zooplankton, and other marine animals. (Gammeltoft, 2006)

The lives of millions of marine animals are being threatened by the plastic waste litter in the ocean. It caused of microplastics as a major part of the issue. Macro and microplastic could cause negative impacts, both if they were eaten by marine organisms and interact with contaminants other environments, and the potential for accumulates in marine organisms through the food chain. However, monitoring and identification macro and microplastic contamination in the aquatic environment and in fisheries products were still lack in Indonesia. As a result, data distribution as well macro intensity and microplastic in the marine environment or are fishery products currently not available.

A group of researchers from the Faculty of Maritime Affairs and Fisheries (FKP) of Universitas Udayana spreaded throughout the coast of Bali in November 2017. About 70 people divided themselves, spreading every 10 km. They practiced the CSIRO method, an Australian research institute in mapping the distribution of coastal waste by random sampling. At each observation point, they recorded the amount and type of waste found every 100 meters. The result, most (45%) types of waste are 'soft' plastic. Then hard plastic (15%) and iron. Others are rubber, wood, foam, clothes, glass, and others. Of the plastic waste, most are from plastic packaging (40%) food or labeled, then straws (17%), and crackle (15%).

Meanwhile, from the map of the distribution of garbage, it looks almost flat across the coast. The bigger the circle, the greater the volume. Including famous beaches in South Bali such as Serangan, Kedonganan, Kuta, Legian, then North Bali and West Bali. This is part of a number of aspects that are studied about marine waste. Previous research is the movement of rubbish and the type of rubbish that landed on the beaches facing the Bali Strait since 2014. Then the type of rubbish stranded on Kuta Beach, because it wheres the most exposed by tourists.

Figure 1 The waste distribution throughout the coast of Bali Island in 2017

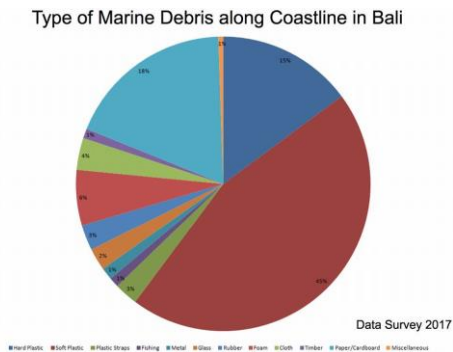


Source: Udayana University FKP Research and CSIRO Australia

Regarding the impact on marine animals, Hendrawan joined with other researchers who have published the number of microplastics in the waters of the Manta Ray migration path, namely Nusa Penida, Bali and Komodo National Park, NTT. The researchers were Elitza Germanov, Andrea Marshall, I Gede Hedrawan, and Neil Loneragan in the collaboration of the

Marine Megafauna Foundation, Murdoch University, Australia, and Udayana University, Bali. A number of posters of microplastic findings have been published. Their findings were that microplastics found at each survey in both locations during the rainy season (wet northwest monsoon season). The microplastic category is plastic flakes under 5 millimeters. The average plastic debris found in Nusa Penida waters is 0.48 pieces per cubic meter and in Komodo National Park 1.11 per cubic meter. So that the estimated potential of Manta Rays ingesting microplastic ranges from 40-90 pieces per hour.

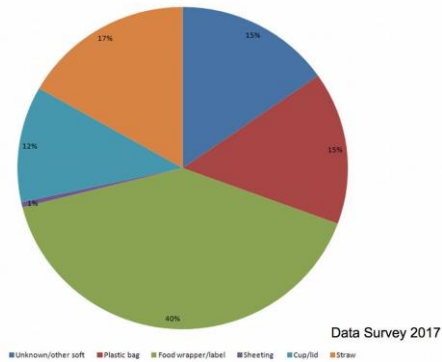
Figure 2 Types of marine debris found in Bali Island waters in 2017



Source: FKP Udayana University and CSIRO Australia Research

Figure 3 Type of plastic waste found on the coast of Bali Island in 2017

Type of Soft Plastics along Coastline in Bali

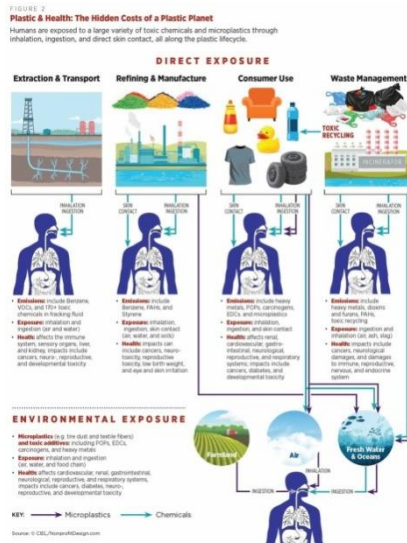


Source: FKP Research at Udayana University and CSIRO Australia

2. Human's Health

A new record displays that plastic is a human fitness crisis hiding in plain sight. *Plastic & Health: The Hidden Costs of a Plastic Planet*, authored through the Center for International Environmental Law (CIEL), Earthworks, Global Alliance for Incinerator Alternatives (GAIA), Healthy Babies Bright Futures (HBBF), IPEN, Texas Environmental Justice Advocacy Services (t.e.j.a.s.), University of Exeter, and UPSTREAM, brings collectively lookup that exposes the awesome poisonous risks plastic poses to human fitness at each stage of the plastic lifecycle, from extraction of fossil fuels, to customer use, to disposal and beyond. (Report: *Plastic Threatens Human Health at a Global Scale*, 2019)

Figure 1.6 Plastic & Health: The Hidden Costs of A Plastic Planet



Source: CIEL/NonprofitDesign.com

According to the report, uncertainties and expertise gaps regularly impede legislation and the ability of consumers, communities, and policymakers to make knowledgeable decisions. However, the full scale of fitness influences at some point of plastic's lifecycle are overwhelming and warrant a precautionary approach. On consumers, microplastic contamination potentially causing interference with gaining endocrine diversity health impacts that are caused.

The uptake of plastic particles by way of human beings can happen through the consumption of terrestrial and aquatic food products, ingesting water and inhalation. Despite seafood being a acknowledged source of contaminants to the

human diet, the prevalence of microplastics in seafood is neither quantified nor regulated. Seafood may be contaminated with microplastics through ingestion of natural prey, adherence to the organism's surface or all through the processing and packaging phase. Organisms that are eaten complete existing a larger risk of publicity compared with these having had the digestive tract removed. Whole fish purchased from fish markets in Indonesia and the USA published that 28% and 25% of all humans had plastics < 4.5 mm present in their guts (Rochman et al., 2015), while commercially vital species sourced from the Adriatic and Mediterranean Seas, English Channel and Portuguese coast established microplastic ingestion in the wild.

Microplastics have additionally been reported in natural populations of the commercially important crustacean species, *Crangon crangon* and *Nephrops norvegicus*. With plastics already existing in a range of seafood items, there is strong support for the transfer of microplastic particles to humans. (Why are the oceans important?, 2018) Medical research on both rats and human beings have proven the translocation of PS and PVC particles < a hundred and fifty μm from the gut cavity to the lymph and circulatory system. Very fine particles are successful of crossing cell membranes, the blood-brain barrier and the placenta, with documented result which includes oxidative stress, cellphone damage, inflammation and impairment of strength allocation similar to that reported for marine organisms. Exposure to hydrophobic contaminants can be a direct end resulting of the ingestion of contaminated microplastic particles, while secondary publicity can appear by fish, birds or other organisms that have collected contaminants within their tissue from in the past egested microplastics. Without in addition investigation and readily handy facts on MP loads in famous seafood items, it is not easy to operate a threat evaluation of seafood for human consumption. (Ancaman Cemar an Marine Debris dan

Mikroplastik Pada Lingkungan Perairan dan Produk Perikanan, 2018)

Evidence suggests that human exposure to microplastics through seafood is plausible, on the other hand the contribution compared with other meals and beverage products is unknown. Research into the elements influencing MP ingestion by means of marine organisms, bioaccumulation elements for popular seafood species and their trophic interactions are urgently wanted to pick out which species have to be eaten in moderation or prevented compared with these that are considered protected to eat. The quantity of micro- and nanoplastics in the surroundings is set to increase, and therefore this location of lookup requires pressing and thorough interest to figure the actual affects on human health.

3. Tourism Industry

The economic changes that have attracted so much attention in recent years can easily explained by two inter-related development. One of these, the widespread liberization of internationa trade and capital flows, has been initiated by governments. The extent to which the world economy is dominated now by transnational corporations in tourism. (Panic, 2003) Bali is an island surrounded by sea areas and about 64% of its beaches are prone to erosion. A quarter had been eroded in 2014. This caused economic and ecological losses in the coastal areas. Tourism activities carried out between tourists and tourism actors, directly and indirectly, can cause waste generation every day. (Attri, 2018) A study from the United Nations Environment Program (UNEP) states that tourists produce an average of six times as much garbage when they are on vacation. As a result, the volume of waste will increase along with the increase in the number of tourist visits to a tourist destination. Waste that is not managed properly in the tourist area can disrupt tourists' comfort in traveling.

Comfort is a very important condition in the tourism industry, in addition to security.

Until now there has been no policy issued by the government to manage plastic waste intended specifically for tourist destinations. The policy issued by the government in order to reduce plastic waste was by issuing *Surat Edaran KLHK No. S.1230/PSLB3-PS/2016 tentang Harga dan 14 Mekanisme Penerapan Kantong Plastik Berbayar*. Through this circular, the government asks local governments (provincial and district / city), producers, and businesses to reduce and handle plastic waste. This policy was tested in 22 cities in Indonesia and implemented in all retail minimarkets. But three months later the government again issued *Surat Edaran No. 8/PSLB 3/PS.PLB.0/5/2016 tentang Pengurangan Sampah Plastik melalui Penerapan Kantong Belanja Plastik Sekali Pakai Tidak Gratis*. Both of these rules caused confusion among the local government and business actors. With the existence of these two circular letters, the attitudes of business operators and regional governments differ. There are some retail businesses / modern shops that have free plastic bags. There are also some modern retail / shop businesses that sell plastic bags as merchandise, and there are also modern retail / shop businesses that follow the mechanism set by the local government. Regions that have set bans on the use of plastic bags in modern retail and shopping centers are Bogor as of 1 December 2018, and Denpasar City as of 1 January 2019.

This policy of reducing plastic waste is ineffective in reducing plastic waste in tourist destinations. First, not all regions have implemented the policy. Second, plastic bags rank 9th out of 10 types of trash that dominate the world's coastline. Based on the International Coastal Cleanup Report, ten types of trash that dominate the world's coast are cigarette butts (1,030,640), food wrappers (314,649), plastic bottle caps (276,483), plastic drink bottles (205,687), beverage cans (127,764), straws and plastic stirrers (125,973), glass drink

bottles (105,929), metal bottle caps (99,740), plastic shopping bags (85,079), and other plastic packaging (77,014). Therefore, there needs to be special policies to encourage tour operators to reduce the use of beverages or food in plastic packages; reduce the use of plastic packaging for toiletries in hotels; rating hotels based on environmentally friendly hotel services (using environmentally friendly products); provide education to the public about the dangers of plastic waste, how to reduce the use of plastic in everyday life and how to manage the plastic waste that it generates, recycle plastic waste for decoration, and others.