THE IMPACT OF COASTAL POLLUTION ON SOCIO-ECONOMIC LIFE OF SUKARAJA FISHERMEN 2008–2015

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ABSTRACT

This research aims to examine how the impact of plastic litter and waste pollution on the coast of Lampung Bay has a socio-economic impact on the lives of fishermen in Sukaraja. One of the main threats to marine and coastal sustainability is marine and coastal pollution from land-based human activities. The fishing community is the community group that most feels the impact of marine and coastal pollution. Fishermen in Sukaraja on the coast of Lampung Bay have to deal with plastic litter and waste pollution daily. This research study shows that the life of Sukaraja fishermen is severely affected by plastic and waste pollution that pollutes the sea and coastal areas of Lampung Bay. Besides, this research also shows that the waste pollution in Lampung Bay comes from industrial waste in the city, while plastic waste originates from domestic waste from surrounding residents, ocean currents, and river waste that empties into the sea. The method used in this research is the historical method. Besides, this research is also complemented by an oral history research method which is based on interviews of historical actors and witnesses from predetermined topics and temporalities.

KEYWORDS: coastal, fishermen, pollution, Sukaraja, Lampung Bay

INTRODUCTION

Lampung Province is a province located at the southern part of Sumatra Island. After the proclamation of independence in 1945, administratively Lampung became part of the Province of South Sumatra under the name Karesidenan Lampung. This status lasted until 1964 when Lampung was later designated as a Region Level I/Province. This status increase is contained in Government Regulation in Lieu of Law No. 13 of 1964 which later became Law No. 14 of 1964. The capital of Lampung Province at that time was the City of Tanjung Karang-Teluk Betung which was a combination of the twin cities of Tanjung Karang and Teluk Betung. Based on Regional Regulation Number 24 of 1983, the City of Tanjung Karang-Teluk Betung then changed its name to Bandar Lampung City starting June 17, 1983. Based on its geographical position, Lampung Province is bordered by South Sumatra Province and Bengkulu Province to the north, Sunda Strait to the south, Java Sea to the east, and Indian Ocean to the west.

Lampung has a land area of 34,623,80 km² and a long coastline of 1.105 km with two large bays, namely Lampung Bay and Semangka Bay (Badan Pusat Statistik, 2019: 174). Semangka
Bay is located in the western region bordering Tanggamus Regency, while Lampung Bay is in the eastern region bordering Bandar Lampung City, South Lampung Regency, and Pesawaran Regency. Lampung Province has 184 coastal villages with a total area of 4,140 km². Referring to Article 3 of Law No. 22/1999 concerning Regional Government, Lampung area has an area of coastal waters of approximately 16,625.3 km² so that the entire Lampung Province has an area of 51,991.8 km² (Pemerintah Daerah Provinsi Lampung, 2000: 1). Lampung Province has two main port facilities, namely Bakauheni Port and Panjang Port. Bakauheni Port connects Sumatra and Java via sea transportation, while Panjang Port is the vital facility of loading and unloading goods activities in Lampung Province.

The marine potential of Lampung Province cannot be separated from the crucial role of coastal areas. The coastal area of Lampung is a meeting point between two phenomena, namely the sea (Java Sea and Indian Ocean) and land (Bukit Barisan Selatan mountains and alluvial lowlands) (Pemerintah Daerah Provinsi Lampung, 2000: 9). In general, the coastal areas of Lampung can be grouped into four regions, namely the West Coast (210 km), the East Coast (270 km), Semangka Bay (200 km), and Lampung Bay (160 km) (Pemerintah Daerah Provinsi Lampung, 2000: 9). The coastal areas of Lampung Province have a rich natural resource potential that can contribute not only to environmental preservation but also to the national and regional economies. For example, the coastal area of Lampung Bay has a rich natural resource potential, such as coral reefs and mangroves. In addition, the potential for fisheries that landed in Lampung Bay can reach 51,000 tons/year (Pemerintah Daerah Provinsi Lampung, 2000: 11). Apart from the fisheries sector, the coastal area of Lampung Bay also has other marine potentials that are no less potent, such as seaweeds and pearls cultivation.

The great potentials and opportunities obtained from the coastal areas in Lampung Province go hand in hand with priority issues that are challenges in maintaining the sustainability of coastal ecosystems. In the results of the study by the Lampung Provincial Government in 2000 regarding the strategic plan for the management of Lampung coastal areas, contains priority issues faced by six cities and coastal districts related to coastal area management. The city of Bandar Lampung is one of the areas facing problems related to the management of this coastal area because of its geographical location which is directly adjacent to the Lampung Bay. One of the coastal management issues faced by Bandar Lampung is the issue of pollution in coastal areas. According to the results of the study, the waters pollution of Bandar Lampung comes from domestic waste of around one million people and about 42 industries in the city (Pemerintah Daerah Provinsi Lampung, 2000: 14). In other words, the majority of marine and coastal pollution comes from land-based human activities, although it is also possible from human activities in the sea.

One of the main threats to the marine and coastal ecosystems of Bandar Lampung is the threat of solid waste and liquid waste. The largest and most dangerous solid waste found on the coast of Bandar Lampung is plastic litter, while liquid waste is industrial waste and oil waste. Both types of pollution have a very detrimental impact on the environment because they are difficult to decompose, dangerous, and poisonous. Decrease in environmental carrying capacity, damage to marine life, and decrease in the quality of seawater and water absorption on land are some examples of the negative impacts of pollution on the environment. Besides, this pollution can also harm human life. Marine debris that has accumulated on the beach can disturb the beauty of the beach, thus threatening the tourism sector. In addition, the quality of public health may also
experience a decline due to increasingly uncontrolled pollution in coastal areas, especially for people who live in areas near or directly adjacent to polluted beaches.

Sukaraja coastal areas in Bandar Lampung is one of the area that facing a serious problem of pollution. Administratively, Sukaraja is a sub-district located in Bumi Waras District, Bandar Lampung. Geographically, Sukaraja is an area located on the coast of Lampung Bay. Therefore, one of the main livelihoods of the people of Sukaraja is fishing. These Sukaraja fishermen make the coast of Lampung Bay the main support for their life. Therefore, the decline in the quality of the waters and the coast of Lampung Bay means a threat to the survival of the fishermen in Sukaraja. The fishermen in Sukaraja have had to face this problem for more than a decade. In a daily basis, Sukaraja fishermen have to deal with solid waste and liquid waste that pollutes their source of livelihood. The solid waste is in the form of plastic, while liquid waste is in the form of oil, coal, and industrial waste. Degradation of the coastal environment due to plastic litter and waste pollution has had a social and economic impact on the lives of Sukaraja fishermen who make the sea a source of livelihood.

Based on the explanation above, the discussion about the impact of coastal pollution on the socio-economic life of Sukaraja fishermen is very interesting for further discussion. As a country with an area of water reaching 70 percent of the total area with a coastline of 99,093 km, the potential for Indonesian marine and fisheries is of course very potential to continue to be developed for the advancement of national development (Badan Pusat Statistik, 2019: 21). Besides, more than two million fishermen in Indonesia depend on marine and coastal ecosystems for their livelihoods. Therefore, this condition also opens the possibility that the problem of waters and coastal pollution is not only faced by Sukaraja fishermen, but also by many other areas and coastal communities throughout Indonesia. This increasingly uncontrollable condition of marine and coastal pollution demands attention, concern, and seriousness from all parties to find the right solution in dealing with problems that increasingly threaten the balance between nature and humans.

The method used in this research is a historical research method which is based on four stages, namely heuristics, criticism, interpretation, and historiography. First, heuristics is the stage of collecting research sources (primary and secondary) to obtain the required information. Second, criticism is a step taken to verify the authenticity and credibility of sources (evidentiary value) and to see the relevance of sources to the research. Third, interpretation is a stage to interpret findings from the heuristic and critical processes and observe the connection between one component and another. Fourth, historiography is an imaginative reconstruction stage of the past based on data obtained by going through the process of critically examining and analysing records and legacies (Gottschalk: 2008: 39). This article was compiled using primary and secondary sources from the Publication of the Central, Provincial, and City Statistics Agency, Sukaraja Village Monograph Profile, Lampung Provincial and Bandar Lampung City Government Publications, National and International Scientific Journal Publications, Lampung Regional Library Collections and Universitas Indonesia Libraries. In addition, this article was also compiled using testimonials from oral history interviews conducted with historical actors and witnesses who in this study were Sukaraja fishermen.

As part of maritime history that intersects with environmental history, the life of fishermen and their relationship with coastal areas can be written using a structural approach. The structural
approach intends to express something that is buried below, not just something that is visible on the surface. Structural history (l'histoire structurelle) usually includes a long period of time, which includes changes in the structure of society and the environment that have occurred gradually (Kartodirdjo, 1993: 115). Therefore, this type of history is also known as a long-term history (longue durée). The term longue durée is a term used by Ferdinand Braudel to express history that moves for a long time. The history of coastal areas and their relationships with coastal communities mainly focuses on the dynamics of human life that affect the dynamics of nature and vice versa. These dynamics operate in a continuous flow of time and without barriers. Therefore, using a structural approach, the historical journey of the area and coastal community communities is seen in changes that have taken place gradually or in other words, in slow moving historical times.

ANALYSIS

The Coast of Bandar Lampung in the Trajectory of National History

Bandar Lampung is the capital of Lampung Province. Before 1982, the city of Bandar Lampung was called the City of Tanjung Karang-Teluk Betung. The naming reflects the two twin cities that make up this city. The Teluk Betung area is an area geographically located on the seashore of the Lampung Bay. The natural characteristics of this area allow this area to develop as a port area. In the 15th century, this bay area was a gathering place for traders who brought their merchandise through rivers and beaches, including Sukamenanti Port, including port airports, such as Bandar Balak, Bandar Lunik, and Bandar Teba (Kementerian Pendidikan dan Kebudayaan, 1984: 24). During the Dutch colonialism era, Teluk Betung was one of six onderafdeeling areas formed by the Dutch in Lampung. Besides, Teluk Betung was also the center of the Dutch government for the Lampung region which was also the center of the position of the Dutch government ruler. The position of this area as the center of government made the Dutch then build buildings and fortresses.

The existence of ports in the Teluk Betung area made the area the main choice when the Dutch colonial government opened plantations in the Lampung area at the end of the 19th century. For the first time, foreign capital entered Lampung through plantation business in 1890 (Kementerian Pendidikan dan Kebudayaan, 1997: 103). The plantation was originally opened in Teluk Betung with economic considerations because it is close to the port and not too far from the island of Java which is a source of labor (Kementerian Pendidikan dan Kebudayaan, 1997: 103). For the purpose of transporting the plantation products, in 1913 a railway was built from Teluk Betung to Palembang (Rijal, 2011: 42). Entering the 20th century, the function of the Teluk Betung Port as a link between Sumatra and Java Island became increasingly clear. The smooth flow of transportation between Sumatra and Java by sea is supported by the opening of railways and roads from South Sumatra to Lampung. When Panjang Port opened around 1935, the functions of Teluk Betung Port and Menggala Port began to be replaced by Panjang Port.

In the early 20th century, the Dutch East Indies colonial government implemented a transmigration program from densely populated areas (Java) to areas with low population density. The Lampung area was then selected as the destination area for the transmigration program on the basis that the population density of the Lampung area was still relatively low with many vacant lands. This transmigration program was carried out in waves during the period 1905–1941.
smooth running of the transmigration program of the Dutch East Indies colonial government was largely determined by the sea transportation facilities that connected the islands of Java and Sumatra. The transmigrants from Java Island were transported by ship to cross the Sunda Strait and dock at Panjang Harbor in Lampung Bay. The transmigrants were then placed temporarily in the Teluk Betung area before continuing their journey to the transmigration destinations in several areas in Lampung.

The Coastal of Sukaraja and Sukaraja Payang Fishermen

Lampung Province is one of the provinces in Indonesia with great marine and fisheries potential. Capture fisheries production in Lampung Province in the 2018 period reached 142,969 tons/year (Badan Pusat Statistik Provinsi Lampung, 2020: 403). The production volume is calculated from capture fisheries in inland open water capture fisheries and marine capture fisheries. The volume of inland open water is 6,219 tons/year, while the volume of marine capture fisheries in Lampung Province reaches 136,750 tons/year (Badan Pusat Statistik Provinsi Lampung, 2020: 403). In marine capture fisheries production, Bandar Lampung is the fourth largest contributor with a volume reaching 17,019 tons/year after East Lampung Regency (31,417 tons/year), South Lampung Regency (25,573 tons/year), and Tulang Bawang Regency (19,587 tons/year) (Badan Pusat Statistik Provinsi Lampung, 2020: 403). Sea fishing activities in Bandar Lampung can be found in the coastal areas of the city, such as Teluk Betung Selatan, Teluk Betung Barat, Bumi Waras, and Panjang. These areas have the characteristics of a coastal area because of their location which is right on the seashore of Lampung Bay.

One of the coastal areas in Bandar Lampung is in the Sukaraja area which is administratively part of Bumi Waras District, Bandar Lampung. Before the division of the region in 2012, Kelurahan Sukaraja was an administrative area of the Teluk Betung Selatan District. The Sukaraja area is one of the areas in the city of Bandar Lampung which geographically is directly adjacent to the Lampung Bay. Kelurahan Sukaraja has an area of 80.3 ha/m^2 with a beachside village area of 50 ha/m^2 (Profil Desa and Kelurahan Sukaraja, 2013). Administratively, Kelurahan Sukaraja is divided into two environments (LK) and 36 Rukun Tetangga (RT/Neighborhood). Environment I is in the coastal area consisting of 17 RT, while Environment II consists of 19 RT. Geographically, Kelurahan Sukaraja is bordered by Kelurahan Way Lunik in the east, Kelurahan Bumi Waras in the west, Teluk Lampung in the south, and Kelurahan Garuntang in the north. In the period of July 2020, the total population of Kelurahan Sukaraja reached 10,202 people with details of 5,207 men and 4,995 women (Laporan Kependudukan Kelurahan Sukaraja, 2020).

The natural characteristics of the Sukaraja area are in the form of a basin-shaped coastal area in the Bay of Lampung. Therefore, one of the livelihoods of the people of Sukaraja is working as fishermen to catch sea fish. In 2014, it was recorded that 1,952 people in Sukaraja made their living as fishermen out of a total of 12,081 residents (Profil Desa and Kelurahan Sukaraja, 2014). In the Kamus Besar Bahasa Indonesia (KBBI), fishermen are defined as people whose main livelihood is fishing in the sea. Fishermen on the coast of Sukaraja make the waters of Lampung Bay the main sea in their marine fishing activity. The activities of Sukaraja fishermen in catching fish in the sea of Lampung Bay have been going on for generations. In particular, Sukaraja fishermen are known as payang fishermen. Payang is defined as a simple and traditional net that
fishermen use as a fishing tool. The type of nets used is in the form of bag nets, not snag nets. The method of catching fish using payang nets has become a tradition for the coastal fishing community of Sukaraja which continues to be used from one generation to the next.

The payang method is a traditional way of catching fish using a simple boat and net. To get to the middle of the sea, payang fishermen use small wooden boats without a motor and rely only on human power. This limitation causes the fishing zone for the Sukaraja fishermen's payang in Lampung Bay to be limited and only around 1 km from the coastline. One unit of the payang team usually contains 11 fishermen who have their respective functions and roles in the fishing process using payang. To get to the fishing zone, 3–4 fishermen row a boat carrying payang nets into the middle of the sea. The whole process of fishermen going to sea to spread the net takes approximately 30 minutes. After that, the net is left in the sea for about 3 hours before finally being pulled and anchored on land. During the withdrawal process, 1 person is at sea to monitor and direct the position of the net to avoid tilt, while 10 other people are on the land to pull the payang net, 5 people are on the right and 5 people are on the left. The whole process of withdrawing payang from sea to land takes approximately 2–3 hours.

In carrying out fishing in the sea, Sukaraja fishermen do not specify specific days for fishing. In the past, the fishermen of Sukaraja devoted themselves to not going to sea on Fridays, but due to the increasingly demanding daily income, now in normal conditions, payang is practiced almost every day in the morning, afternoon, evening, and night. In general, fishermen usually do payang activities after 05.00 a.m. and finish at midday. Apart from that time, payang activities are also usually carried out when entering the afternoon at around 3.00 p.m. and finish until the evening or early morning. In other words, the duration of fishing activities of Sukaraja fishermen does not have certainty or time and hour provisions, but it adapts to sea conditions and fish
availability. In a day, an average of 1 Sukaraja fisherman can go to sea or do payang 2–3 times. The catch of Sukaraja fishermen is mostly sea fish with the types of mackerel and tuna, while other marine catches such as shrimp and squid are rarely found.

Based on the ownership of fishing gear, fishermen can be divided into two groups, namely labor fishermen and owner fishermen. In general, labor fishermen are defined as fishermen who provide their energy to participate in fishing activities, while owner fishermen are those who own boats and equipment used in fishing activities (Badan Pusat Statistik, 2019: 138). The two groups of fishermen based on fishing gear ownership can also be found in the Sukaraja payang fishing community. The ownership of payang fishing gear in the Sukaraja fishing community was previously dominated by the Minangkabau ethnicity. Over time, this role was later replaced by ethnic Banten, Sunda, and Palembang. Ownership of payang nets and boats is owned by individuals called juragan payang. In the process of fishing in the sea, the juragan payang can participate in the sea or employ 11 people. Of these 11 people, 1 person is the pawang or payang carrier (at the time of drawing the net is in the sea to adjust the slope), while the other 10 are referred to as anak payang. The wage system applied is a profit-sharing in the form of money from the sale of fish consisting of 25% of the juragan payang, 15% of the pawang, and 6% of each of the 10 anak payang.

Pollution of the Waters and Coastal Areas of Sukaraja

Before the massive construction of the coastal area was carried out, the Sukaraja coastal area was still a forest area with the beachside functioned as a place for fishermen to base their fishing gear. The location of residential residents, including fishermen, is a little distance from the beach. Initially, Sukaraja beach was a white sandy beach with a potential coral reef ecosystem. However, entering the period of the 1990s, coastal stockpiling began to flourish using soil and cumplung (hollow coconut shells). Entering the 1998 period, massive development was carried out in the coastal area of Sukaraja. The locations on the right and left of the beach are continuously stockpiled to meet the need for land for residential areas and trade areas. The development is increasingly being carried out at the expense of the coastal ecosystem of Sukaraja, including the coral reef ecosystem. The location on the right and left of the beach which is now occupied by the houses of the residents used to be the location of the existence of coral reefs. To anticipate the impact of the waves, residents built embankments from cement or piled high natural stones from Mount Kunyit.

Entering the 1998 period, the activity of fishing for payang fishermen on the coast of Sukaraja began to face the problem of non-organic waste pollution, especially plastic. At that time, the presence of plastic began to appear on the Sukaraja beach, but the condition was not yet severe. For a decade, this condition worsened because in the period around 2008, the condition of Sukaraja beach was completely filled with plastic waste. As explained by one of the following Sukaraja fishermen:

Sampah [plastik] itu sejak awal-awal sudah ada sih, semasa kita disini sudah ada cuma belum banyak pada saat itu. Masuk tahun 1998 itu memang sudah ada, tahun 2008 sampah sudah penuh. Cuma belum seperti sekarang ini, sekarang ini kan sudah benar-benar tebal benar sampahnya. (Wawancara, Sukaraja, 23 Agustus 2020)
Translation: Waste [plastic] has existed since the beginning, when we were here there was just not much at that time. In 1998 it was already there, in 2008 the garbage was full. It's just not like now, right now the trash is thick. (Interview, Sukaraja, 23 August 2020)

As stated by other Sukaraja fishermen:

Sejak 1998-an, 1997/1998 itu mulai [pencemaran plastik], masalahnya waktu 1990 itu belum ada plastik. Tahun 1990 saya di sini, menimbun pantai ini. [Penimbunan] ini memakai cumplung. Tau cumplung ya? Kelapa bolong bundar yang dimakan bajing itu. Kan banyak di pesisir ini cumplung, kosong semua. Ya itu yang ditumpuk-tumpuk untuk menimbun ini [rumah] dulu. Karena belum ada yang namanya plastik, sedangkan kalau mau beli beras itu dari kantong semen dulu. Dari 1997/1998 pencemaran [plastik] mulai banyak. (Wawancara, Sukaraja, 24 Agustus 2020)

Translation: Since 1998, 1997/1998 it started [plastic pollution] because there was no plastic in 1990. In 1990 I was here, stockpiling this beach. This [hoarding] wears cumplung. Do you know cumplung? The rounded coconut that the squirrel ate. There are many on this coast, all empty. Yes, that's what is being piled up to hoard this [house] first. Because there is no such thing as plastic, whereas if you want to buy rice it is using a cement bag. From 1997/1998 pollution [plastic] started to increase. (Interview, Sukaraja, 24 August 2020)

Contamination of plastic waste from land to sea is one of the most pervasive pollution problems faced by the Earth today with over 20 million tons of plastic estimated to reach the oceans each year (Hanson, 2019: 76). Thus, this problem becomes one of the main threats to the sustainability of marine and coastal ecosystems. Physical alteration and destruction of coastal ecosystems are now considered the most important threats to coastal areas (Rudianto, Ismadi, Yamindago, 2015: 220). The coastal areas of Sukaraja are also not free from this problem. Every day, the threat of plastic litter and damage to ecosystems continues to be an ongoing issue. Sukaraja Beach, which is located on the coast of Lampung Bay, is the main support for the life of the coastal community, especially fishermen. Threats to the sustainability of coastal ecosystems mean threats to the lives of fishermen. In general, the waste that pollutes the Sukaraja coast can be divided into two types, namely organic and non-organic waste. Some of the organic waste that can be found on the coast of Sukaraja includes pieces of wood, tree roots, and bamboo. The nature of organic waste is easy to decompose. Therefore, its existence tends to be not too dangerous for coastal ecosystems and communities.

Different conditions occur in non-organic waste which also contributes to waste pollution on the coast of Sukaraja. In fact, the type of non-organic waste is the biggest component that pollutes the sea and coastal areas of Sukaraja. These types of non-organic waste include plastic, both plastic bags or bottles and the remains of commercial trademark products, as well as styrofoam. Single-use disposable food containers and packaging, together with plastic bags, make up the largest components of marine and coastal plastic litter (UNEP 2016 in Hanson, 2019: 76). The increase in consumption patterns of urban communities is believed to be one of the factors causing the high rate of plastic use. Plastic or other non-organic litter has a high potential for
environmental problems because it is very difficult or even impossible to decompose. Plastic litter that pollutes the coast of Sukaraja can be mapped from at least three sources, namely domestic waste from surrounding residents, ocean currents, and trash in the river that empties into the sea of Lampung Bay.

The existence of marine debris in the waters and coastal areas of Sukaraja comes from domestic waste from surrounding residents. Although not all, some residents on the coast of Sukaraja still throw their domestic waste into the sea. Lack of public awareness of the importance of the sea and environmental sustainability, the absence of adequate sanitary facilities, as well as the inadequate management of coastal waste management by local governments are several factors. Regarding this, one of the Sukaraja fishermen gave the following testimony:

Kalau sampah-sampah plastik itu yang pasti dari rumah tangga-rumah tangga saja. Kebanyakan dari rumah tangga. Pastinya dari pesir di sini dulu lah yang kadang-kadang mereka membuangnya [sampah] juga ke laut. Laut kita ini karena hanya cuma ini yang berbentuk teluk, begitu kan? Jadinya berkumpul di pantai ini saja. Karena kebetulan pantai ini cuma, daerah teluk ini, hanya ini yang masih ada pantainya dengan di Bumi Waras kalau tidak salah. (Wawancara, Sukaraja, 23 Agustus 2020)

**Translation:** For plastic waste, it must be from households only, mostly from households. Surely it was from the coast here that sometimes they threw [garbage] into the sea. Our sea is because it's the only one in the form of a bay, right? So just gather on this beach. Because just so happens that this beach is just this bay area, this is the only beach that has beaches in Bumi Waras, if I'm not mistaken. (Interview, Sukaraja, 23 August 2020)

This statement was also confirmed by one other fisherman:

Ya mungkin ada juga sih yang tidak kelihatan [membuang sampah ke laut], yang bagian-bagian di situ [rumah-rumah yang benar-benar berbatasan langsung dengan pantai] membuang ke laut. (Wawancara, Sukaraja, 24 Agustus 2020)

**Translation:** Perhaps maybe some are invisible [throwing garbage into the sea], where parts [of the houses directly adjacent to the beach] dump into the sea. (Interview, Sukaraja, 24 August 2020)

The geographical condition of Sukaraja beach is a basin in the Bay of Lampung. This natural topography causes marine debris to tend to be carried away by the current until it lands on the coast of Sukaraja. This condition gets worse when the wind blows from the north towards the coast. Under these conditions, the volume of waste on the coast of Sukaraja Beach tends to increase significantly. Besides, garbage along the river also contributes greatly to marine debris on the coast of Sukaraja. There are 3 rivers that contribute to carrying community waste from the city (upstream) which empties into the coastal area of Sukaraja, namely the Kali Kuala River, the Kunyit River, and the Way Lunik River. The behavior of people throwing garbage into rivers is still common. Communities along the river flow still have the habit of disposing of their domestic waste into the river. During the dry season, the garbage piles up in the river, but when the rainy season arrives, the rubbish is carried away by the flow of the river and lands into the sea of
Lampung Bay. One of the fishermen in Sukaraja shared his own experience when he witnessed the dumping of garbage into the river by the upstream household:

Pada saat di rumah teman, di dapurnya itu, bawahnya sungai, dia menggantung di paku jendela. Ketika penuh dia buang [ke sungai]. Ketika itu saya tahu. Saya tanya, “Bu, buangnya kemana itu, Bu?” “Iya ke sungai, katanya.” “Itu nanti ke tempat saya itu.” “Dimana tempatmu, Din?” “Di Sukaraja”. (Wawancara, Sukaraja, 23 Agustus 2020)

Translation: At a friend's house, in the kitchen, at the bottom of it is a river, she hangs [domestic waste] on a window nail. When it was full she threw it [into the river]. At that time I knew. I asked, "Mrs., where do you throw it?" "Of course to the river, she said." "That will come to my place later." "Where is your place, Din?" "In Sukaraja". (Interview, Sukaraja, 23 August 2020)

The pile of plastic waste on the coast of Lampung Bay, to be precise at Sukaraja beach, is now in a critical condition. The height of the garbage pile is estimated to reach more than 1 meter and cover the entire beach surface. The existence of this rubbish on the shores of Sukaraja beach is not only caused by the ocean currents that make the trash pull over on the beach by itself but also one of them is caused by the activities of the Sukaraja payang fishermen. When payang nets are dragged or pulled ashore after 3 hours of being left in the ocean, the nets not only contain fish but also contain plastic waste. The sorting between fish and plastic waste has become a routine activity of Sukaraja fishermen when doing payang. After separating the fish and plastic, the waste is then allowed to pile up on the shoreline. Indeed, there have been attempts by fishermen to clean up the garbage and throw it to the nearest garbage dump site (TPS), but because the volume of waste continues to increase and the management of coastal waste management is not optimal from the local government, it causes fishermen to finally choose to let the plastic waste piled on the beach.

Sampah... ya ditinggal di situ lah. Kalau awalnya memang kita [nelayan] bersihkan, kita buang di TPA [Tempat Pembuangan Akhir] itu. Karena meningkatnya sampah itu, kadang tidak terbuang oleh petugas kebersihan juga, jadi kami [nelayan] juga malas begitu kan. Karena di daratan juga, airnya kotor juga kalau sampai tidak terbuang. (Wawancara, Sukaraja, 23 Agustus 2020)

Translation: Garbage ... so we leave it there. Initially, we [fishermen] cleaned it, we disposed of it in the TPA [Final Disposal Site]. Because of the increase in garbage, sometimes it is not wasted by the cleaners either, so we [fishermen] are lazy too, right? Because on land too, the water is dirty if it doesn't get wasted. (Interview, Sukaraja, 23 August 2020)
Plastic litter pollution in the waters and coastal areas of Lampung Bay is not the only pollution problem that must be faced by the Sukaraja coastal community. Industrial waste pollution is one of the main problems that adversely affect the socio-economic life of fishermen. Regarding industrial waste, according to a study published by the Lampung Provincial Government in 2000, 42 industries in the city have polluted the waters of Lampung Bay (Pemerintah Daerah Provinsi Lampung, 2000: 14). Apart from having main pipes, these industrial factories are suspected of also having other pipes that flow into the river. When it rains a lot, the other pipe is opened to drain the waste into the river. As a result, waste flows simultaneously with river water discharge which increases significantly due to rain and then empties into the sea of Lampung Bay. This suspicion stems from the experience of fishermen that when it rains heavily, sometimes the seawater turns black and creates a strong smell. Besides, afterward the fish also often show abnormal behavior or even die suddenly en masse.

Apart from pollution from industrial waste, Sukaraja fishermen also often complain about the presence of oil in the waters of Lampung Bay. The content of industrial waste coupled with the content of oil, lubricant oil, and diesel fuel makes the water quality in Lampung Bay very bad. As a result, many small fish died in the sea of Lampung Bay. It is estimated that the oil, lubricant oil, and diesel waste originates from river flows. Apart from that, besides being a fishing zone for fishermen, Lampung Bay is also a port zone which is the lifeblood of loading and unloading activities in Lampung Province. Regarding the presence of industrial waste and oil content in the waters of Lampung Bay, a fisherman gave the following testimony:

Pada saat itu [ikan mati massal] memang air kotor, seperti beroli begitu. Coklat-coklat, bercak-bercak begitu. Seperti berminyak begitu. (Wawancara, Sukaraja, 23 Agustus 2020)
**Translation:** At that time [mass dead fish] was water was indeed dirty, like oily. Brown and speckled. Like oily. (Interview, Sukaraja, 23 August 2020)

Other fishermen gave the following testimony:

Tahun 1998 itu ikan-ikan masih ada. Cuma waktu itu belum ada pencemaran, masalah limbah belum ada karena pabrik-pabrik itu jarang dulu. Paling ada sampah juga, jarang juga membuangnya, dibuang kemana tidak tahu. Tapi sekarang ini semenjak banyak masyarakat yang di pesisir maupun yang di atas sana, yang di Karang [Tanjung Karang] sana pasti membuangnya ke sungai. Larinya ke Kali Kuala di situ. Mengalir plastik-plastik itu kan. Lalu ke sini, menumpuk lah di sini. Apa ya air oli, dibuang waktu hujan, itu lah pencemaran. (Wawancara, Sukaraja, 24 Agustus 2020)

**Translation:** In 1998 the fish were still there. But at that time there was no pollution, there was no waste problem because factories were rare in the past. At most there is trash, rarely throw it away, but throw it away where? Don't know. But now, since many people on the coast and up there, those in Karang [Tanjung Karang] must throw it into the river. It ended up to Kali Kuala there. The plastics flow, right? Then come here, pile up here. Is it oil-water? Discarded when it rains, that is pollution. (Interview, Sukaraja, 24 August 2020)

Industrial waste pollution and the presence of oil content in the waters of Lampung Bay are not the only problems faced by the Sukaraja fishing community. Sukaraja fishermen are also often disturbed by the passage of coal barges heading to a port that is exclusively owned for the own benefit of a coal company. The cross-zone for coal barges is right in the distribution zone for the Sukaraja fishermen's payang nets. In the fishing process, the payang nets used by Sukaraja fishermen take up a large spreading zone. Therefore, the presence of these vessels greatly disturbs fishermen's activities when carrying out payang. When the ships cross, Sukaraja fishermen cannot do payang because the risk of nets getting caught and torn by the propellers is very high. The frequency of these ships passing is uncertain because it depends on loading and unloading times at the port, but on average every week they always pass regularly. The existence of coal is also suspected of contributing to waste pollution on the coast. With the presence of coal that is loaded on land when it rains, water containing coal content is thought to flow into the sea of Lampung Bay. Every time it rains, not only does the volume of waste increase, but the volume of waste also increases significantly.

Pollution in Lampung Bay does not only affect coastal communities in Bandar Lampung City but also affects every community along the coast of Lampung Bay. In 2012, for example, there was a pollution that affected fishermen known as *keramba jaring apung* (floating net cages) who lived on the coast of Lampung Bay in Pesawaran District. The pollution began when PT Pelabuhan Indonesia II (Persero) Cabang Pelabuhan Panjang normalized the port by deepening the shipping channel and pond of the Pelabuhan Panjang Bandar Lampung. The dredging is carried out to deepen the sea to facilitate the flow of ships in and out of the port. The dredged mud is then dumped near Tegal Island, which is located in the middle of the sea in Lampung Bay which is close to the coast of the Pesawaran Regency. As a result, the fish in the floating net cage of the fishermen die and fishermen are forced to experience crop failures. The dredged mud is proven to
have crossed the water quality standard because it is stirred so that the seawater becomes cloudy which results in the death of fish and other marine biotas (Putusan Mahkamah Agung Republik Indonesia, 2017).

**The Impact of Coastal Pollution on the Life of Fishermen in Sukaraja**

The topography of the Sukaraja area that juts into or is sunken on the coast of Lampung Bay makes the Sukaraja coastal community one of the main parties who feel the impact of pollution in the waters and coast of Lampung Bay. This plastic and waste pollution directly affects the income source of Sukaraja fishermen, who depend on the marine and coastal ecosystems as the main support for life. Poor water quality, pollution, and degradation of coastal habitats affect the health of plants, animals, and people living at the coast (Rudianto, Ismadi, Yamindago, 2015: 120). The decline in the quality of the waters of Lampung Bay due to marine debris and waste causes a decrease in the catch of fishermen's sea fish. The condition of polluted seawater, narrowing of the fishing zone due to reclamation, and traditional fishing gear owned by fishermen have made it increasingly difficult for Sukaraja fishermen to find fish on the coast of Sukaraja. This condition has a direct impact on the decline in the economic condition of fishermen.

Before the pollution of plastic and waste was rampant on the coast of Sukaraja, the catch of fishermen's fish was abundant. In the period before the 1990s, fishermen were able to catch up to a quintal scale in one payang, but now only one bucket (approximately 14 kilograms) or even only one plastic. In other words, the number of fishermen’s fish catch from the sea is decreasing, unstable, and difficult to predict. The water quality is getting worse, so big fish such as simba and tuna are never caught by fishing nets on the coast. Large fish such as simba and tuna can go away to the middle of the sea in search of a healthier water zone. This condition causes the fish caught in fishermen's nets to only be small fish such as mackerel. One of the Sukaraja fishermen gave the following testimony:

Kalau dilihat ke belakang, dari orang tua kita dulu, itu kantong payang itu penuh, bahkan ikan itu tidak terurus, ikan itu tidak terurus. Zaman dulu belum terlalu ada es, jadi ikan itu hanya digelar begitu saja. (Wawancara, Sukaraja, 23 Agustus 2020)

**Translation:** If you look back, from our parents, the payang net is full, even the fish is not taken care of, the fish is neglected. There wasn't much ice in the old days, so the fish was just spread out. (Interview, Sukaraja, 23 August 2020)

He also added:

Jauh… jauh sekali, pendapatan dulu dengan pendapatan sekarang. Jauh… 80 persen. Ikannya menjauh, logikanya ikannya menjauh. Ikan itu tidak akan mati. Ikan itu yang mati hanya yang sudah menumbur ke lintasan limbah itu saja. Ikan itu kan memiliki rasa juga. Kalau air itu dia rasakan, kalau ibarat orang dulu polusi, debu, ya mereka juga kan menyingkir. Ikan itu tidak mungkin bertahan di tempat yang kotor. Jadi ikan itu jarang tembus dari tengah ke pesisir ini, ke pinggiran-pinggiran laut ini. (Wawancara, Sukaraja, 23 Agustus 2020)
Translation: Far... far away, previous income with current income. Far… 80 percent. The fish are moving away, logically the fish are moving away. The fish won't die. The fish that die are only those that have sprung into the waste passage. The fish has a taste too. If its feels the water if, like the old people, pollution, dust, they will also move away. The fish cannot survive in a dirty place. So the fish rarely penetrates from the center to this coast, to these edges of the sea. (Interview, Sukaraja, 23 August 2020)

Payang fishing community is a community that relies on fishing in the sea as their main livelihood. This means that a decrease in fish catch means a decrease in fishermen's income. Fishermen's household welfare depends on the fishermen's income from fishing. This means that a decrease in the catch has a direct effect on decreasing the welfare of fishermen's households. According to Kusnadi (2003), poverty and low levels of social welfare afflict most of the traditional fishermen and labor fishermen who are the largest social group in the fishing community (Fadilah, Zainal Abidin, Kalsum, 2014: 71). The urgent economic demands then caused many Sukaraja payang fishermen to diversify their jobs. Side jobs, such as construction workers or warehouse transport workers, are carried out by fishermen when fish or sea conditions are not possible for payang. Limited ability, experience, and education limit the types of work that Sukaraja payang fishermen can do. Fishermen do not have many options but to work in the informal sectors. To meet household needs, the wives of Sukaraja payang fishermen usually help the family economy by trading or opening small stalls. Regarding the household welfare conditions of Sukaraja fishermen, one fisherman gave the following testimony:

Sangat menyedihkan kalau kita ini mah. Kadang-kadang mereka [nelayan] itu hanya dapat uang 5.000 [rupiah], paling besar 10.000, sedangkan kami ini ditungguin anak bini di rumah. Apa cukup uang 10.000 atau 5.000? Hanya sekali payang mereka berhenti… Makanya mereka keluar dulu [mengerjakan pekerjaan lain], kalau baru ada ikannya baru mereka ke sini lagi [melayat]… Ada yang [buruh] bangunan, apa saja. (Wawancara, Sukaraja, 24 Agustus 2020)

Translation: [Our condition] is very sad. Sometimes they [fishermen] only got 5,000 [rupiah], 10,000 at most, while the chaplain waited for us at home. Is 10,000 or 5,000 enough? Only once they stop… That's why they go out first [do other work], when there are fish, then they come here again [go to sea]… There is construction [workers], whatever. (Interview, Sukaraja, 24 August 2020)

The existence of plastic litter in the coastal waters of Sukaraja creates problems for Sukaraja fishermen when doing payang. When payang nets are pulled from the ocean and anchored on land, fishermen have to sort between plastic and fish. This process makes the fishermen's work duration longer than they should be. Besides, the existence of plastic litter piles on the mainland of the coast also creates problems for the coastal community of Sukaraja. The thickness of the plastic litter is now estimated to be more than 1 meter because it has been piled up over the years. One of the harmful properties of plastic litter is its low degradability. It takes decades for plastic litter to decompose on its own, even for the styrofoam type it is impossible to decompose. The existence of piles of plastic litter generally disturbs the comfort of the coastal community of
Sukaraja. The environment becomes dirty and the beauty of the beach is also lost because it is covered by piles of garbage. Especially for fishermen, the existence of this pile of plastic litter causes discomfort when the process of pulling the payang net from the ocean to the mainland. When pulling the payang net, fishermen stand on top of the pile of plastic litter. This condition causes inconvenience because fishermen's feet do not rest on solid and stable soil but on the pile of garbage. Another problem that arises from the accumulation of garbage is related to the safety, security, and health of fishermen. Organic waste such as wood and bamboo sometimes has nails stuck in logs or bamboo. When the rubbish is piled up with other rubbish, fishermen cannot see or know where the nails are. As a result, the risk of piercing their feet by nails is very high. This situation is increasingly worrisome because some fishermen, although not all of them, are still doing payang activities without wearing shoes or other footwear.

CONCLUSION

Marine and coastal ecosystems are the main pillars that support the lives of local coastal communities. The fishing community is one of the coastal local communities that make the sea and the coast their main source of life. Therefore, the degradation of the quality of the environment and the preservation of marine and coastal areas is a threat to fishermen's life. One of the main problems faced by marine and coastal ecosystems and their communities is the pollution of marine debris, such as plastic litter and waste. This pollution has a very bad impact on the quality of the marine and coastal environments, such as a decrease in the carrying capacity of the environment, damage to marine life, and a decrease in the quality of seawater and water infiltration on land. The sea and coastal areas in Indonesia are also inseparable from the problems of marine and coastal pollution. The Sukaraja fishing communities who live on the coast of Lampung Bay, for example, have to deal with the problem of plastic waste pollution daily. This condition is then exacerbated by the presence of industrial waste polluting the Lampung Bay. The majority of both plastic litter and waste originate from activities in the upstream cities. This means that pollution that occurs in Lampung Bay is dominated by garbage and waste from land-based human activities.

The existence of plastic litter and waste in the waters and coastal areas of Sukaraja has a bad impact and greatly affects the lives of Sukaraja fishermen. Socio-economic aspects of fishermen's life are the two aspects of life that are most significantly affected. Both types of pollution, both plastic litter and waste, both have a negative impact on the lives of fishermen, but both have their respective portions of this impact. The decline in fishermen's economic income due to a decrease in fish catches is more caused by waste pollution in the waters. Waste content, especially industrial waste, which is hazardous and toxic material, has the ability to kill marine life. The decline in fishermen's economic income means a decrease in the quality of fishermen's household welfare which then has an impact on the ability of fishermen households to survive. Pollution of plastic litter, both those that are still in the sea and those that have piled up on the surface of the beach, also presents a problem of its own to coastal communities, including fishermen. The comfort of the community is disrupted due to the coastal environment which has become dirty and no longer attractive to enjoy its beauty. The disturbance also affects fishermen's activities in the fishing process using payang. The two types of pollution are basically not only harmful and detrimental to the environment, but also to humans as parties who enjoy and are tasked with protecting environmental sustainability, including marine and coastal ecosystems.
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