



Socio-Economic Changes in Coastal Fishermen of West Sumatra as the Impact of Coastal Abrasion

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Abstract

This study is about the socio-economic changes of fishermen on the west coast of Sumatra as a result of coastal abrasion. The purpose of this study is to explain the fishermen's struggle in dealing with abrasion and rebuilding the economy back to normal. The area on the west coast of Minangkabau facing the Indian Ocean is inhabited by people living on the coast. The west coast of Sumatra is very prone to coastal abrasion, because it faces the Indian Ocean which has high waves and big waves, so that coastal erosion always occurs in several areas, including Agam Regency, Padang Pariaman Regency, Padang City, and Pesisir Selatan Regency. In general, the west coast of Sumatra is a maritime-oriented residential area, both fishermen and other maritime cultural-oriented people. The nuances of their economic life are very dependent on the sea, such as fishing, processing of dried fish, sea transportation, port activities, shipping and trade. Ideally, all activities of fishing communities run smoothly according to the available natural and human resources. The method used is the historical research method, which includes heuristic (data collection), criticism, interpretation, and historiography. Several fishing settlements on the west coast of West Sumatra experienced coastal abrasion. As a result, they were forced to be moved to other settlements, so they could avoid the beach abrasion disaster. Automatically their livelihood changes and income also changes, resulting in social change. Those who initially worked as fishermen were forced to switch to the agricultural economy, because their settlement was far from the coast.

Keywords: Abrasion, Disaster, Economy, Mitigation, Fishermen, Change, Social.

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1.0 Introduction

This study discusses the Socio-Economic Changes of Coastal Fishermen of West Sumatra as the Impact of Coastal Abrasion. The west coast of Sumatra stretches from northwest to southeast. The coastal area is located in a narrow area between the western coastline and the Bukit Barisan mountain range. The western coastline of West Sumatra faces the Indian Ocean, so this area is often hit by storm winds, high waves and big waves. Residents who work as fishermen live in certain settlements or fishing villages, are familiar with fishing, drying fish, port activists, shipping operators, and trading. They are used to the atmosphere of high waves and big waves. However, when the waves hit their residential area, they were unable to stem the natural event, resulting in beach abrasion.

Throughout the year the west coast of West Sumatra experiences big waves and beach abrasion. Countless fishermen's houses plunged into the sea. Likewise with productive plants or trees that grow on the beach, falling into the sea, such as coconut trees, shade trees, and other mangrove trees. Since 2009, beach abrasion events in the coastal areas of West Sumatra have increased. Fishermen's houses and other buildings are falling into the sea more and more, causing significant losses for fishermen. Events during September and October 2019 were the most frequent occurrences of coastal abrasion in coastal fishing settlements in West Sumatra, for example coastal abrasion that occurred in Batang Kapeh District, Pesisir Selatan District, Padang City, Padang Pariaman District, and Tiku V Jorong Agam District. The disaster resulted in obstructed access to transportation, so that fishing communities became isolated from damaged main roads. Nagari Muaro Putus in Tiku V Jorong, Agam Regency was damaged by big waves, and several fishing gears were also damaged. Abraded sand filled the shoulder of the highway for about 500 meters with a height of 1-2 meters in Batang Kapeh, Pesisir Selatan District.

Coastal abrasion that occurred on the west coast of West Sumatra from 2009-2019 resulted in abrasion victims in the South Coast region. In 2019, 17 houses were seriously damaged, 11 units of community houses were buried in sand, 1 unit of anchovy warehouse was heavily damaged, and 1 unit of office building for a State-Owned Enterprise. There are countless victims of abrasion in the cities of Padang, Pariaman and Agam. The coastal abrasion disaster has caused quite large casualties and losses for fishermen on the coast of West Sumatra.

During 2019 there were 157 people who became victims of coastal abrasion from Nagari Empat Koto Hilie, Batang Kapas District, Pesisir Selatan Regency. They came from the 38 Family Heads. Beach abrasion at Empat Koto Hilie has occurred since September 2019 and damaged the houses of residents on the beach at Empat Koto Hilie. Likewise the conditions in Maro Putus, Agam Regency, so that many houses fell into the sea, including the local mosque. The victims of coastal abrasion need to be relocated to a safer place. A number of residents' houses were so badly damaged that they were no longer habitable. The houses that were destroyed were generally of the permanent and semi-permanent type, so they could not be reoccupied. The threat of beach abrasion continues because of the extreme weather and there are still houses standing around the beach. Prior to being moved to the new settlement location, the abrasion victims temporarily lived in emergency

tents and tents prepared by the Pesisir Selatan District Social Service for Women's Empowerment and Child Protection. In addition, some of them stay at the homes of their relatives or other neighbors they know.

The process of tackling beach abrasion is coordinated with the District Governments (Pemkab) in West Sumatra and West Sumatra Province, either through the Provincial Regional Budget (APBD) or the central government. The search for new settlement locations is the authority of the District Government, while the process of building houses can be shared with various parties of authority. The relocation of victims of coastal abrasion on the west coast of West Sumatra is also the responsibility of the Provincial Government of West Sumatra, considering that coastal abrasion has become victims of coastal abrasion in particular.

The local government makes a program to deal with coastal abrasion disasters, because coastal abrasion needs to be prevented and disaster mitigation is carried out so that it does not occur. Coastal abrasion that takes place continuously can disrupt the economic stability of fishermen and changes in spatial planning used by fishermen to seek economic life. This study aims to reveal the socio-economic changes of fishermen on the west coast of West Sumatra due to the impact of coastal abrasion. A more detailed objective is to describe the geographical location of the coast of West Sumatra which is prone to being hit by coastal abrasion; explain disaster mitigation patterns that are suitable for preventing coastal abrasion, obtaining solutions for settlements of abrasion victims around the coast; and empower victims of abrasion so that their economic level is better.

This study can be used as reference material for both local and central government in making disaster policies so as to produce models of rescue, protection, development and utilization of disaster mitigation. This model will be very useful for stakeholders in West Sumatra today, especially for regional leaders, who are often hit by abrasion disasters, and other related agencies. The results of this study can also be used as a reference for the governance of the nagari in West Sumatra, especially the nagari which are located on the coast.

The negative impact of beach abrasion on the coast of West Sumatra is the cut off of public transportation access around the coastal area because parts of the road on the beach are buried in abrasion sand. The abrasion incident in Muaro Batang Kapeh Hamlet, Pesisir Selatan Kanupaten, for example, has claimed as many as 38 heads of families, but there were no fatalities. Most of the people affected by the victims were forced to flee to other safer areas and some of them were forced to live in tents at evacuation sites prepared by the local district government. Government and community efforts to overcome this disaster require serious handling. The fishermen of Muaro Batangkapeh hamlet who live close to the shoreline are advised to continue to increase their vigilance against the threat of further abrasion. The abrasion disaster on the coast of West Sumatra Province has been experienced by hundreds of heads of families in the area, starting from West Pasaman Regency in the Northwest to Pesisir Selatan Regency in the Southeast.

2.0 Literature Review

In general, there are no studies on coastal history, especially the effects of abrasion, so that references to cases of coastal abrasion are still very rare. Studies in this field have not looked at trends in the emerging abrasion impacts and models for dealing with them, and there has been no effort to try to create a model for implementing disaster mitigation in the coastal environment. Existing research also has not been linked to disaster mitigation which is beneficial for the safety of the population, especially residents affected by coastal abrasion.

Christine Dobbin once wrote that countries on the west coast of Sumatra are always blown by monsoon winds. The wind causes high waves so that coastal countries or villages experience natural disasters originating from the ocean. The disaster he meant was high waves and beach abrasion (Christine Dobbin, 1992: 55). Meanwhile, Adrian B. Lopian saw that the archipelago, which consisted of parts of the glory of the archipelago in the past, consisted of islands, seas and straits. This condition causes the territory of Indonesia to have many coastlines and coastal areas, which are always hit by the surrounding sea waves. Shipping and trading activities occur between one island to another (Adrian B. Lopian, 2009: 123).

According to Gusti Asnan, the movement of the Minangkabau inland population to the coastal areas in the past was related to the need for salt, which then developed into a trading world between the coast and the interior (Gusti Asnan, 2007: 37). Muhammad Nur in his work *Technology and Management in Earthquake and Tsunami Disaster Mitigation in the Mentawai Islands*, explained that the Mentawai Islands are in the waters of the west coast of Sumatra. This condition means that it is enough to help the west coast coast of Sumatra so that it is protected from the big and high waves of the Indian Ocean. The islands in the Mentawai Archipelago that protect the west coast of Sumatra include the islands of Siberut, Sipora, North Pagai and South Pagai (Mhd. Nur, 2022: 41). Meanwhile, on the west coast of Sumatra, several spice ports developed so that the population of the west coast of Sumatra in the past was full of dynamics and showed high mobility (Mhd. Nur, 2019: 68).

The magnitude of the disaster risk on the west coast of Sumatra has occurred for centuries. In addition to coastal abrasion, earthquakes, tsunamis and shipwrecks have also occurred as a result of being hit by large waves. Several ships belonging to the Allied forces during the Indonesian War of Independence sank in the waters off the west coast of Sumatra, such as the SS Elout, SS. Buykes, and MV. Boeloengan Nederland (Nia Naelul H. Ridwan, et al., 2021: 433). Several other references related to this article are as follows, several studies on Sibolga port (2000), Airbangis port (2003), boat building industry (2014), and abrasion in Batang Kapeh District (2019).

Continuous beach abrasion can threaten the environment in coastal areas because the shoreline collapses and plunges into the sea. The steep coastline will get steeper so that the land around the steep coast decreases because it plunges into the sea. All sources of life in the coastal abrasion area of course also plunge into the sea, such as shade trees, roads, people's houses, business stalls, boat building huts, and other economic facilities or

facilities. As a result, the coastline is getting closer to residential areas in the hinterland. As a result of beach abrasion, permanent and semi-permanent buildings also plunged into the sea. Usually it will also damage the agricultural land of the population, such as plantations, rice fields, and so on

3.0 Methodology

This study approach can be done with concepts and theories about abrasion and coastal economics. This study is very important because it concerns the economy of fishermen who mostly live on the coast. The way to test the hypothesis is done through several stages, such as collecting data in the library and in the field, selecting primary and secondary data, analyzing, and writing research results. The output target to be achieved is to produce a publication that is ready to become a reference.

This research on coastal abrasion on the west coast of West Sumatra attempts to use historical research methods, which depend on various types of maritime history and cultural data. Maritime cultural data found are verified according to the stages of the research method, especially in historical research: such as heuristics, criticism, interpretation, and historiography (Gottschalk, 1985: 35). In this regard, this research was conducted through the following stages: Observation and data collection; description and classification of data through source criticism; and data analysis or interpretation (Interpretation) in order to reconstruct a narrative mitigation model (Historiography).

The heuristic stage is the research planning stage once collecting historical data or sources both in the library (Library Research) and in the field (Field Research). The data collected in the library consists of written sources, such as archives, newspapers, magazines, digital data, and other printed materials. This library data consists of various types, such as primary sources, secondary sources, tertiary sources, and so on. Data collection in the field (Field Research) was carried out in several places, such as Batang Kapas District, Pesisir Selatan Regency, Padang City, Naras Kota Pariaman, Nagari Tiku Selatan and Nagari Tiku V Jorong, Agam Regency. This field research was conducted to document several coastal points that were hit by abrasion, ways to deal with abrasion, and several coastal points that are still threatened by abrasion. In addition to taking documentation, interviews were also conducted with fishermen, village leaders, and policy makers at the abrasion locations, such as the Wali Nagari, Camat, Regent, and the legislative elements of the government.

The criticism stage is a selection of sources or data, both those found in the library and data found in the field. The criticism phase is carried out with two models, the first is external criticism and the second is internal criticism. External criticism is to see whether a data or historical source is primary, secondary, and tertiary. There is even a possibility that the data or source is fake, contrary to the facts that have occurred. External criticism focuses on external sources in the form of texts, archives, books, documents, and so on. It should be noted the type of paper used, whether in accordance with the era or not. You can also see the type of font or ink used. Written data must be distinguished between letters typed with

a typewriter or letters that have been typed via a computer. The difference will also indicate the time period in which the source or data was created. While internal criticism focuses attention on the content of the source material or data. Source material is usually inseparable from the subjective data author or written source, for example the thoughts of a politician, the thoughts of the government or authorities, the author of articles, and so on.

The interpretation stage is held after finding sources or data that lead to historical facts. The results of source criticism can be compared with other data so that consideration occurs in deciding the results in the form of facts. Facts are conclusions that lead to actual events. This fact was obtained after going through several tests and avoiding things that are doubtful. Facts are findings that need to be narrated.

Narration results from facts need to get a historical explanation so that it is clear and can be understood by audiences or readers. The stages of writing the narrative and explaining the facts that have been found need to be written in the form of historiography. The Historiography stage is the writing stage in historical research. This stage includes the main thinking problems, research questions, historical explanations of findings based on various types of historical sources. Facts about events that have been found are explained in narrative or story form and written through the subjective view of the researcher.

According to B. Triatmodjo (1999: 397) coastal abrasion is defined as the retreat of the coastline from the sea towards the mainland (B. Triatmodjo, 1999: 397). Meanwhile, according to Buddin A. Hakim, abrasion is also known as coastal erosion or erosion due to sediment transport along the coast so that sediment moves from one place to another (Buddin A. Hakim, et al. 2012). Global climate change that is happening in Asia and Australia can cause damage to coastal ecosystems on the west coast of West Sumatra, including the mangrove ecosystem as a means of preventing abrasion around the swampy coast. The impact of global warming is the melting of ice at the North Pole and South Pole, so that sea levels rise and submerge some low-lying beaches and increase beach abrasion itself. There are several factors that raise sea levels and result in several things, such as coastal erosion, prolonged flooding, and lowlands being inundated with water, tides around rivers and bays, and changes in the location of river deltas in estuaries (M. Ghufon, et al., : 134).

Mangrove forest is a forest that grows in coastal areas in conditions of regular waterlogging and is affected by tides, but is not affected by climate. Most of the coastal areas are affected by tides and often grow mangrove forests, which are dominated by several species of trees that are typical of shrubs that can grow in salty waters (Santoso, 2000: 46). The word mangrove has two meanings, first as a plant or forest community that is resistant to salt water levels (sea tides). Second, mangrove comes from the word *Macnae* ("mangal") which relates to forest communities and "mangrove" to individual plants. Mangrove forests that often grow around swamp water are often referred to as mangrove forests or brackish forests. The mangrove ecosystem is a system in nature where life takes place which reflects the mutual relationship between living things, coastal areas, and sea tides, which are dominated by species of trees or shrubs that are unique and able to grow in brackish waters (J.W. Nybakken, 1992: 22).

The ecological and economic functions of mangrove forests are to protect the shoreline from abrasion, accelerate coastal expansion through deposition, prevent seawater intrusion into the mainland, as a buffer for various marine biota, and as a regulator of the microclimate. The economic function of mangrove forests is to produce household needs, such as firewood, charcoal, for industrial use, produce fish seeds, shrimp fry, tourism destinations, research fields, and education. Coastal environmental conditions such as high waves, appear every year related to the wind season that blows hard. This factor is due to the west coast of West Sumatra facing the direction of the monsoon winds. When it is the west monsoon season, the open coastal area is hit by waves and sea waves from the west. Conversely, if the east monsoon season, the east coast is also affected by the monsoon winds, but not as strong as the west monsoon.

Mitigation is an effort to reduce the risk of natural disasters, both after and before the disaster. The west coast of West Sumatra facing the Indian Ocean is of course very prone to disasters, both earthquakes and abrasion (B. Triatmojo, 1999: 397). In mitigating coastal abrasion disasters, efforts are made to reduce the risk of disaster victims. Several rescue models can be carried out in short-term and long-term programs. Perhaps it can be assumed that the occurrence of abrasion is also caused by elements of human negligence which damage nature. While another factor is that the potential for disaster is also caused by the geographical conditions facing the Indian Ocean which are known to be ferocious. Based on the problems previously stated, the tool that is considered suitable for analyzing research on beach abrasion is the abrasion theory.

Experts consider that coastal abrasion is a system consisting of elements that are interconnected with each other. The way coastal abrasion analysis works is by analyzing the structure of the various layers of the population's traditions that form a network of social and cultural environments. This approach among historians is known as the social sciences or multidimensional approach. According to social change theory, the history of abrasion can be seen as a coherent system (Kartodirdjo 1982: 126). The study of abrasion history is not only concerned with coastal nature, but also covers all areas affected by the coastal environment.

4.0 Findings and Discussion

Batang Kapeh is a sub-district administrative area located on the southeastern coast of West Sumatra. Batang Kapeh is one of 12 sub-districts in Pesisir Selatan Regency. This sub-district is located on the edge of the Indian Ocean and is positioned in the middle of the coastline of Pesisir Selatan district. The population of Batang Kapeh is around 30,038 people, consisting of 14,911 men and 15,127 women. The population density is 64 people/square kilometer. Batang Kapeh has 5 nagari as government administrative areas of Batang Kapeh District. The sub-district center is in the Kuok market. The topography of the area is flat along the coast and interspersed with hills. Kuok is at an altitude of 2-25 meters above sea level. Forest area reaches 60% of the total area, agricultural cultivation

land is 22% and housing/settlements is 10% and the remaining 8% consists of swamps and reeds.

On September 28, 2019, Batang Kapeh District was pushed by big waves coming from the waters of the Indian Ocean, resulting in an unusual coastal abrasion. Piles of sand from the sea are dumped onto the land so that fishing settlements and highways are covered with sand. This incident cut off road access between Painan and Kambang. As many as 13 fishermen's houses were badly damaged because they were daydreamed by the big tidal waves. The roof of the house and the walls were shattered. The fishermen's houses, which consisted of permanent, semi-permanent, and simple simple houses, were all destroyed and heavily damaged. The houses generally have tin roofs and semi-permanent clapboards. Rinaldi, a government employee for Pesisir Selatan District, received a report from Batang Kapeh District officials regarding beach abrasion due to tidal waves. Based on the report from the sub-district, the Regent of Pesisir Selatan, Hendrajoni came there to observe the disaster that occurred in Batang Kapeh. He ordered his subordinates to act as soon as possible so that the death toll would not increase. On October 4 2019, the Pesisir Selatan Regent also advised residents on the coast to increase their awareness of the threat of high waves and beach abrasion.

Coastal abrasion events in Batang Kapeh were recorded by the Public Works and Spatial Planning (PUPR) Office of Pesisir Selatan District. They collect data about the spatial layout of the beach abrasion location. Next, they cleaned up the environment, which consisted of piles of sand and trash scattered around it, especially around the shoreline of Muaro, Bukit Tambun Tulang Village, and Nagari IV Koto Hilie, Batang Kapas District. The work was controlled by the Regent of Pesisir Selatan, Hendrajoni, who recommended that the cleaning be used with heavy equipment, because the sand covering the road was immediately cleaned. Hendrajoni's suggestion was conveyed during his visit as South Coastal District Head to Muaro Hamlet, Bukit Tambun Tulang Village, and Nagari IV Koto Hilie, Batang Kapas District.

The beach abrasion that occurred in Batang Kapeh resulted in land transportation access being hampered, because the highway that stretches along the coast is full of sand piles for 500 meters. Piles of sand piled up to 2 meters high. The government is trying to quickly push this sand off the road surface so it doesn't have a negative impact on land transportation. The Pesisir Selatan Regency Government, Hendrajoni handed over 1.26 tons of rice assistance, which came from the Pesisir Selatan Regency Social Service. Other sources of assistance collected 500 kilograms of rice and the Food Service provided 726 kilograms of rice assistance. Other types of assistance included cooking oil, instant noodles, cooking equipment, and boxed rice from Quick Response Action (ACT).

Meanwhile, the Mayor of Nagari IV Koto Hilie, Satria Darma Putra, said that the abrasion disaster in Muaro Hamlet had claimed the lives of 38 heads of families. Some of the people were forced to flee to safer areas and some others are still living in evacuation tents prepared by the local district government. The victims of abrasion are temporarily living in emergency tents and some are staying at the homes of relatives or other residents. A number of residents' houses were badly damaged due to being hit by the tidal waves so

that they could no longer be inhabited. In general, the houses that were damaged were semi-permanent houses, so they could no longer be occupied. The threat of abrasion continues while the tides are still strong, while there are still residents' houses that are only about 30 meters from the beach.

The process of tackling Batang Kapeh beach abrasion is coordinated by the South Coastal District Government. The government includes the Regional Expenditure Revenue Budget (APBD) of the Province and the Central Government to tackle and mitigate coastal abrasion disasters. The solution to fulfilling new settlements is to find new housing locations for victims of coastal abrasion. The process of building houses and arranging the environment is carried out by the government together with the community and other related agencies. The management of Batang Kapeh beach abrasion is also the responsibility of the Provincial Government of West Sumatra, because coastal abrasion threatens the lives of people in the coastal areas of West Sumatra. One of the solutions for the government of West Sumatra Province for overcoming coastal abrasion is budgeting sufficient funds. For the construction of houses in Batang Kapeh alone, there are 16 housing units. Meanwhile, fish sheds that were heavily damaged can be built relatively close to the coast. The village-owned enterprise building, which was heavily damaged due to beach abrasion in Muaro Hamlet, can be rebuilt a safe distance from the abrasion.

As many as 157 residents from 38 heads of families (KK) in Nagari Empat Koto Hilie, Batang Kapas District, became victims of beach abrasion. Coastal abrasion has occurred since September 2019 and has continued to damage residents' houses on the beach until October 2019. They all need to be relocated to a safer place so they don't become the next victims. This factor has caused the Pesisir Selatan Regency Government to prepare new settlements so that the people affected by abrasion are completely safe from the threat of tidal waves and strong winds. Community leaders in Batang Kapeh District and village leaders have been looking for a suitable location for a new settlement for fishermen affected by coastal abrasion, because it has threatened residential areas and the South Coast Crossing Road.

Apart from that, beach abrasion also occurred in Lengayang District with the same conditions as in Batang Kapeh. The threat of abrasion hit residential areas in Karang Laburan Village, Lengayang District. The distance between the shoreline and residential areas is only about 10 meters. In fact, abrasion also threatens the causeway between West Sumatra and Bengkulu, because the distance between the highway and the shoreline is only about 50 meters. Coastal abrasion does not only occur in Batang Kapeh and Lengayang Pesisir Selatan Districts, but also in other areas of West Sumatra. This is because the west coast of Sumatra is an area facing the Indian Ocean which has high waves and big waves. The condition of the waters of the Indian Ocean is known to be ferocious with big waves and strong winds. This condition also causes the west coast of Sumatra in general to experience coastal abrasion and have steep beaches, because the coast is very close to the foot of the Bukit Barisan mountains which extend along the island of Sumatra.

The coast of the city of Padang is not immune from the threat of beach abrasion throughout the year, especially during the West Monsoon winds. The city of Padang, which is located on the beach, has a fishing village facing the Indian Ocean. Every August to December, big waves and high waves hit the coast of the city of Padang and the fishing villages in Purus, Lolong, Ulakkarang, Muaro Penjalinan, Pasia Nan Tigo, and others. The fishermen's settlements experienced coastal abrasion and not a few of them the fishermen's houses fell into the sea.

Since the era of the Indonesian New Order government, the Padang city government led by Syahrul Ujud, S.H, has piled up grip stones along the coast of Padang city. At that time, the Padang beach abrasion area only occurred around Muaro beach and Purus beach. However, after the division of the city of Padang, coastal abrasion also extended to Purus, Muaro Lasak, Lolong, Ulak Karang, Tabing, and Pasir Jambak (Pasia Nan Tigo). It has been hundreds of years that beach abrasion has occurred around the port of Muaro Padang. The Muaro area is the entrance for ships that come and want to dock at the Batang Harau River. Big waves and high waves of the Indian Ocean meet the flow of the Batang Harau River so that abrasion tends to shift to the coast a little to the north, around Jalan Samudra in front of the Padang City Prison or Correctional House. Apart from that, the Muaro Padang area is also fortified by Mount Padang, which stands firmly so that coastal abrasion weakens in the area.

The abrasion that leads to Jalan Samudra, the city of Padang, lasts all year round and seriously threatens the area. Installing grip stones as breakwaters can minimize the risk of abrasion so that they are safe from the crashing waves. This condition allowed the Padang city government to build a floating Al Hakim mosque on the beach in 2019, right in front of the Padang Prison House. Apart from that, on this beach and the construction of a tsunami shelter which also functions as the Office of the Culture Office of the Province of West Sumatra. Between the building of the Al Hakim mosque and the Office of Culture of the Province of West Sumatra, there are 3 rows of grip stones for breakwaters.

The grip stones for breakwaters on Padang beach need to be added every year by arranging large boulders so that they are not pushed by high waves. The method of installing grip stones is a powerful way to defend the coast of the city of Padang from the threat of beach abrasion. The strong grip stones are resistant to the threat of beach abrasion. Although not all beaches are installed with grip stones, other parts of the beach can survive within 100 meters. A grip stone was also installed in front of the Padang beach floating mosque.

Calm wave conditions due to grip stones also make sandy beaches safe. Moreover, the grip stone is also starting to grow coconut trees or other protective trees so that the beach is increasingly maintained and protected from the waves. Several grip stone arrangements protrude into the sea to block the onslaught of waves so that beach abrasion does not occur. More and more trees grow around the grip stone so that Padang beach is increasingly safe from the threat of abrasion.

Even though the waves are still strong to hit the beach, the grip stones and trees that are getting taller are effective enough to avoid beach abrasion. Purus Beach which is

included as an abrasion safe area has been transformed as a tourism spot. Grip stones are installed along this beach with steps that are easily stepped on by visitors. The beautiful Padang beach area is also equipped with lights at night. Brands are still installed in each area, such as Puruih Padang Beach, Muaro Lasak Beach, and others, so that it attracts tourists to take personal and family photos there.

Puruih Padang Beach is located on a shoreline which is prone to beach abrasion, but can be maintained because grip stones have been installed around it to protect it. However, there are still other parts of Padang beach which are still threatened by beach abrasion, even though they have become tourist areas. Muaro Lasak Beach is actually included in the category of beach abrasion safe areas because the Aru, Ketaping, and Pinus trees have grown big, but it is possible that it will still be hit by the waves of the Indian Ocean which can turn into big waves at any time due to changes in weather.

One of the Muaro Lasak beach areas which is considered safe, but is still hit by big waves caused by extreme weather. The damage to the beach also affected the economic life of fishermen and other small traders around Muaro Lasak beach. The fishermen had difficulty landing their boats, so it was difficult to go to sea from there. Likewise, the small traders selling around the Muaro Lasak beach had difficulty putting up their tents because of the strong winds.

In general, the economy of fishermen in Muaro Lasak is fishermen. They go down to the sea every early morning by rowing a canoe driven by the wind. For fishermen who can afford to buy an outboard engine, the boat is driven by an engine so that it moves faster. However, for rowing boats, sails are the main tool in propelling the boat. In the afternoon, the fishermen return to the mainland with their catch and then sell it to the community. While the fishermen's wives sell around the sandy beach. They opened tent stalls and sold various kinds of bottled and boxed drinks.

Muaro Lasak beach traders, most of whom are fishermen's wives, build tent or umbrella stalls. Plastic chairs are placed under the tents for visitors to sit on. In addition, there are also traders who provide rental benches for visitors to sit on. Tourists can enjoy bottled tea, sprit, soda, cappuccino, energy, Whitecoffee, Cocacola, young coconut, and so on. The tent shop trade is an additional economy for fishing families besides going to sea. However, sometimes the security of the tent shop trade is often disrupted by strong winds, so that the tents fly and the tent umbrellas are toppled by the wind. Emergency tents flew up so that only the rubble of poles or poles remained. Fortunately, there are several shade trees that can protect them from the strong winds.

Even though the condition of the Muaro Lasak beach is often hit by strong winds and the crashing waves of the Indian Ocean, as well as beach abrasion, the Municipal Government of Padang is still improving the area for tourism. The government built the Peace Merpati Monument on Muaro Lasak Beach, Padang City, as a sign of a happy place. This area is very interesting to visit, because besides enjoying the beauty of the monument building layout, visitors can also enjoy the beauty of the blue sea and the traffic of fishing boats in the vicinity.

The Peace Dove Monument (Peace Dove Monument) is a monument that was inaugurated by President Joko Widodo on April 12, 2016 on the coast of Taman Muaro Lasak, Padang, West Sumatra. The inauguration of this monument is part of a multi-country maritime exercise initiated by the Indonesian National Navy which is more popularly called the Multilateral Naval Exercise Komodo in 2016. The MerpatiPeace Monument rises eight meters high. The design of the monument made of metal resembles origami paper.

The MerpatiPeace Monument in Muaro Lasak almost collapsed due to beach abrasion on November 7 2019. Police lines have been installed along the right and left sides of the monument as a sign that tourists should not be allowed to pass. The stairs behind the monument have been badly damaged by sea waves. At the back of the monument, several sandbags were installed to break the waves. But in other parts, there was success in installing stones and dikes separating the highway and the sea waters of the Indian Ocean. This condition made the construction of the Muaro Lasak – Ulak Karang beach road go well. The grip stones are the main element as a safeguard against the threat of beach abrasion. High waves keep hitting the Muaro Lasak beach all the way to Ulak Karang beach. This blow was saved because between the beaches of Muaro Lasak and Ulak Karang, several grip stone structures have been built that protrude into the sea.

Ulak Karang Beach in the city of Padang is one of the beaches that is prone to abrasion. Big waves from the Indian Ocean hit the shoreline which is densely packed with residential residents. To prevent the crashing of the waves, the Municipal Government of Padang built several grip stones so that the crashing of the waves could be prevented. Such conditions make the space for fishermen to move even narrower. It can be said that only a few fishermen's families still go down to the sea because of the difficulty of fishing life. The Ulak Karang fishing boat base is next to the main road and piles of waves blocking the waves still exist to fight for the fishermen's economy. Of course the catch of fishermen is very minimal because the fishing technique is still simple.

High waves and the big waves of the Indian Ocean hit the coast of the coast of Sumatra freely. The government must continue to try to add grip stones so that the settlements around the coast are not threatened. The strong arrangement of grip stones can prevent beach abrasion because before reaching the beach, the waves have been broken up by grip stones. This condition is an example of success in preventing coastal abrasion in the city of Padang.

Some breakwater grip stones are also arranged on Tiku beach. Tiku is the capital of Tanjung Mutiara District in Agam Regency. This sub-district consists of four nagari, namely Nagari Tiku Selatan, Nagari Tiku Utara, Nagari Tiku V Jorong, and Nagari Duriankapas Darussalam. Nagari Tiku Selatan and Nagari Tiku V Jorong are located along the coast facing the Indian Ocean. The natural conditions are quite harsh because it is often hit by waves and tidal waves of the Indian Ocean. Several areas that frequently experience beach abrasion in the Nagari Tiku Selatan are in Jorong Pasir Panas, Ujung Labung, and Muarojuang. The condition of this jorong is indeed very threatened due to beach abrasion. The big waves and high waves erode the beach all year round so that there are several houses that have plunged into the sea in all three places.

To prevent continuous erosion in Nagari Tiku Selatan and Tiku V Jorong, the Agam Regency Government, through the Provincial Government, has built grib stones to break the waves. The construction of the grib stones has brought quite a lot of results, even though the waves of the Indian Ocean are still high. The stones are large in size with a diameter of about 2 meters arranged neatly by extending in the direction of the waves. This technique can be effective in protecting the beach from abrasion and collapse of the shoreline. In addition to the arrangement of grib stones which are built facing the sea, there are also grib stones which are arranged parallel to the coastline at Pasia Paneh. These stones are only arranged in certain places, the points of the strong waves.

The waves of the Indian Ocean around Pasia Paneh Nagari South Tiku (Tiku Selatan) are big and strong. Various techniques of grip stone arrangement are found there, such as protruding towards the sea, parallel to the shoreline, and blocking the flow of sea waves that come sideways. Coastal abrasion around the former Tiku port is somewhat reduced because the waters are protected by two islands. Tangah Island and Tapi Island are two islands located in the waters of the Indian Ocean, to be precise in Tiku waters, Tanjung Mutiara District, Agam Regency. The existence of these two islands makes Tiku's waters calm so that many ships anchor there, both in the past and in the present. Bandar Tiku was famous as Pepper Harbor in the mid-17th century. Many foreign ships came there to look for spices, especially pepper, such as the Portuguese, Dutch, British, French, Arabs, Indians, Gujaratis, and so on. Many ships coming from ports along the west coast of Sumatra also stop at Tiku, such as from Indrapura, Painan, Tarusan, Padang, Pariaman, Airbangis, Sasak, Tiagan, Sibolga, Barus, Susoh, Singkel, Meulaboh, Aceh, and others.

On the Tiku Selatan Fisherman Monument there is a three-dimensional carving, which shows two boats sailing in the ocean with high waves. The first boat contains 9 passengers, consisting of 5 men and 4 women. The men hold the anchor ropes, as a sign to move closer to the shore. While on the second boat, which is in a position behind the first boat, it consists of 8 passengers. Beside the monument there are several grip stones arranged neatly to block waves and big waves. When compared to other coastal areas of West Sumatra, the waves and sea waves at Pasia Paneh are the biggest waves and the highest waves. The grib stones that are installed automatically sink into the sea because part of the beach bottom experiences abrasion. Grib stones that are arranged parallel to the shoreline are hit by waves from parallel sides, so that the waves rotate, and not only hit certain shorelines, but also hit the entire beach.

In general, residents of the west coast of West Sumatra work as fishermen. They catch fish in the open seas of the Indian Ocean with very simple equipment. Their life is very dependent on the sea. The fishing gear they use the most are sailboats, outboard motor boats, as well as trawlers, nets, hooks or fishing rods. Such a life is certainly very dependent on nature, such as weather, wind, waves, storms and high waves. They can only go to sea when the weather is good, the wind is not strong, the waves are calm, without storms and high waves. Working as a fisherman is a hereditary skill at sea. Weather and navigation knowledge they got from their ancestors since ancient times. However, it seems that the fishermen's life has never changed to a more prosperous level. Although there is one

successful fisherman who becomes a sailor by owning several fishing charts or a successful fish trader. The fish skippers have crew members and are paid a salary. However, in general, fishermen's lives are unstable because they are always in a condition of minimal income. Fish that are obtained daily are only enough to meet daily needs. To meet the needs of the next day must catch fish again.

Many fishermen's children have had their education disrupted because they are required to help their parents at sea. They may be able to complete basic education because Elementary Schools (SD) are spread evenly in every settlement, including in the areas where fishermen live. However, very few of the fishermen's children who graduate from elementary school continue to a higher level, such as junior high school (SMP) or the equivalent such as Public/Private Tsyawiyah Madrasah (MTsN), let alone continue on to senior high school (SMA) and higher education. High (PT). Their parents rarely motivate their children to continue their education to a higher level because of the lack of parental knowledge.

The role of fishermen's wives on the west coast of West Sumatra is to help their husbands meet their daily household needs. Among the fishermen's wives there are those who help their husbands by drying the fish to dry, selling fish, doing small business, selling food, rice stalls, and so on. In addition, there are also fishermen's wives who already have small and medium businesses, which meet the needs of fishermen for going out to sea, such as fishing rods or hooks, nylon netting materials, consumption needs while at sea for starting boats, buckets, basins, clothes, and so on.

It is not uncommon for fishermen's wives to catch fish directly into the sea by fishing. Wives of fishermen in the Nyalo River area, Koto XI Tarusan District, Pesisir Selatan Regency, for example, many participate in fishing in the sea to supplement their husbands' income as fishermen (Ratis: 2019). Perhaps many things have happened in other places so that the role of the fisherman's wife is really the same as that of her husband. Besides that, the role of the fisherman's wife is also to split the fish and boil the anchovies for further drying.

The existence of fishermen on the west coast of Sumatra is inseparable from the political object of various political parties. Party leaders are competing to get votes in the Regional Head Elections or General Elections from the votes of the fishermen. They promised to empower fishermen, build fishermen housing, help with fishing gear, modernize fishing technology, increase fishermen's income, and other political promises. However, after a party or regional leader candidate wins the election, promises are still promises, the realization of which is still far from expectations.

Before the west coast of Sumatra experienced rather serious coastal abrasion, the life of the fishermen could be said to be stable. Even though their income is only mediocre, their life is quite good and they can fulfill their daily needs. The results of fishing that they do are then sold to consumers and the money is bought for household needs, such as rice, cooking oil, chilies, sugar, tea, coffee, gasoline, kerosene, and other needs for one day. This condition lasted from day to day, week to week, and month to month.

The fishing community on the west coast of West Sumatra has a complex pattern of social relations with other community members. When living in society, they also interact with other members of society. Not only with fellow fishermen but also with traders, teachers, bank employees, sub-district officials, village officials, sub-districts, and even guests who come from outside. Fishermen get their needs by buying their daily necessities from traders, such as clothing traders, building traders, food traders, vegetable traders, rice traders, fishing equipment traders, plumbers, PLN officers, tax officials, regional election officials, regional election officials elections, and so on. When fishermen's families send their children to school, social relations also occur with educators, such as teachers at school, school administrative officers, school cleaners, school security officers, other parents of students, small food vendors, cafes, and so on. This social relationship needs to be done because it is part of a social system that has developed in society.

After the west coast of Sumatra experienced a rather serious beach abrasion, the lives of the fishermen began to change. Their income, which was stable before, has been reduced because the land they occupy is affected by abrasion. Their economy began to decline because the house where they lived was damaged, the boat was destroyed, and the weather was getting more extreme. They cannot meet their daily needs as before without the help of others. Automatically fishing results are reduced or even non-existent. They no longer sell fish to consumers because they catch less fish than usual. This condition makes them unable to earn money. Meanwhile, they have to buy household needs, such as rice, cooking oil, chilies, sugar, tea, coffee, gasoline, kerosene and other necessities for one day. If this condition persists for a rather long period of time, it is certain that there will be an increase in the poverty and powerlessness of fishermen.

Although the fishing community on the west coast of West Sumatra has a complex pattern of social relations with other members of the community on normal days, after the beach abrasion the pattern of social relations has changed. As a result of coastal abrasion, fishing communities have had to flee to safer places, and even their settlements have been completely moved to places provided by the Regional Government or the mayor. In the changing conditions of community life, fishermen also experience changes without interacting with other members of the community as before. Instead the fishermen will interact with the community in the new residential environment. After coastal abrasion, fishing communities are no longer in contact with the original community in the form of social and economic relations with fellow fishermen. They rebuilt the relationship with the traders in the new location, the children were sent to a new school so they learned from the new teacher. All socio-economic activities carried out by fishermen who are victims of coastal abrasion have changed because they are already in a new settlement. They no longer have social relations with officials at the old place, such as banks, sub-district officials, village officials, sub-districts, and even no guests who come from outside. The fishermen experience difficulties in obtaining their daily needs because there is no social communication with traders in the new settlement, such as clothing traders, building traders, food traders, vegetable traders, rice traders, fishing equipment traders, plumbers, State Electricity Company (PLN) officers, tax officer, election officer, election officer, and

so on. Even in their new place, they experienced a change in their livelihood from fishermen to small traders, hired workers, services, or even became farmers by working other people's land.

When fishermen send their children to school in a new residential environment, new social relations occur with new educators, such as teachers who teach at their children's schools, new school administration officers, new school cleaners, school security officers, parents, other students, small food vendors, new cafes, and so on. Social relations are automatically carried out because they are part of a social system that has developed in every society. Many fishermen who are victims of coastal abrasion have changed their livelihoods from fishing to trading professions. It is impossible for them to maintain their fishing profession because the land or beach where they leave for sea makes it impossible for them to engage in fishing. Houses, yards, ships, boats, and so on have been destroyed by the tidal waves and have fallen into the sea. The trading profession they live in is selling food, opening simple stalls, services, and so on.

5.0 Conclusion

The coastal area of the west coast of Sumatra is generally a steep beach which is often hit by waves and high waves. The coastal area is located in a narrow area between the western coastline and the Bukit Barisan mountain range and faces the Indian Ocean. Residents who work as fishermen live in certain settlements or fishing villages around the coast. They are used to the atmosphere of high waves and big waves to cross the ocean. When the waves of the Indian Ocean hit the fishermen's settlements, beach abrasion occurred, so that the people living in the vicinity were powerless to stem this natural event.

Throughout the year, the west coast of West Sumatra experiences coastal abrasion so that countless houses plunge into the sea, such as in Batang Kapeh, Pesisir Selatan District, Purus beach, Muaro Lasak, in Padang City, Ulakan and Naras in Pariaman City, Nagari Tiku Selatan and Nagari Tiku V Jorong in Agam Regency. Productive trees that grow on the beach, such as coconut trees and other trees, also fell due to abrasion. Coastal abrasion events in the coastal areas of West Sumatra have increased in 2017, 2018 and 2019. Fishermen's houses and other buildings are increasingly falling into the sea, causing significant losses for fishermen on the west coast of West Sumatra. Coastal abrasion that has occurred on the west coast of West Sumatra for the last ten years (2009-2019) has resulted in many victims of abrasion, for example in 2019 many houses were heavily damaged, community houses were buried in sand, damaged anchovy warehouses and damage to other buildings. There are countless victims in Padang City, Pariaman City, and Agam Regency. The coastal abrasion disaster has caused quite large casualties and losses for fishermen on the coast of West Sumatra. Some of the people were forced to flee to a safe area and some lived in tents prepared by the district government, a local patent.

Factors causing beach abrasion apart from natural factors and weather are coastal environmental factors that are not planted with protective trees, such as mangrove forests, which are able to prevent abrasion. Another factor is various aspects of environmental

damage. The impact it has on the community is the attack of high waves and strong waves crashing towards the beach. The geographical position of the coastal area of West Sumatra Province is indeed a harsh nature, facing the Indian Ocean so that it is hit by big waves and high waves. Even though the great danger threatens, the lives of the fishermen are very dependent on the sea. The government and the community have tried to properly mitigate coastal abrasion and save the fishermen's economy. Patterns of disaster mitigation that are suitable to be applied in coastal communities are planting mangrove forests, installing grib stones, and planting shade trees. Classify the types of victims of coastal abrasion disasters, consisting of victims of fishermen's houses, victims of boats, victims of boats, victims of fishing gear, and so on. The original settlement of the community around the beach which is prone to abrasion is the fisherman housing complex which is directly adjacent to the beach. Such complexes must be empowered so that they are safe and have a better economic level.

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