

# Management Model for Coastal Areas Threatened by Abrasion Community based in the Pariaman City West Sumatera Province, Indonesia

by Management Model For Coastal Areas Threatened By A Management Model For Coastal Areas Threatened By A

---

**Submission date:** 10-Oct-2022 09:56AM (UTC+0700)

**Submission ID:** 1921131181

**File name:** Nomor\_2.pdf (305.15K)

**Word count:** 6692

**Character count:** 35784

# Management Model for Coastal Areas Threatened by Abrasion Community based in the Pariaman City West Sumatera Province, Indonesia

Haryani<sup>1</sup>, Agus Irianto<sup>2</sup>, Nurhasan Syah<sup>3</sup>, Eri Barlian<sup>2</sup>

<sup>1</sup> Doctor Programe of Environmental Science, Universitas Negeri Padang, Indonesia

<sup>2</sup> Professor at Post Graduate Environmental Science-Universitas Negeri Padang, Indonesia

<sup>3</sup> Associate Professor at Post Graduate Environmental Science- Universitas Negeri Padang, Indonesia

## Abstract

The abstract should summarize the content of the paper. Pariaman City is one of the coastal cities in West Sumatra Province which is threatened by high and up to high coastal abrasion. The characteristics of coastal abrasion in the last 15 years (2003 to 2018) in Kota Pariaman caused a significant reduction in land mass in Kota Pariaman at an average of 13.18 ha / year, while the addition of land was 19.03 ha / year. The physical factors that most influence the abrasion and accretion of the coast of Kota Pariaman are the current factor, coastline shape, coast typology and vegetation cover while the low wave factor is quite influential. Seeing the high level of abrasion threat, it is necessary to manage community-based coastal areas to reduce the level of abrasion threat and environmental management. This research is a qualitative research. Data obtained by survey methods, namely the distribution of questionnaires to the target group, in-depth interviews with key informants while the analysis used is the method of participatory Rapid Appraisal (PRA) analysis with the local community. The results of the study are the management of coastal areas threatened by community-based abrasion ("Nagari") is an effort to optimize the social potential and local values of the community. Among the local wisdoms are traditional ideas or proverbs in the form of tambo and expressions; a) "Alam takambang jadi guru" (nature develops becomes a teacher), b) "Badoncek" (mutual cooperation), c) "Gebu Minang"; (movement of a thousand) beach trees and d) Management of coastal zones based on 'nagari'.

**Keywords: Disasters, Coastal Abrasion, Management Models, Community Based**

## 1. Introduction

Indonesia islands as a disaster-prone country, recorded in the report of The Atlas of the Human Planet 2017. Many sources data showed the natural disasters. The threat of natural disasters has doubled in the last forty (40) years in line with increasing population. This condition we found in West Sumatra Province as parts of Indonesia Country. West Sumatra Province is an area always happens many natural disasters from 1943 to 2011. The natural disasters in West Sumatra Province based on the highest percentage order include floods of 43%, landslides 18%, fires 7%, floods and landslides 7%, earthquakes 6%, tidal waves and abrasion 3%, and other disasters 7% (Source: Data and Information on Indonesian Disaster Sources (DIBI) [1-3]

Furthermore, Climatologically, summer and rain in West Sumatra Province always happens and has changed which is significant and extreme. So that it is prone to landslides, floods and tidal waves and abrasion. For natural disasters, tidal waves and abrasion, as much as 3.00% of the coastal area of West Sumatra Province is at a high risk level, 1.71% is at the level moderate risk and 5.41% are at low risk. [14-16] from 2003 to 2016 on the coast of West Sumatra Province there have been abrasion and accretion disasters in 32 points spread across 6 Regencies and Cities where abrasion is 732.69 Ha and accretion is 55.4 Ha. The abrasion disaster caused a significant reduction in land mass in West Sumatra Province at an average of 56.3 Ha / year, while the addition of land was only 4.26 Ha / year. This figure proves insignificant between the area of coastal abrasion and beach accretion in West Sumatra Province. [4-7].

Mitigation efforts are needed to reduce the risk of abrasion occurring. [8-15] argues that the values of local wisdom can reduce natural disasters, ten years after the tsunami struck Aceh. The results of the study there are five policies formulated

from disaster-based local wisdom, namely (a) curriculum, (b) evaluation of learning, (c) traditional songs, (d) learning materials, (e) school meunasah. Sandra Fatori, Ricard Morén-Alegret (2013), participatory based vulnerability analysis covers social, cultural, environmental, economic and political dimensions, making it possible to build a better understanding of vulnerability and adaptation in climate change. The choice to leave the area is believed to be acceptable to some stakeholders, especially men, the older population and foreigners as a disaster mitigation effort [16-18], disaster mitigation by the community by using the concept of cultural capital they have. The community is able to adapt and modify the environment as a form of cultural capital they have. Communities apply traditional ecological knowledge and build institutions so that mangrove conservation is maintained.

[19-20] Designed a management plan for abrasion control in the coastal area of Garut Regency. Abrasion and accretion occur at different levels and indicate that ecosystems play an important role in controlling abrasion, especially in areas where mangrove ecosystems are located. The impact of abrasion is caused more by natural factors than human activity. Integrated management in the form of a synchronization program with related agencies was initiated and developed a series of schemes that became regional development priorities. [21-23], integration of local and indigenous knowledge relating to hydro-meteorological hazards and climate change with science, were developed through a project implemented between coastal communities and small islands in Indonesia, the Philippines and Timor-Leste. [24-26] That the ability and knowledge of Samoans to predict extreme weather events and climate events, which mainly depend on changes in the local environment is a vital tool that must be included in the formulation of human-induced climate change adaptation strategies. [27-30] Local wisdom in disaster mitigation owned by the Baduy community is actually based on pikukuh (traditional provisions) which serve as a guide and direction in thinking and acting. Pikukuh is the basis of traditional knowledge that is wise and prudent, including preventing disaster.

[15] [16] There have been abrasion and accretion disasters in 32 points spread across 6 Regencies and Cities in West Sumatra Province, namely West Pasaman Regency, Agam Regency, Padang Pariaman Regency, Pariaman City, Padang City and Padang Pariaman Regency. Pariaman City is one of the coastal cities in West Sumatra Province. Geographically, Pariaman City is located between  $0^{\circ} 33'00'' - 0^{\circ} 40'43''$  LS and  $100^{\circ} 04'46'' - 100^{\circ} 10'55''$  East longitude. Land area is 79.22 km<sup>2</sup> and sea area is 282.69 km<sup>2</sup> with 6 small islands namely Bando Island, Gosong Island, Ujung Island, Tangah Island, Angso Island and Kasiak Island with a coastline length of approximately 12.7 km. Kota Pariaman consists of 4 (four) districts, namely North Pariaman District, Central Pariaman, East Pariaman and South Pariaman with a total of 16 villages and 55 villages belonging to 12 (twelve) Kenagarians (Source: Revised Pariaman RTRW 2010-2030). The characteristics of coastal abrasion in the City of Pariaman in the last 15 years (2003 to 2018) caused a significant reduction in land mass in the City of Pariaman, which averaged 13.18 ha / year, while the addition of land was 19.03 ha / year [16] [17]. The physical factors that most influence the abrasion and accretion of the coast of Kota Pariaman are the current factor, coastline shape, coast typology and vegetation cover while the low wave factor is quite influential. Seeing the high level of abrasion threat in the City of Pariaman, it is necessary to manage community-based coastal areas to reduce the threat of coastal abrasion.

## 2. Methodology

This research uses a qualitative approach. Data was collected through survey methods, observations and in-depth interviews, and data were processed descriptively-analytically. Data collection methods used are primary survey and secondary survey methods. Primary survey is a method of direct observation (observation) to the field, interviews and questionnaires conducted to obtain information and data from resource persons directly involved in research both coastal communities and KAN (Nagari Indigenous Density) consisting of community leaders, religious scholars, clever clever and youth. For this reason, questionnaires were distributed to the coastal community as 217 respondents in 14 coastal villages. Determination of respondents in local communities is done by purposive sampling technique which means determining locations and respondents with certain considerations by researchers based on characteristics or characteristics of the population that have been known previously [27]. Furthermore, it is analyzed by means of descriptive statistics in the form of averages and percentages to analyze the data captured through a questionnaire and in-depth interviews with key informants. Secondary survey is a method by collecting data from various government agencies as well as literature studies related to the substance of the object of study in Kota Pariaman in the form of documents, books and articles in relevant scientific journals which are processed into one data and information. To formulate an abrasion threatened environmental management model, the FGD method is used. The Focus Group Discussion (FGD) method is a Focused Group Discussion which is carried out in a participatory manner in which the participants are selected coastal communities to find and develop a community-based Abrasive Coastal Environmental Management Model. The resource persons in the FGD are the

stakeholders (stakeholders) namely the Nagari Indigenous Density (KAN) consisting of Indigenous Leaders and Coastal Communities.

### 3. Result and Discussion

#### Beach abrasion of Pariaman city

During the last fifteen (15) years there has been a significant loss of land in the Pariaman City due to coastal abrasion, it is feared it will get bigger and bigger. In Pariaman City there are 13 abrasion locations (beach reduction) with abrasion area of 197.65 ha spread in 8 villages and 11 accretion points (addition of beaches) with accretion area of 285.38 ha spread in 9 villages. The distribution of abrasion and accretion is found in villages

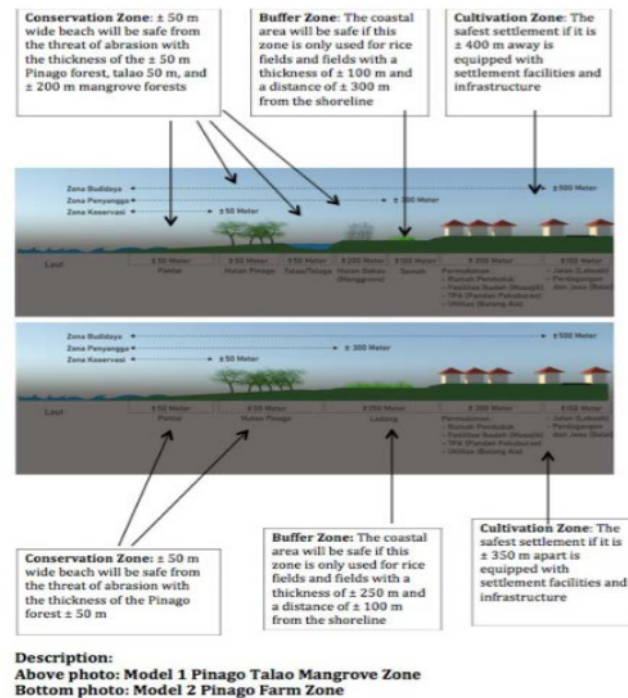


Figure 1. Zonation with Management Model for Coastal Areas Threatened by Abrasion Community based in the Pariaman City

This condition if the coastal abrasion mitigation efforts are not made, will threaten the balance of the coastal environment, where the loss of the beach will continue to threaten the Pariaman City. Meanwhile the accretion that occurs will also raise new problems related to the status of land ownership due to unclear beach accretion (growing land).

#### Characteristics of coastal and settlement communities

The coastal area referred to in this study is an area directly adjacent to the sea where the marine and coastal areas meet. The number of coastal areas in Pariaman City is in 3 subdistricts and 14 coastal villages. Generally, residents work as fishermen, amounting to 21.74% consisting of 593 full-time fishermen, 372 main part-time fishermen and 1,177 additional part-time fishermen. Aside from being a fisherman, there are also those who work as traders by 15.94%, civil servants 1.93% and entrepreneurs 2.42%. In addition to the main livelihoods, the most alternative livelihoods of the Pariaman coastal community are as embroiders (embroidery) 25% which are spread in North Pariaman District and South Pariaman

Subdistrict while the other alternative livelihoods are as 35.29% merchants, especially in tourist objects which are located in Central Pariaman District.

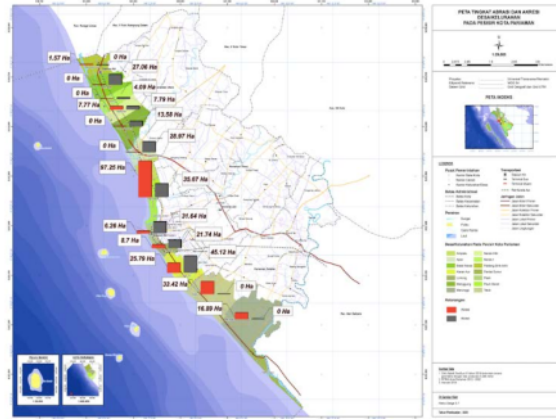


Figure 2. Prosentase Abrasion per village in Pariaman City

Judging from the average length of stay of people living on the coast since 1951-2000 (approximately 50 years) as much as 58.06% but quite a lot also since 2000 (18 years) have just settled on the coast of the Pariaman City which is equal to 36.41%. In the District of North Pariaman more people have just settled since 2001 in the amount of 62.92%. The condition of community houses on the coast of Pariaman City can be classified into permanent houses, semi-permanent houses and temporary houses. However, the condition of permanent housing (livable) is dominant on the coast of Pariaman City which is 66.36% while temporary houses which are less livable houses are still found which is 9.22%. The coastal settlements of Pariaman City are located very close to the beach and some are only less than 25 m (20.83%) from the shoreline and this is very dangerous and violates the provision that permitted settlements are 100 m from the highest tide (asl). Only 9.72% of the population's houses met the applicable law, which is a large distance from 100 m above sea level, the rest did not meet the applicable rules even though they were inhabited by permanent houses (dominant 66.36%), semi-permanent (24.42%) and temporary only 9.22% and have long lived in the coast which is more or less 50 years (58.06%). There are various reasons why people on the Pariaman coast live very close to the beach. There are at least 6 reasons (sorted from the most) why people live on the beach, namely: a) join parents / live with parents 28.31%, b) close to the place of work (fishermen, traders) 26.48%, c) no land / other land 18.72%, c) given land "pasie mahelo" 11.87%, d) follows the husband (ownership rights) 8.22%, and e) cheap land prices 6.39%.

The reason for attracting the coastal communities of Pariaman City to live very close to the beach is that it is not only due to the low land price (6.39%), it is due to the acquisition of land "pasie mahelo"; of 11.87%. "Pasie mahelo"; is the Pariaman community term for growing land / increasing beaches caused by the accretion of the beach (increasing beaches). "Pasie mahelo" is usually found in estuaries of the river and then they build houses / buildings to make a place to live (settle) or a place of business. "Pasia Mahelo" is actually state-owned land so that when the community uses it, the community actually uses State land that is actually not allowed to be built. Theoretically if at one place accretion (the addition of the beach) then abrasion (reduction of the beach) will occur at the other place, so that the nature of the "pasie mahelo"; land resulting from beach accretion is fluctuating and very dangerous if used as a residence by the community.

#### Public knowledge of coastal abrasion and environmental damage

The results of interviews with the community, they say about "pasia takikih (eroded beaches) is a local term for the occurrence of coastal abrasion is as follows; "dulu pantai tuh jauh kamuko, kini lah dakek jo rumah, sabab pantai lah takikieh" (The beach was far ahead, now it is near the house, because the beach has been eroded). The term beach abrasion (pasia takikih) is known by coastal communities from various sources namely print media (newspapers), electronic media (TV) and social media (facebook, tweeter, instagram). The causes of coastal abrasion according to the coastal community

of Pariaman City can be grouped due to natural factors and artificial / non-natural factors. Natural factors such as: a) the influence of large waves, b) large tides, c) the effect of weather / annual cycles, d) constellations if the moon and stars' food, e) the influence of the wind, f) the power of God, and g) earthquake. While those included due to non-natural factors are: a) incorrect installation of breaking stones (boulders), b) human negligence, ie disposing of marine trash and c) many people commit adultery / immorality.

Some coastal communities in Pariaman City said that their residence had been affected by abrasion (48.36%). According to the community, disasters will occur if nature issues its signs. As for the natural signs of the coming beach abrasion disaster, marked by the following matters; a) 'gagak' clouds (torn clouds, torn) in the direction of the sea (57.81%), b) weather changes (20.83%), c) seen from annual constellations / cycles (8.85%), d) strong winds (5.73%), e) big waves (3.65%), f) 'moon 'pakisahan' ' (moon cycle), g) 'Cawang ka naiak' ("cawing" will rise), h) seen from the color of the red star marked by a storm and i) the presence of a transverse line in the sea a sign of a storm.

#### Coastal community action against coastal abrasion

Economic factors are the main instrument why they remain on the coast because they have found it easy to work as fishermen. They are guided by the adage "di ma langik dijunjuang disitu bumi dipijak" (where the sky is held there on earth) which means that where he works, there he will live, even though there are some people who are materially capable of moving house away from the beach. Actions of participation that have often been carried out by the community so far have been making embankments from sacks filled with sand by being placed near houses affected by abrasion, piling up sacks filled with sand on the shores of the beach as a waveguide, making embankments from sandbags with sticks of coconut palm trees, or hibiscus tree as a buffer, and allow wild plants to live around the beach and plant hibiscus or sea cypress trees, are some of the findings of abrasion control behavior on the coast of Pariaman City.

The results of the distribution of coastal community action questionnaire Pariaman City to mitigate coastal abrasion are sorted according to what is most often done are as follows; a) Planting trees (49.67%), b) Protecting the environment (34.44%), c) Making sandbags (7.28%), d) Do not violate adat (2.65%) and e) Make a strong building structure (house) (1.32%). Actions that are often taken by coastal communities after coastal abrasion can be grouped into structural and non-structural actions (not violating customs and protecting the environment). The restrictions that exist in the midst of the community so that the abrasion disaster does not occur in the environment where they live and protect the environment are as follows; a) prohibited from dating / adultery, immorality, negative deeds (61.98%), b) Comply with Pariaman City rules which are prohibited from building on the beach (15.10%), c) are prohibited from fighting / fighting (6.77%), d) prohibited from bombing fish (5.20%), e) prohibited from throwing garbage into the sea (4.16%), f) prohibited from damaging the environment (2.08%), g) prohibited from throwing fish catches from land to sea, h) Going to sea at certain times / after Friday prayers, i) people must perform worship, j) prohibited from cutting down trees on the beach, k) there are sanctions and l) prohibited from going to sea when the weather is bad.

Public knowledge about the environment including the function of mangrove forests is quite high. The function of mangrove forests according to the community is to play a major role in controlling coastal erosion, maintaining sediment stability, and protecting coral reefs. Mangrove forests can be used as a natural protector from the threat of coastal abrasion and tsunami disasters. Then, the mangrove forest also has an important function, including maintaining a stable coastline, protecting the coast from the onslaught of waves and abrasion, a habitat for marine life, especially fish, crabs and shrimp. Three coastal villages in North Pariaman District that still have mangrove forests to date (February 2019) are Manggung Village, Apar Village and Ampalu Village which are part of the "Kanagarian Manggung". The results of a preliminary study over the past 15 years (2003 to 2018) in these 3 villages apparently did not occur abrasion (land reduction) but there was accretion (addition of land), namely in the Manggung village covering 13.58 Ha and Apar Village 28.97 Ha. Coastal communities are well aware that if a coastal area occurs in "pasia takikih"; (eroded beach / abrasion of the beach), then in other beaches there will be a "pasia mahelo" (increased sand / beach accretion). So that the community believes that the construction of a rock is one of the causes of coastal abrasion, so the community hopes that construction of a rock along the coast of Pariaman City will be carried out as well as planting trees and maintaining existing mangrove forests.

#### Community based coastal management

Management of areas threatened by community-based beach abrasion is an effort to optimize the social potential and local values of the community to facilitate the process of handling coastal abrasion. Among the local wisdoms are traditional

ideas or proverbs in the form of tambo and expressions which are still held firmly by the Pariaman City Kenagarian community as one of the “Kenagarian” in North Pariaman District. The results of the FGDs carried out are as follows.

#### 1. Alam takambang jadi guru” (nature evolves to become a teacher)

Coastal areas that are threatened with abrasion need to be addressed to reduce the threat of abrasion disaster by managing coastal / coastal areas based on communities so as to reduce the loss of lives and property. There is a local wisdom that is growing in the midst of the Kenagarian Manggung Pariaman City coastal community to manage coastal areas that are threatened with abrasion as a disaster mitigation effort. To find out local wisdom and the forms of community participation in Kanagarian Manggung Pariaman City in the management of coastal areas threatened with coastal abrasion, direct observations were carried out in the field, in-depth interviews with key informants (Tuo Pasié, Chairperson of KAN Manggung (“Kerapatan Anak Nagari”), “Pemuda Pelopor”, “Ninik Mamak”, “Bundo Kandung”, “Alim ulama”, “cerdik pandai”) and FGD. The compiled data is then analyzed descriptively. Local wisdom is seen to play a significant role in efforts to manage the environment that is threatened with abrasion. In Law PPLH No. 32 of 2009 states that local wisdom is the noble values that apply in the life order of the community to among others protect and manage the environment in a sustainable manner. The concept that is still used by the Pariaman City Kenagarian community today is “Alam takambang jadi guru” which means learning from nature through symptoms or phenomena that appear either implicitly or explicitly so as to form traditions or culture to reduce (mitigate), protect and manage the environment live sustainably as local wisdom. This concept is used in efforts to mitigate coastal abrasion in the Pariaman City, which sees natural phenomena as initial signs of a storm or big waves that trigger coastal abrasion.

The results of in-depth interviews with key informants and fishing communities, beach abrasion is caused due to natural factors and non-natural factors (human activity). The most important natural factor causing abrasion is the size of the waves. “Ombaknyo dicaliak, pasie diliek, bara gadang ombak tuh” the waves are seen, the sand is seen, how big are the waves. If the waves are big then the abrasion will also hit the beach big. The size of the waves depends on the weather, especially the wind. “Jiko ghabaknyo dihulu, cewang dilangik tando hari katarang, tapi kalau hari lah kalam, awan lah kalam tando hari ka hujan badai” (if the cloud is torn upstream, the girl in the sky will be bright, otherwise if it is dark, the dark cloud will be a storm”. This rainstorm accompanied by large waves is what causes coastal abrasion. The Pariaman coast community believes that the category of large waves is influenced by the meeting between the moon and stars. Pariaman coastal communities classify the waves into several categories of causes.

“Bintang gadang”/big star; happens when “bintang balago jo bulan, lapeh ka barat, tando hari ka badai”, off to the West, a sign of the day will be a storm. Usually due to big stars for 7 days there will be waves accompanied by large storms. The wind comes from the east towards the west (northeast wind).

- a) “Bintang Kalo” (scorpion star) is a scorpion-shaped star where if “sapiknyo masuk ka dalam bulan, tando hari ka badai lapeh ka Barat”; means that if the star its claws enter the moon, the sign of the day will the storm escape to the West. The wind comes from the east towards the south. According to the Pariaman coastal community the wind if; is the strongest wind that causes big waves / waves so it is very feared by the community because it will cause various disasters including coastal abrasion.
- b) “Bintang banyak” (many stars) is a star that moves from the East to the South accompanied by strong winds, hot days, the waves are not too big so that the fishermen assume this is a natural sign that fishermen may go to sea because of good weather
- c) “Bintang Pakuang” (Pakuang star) is a type of star that takes the name of a fisherman named “Pakuang” who died at sea due to a storm in the sea off Pariaman. Pakuang Star occurs when “bintang balago jo bulan, lapeh ka Barat, kalua angin timur laut”; which means that if the star collides with the 1 moon towards the West, the Northeast wind will emerge, namely the windstorm or hurricane. There will be a hurricane for 5 days accompanied by large waves.
- d) “Bintang Kuniang” (yellow star) almost the same as “Pakuang Star”, where if there is a yellow star is a sign that there will be a typhoon with large waves that occur for 3 consecutive days.

As a result of storms that cause high waves, causing beach abrasion, “pasang gambuang”/ ‘pasang naik sahinggo maelo kasiak ka ateh tabiang” known as beach abrasion is the erosion of the beach. Conversely, if the “pasang kariang, pasie maelo ka laui” which means the beach accretion. The magnitude of the waves caused by the “paraduan bulan jo bintang” the meeting of the moon with the star can cause “Pasakian” (fortune) obtained by the fishing community. The level of “Pasakian” can be classified into several categories.

- a) “Pasakian lapeh ka ikan”; meaning free fishing for fish which means that fishermen will get a lot of fish, “lauak kanai” (many fish) and “lauak kalua” (fish out).
- b) “Pasakian lapeh ka ombak”; meaning “escape from the waves” which means that no fishermen are caught because of the “ombak gadang” (big waves).
- c) “Pasakian lapeh ka angin”; meaning “escape from the wind”; which means that because of the storm the fishermen do not get anything because the fish do not exist.
- d) “Hari tarang”; meaning “bright day”; so the fish does not exist so the fishermen do not catch any fish.

## 2. Badoncek (mutual cooperation)

“Badoncek” is a social culture of people in Minang, namely mutual cooperation in the form of energy and material in overcoming disasters. “Badoncek” can mean that humans cannot live alone, but they must live in groups and help one another and work hand in hand. Generally Kenagarian Manggung coastal communities are always ready to participate in overcoming abrasion. This shows the nature of mutual cooperation and tolerance is still high, although the type of participation varies according to their abilities. In the event of a disaster, the “Nagari” (village) community will jointly work hand in hand to work together to overcome the coastal abrasion that occurs in the following manner.

- a) make sand-filled sacks to be installed on abrasion-affected beaches so that they form a wall to withstand the waves.
- b) Planting coconut trees, waru trees or bamboo trees on the beach or houses / buildings affected by coastal abrasion to withstand the waves.
- c) Contribute voluntary labor and materials (building materials, food and drink, clothing, money) to victims affected by the disaster or to repair damaged facilities and infrastructure such as roads or public facilities at mosques, markets and others.

## 3. ‘Gebu Minang’ becomes Gebu (thousand movements) Beach Tree

“Gebu Minang” is an abbreviation of the Minangkabau Economic and Cultural Movement, a Minangkabau community organization that aims to gather and foster the potential of the Minang community who are overseas in the economic and cultural fields. The Gebu Minang activity was applied by the coastal community to a thousand tree planting movement on the beach, namely the efforts of the Kenagarian Manggung coastal community in mitigating coastal abrasion. Efforts made by the community in Apar Village in coastal management from the threat of abrasion, is to carry out planting mangrove seedlings. By planting mangroves on an ongoing basis, fishermen hope not to have to move because the house is free from abrasion disasters or high waves. To do fishing activities also do not need to be too far away, because all that is needed is available around the beach. As for the sandy beach, the planting of sea cypress trees, coconut trees and waru trees is carried out.

The existence of a youth organization Community TDC (Tabuik Diving Club) that cares about saving the environment (coastal and marine forests), has an impact on the safety of the coastal environment from destruction. Besides being beneficial for fishermen, the mangrove forest has also been developed as a new destination in Apar Village as an ecotourism for mangrove forests in 2017. The mangrove forest ecotourism in Apar Village has been equipped with tracks / paths along 50 m and 1.5 m wide to enjoy mangrove forests. The development of this mangrove ecotourism is a collaboration between Pariaman City Government and the nature lover community “Tabuik” Diving Club with funding from the Minangkabau Aircraft Filling Depot CSR program. Until now the mangrove forest in Apar Village has become one of the new mangrove tourism destinations, while maintaining the environment from the threat of abrasion, it also adds to people's income and is an alternative livelihood. The concern of the TDC community which consists of young people from the Apar Village is not only limited to that, since 2011 it has planted approximately 100,000 mangrove seedlings at several points, which are estimated to live as much as 95%. The seedlings were imported from Bengkalis and Riau Province while the planting was carried out by coastal communities.

## 4. Model of management of coastal areas based on nagari spatial planning

Regulate land use and spatial patterns by applying the concept of nagari formation in Minangkabau as follows.

- a) Conservation zone; consisting of the coast, pinago forest area and mangrove forest determined as nagari forest with a thickness of 50 m from the coastline and ‘talao’ (lake), where this zone is the distance from the shore to the



coast as far as approximately 50 m, functioning as the front guard for the main safety beach because it is directly adjacent to the sea.

- b) Buffer zone; is the second layer after the conservation zone with the setting of fields (nan basah dipasawah) and farm ('nan kariang di paladang') as a buffer area with a thickness of 250 m, as well as an area for cultivation for the country within close proximity of the coastline. about 300m. In accordance with the saying of Minang 'Nan lereng ditanam bambu, nan miriang ditanam tabu, nan bancah buek kolam, nan rawa buek sawah, nan kariang buek ladang, nan munggu buek pandam kuburan' (slopes planted with bamboo, sloping with sugarcane, watery as pond, dried with field, dry with field / garden).
- c) Cultivation zones; is a third tier zone with the designation of residential areas as 'huma' (houses) where Anank Nagari lives and is equipped with infrastructure. A village must be equipped with facilities and infrastructure of the village settlement is 'labuah' (road), 'hall / feed' (market), 'bali-balai' (meeting place), 'musajik' (mosque), 'pandan pusaro' (place cemetery / tomb) and 'tapian' (river, clean water source). The distance of the cultivation zone from the coastline is approximately 350 m so it is quite safe from the threat of coastal abrasion.

#### 4. Conclusions

Environmental management of coastal areas that are threatened with abrasion is defined as a conscious effort by the community to continue to maintain and improve environmental quality in line with the times. Environmental management is an important aspect to prevent environmental damage due to inappropriate development projects. Management of the coastal area from the threat of abrasion here does not mean protecting the ecosystem by preventing development from taking place but encouraging environmentally oriented and community-based development efforts "Nagari" (villages) and not just considering the economy alone. The management of coastal areas threatened by abrasion based on the "Nagari" community is an effort to optimize the social potential and local values of the Kenagarian Manggung community to facilitate the process of handling coastal abrasion.

#### References

- Oktorie, O., D. Hermon., E. Barlian., I. Dewata., I. Umar. Policy Model of Disaster Mitigation for Liquefaction Potential in Pagar Alam City-Indonesia. IJSET - International Journal of Innovative Science, Engineering & Technology. Vol. 7 Issue 5. p107-113. 2020
- Rostika, R., N. P. Purba., M. Lutfi., J. Kelvin., I. Silalahi. The Managing Plan for Abrasion in Coastal Area of Garut Regency. International Journal of Procedia Environmental Sciences. 33 (2016): 512 – 519. 2016
- Oktorie, O., Rusdi., Heldi., E. Barlian., A. Putra., R. Ramadhan. Disaster Mitigation Based on Environmental of Coastal Area Communities in Pariaman City Indonesia. Sumatra Journal of Disaster, Geography and Geography Education. Vol. 3 No. 2. p202-207. 2019
- Fatori, S and R. M. Alegret. Integrating Local Knowledge and Perception for Assessing Vulnerability to Climate Change in Economically Dynamic Coastal Areas: The Case of Natural Protected Area Aiguamolls de l'Empordà, Spain. Migration Research Group, GRM, Department of Geography, Autonomous University of Barcelona, Building B, Campus UAB, Cerdanyola del Vallès. Ocean & Coastal Management 85 (2013); 90-102. 2013
- Fitriani, D and O. Oktorie. Community Participation in Flood Disaster Mitigation in Solok Selatan Regency-Indonesia. Science and Environmental Journals for Postgraduate (SENJOP). Vol. 1. Issue 2. p. 1-9. 2019
- Hermon, D. Mitigation and Adaptation: Disaster of Climate Change. Sara Book Publication. India, 2019
1. Oktorie, O., D. Hermon., E. Joni., A. Syarief., A. Putra. A Calculation and Compiling Models of Land Cover Quality Index 2019 uses the Geographic Information System in Pariaman City, West Sumatra Province, Indonesia. International Journal of Recent Technology and Engineering (IJRTE). Vol. 8., No. 3, p. 6406-6411. 2019
  2. Hermon, D. Evaluation of physical development of the coastal tourism regions on tsunami potentially zones in Pariaman City-Indonesia. International Journal of GEOMATE, Vol. 17, Issue. 59, pp. 189-196, 2019
  3. Hermon, D. Geografi Bencana Alam. Penerbit: RajaGrafindo Persada, Jakarta, 2015
  4. Hermon, D. Ganefri, Erianjoni, Dewata, I., Iskarni, P and Syam. A. A Policy Model of Adaptation Mitigation and Social Risks The Volcano Eruption Disaster of Sinabung in Karo Regency-Indonesia. International Journal of GEOMATE, Vol. 17, Issue. 60, pp. 190-196, 2019
  5. Hermon, D. Impacts of Land Cover Change on Climate Trend in Padang Indonesia. Indonesian Journal of Geography. Volume 46. Issue 2. p: 138-142. Fakultas Geografi Universitas Gajah Mada. 2014.
  6. Hermon, D. Mitigasi Bencana Hidrometeorologi: Banjir, Lonsor, Ekologi, Degradasi Lahan, Puting Beliung, Kekeringan. UNP Press. 2012
- BAPPEDA (Regional Planning and Development Agency) Pariaman City. Revised 2010-2030 Pariaman Regional Spatial Plan (RTRW). 2017

- Erianjoni, D. Hermon., R. Wilis. The Formulation of Natural Disaster-Based Local Wisdom Values After Tsunami Disaster in Aceh Jaya District, Aceh Province, Indonesia, Research on Humanities and Social Sciences [www.iiste.org](http://www.iiste.org) ISSN (Paper)2224-5766 ISSN (Online)2225-0484 (Online) **Vol.6, No.16.**
- Haryani. Model Mitigasi Bencana di Wilayah Pesisir dengan Pemberdayaan Masyarakat. Jurnal Nasional Tataloka. ISSN 0852-7458. Vol.14 No.3 Agustus 2012. 2012
- Haryani, Agus Irianto and Nurhasan Syah. 2018. Coastal Abrasion and Accretion Studies of West Sumatera Province in Period 2003-2016. Journal of Environmental Science and Engineering A 7 (2018). Vol 7.No.1, Januari 2018: 22-29.
7. Haryani, Agus Irianto, Nurhasan Syah. Study of Coastal Abrasion Disasters and Their Causes in Pariaman City. IOP Conf. Series: Earth and Environmental Science 314 (2019) 012009 doi:10.1088/1755-1315/314/1/012009. 2018
8. Hermon, D., Erianjoni, I. Dewata, A. Putra, O. Oktorie. Liquefaction Vulnerability Analysis as a Coastal Spatial Planning Concept in Pariaman City–Indonesia. International Journal of Recent Technology and Engineering (IJRTE). Vol. 8. Issue 2. p 4181-4186. 2019
- Hiwasaki, L., E. Luna, Syamsidik, R. Shaw. Process for Integrating Local and Indigenous Knowledge with Science for Hydro-Meteorological Disaster Risk Reduction and Climate Change Adaptation in Coastal and Small Island Communities, International Journal of Disaster Risk Reduction 10 (2014) 15–27. 2014
- Oktorie, O. A Study of Landslide Areas Mitigation and Adaptation in Palupuah Subdistrict, Agam Regency, West Sumatra Province, Indonesia. Sumatra Journal of Disaster, Geography and Geography Education. Vol. 1. Issue. 1. p. 43-49. 2017
- Messalina, M., L. Salampessya, I. G. Febryanob., E. Martinc., E. Martha., S. R. Papilayae. Cultural Capital of The Communities In The Mangrove Conservation in The Coastal areas Of Ambon Dalam Bay, Moluccas, Indonesia, Procedia Environmental Sciences 23 (2015) 222 – 229. 2015
- Notoatmodjo, S. Health Research Methodology, Revised Edition, Jakarta: PT Rineka Cipta. Hal. 35. 2002
9. Navis, A.A. Alam Takambang Jadi Guru. Jakarta: PT Grafiti. 20184
10. Hermon, D. Climate Change Mitigation. RadjaGrafindo. Jakarta. 2017
- Penehuro, F. L., U. Aso. Stormy Weather Today: Traditional Ecological Knowledge of Weather and Climate. The Samoa Experience, Climatic Change (2010) 100:317–335. 2010
- Permana, R., C. Eka., I.P. Nasution., J. Gunawijaya. Traditional Wisdom About Disaster Mitigation in Baduy Communities. Jurnal Makara, Sosial Humaniora, 15(1):67-76. 2010
11. Hermon, D., Erianjoni, I. Dewata. A. Putra and O. Oktorie. Liquefaction Vulnerability Analysis as a Coastal Spatial Planning Concept in Pariaman City–Indonesia. International Journal of Recent Technology and Engineering (IJRTE). Vol. 8. Issue 2. pp. 4181-4186. 2019
12. Barlian, E. Metodologi Penelitian Kualitatif & Kuantitatif. UNP Press, 2018
13. O. Oktorie, A Study of Landslide Areas Mitigation and Adaptation in Palupuah Subdistrict, Agam Regency, West Sumatra Province, Indonesia. Sumatra Journal of Disaster Pt\*, Geography and Geography Education. Vol. 1. No. 1. pp. 43-49. 2017
14. L. Arlym, D. Hermon, D. Lanin, O. Oktorie and A. Putra. A Policy Model of Preparedness The General Hospital in Reducing Victims of Earthquake and Tsunami Disasters in Siberut Mentawai Island, Indonesia. International Journal of Recent Technology and Engineering (IJRTE). Vol. 8. Issue 3. 2019
15. Hermon, D. Land Stability Model for Sustainable Spatial Planning in Padang City-Indonesia based on Landslide Disaster. Journal of Geography and Earth Sciences. Vol. 7. Issue 1. Pp 19-26. 2019

**Haryani**, is a Program Doctor (S3), Department of Environmental Science, Universitas Negeri Padang. He is actively involved in any researches regarded to natural disaster, environmental science. He is a Student Doctoral Program of Environmental Science, Universitas Negeri Padang, Indonesia

**Agus Irianto**, is a Professor of Environmental Education, obtained the Doctorate Degree in Doctor Program Education Science at Universitas Negeri Jakarta, 1999. He is actively involved in any researches regarded to environmental education, Universitas Negeri Padang, Indonesia. He is Chair of Doctoral Program of Environmental Science, Universitas Negeri Padang, Indonesia

**Nurhasan Syah**, is an Associate professor of Environmental Science, obtained the Doctorate Degree in Doctor Program Education Science at Universitas Indonesia, 2009. He is actively involved in any researches regarded to environmental science, Universitas Negeri Padang, Indonesia



**Eri Barlian** is a Professor of Environmental Education, obtained the Doctorate Degree in Doctor Program Education Science at Universitas Negeri Jakarta, 1999. He is actively involved in any researches regarded to environmental education, sports, recreation and disaster and produces several scientific works in the form of Scopus indexed journals (ID: 57202293479). He is Chair of Doctoral Program of Environmental Science, Universitas Negeri Padang.

# Management Model for Coastal Areas Threatened by Abrasion Community based in the Pariaman City West Sumatera Province, Indonesia

---

ORIGINALITY REPORT

---

**14%**  
SIMILARITY INDEX

**11%**  
INTERNET SOURCES

**7%**  
PUBLICATIONS

**5%**  
STUDENT PAPERS

---

MATCH ALL SOURCES (ONLY SELECTED SOURCE PRINTED)

---

3%  
★ [iopscience.iop.org](http://iopscience.iop.org)  
Internet Source

---

Exclude quotes    On  
Exclude bibliography    On

Exclude matches    Off