

Abrasion Hazard Mitigation Efforts on The Coast Maros Regency of South Sulawesi, Indonesia

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Abstract—Abrasion is one of the natural disasters that have to be controlled in a comprehensive manner. As for research purposes namely; 1) to know what mitigation efforts already undertook community on the coast of Maros. 2) to analyze what the appropriate mitigation forms are done in order that the Maros Beach remain sustainable. The results show that Mitigation already carried out on the beaches of Maros, namely structural mitigation rehabilitate mangrove forests with varieties of *Rhizophora* sp., and nonstructural mitigation, i.e., the Government already made the regulation of utilization of mangrove forests to meet the needs of community life, but less socializing. Suitable structural mitigation, i.e., the development and rehabilitation of mangrove forests due to the topology of dominant coastal mudflat. The Government needs to improve the dissemination of regulations and community empowerment. Disaster mitigation efforts were undertaken together with the community and Government.

Keywords—*abrasion hazard, mitigation of community, mangrove forests*

I. INTRODUCTION

Indonesia is the largest archipelago in the world, so it has a rich resource of the coastal area and at the same time has the potential of natural disasters is very high (Ruswandi et al., 2008). Indonesia has the longest coastline in the world after 3 countries namely United States, Canada, and Russia [1]. Approximately about 75% of cities in Indonesia located on the coastline with a number of the population over 100 million people. It also results in the coastal areas of developing rapidly to meet a variety of needs including human settlements, ports, industrial areas, fisheries, agriculture, and tourism [2]. As a result of many coastal regions in Indonesia having such problems: erosion, abrasion, sedimentation, and saltwater intrusion.

Abrasion shore end late into the discussion of the academia and the Government. Because the coastline is experiencing a shift or eroded area, so that will have an impact on the ecosystem in it, and the sustainability of utilization for the fulfillment of needs, and give rise to conflicts between regions even among countries. Abrasion is the process of annihilation of the coast caused by the lacing of ocean waves, currents and tides are destructive to the surrounding area [2]. Further Bisceglia et al. [3] reveals that abrasion is the workmanship of fractional waves (waves).

The condition of the beach in Indonesia is extremely unsettling incident due to abrasion. Approximately 100 locations in 17 provinces with the length of the coast about 400 km experience abrasion. Areas that experienced the

abrasion is a South Aceh, Banda Aceh, Medan, Padang, Agam, of North Jakarta, Rembang, Bali, Sikka, and Selayar Regency in South Sulawesi [2].

The West coast of South Sulawesi province on Eastern Monson mostly sedimentation. However, in the West occur abrasion Monson. It also occurs on the coast of Maros on Monson East, but in the West occur abrasion Monson. Very troubling mangrove forest on the coast of Maros degraded due to mangrove forests are converted into fishponds. The expansion added the results of the conversion of mangrove forests and rice paddies [4]. These conditions will cause Beach Maros threatened disaster too high abrasion if not disaster mitigation efforts abrasion.

Most of the inhabitants of the coast her work as fishermen and farmer pond. They exploit the excessive needs for his life thus causing damage to the infrastructure and means of settlements and farmed acreage that could lead to the occurrence of the larger coastal abrasion. It's been much done to arouse the community, but not yet show even better results the more complex issues [5].

To reduce the risk of abrasion on the beach to make disaster mitigation efforts. There is two namely disaster structural and nonstructural mitigation. Structural mitigation is the physical effort made to reduce the risk of disasters that are mechanical and vegetative. These efforts include; early warning, development-breaking waves, shock arrestor abrasion sedimentation (of Gróin), residential development stage, and restore mangrove forest. Nonstructural mitigation is to reduce the impact of disasters in addition to physical infrastructure and technology. It covers policy making, regulation, and strengthening the capacity of the community. Canvassed in this case namely structural and nonstructural mitigation [6].

Beach Maros on sedimentation occurred Timor Monson, but on the contrary, that is happening West Monson abrasion. As for research purposes to be achieved, namely; 1) to know what mitigation efforts already undertook community and Governments on the coast of Maros. 2) to analyze what the appropriate mitigation forms are done in order that the Maros Beach beaches remain sustainable.

II. RESEARCH METHODS

Maros Beach which includes 4 subdistricts, namely: Bontoa, Lau, Maros Baru, and Marusu. The beach is located between astronomically Maros 4°52 ' 57.045 "LS came to the 5°3 ' 35.037" LS, and 119°31 ' 4.956 "BT to 119°28 ' 41.572" BT. Moreover, geographically the coast Maros is

westernmost landmasses Maros northern borders Pangkep Regency, South of the town of Makassar in Eastern

mainland Maros, and west facing the Makassar Strait. This research is located along the coast of Maros (Fig. 1).

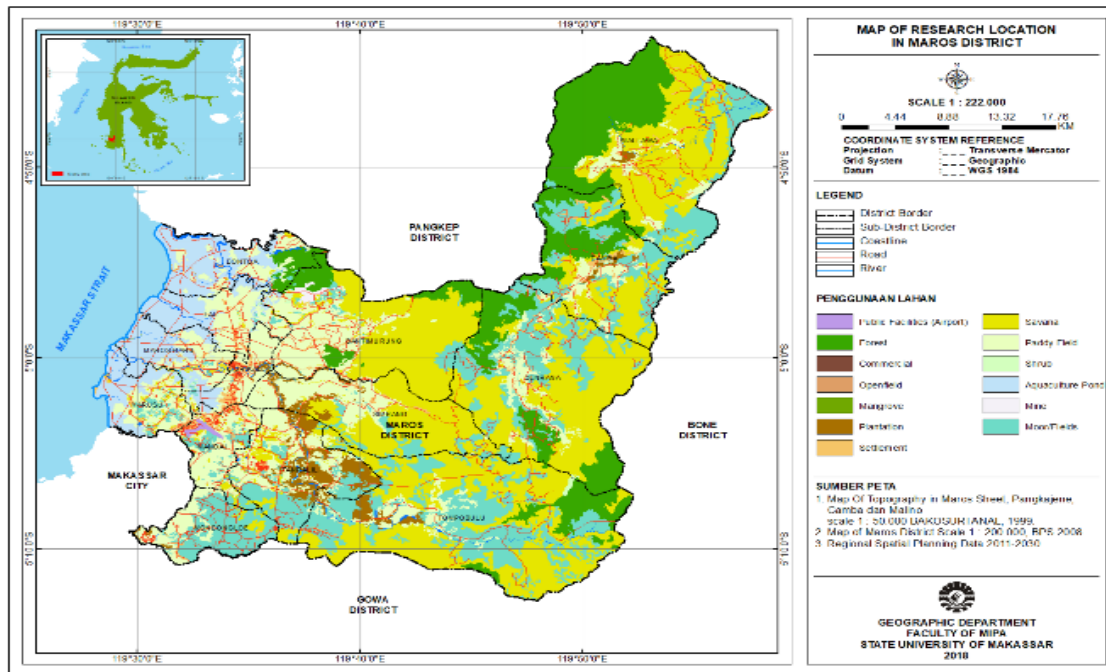


Fig. 1. Location map of coastal research at the Maros

The collection of data in this study, i.e., 1) literature and review documentation associated with the coastal areas of Maros. 2) observation, i.e., measurements and observations from the mitigation already done community. 3) conducting interviews in the community and Government officials about the rules or policies of the management of the coast. The analysis is done that is descriptive analysis.

III. RESULTS AND DISCUSSION

Maros Beach extends directly facing the Makassar Strait, so affected the dynamics of the Makassar Strait. It will affect the dynamics of the beach that is the occurrence of abrasion and sedimentation. The coast of the Maros River, several Rivers empty into large and small. The major rivers

in Maros regency namely the river Maros and the river Binangasangkarak. Maros River originates on the slopes of the Tinggimoncong Sub-district of Gowa Regency North Mountains Lompobattang. The River originates in the Binangasangkarak district Pankajene and Maros. The pedestrian use of the Maros coast dominated land use of ponds, rice fields, settlements, and tourist attractions.

Mitigation efforts have been already undertaken community and Governments on the beach in the form of structural mitigation Maros namely planting mangroves to dampen a wave. Fig. 2 shows most of the coastal areas of mangrove-covered Maros. As for the type of mangrove is no 2 IE *Avicennia* sp. and *Rhizophora* sp.



Fig. 2. The mangrove forest as seen from the sea as a mitigation effort abrasion

The community utilizes the mangroves as firewood if there is a big event such as a wedding. It's not too big its effect on an area of mangrove forests. The effect on the total area of mangrove forests, namely land embankment made of mangrove forests. The expansion of the embankment because of the economic value of the embankment directly perceived by the public than the economic value of mangrove forests. The more difficult it is to preserve mangrove pond owners because most do not live in the coastal area. It is living in the coastal areas most simply as sharecroppers. The rapid expansion of the embankment can be seen in Fig. 3, embankment behind the mangrove forests are characterized by reduced mangrove thickness can be opaque.



Fig. 3. Embankment behind the mangrove

The dominant mangrove lives on muddy material called Mudflats. Most of the coastal areas of Maros muddy their material, since it is the mouth of the river. There are 8 (eight) river which rises in the coast of Maros, 3 major rivers namely the river Maros, rivers Binangasankarak, and Stream Tallo. The community's efforts in preserving the mangrove have been started by planting mangroves in areas that are prone to abrasion see Fig. 4. The community has planted mangrove types *Rhizophora* near Bontobahari.



Fig. 4. Mangrove regeneration type *Rhizophora*

A lot of mangroves grown IE *Avicennia Marina* naturally, and for rehabilitation of mangrove plant community types *Rhizophora*. Both types of mangrove that dominate almost the entire territory of Maros beaches from North to South (Kecamatan Bontoa, Lau, Maros Baru, and Marusu), except on the coast of Kuri Caddi and Kuri Lompo. Kuri Caddi and Kuri Lompo Beach Pabbentengan Marusu Village Sub-district, because the coast of Kuri Caddi and Kuri Lompo is a beach denudational. The more he explained it could be seen in Fig. 5. In coastal mangrove planting is done Kuri Caddi in the river rather than on the beach because it is not suitable to be developed in the coastal mangroves.

The study has been implemented mitigation efforts of society and Government is a mangrove planting, namely structural by society and the Government. Nonstructural mitigation, i.e., Rulemaking utilization of mangrove forests to meet the needs of the community in his life. However, there are drawbacks because less Government promotes the regulation so that the community expands farmed land with mangrove forests. The community expanded the embankment by converting mangrove forests. Expansion of fishponds and wetland conversion results in mangrove [4].



Fig. 5. The coast of Kuri Caddi on the Maros

Mangrove forests were converted to farmed land because they consider the economic value of embankment higher than the economic value of mangrove forests on the economic value of mangrove forests higher than pond [7]. Just because the community has yet to figure it out, then needed empowerment society with guidance and training so that the knowledge society is increasing. The knowledge society is increasing then the impact on the attitude of the community towards the development of mangrove forests [5]. Development of mangrove forests adapted to the soil or typology of the beach and the economic conditions of the community. The condition of the land or coastal Maros typology is the mudflats. Its material consists of Mudflats which bogs suitable for mangrove development [7][8].

The factors causing abrasion in Maros Beach are the high waves of seawater. This happens because of the high wind speed that causes differences in land and sea temperatures; increased temperature on land due to the depletion of mangrove forests. The pedestrian use of the Maros coast dominated land use of ponds, rice fields, settlements, and tourist attractions. The control efforts of abrasion already undertaken community, i.e., vegetative methods, however, there needs to be a combination of vegetative with the mechanics in the coastal areas of Kuri Lompo and Kuri in Marusu Caddi. Vegetative methods to the reduced territory, due to the expansion of the embankment by converting mangroves. Expansion of farmed land is the result of the conversion of wetland and mangrove forest land [4].

Maros Beach closed mostly mangrove forests and is the mouth of the river Binangasankarak and the river Maros which carries more sediments. Mangrove forests are capable of absorbing the energy of the wave coming. Energy waves are to the beach fairly constant. Wave energy is affected by the ups and downs, the speed of the flow and speed of the wind. Wind speed is determined by the difference in temperature. The temperature can be muted with mangrove forests [9]. Temperature increases if forest and open green space are reduced [10].

IV. CONCLUSION

Mitigation community has done, and the Government is structural mitigation that is developing the mangrove forests that could dampen the waves cause abrasion. It is caused due to the mudflats study suitable for mangrove development. And the Government already made nonstructural mitigation, i.e., the regulation must not extend the embankment of mangrove forests, but has not been

socialized so conflict interests. To address that need community empowerment Beach Maros. Disaster mitigation efforts are implemented on an ongoing basis in cooperation of the community and the Government.

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REFERENCES

- [1] H. Umar, S. Rahman, A. Y. Baeda, and S. Klara, "Identification of coastal problem and prediction of coastal erosion sedimentation in South Sulawesi," *Procedia Eng.*, vol. 116, pp. 125–133, 2015.
- [2] T. Ophiyandri, B. Istijono, A. Hakam, and D. S. Center, "Community Empowerment in Planting Vegetation to Reduce Coastal Abrasion in West Sumatra," *Int. J. GEOMATE*, vol. 16, no. 54, pp. 68–73, 2019.
- [3] B. Bisceglia, R. De Leo, A. P. Pastore, S. von Gratowski, and V. Meriakri, "Innovative systems for cultural heritage conservation. Millimeter wave application for non-invasive monitoring and treatment of works of art," *J. Microw. Power Electromagn. Energy*, vol. 45, no. 1, pp. 36–48, 2011.
- [4] U. Utojo, A. Mustafa, and H. Hasnawi, "Peruntukan Kawasan Pesisir Kabupaten Maros, Sulawesi Selatan Sebagai Lokasi Pengembangan Budidaya Tambak Ramah Lingkungan," *J. Ris. Akuakultur*, vol. 6, no. 2, pp. 325–339, 2011.
- [5] K. Jannah, "Hubungan antara Persepsi Masyarakat tentang Bencana Abrasi dengan Penanggulangannya di Desa Bulakbaru Kecamatan Kedung Kabupaten Jepara," *Geo-Image*, vol. 2, no. 2, 2013.
- [6] R. Ruswandi, A. Saefuddin, S. Mangkuprawira, E. Riani, and P. Kardono, "Identifikasi Potensi Bencana Alam dan Upaya Mitigasi yang Paling Sesuai Diterapkan di Pesisir Indramayu dan Ciamis," *Ris. Geol. dan Pertamb.*, vol. 18, no. 2, pp. 1–19, 2008.
- [7] A. W. Nirwansyah, "Implementation Of Community Based Disaster Risk Reduction In Coastal Area Of Pemalang (Case Study: Mangrove-Community In Lawangrejo Village)," *Geo Edukasi*, vol. 3, no. 2, 2014.
- [8] E. Maulana, T. R. Wulan, D. S. Wahyuningsih, I. Mahendra, and E. Siswanti, "Strategi Pengurangan Risiko Abrasi Di Pesisir Kabupaten Rembang, Jawa Tengah," 2016.
- [9] M. A. Marfai, "The hazards of coastal erosion in Central Java, Indonesia: An overview," *Geogr. J. Soc. Sp.*, vol. 7, no. 3, 2017.
- [10] R. Maru, M. R. Abidin, A. Arfan, S. Nyompa, U. Uca, and S. Hasja, "Mapping of Protected Forests and Cultivated Area in North Luwu South Sulawesi, Indonesia," *Asian J. Applied Sci.*, 2016.