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DISASTER MITIGATION BASED ON ENVIRONMENTAL OF COASTAL AREA COMMUNITIES IN PARIAMAN CITY INDONESIA

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ABSTRACT: Pariaman city is one of the areas most severely affected by natural disasters that have the potential for tsunamis. The impact of the earthquake potential tsunami seen in fatalities and damage to infrastructure, both residents' homes and other public facilities. The impact also caused the community to lose their livelihood. Most of the people of Nagari Gunung Padang have livelihoods as farmers, after the earthquake disaster has the potential of a tsunami, many people lost their land and gardens because of the cliff ruins and buried by landslides that caused the land cannot be recycled. By taking into account all the physical, social, and economic aspects, this is the reason for the researchers' interest to conduct research related to the direction of Natural Disaster Mitigation Policy based on Environmental Physical Conditions and Socio-Economic Characteristics of Coastal Area Communities in Pariaman city. With Mixed Method methods, such as simultaneous and sequential data collection. Then descriptive physical environmental conditions and socio-economic characteristics, and Focus Group Discussion (FGD) in policy direction. The results of this study in the form of an explanation of the physical, social and economic Pariaman city, as well as the policies needed in disaster mitigation in Pariaman city

Keywords: *FGD, Earthquake, Mitigation, Coastal*

1. INTRODUCTION

The social life community is always undergoing change. Changes in people's lives are social phenomena that are very reasonable because every human being has unlimited interests and needs. Changes will appear after the social order and the life of the old community can be compared with the new life [1-3]. Along with the times and the dynamics of society, it can be seen that social changes occur in a sustainable manner, both in urban areas and in rural communities. Therefore, it would be more realistic and useful to see change as something inherent in certain traits, including social life. Even though it talks about the physical environment, history, and human intellect, it always undergoes changes and movements from its original place [4].

Social conditions that cause changes in aspects of social life include economic, technological and geographical conditions. This change is not only caused by internal factors, but also due to external factors. The external social conditions in question are like the earth's movement cycle which in recent years has caused frequent natural disasters. Natural disasters which inevitably change the social order of the community, such as the large earthquake on September 30, 2009, were centred in Padang Pariaman Regency [5]. [6-8] explains Pariaman city is one of the worst affected areas due to a potentially catastrophic earthquake. The impact of the earthquake potential tsunami seen in fatalities and damage to infrastructure, both residents' homes and other public facilities. This event really became a sad phenomenon in the midst of community life.

The damage to various privately owned buildings such as houses and public facilities such as schools, government buildings and other facilities is part of the physical losses caused by natural disasters in earthquakes. Nearly most of the buildings were severely damaged. Earthquakes not only cause damage to infrastructures, such as collapsed buildings (houses), damage to houses of worship, schools, roads, and other public facilities. Many of the buildings that were badly damaged can no longer be occupied or used, where government buildings and offices are no longer functioning [9-10].

The impact of this earthquake which has the potential of a tsunami has also caused the people to lose their livelihoods. Part of the people of Pariaman city are livelihoods as farmers, after the

earthquake disaster has the potential of a tsunami, many people lose their lands and gardens due to the collapse of the cliffs and are buried by landslides which causes the land cannot be recycled. Loss of land, automatically also makes people unable to meet the needs of family life [4, 8]. It can not be denied causing shocks in people's lives ranging from physical, moral or material. The complexity of the social problems that occurred due to the impact of the earthquake was very influential in the socio-economic life of the people after the earthquake [10-11].

In the social life, the people of Pariaman city live with customs as norms that regulate their lives, both in the form of procedures for marriage, visiting people who give birth, circumcision and organizing death. Among fellow members of the community still have a sense of brotherhood, and the community is still dominant as a community living in this area. In terms of development in this area, it looks still very far behind, this is marked by 7 villages out of 9 culverts still isolated or still on dirt roads. Likewise with the clean water service the community still utilizes springs that have no management [11].

Based on the visit of "Tour de Singkarak" which began on June 1-6, 2011 stage 2a took place from Padang to Pariaman city for 84.5 km and stage 2b from Pariaman to Maninjau as far as 90.2 km, it was seen that people live in Pariaman city had changed a lot [12]. Physical changes can be seen that the post-earthquake earthquake potential development on 30 September 2009 in Pariaman city is progressing. The development can be seen in the improvement of public service centres, health centres, educational facilities that were damaged by the earthquake potential tsunami. In addition, development is also seen in the service of clean water sources and the construction of roads in isolated areas.

Likewise with the economic life of the people not only depend on their lives on service activities, trade, fishing and agriculture, but after the earthquake disaster has the potential of an earthquake they have been able to make changes in livelihood patterns of living outside the agricultural sector. Other work carried out by the community is as a construction worker, chicken farmer, stall, trader, fisherman, transportation services, household crafts and a workshop. With the diversity of community, work is likely to affect the income, consumption patterns and lifestyle of the community [13-15]. Thus the community can accept the vulnerable conditions by being able to survive and get out of the state of adversity. This is driven by the concern of other local communities and the government in providing aid funds so that the community can meet their daily needs and provide motivation to think ahead. A large number of volunteers and outside communities coming to participate in this area has a very positive impact on the people of Pariaman city. In social life, the impact that occurs after a potential tsunami disaster is the increasingly loose relations with fellow community members. Communities with the disaster only focus on nuclear family relationships and ignore relationships with extended families. In everyday life, the community is more individualistic because they are more busy working to meet the needs of their respective families [5].

2. METHODS

The method in this research is Mixed Method [16-17], a method that tends to be based on the pragmatic knowledge paradigm, using research strategies that involve data collection, both simultaneously and sequentially. Research on the physical condition of the environment and the socio-economic characteristics of the community was carried out descriptively, while research on policy direction was carried out qualitatively and quantitatively. The analysis technique used in the research of policy directives is the expert system technique based on Focus Group Discussion (FGD) [18-20] so that the emerging policy directives are qualitative.

3. RESULTS AND DISCUSSION

Physical environmental conditions

The coastal area of Pariaman city is a low-lying expanse located on the West coast of West Sumatra Province with an altitude between 0 to 2 m above sea level with a land area of 6,786 Ha and an ocean area of 282.69 km² and 6 islands small islands: Bando Island, Gosong Island, Ujung Island, Tangah Island, Angso Island and Kasiak Island. The length of the beach is approximately 12.7 km [11, 21].

Like most other areas on the west coast of the island of Sumatra, the coastal area of Pariaman city has sand and clay-sand types. The topography of the region, geomorphology and the shape of the region together form a river flow pattern. The City of Pariaman is divided into 4 rivers, i.e: 1) Batang (watersheld) Manggung through North Pariaman Sub-district, 2) Batang (watersheld) Piaman, 3) Batang Jirak that passes through Central Pariaman Sub-district, and 4) Batang (watersheld) Mangau through South Pariaman sub-district.

Land conditions in the coastal area of Pariaman city generally have relatively stable conditions. With such conditions, agricultural activities have the potential to be further developed in the coastal area of Pariaman city. The types of soil found in the coastal area of Pariaman city consist of Glai Humus, Andosol and Regosol soils, which are spread in all three sub-sub-districts of Pariaman city [22].

Pariaman city is a wet tropical climate that is strongly influenced by the west wind and has a very short dry moon. Annual rainfall reaches around 4,023 mm (in 2015) with 198 days of rainy days. The average temperature is 25.34° C, with an average humidity of 85.25 and an average wind speed of 1.80 km/hour. The dry and rainy seasons always change with time. Such a climate allows for the growth of various types of plants, but rainfall and high levels of humidity that cause various problems, for example plants that need a dry season climate can not grow properly, is an obstacle for post-harvest handling of certain commodities that require hot weather and bright during the drying process, constraints in commodity storage, reduced number of productive working days and negative effect on a number of commodities. Climate also greatly influences the amount of fish catch for fishermen.

Hydro-Oceanographic parameters include bathymetry, ocean currents, tides, waves, sea temperatures and waters brightness, with the following conditions: (1) Bathymetry, the Pariaman coastal area has a relatively straight coastline, as well as beaches directly facing the Indian Ocean. The average depth in the coastal area of Pariaman city ranges from 3-200 m. While the islands around Pariaman coastal areas such as Kasiak Island, Tangah Island, Ujung Island, Angso Island and Gosong have sea depths around these islands ranging from 5 - 30 m, (2) Sea Currents, in general, the pattern of water circulation in the Pariaman Coast moves from North-West-Sea to the Southeast, parallel to the coast orientation. This pattern can be said to be fixed throughout the year, except varies from month to month. Currents that occur in Pariaman waters are caused by tidal and rising tides.

In addition to the tidal and tidal factors, the current pattern around Pariaman waters is also caused by the flow of several rivers that lead to the beach, (3) Tides, the tidal patterns that occur are diurnal type, ie one day there are two tides and ups and downs. Based on observations of tidal fluctuations on the coast of Pariaman Beach around 1-2 m, (4) Waves, winds and waves in Pariaman city waters are strongly influenced by winds from the Indian Ocean with wave heights of no more than 1 m, and (5) Sea temperatures, water temperatures is an important factor in the aquatic environment. Changes in water temperature will affect the biological and ecological processes that occur in the water and ultimately will affect the biological community therein.

Socio-economic characteristics

The population of Pariaman city during the period of 6 years, namely in 2012-2017 fluctuated, where in 2012 the population was 65,172 people and in 2013 the population increased to 65,433 people. More details on the population of the City of Pariaman from 2012-2017 can be seen in Table 1 below.

Table 1. The number of populations in Pariaman city in 2012-2017

Year	Total Population (Soul)	Population Growth Rate (r)
2012	**65,172**	**0.02**
2013	**65,433**	**0.03**
2014	**62,607**	**0.02**
2015	**62,107**	**0.03**
2016	**63,898**	**0.02**
2017	**64,509**	**0.02**

Source: BPS of Pariaman city in 2012-2017.

If you pay attention to the population of the City of Pariaman from 2012 to 2017 experienced a significant increase in population, the population growth of the City of Pariaman is growing rapidly. During the period of 2012-2017, the population growth in Pariaman city averaged 0.02%. The population density in Pariaman city in 2007 was 631 inhabitants/km², whereas in 2008 the population density of Pariaman city increased to 980 inhabitants/km². If seen from the classification of population density categories according to existing standards, Pariaman city is included in the very low-density category (<5000 people/km²).

The majority of the population in the coastal area of Pariaman city (62%) has the main livelihood in the fisheries sector (fishermen), then is followed by the small/medium industry sector (19%), households (11%) and agriculture (8%). With the reality of the condition/potential of natural resources and human resources like this it is not surprising that the economic structure in the coastal area of Pariaman city is controlled by the fisheries, industry and trade sectors. As an illustration in 2007, the fisheries sector contributed 28% to the city economy. Although the role of the primary sector tends to continue to decline in line with the increasing role of the secondary and tertiary sectors of the economy. The economic potential contained in Pariaman city includes agriculture, transportation, industry, trade, and tourism. The resulting production has prospects for meeting the needs of the domestic market.

Policy direction for natural disaster mitigation based on physical environmental conditions and socio-economic characteristics of communities in coastal areas in Pariaman city

Natural disasters are natural events that cannot be eliminated or postponed. However, humans can reduce the risk posed by natural disasters. Disaster risk efforts include activities undertaken to reduce losses caused by natural disasters, both life and material losses. The activities that need to be carried

out are not only limited to building infrastructure or other physical activities but also involve setting policies and controlling disaster risk reduction efforts.

In general, efforts that need to be made in disaster risk reduction are the arrangement and utilization of disaster-based space, make arrangements for disaster risk reduction (regulation), establish adequate tools to deal with disaster relief efforts, and prioritize funding for activities related to disaster risk reduction efforts. Related to the conditions and issues of hatred in Pariaman city, the local government policies that are needed are:

1. Arranging regional disaster regulations (Regional Regulations) which include regulations on:
   b. Organizing regional apparatus organizations that handle disasters.
   c. Funding arrangements for activities related to disaster risk reduction efforts.
   d. The regulation and stipulation of legal basis regarding the technical aspects of disaster risk reduction efforts, including standards for the establishment of disaster-resistant buildings, disaster evacuation routes, ecosystem and environmental management standards, etc.
   e. Planning for risk reduction and natural disaster management.
2. Form regional devices that handle disaster problems
3. Establishment of a Disaster Working Group consisting of related Departments
4. Strengthening cooperation in handling disasters with other regions in the vicinity
5. Strengthening communication access between islands, either by radio or telephone
6. Strengthening information access to disaster information centres and research institutions especially in remote island areas
7. Building a disaster information system.
8. Facilitating researches conducted by research institutions on the disaster in the Pariaman City area.
9. Strengthen government, community and private networks in disaster risk reduction
10. Strengthening community preparedness by disseminating information and training on disasters
11. Conduct logistical planning and supply of funds, equipment and materials needed for emergency response
12. Plan and prepare a Standard Operation Procedure (SOP) for emergency response activities.

4. CONCLUSIONS

The population of Pariaman city from 2012 to 2017 experienced a significant increase in population, the population growth of Kota Pariaman is growing rapidly with the majority of the population in the coastal area of Pariaman city having the main livelihood in the fisheries sector (fishermen) (62%), then followed by the sector small/medium industries (19%), households (11%) and agriculture (8%). In general, efforts that need to be made in disaster risk reduction are the arrangement and utilization of disaster-based space, make arrangements for disaster risk reduction (regulation), establish adequate tools to deal with disaster relief efforts, and prioritize funding for activities related to disaster risk reduction efforts.

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