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Pre-Disaster Management of Tropical Cyclone Seroja to Realize Disaster Resilient Area in Rote Ndao Regency, East Nusa Tenggara Province

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Abstract

The author focuses on the problem of tropical cyclone Seroja which is known to have hit Rote Ndao Regency for the first time and how to deal with it if the disaster occurs again, so good management is needed. The purpose of this research is to find out how BPBD manages activities in dealing with the Seroja tropical cyclone disaster if it occurs again. This research uses qualitative methods with data collection techniques used through observation, interviews and documentation. In accordance with the type of research above, the authors used an interactive model from Miles, Huberman and Saldana (2019) to analyze the research data with 3 steps, namely data reduction, data presentation and conclusion drawing/verification.The findings obtained by the author in this study are that the management by BPBD in the Seroja tropical cyclone disaster is quite good, however, it still has constraints on funding and manpower which are still lacking. Disaster management in dealing with the Seroja tropical cyclone in Rote Ndao Regency is classified as good, this is because there is good coordination between BPBD and related regional apparatus in overcoming disasters in pre-disaster activities. in order to improve disaster resilient areas, it is advisable to optimize the use of local communities to be ready and alert in the face of disasters.

Keywords: Disaster Resilient Area, Management, Seroja Tropical Cyclone

INTRODUCTION

Based on Article 1 of Law No. 24/2007, a disaster is an event or series of events that threaten and destroy people's lives and livelihoods caused by natural factors and/or unnatural factors and man-made factors, resulting in casualties, environmental damage, property damage, and psychological effects. Disasters consist of natural disasters, non-natural disasters, and social disasters.

Natural disaster is an event or series of natural events, namely earthquakes, tsunamis, volcanic eruptions, floods, droughts, hurricanes, and landslides. Non-natural disasters are unnatural events or series of events, including technological failures, modernization failures, epidemics, and disease outbreaks. Social disasters are disasters caused by an event or series of human events, including social conflict and terror between groups or communities.

There are two impacts arising from disasters, namely positive impacts and negative impacts and certainly more negative impacts than positive impacts. The negative impacts of natural disasters that occur are losses and damage, including losses and damage in the economic, social and environmental fields. These negative impacts are certainly very disturbing to the peace of life and the life patterns of people who are in the disaster area.

Rote Ndao Regency is one of the regencies in East Nusa Tenggara Province. Rote Ndao Regency generally has a tropical and dry climate which also tends to be influenced by wind and is categorized as a semi-arid area due to relatively low rainfall and vegetation dominated by savanna and steppe. In 2021, East Nusa Tenggara Province was shocked by the Seroja Tropical Cyclone, which is known to be the first time this tropical cyclone has visited East Nusa Tenggara Province and Rote Ndao Regency also experienced the impact of the cyclone.

Seroja tropical cyclone is a tropical cyclone that began to form its seeds in the southern part, precisely in the Sawu Sea of East Nusa Tenggara, Indonesia on April 03, 2021 and the occurrence of Seroja tropical cyclone in the East Nusa Tenggara region on April 04 and 05, 2021. This cyclone has a huge impact on extreme weather, the affected areas include NTT Province, NTB Province, Bali, East Java, and Central Java and the most severely affected area is East Nusa Tenggara where this tropical cyclone seroja brings congenital disasters in the form of strong winds, floods to landslides.

The congenital disasters that occurred resulted in damage to people's homes, economic damage, damage to facilities and infrastructure, loss of property and livestock and also loss of life and made tens of thousands of people have to evacuate. The total number of victims and damage in the East Nusa Tenggara Province reached 181 deaths, 27 missing victims and 126,459 damaged houses and public facilities,

In 2021, due to the teroja tropical cyclone disaster in Rote Ndao Regency based on rotendaokab.go.id data, the total number of victims and damage due to the disaster was recorded as 14 people injured while for residents who were displaced in East Rote District amounted to 697 people, Lobalain District amounted to 520 people, Northwest Rote District amounted to 247 people, Southwest Rote District amounted to 99 people, West Rote District amounted to 10 people so that the total number of refugees was 1,573 people. For houses that suffered heavy damage amounted to 1,112 units, medium damage amounted to 1,335 units, light damage amounted to 3,246 units, while for social facilities and public facilities that suffered heavy damage amounted to 31 units, medium damage amounted to 63 units, light damage amounted to 11 units.

Sealin, for the impact of the productive economic sector that suffered damage, namely in the agricultural sector with rice fields totaling 1,327.79 ha, 137.36 ha of gardens, in the fisheries sector, namely fishing boats that were severely damaged totaling 49 units, moderately damaged 88 units, fishing gear that was severely damaged as many as 16 units while the damaged seaweed was 5,792.51 meters. As for the estimated losses, they are still being calculated by the technical team, but it is estimated that the losses due to natural disasters of extreme weather, extreme waves, floods and landslides in Rote Ndao Regency will reach billions of rupiah.

Dewi Kurniawati (2020), Disaster Mitigation Communication as Community Vigilance in the Face of Disasters. This research uses quantitative descriptive method. The results showed that this research was conducted to anticipate and increase community vigilance in facing disasters.Then Novan, et al (2020), Flood Disaster Mitigation Strategy of Stretching River in Gedangan and Sumbermanjing Wetan Subdistricts, Malang Regency. The research method used is descriptive quantitative, data collection is done by interview using a questionnaire to experts. The results showed the Flood Disaster Mitigation Strategy of Stretching River in Gedangan and Sumbermanjing Wetan Subdistricts, Malang Regency.

Dio Mahardika, et al (2018), Disaster Management by the Badan Penanggulangan Bencana Daerah (BPBD) in Overcoming Floods in Semarang City. This research uses a qualitative research type descriptive approach.The data obtained comes from primary data from interviews and secondary data.The results showed that the formation of disaster-prepared villages and disaster resilient villages in order to reduce the risk of the impact of flood disasters that occur, the Badan Penanggulangan Bencana Daerah (BPBD) of Semarang City formed *Kelurahan Siaga Bencana (KSB) and Kelurahan Tangguh Bencana*. There are several issues related to the management of tropical cyclone Seroja.The labor factor is one of them. The lack of manpower in dealing with disasters has an impact on the process of dealing with disasters so that additional members are needed in order to facilitate the disaster management process.This is in line with the data of 25 members of BPBD Rote Ndao Regency with 19 permanent employees and 6 non-permanent employees. From this data, it is difficult for BPBD Rote Ndao

Regency to manage disasters in a short time.This research aims to find out how BPBD manages activities in dealing with the Seroja tropical cyclone disaster if it occurs again.

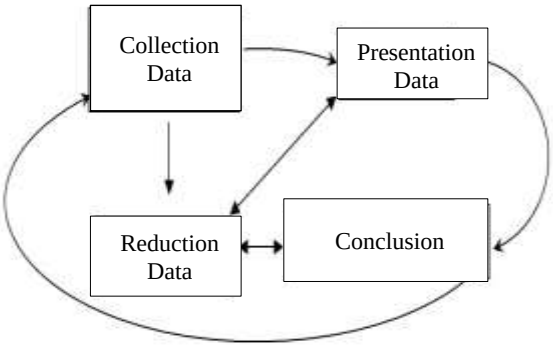
RESEARCH METHODS

Sugiyono (2018: 147) research method is a scientific method used to obtain data with specific purposes or uses. The purpose of using descriptive qualitative methods is to get maximum results and provide an overview or describe systematically. This research emphasizes on providing an objective picture related to the actual conditions regarding pre-disaster management of tropical cyclone Seroja in order to realize disaster resilient areas in Rote Ndao Regency, East Nusa Tenggara Province.

This research used two data sources, namely primary data and secondary data. Key informants as primary data sources are the Chief Executive of BPBD, Head of Prevention and Preparedness. Meanwhile, secondary data in this research comes from documents, archives and reports related to the performance of BPBD Rote Ndao Regency.

The data collection techniques used in the research were observation, interviews and documentation. In accordance with the type of research above, the authors used the interactive model from Miles, Huberman and Saldana (2019) to analyze the research data with 3 steps, namely data reduction, data presentation and conclusion drawing/verification. The interactive model of data analysis is shown in the following figure.

Figure 1
Interactive Model of Data Analysis



RESULT AND DISCUSSION

This research discusses the issue of pre-disaster management, especially the Seroja tropical cyclone disaster which is known to have occurred for the first time in the Rote Ndao Regency area of East Nusa Tenggara Province. The results of this research are presented based on pre-disaster management theory and research results found directly by the author in the field.

The results of the research researched by the author at the Regional Disaster Management Agency of Rote Ndao Regency are based on problem formulations, namely, how pre-disaster management is being carried out, how efforts to build disaster resilient areas, what are the obstacles to the implementation of pre-disaster management and obstacles to the formation of disaster resilient areas.

Storm Management of Tropical Cyclone Seroja in Rote Ndao Regency

1. Preparedness

Preparedness according to the Law of the Republic of Indonesia No. 24 of 2007 is a series of activities carried out to anticipate disasters through organization and through appropriate and effective steps. Preparedness is an attitude and action taken to prepare for unexpected or emergency situations or events. Preparedness does not only apply in the event of a natural disaster or major event, but also in everyday life.

Effective cooperation between local governments, non-governmental organizations and the international community is an important element in disaster management. Yulianto et al. (2021) showed that good coordination between various parties can accelerate the response and distribution of aid during and after a disaster. In Rote Ndao, this collaboration can be strengthened through communication forums and cross-sectoral cooperation. From the interview with Mr. Ronald Maka Ndolu, S.Pt as the Head of Prevention and Preparedness Division of BPBD Rote Ndao Regency, it is known that preparedness actions carried out by BPBD Rote Ndao Regency together with Non-Governmental Organizations (NGOs) or other partners, namely Basarnas, conduct training and socialization to the community about steps to deal with disasters that can befall the community at any time by gathering the community in the village hall or church or a place that can be used as a community gathering place.

2. Early Warning

Early warning is a system used to provide early information about the possibility of a disaster or event that could endanger human safety. The purpose of early warning is to provide sufficient time for the community and related parties to make preparations and take necessary actions to reduce the impact of the disaster or event. An effective early warning system can provide sufficient time for people to evacuate and secure themselves. BMKG plays an important role in providing weather information and early warning for tropical cyclones. Harjadi et al. (2020) emphasized the importance of weather prediction technology that can help communities and local governments respond to disaster threats quickly and accurately.

From the interview with Mr. Ronald Maka Ndolu, S.Pt as Head of Prevention and Preparedness of BPBD, it is known that in the early warning stage, BPBD Rote Ndao conveys information forwarded by BMKG if a disaster will occur in an area in Rote Ndao Regency. The action that will be taken by BPBD Rote Ndao Regency to convey early warning information is by issuing an official letter to the head of the region whose area will be approached by a disaster and also through radio media and via whatsapp.

3. Mitigation

Mitigation is an effort to reduce the impact of disasters both structurally and non-structurally based on references to legislation and research that has been carried out, mitigation efforts are carried out for all types of disasters both natural and non-natural disasters. Sularso H.S, et al, (2021). Meanwhile, mitigation according to Coppola (2007) in Wigyono (2018) defines that mitigation is an effort that is carried out in a sustainable manner to reduce the risk of hazards through reducing the possibility or consequence of disaster risk.3 Mitigation according to Law No.24/2007 concerning disaster management is a series of efforts made to reduce the risk of disasters, both natural disasters, man-made disasters.4 There are two types of mitigation studied by the author, namely:

a. Structural Mitigation

Structural mitigation is defined as an effort made to minimize disasters through the construction of various physical infrastructure and by using a technological approach, structural mitigation is an effort to reduce vulnerability to disasters by means of technical engineering in disaster-resistant buildings. Some of the efforts that can be made in structural mitigation by strengthening buildings and infrastructure that will potentially be affected by disasters. is a

mitigation action that focuses on improving or developing physical infrastructure that can reduce disaster damage. Disaster-resistant infrastructure plays an important role in reducing the physical impact of disasters. The construction of public buildings, houses, and public facilities designed to withstand the weight of tropical cyclones can reduce damage and loss of life. The study by Kusuma et al. (2021) shows that investment in disaster-resistant infrastructure can provide long-term benefits by reducing post-disaster recovery costs.

Particularly in the Seroja tropical cyclone disaster, from the interview with Mr. Ronald Maka Ndolu, S.Pt as Head of Prevention and Preparedness Division of BPBD Rote Ndao Regency, it can be seen that BPBD Rote Ndao Regency has implemented structural mitigation in collaboration with the Public Works and Public Housing Office of Rote Ndao Regency in the construction of embankments at several points on the riverbanks in the Rote Ndao Regency area. The selected embankment construction points have the potential for overflow in the event of flooding due to the Seroja tropical cyclone. In addition, structural mitigation activities have been carried out by building evacuation signs that function to help the community to evacuate to a safer place from disaster risk.

b. Nonstructural Mitigation

Nonstructural mitigation is an effort to reduce the possibility of risk in the form of adjusting and regulating it according to human activities or commonly referred to as human efforts to adapt to nature. Efforts made in nonstructural mitigation activities such as establishing regulations that contain disaster mitigation efforts such as licensing and zoning regulations in land use, limiting facility services in disaster-prone areas, controlling population density, building public awareness and increasing knowledge about disaster risk.

Especially in the tropical cyclone Seroja disaster. From the results of the interview with Mr. Ronald Maka Ndolu, S.Pt as Head of the Prevention and Preparedness Division of BPBD Rote Ndao Regency, it is known that in addition to structural mitigation BPBD Rote Ndao Regency together with Non-Governmental Organizations (NGOs) and other partners also carry out non-structural mitigation actions where the activities carried out are holding disaster mitigation socialization and emergency response training by forming disaster preparedness teams in order to provide insight and knowledge to the community in dealing with disasters caused by tropical cyclone Seroja.

Realizing Disaster Resilient Areas in Rote Ndao Regency

The establishment of disaster resilient areas in Rote Ndao Regency begins with the formation of disaster resilient villages and sub-districts. Disaster resilient areas are formed to increase the capacity of the region to deal with disasters that often occur in the region, as well as in Rote Ndao Regency. An area can be considered a disaster resilient area if all villages and sub-districts become disaster resilient villages and sub-districts.

From the results of an interview with Mr. Ronald Maka Ndolu, S.Pt as Head of the Prevention and Preparedness Division of BPBD Rote Ndao Regency, where in 2019-2023 BPBD Rote Ndao Regency together with Non-Governmental Organizations (NGOs) and other participating partners have formed at least 23 disaster resilient villages or villages in Rote Ndao Regency. The establishment of disaster resilient villages or sub-villages is not just a label, but always ready to face and able to immediately rise and recover from the impact of disasters independently.

The following table shows the villages or sub-districts that have been formed by the BPBD of Rote Ndao Regency together with Non-Governmental Organizations (NGOs) and other partners who are involved are as follows:

Table 1. Establishment of Destana in Rote Ndao Regency

NO *(1)*	District *(2)*	Village/Subdistrict *(3)*	Cooperation *(4)*	Description *(5)*
1	Southwest Rote	Batutua	BNPB	Year 2019
2	Southwest Rote	Lakukoen	BNPB	Year 2019
3	Northwest Rote	Daudolu	BPBD/CIS	Year 2021
4	Northwest Rote	Oetutulu	CIS & CARE	Year 2020
5	Northwest Rote	Busulanga	BPBD	Year 2021
6	Lobalain	Baadale	BPBD	Year 2021
7	Lobalain	Kuli	BNPB	Year 2020
8	Lobalain	Metina	BPBD / CIS	Year 2021
9	Lobalain	Mokdale	BPBD	Year 2021
10	South Rote	Lidabesi	BPBD	Year 2022
11	South Rote	Onotali	BPBD	Year 2023
12	East Rote	Serubeba	BPBD	Year 2022
13	East Rote	Faifua	CIS	Year 2021
14	New Beach	Olafulihaa	BNPB	Year 2023
15	New Beach	Lenupetu	BNPB	Year 2023
16	Ndao Nuse	Anarae	CARE	Year 2022
17	Ndao Nuse	Nuse	CARE	Year 2022
18	Landu Leko	Sotimori	BPBD	Year 2021
19	Landu Leko	Daiama	BPBD	Year 2021
20	Loaholu	Boni	ASB	Year 2019
21	Loaholu	Tolama	ASB	Year 2021
22	West Rote	Bo'a	BPBD & CIS	Year 2021
23	Amarasi	Oenitas	ASB	Year 2019
	Total	**23 Village/Subdistrict**		

Source: BPBD of Rote Ndao Regency processed in 2024

Creating a disaster resilient area in Rote Ndao Regency requires a holistic approach that involves strengthening community capacity, building disaster-resistant infrastructure, strengthening early warning systems, coordinating between institutions, and utilizing information technology. By adopting these strategies, Rote Ndao Regency can be better prepared to face and recover from the impacts of natural disasters such as Tropical Cyclone Seroja, creating a more resilient and resilient community.

1. Legislation

Legislation is the process of making, passing, and implementing laws or regulations that apply in a country or region. The legislative process involves the drafting of laws or regulations, discussion, and ratification by the legislative body or the authorized government, in this case the National Disaster Management Agency. From the statement of Mr. Diksel S. Haning, SE as the Chief Executive of BPBD Rote Ndao Regency, it is known that the preparation of disaster risk assessment documents in Rote Ndao Regency is carried out based on the methodology contained

in the Regulation of the Head of the National Disaster Management Agency Number. 2 of 2012 concerning General Guidelines for Disaster Risk Assessment.

Furthermore, according to the statement of Mr. Ronald Maka Ndolu, S.Pt as Head of Prevention and Preparedness Division of BPBD Rote Ndao Regency, where the methodology contained in the Head of National Disaster Management Agency Regulation Number 2 of 2012 concerning General Guidelines for Disaster Risk Assessment was determined to produce a study of hazards, vulnerability, capacity and risk for each hazard in Rote Ndao Regency. Based on the methodology, 9 (nine) types of potential disasters in Rote Ndao Regency were produced, namely earthquake, tsunami, landslide, flood, flash flood, drought, extreme wave and abrasion, extreme weather, forest and land fire.

2. Planning

Planning is a process to plan and organize available resources in order to achieve the desired goals. In the context of disaster planning is one of the indicators that is very important because in disaster risk reduction there needs to be a disaster risk assessment such as spatial planning carried out to regulate land use in a planned manner so as to create a balance between land use and sustainability of life and safe from disasters in order to realize disaster resilient areas.

Mr. Ronald Maka Ndolu, S.Pt as Head of Prevention and Preparedness Division of BPBD Rote Ndao Regency said "BPBD Rote Ndao has made a disaster risk assessment which in the disaster risk assessment has contained spatial planning based on mapping of disaster risk areas, the planning is a reference in development and spatial planning in the community area in order to reduce the impact caused by disasters in order to realize disaster resilient areas."

3. Institutionalization

Institutions are an organizational system consisting of various elements, such as structures, procedures, and norms that are governed by a rule or regulation. Institutions have a very important role in ensuring that an activity or program can run well and be well coordinated. Institutions in disasters are organizational systems that have an important role in reducing disaster risk and improving coordination in disaster management. Disaster institutions include various elements, such as the government, non-governmental organizations, health agencies, and various other related parties.

Mr. Ronald Maka Ndolu, S.Pt as Head of Prevention and Preparedness Division of BPBD Rote Ndao Regency said, "In addition to the Regional Disaster Management Agency, there are institutions that help disaster management, namely FPRB (Disaster Risk Reduction Forum). The task of the forum is to provide socialization about disasters, provide disaster assistance, and also participate in emergency response activities with the Disaster Management Agency and other partners."

4. Funding

Funding is a process or activity related to the collection or allocation of funds or financial resources to finance a project, activity, or business. Funding in disaster activities is very important to ensure the readiness and smoothness of natural disaster management. Funding can come from various sources, both from the government, the private sector, and the general public.

Mr. Ronald Maka Ndolu, S.Pt as Head of the Prevention and Preparedness Division of BPBD Rote Ndao Regency said "funding in disaster activities comes from DPA or budget implementation documents to the field of one pre-disaster and Destana funds in its formation. The mechanism for using the disaster budget is regulated according to what is needed and every disaster activity carried out always makes minutes so that it is clear and directed in the use of the disaster budget."

5. Capacity Building

Disaster-resilient communities are key to reducing disaster risk. According to Rahmawati et al. (2020), continuous education and training for communities can increase their awareness and

preparedness in facing disasters. The Destana program initiated by the central government aims to build local capacity by providing training on disaster mitigation and evacuation simulations. In the context of Rote Ndao, this program is particularly relevant given the community's high level of vulnerability to tropical cyclones.

Capacity building is a process to improve the ability of individuals, groups or organizations to achieve desired goals. This process includes various activities, such as training, education, learning, consultation and technical support. In disaster management, capacity development is one of the most important activities in which the Regional Disaster Management Agency of Rote Ndao Regency together with non-governmental organizations carry out disaster socialization and training to the community on how to deal with disasters. The training is useful for increasing the capacity of the community in dealing with disasters in order to reduce or reduce casualties from the impact of disaster risks caused.

Mr. Ayub Anzgar Manafe, S. STP as Head of the Prevention and Preparedness Division of BPBD Rote Ndao Regency said "the training and socialization provided to the community is to provide knowledge about the description of areas or regions prone to disasters in accordance with the results of mapping disaster-prone areas that have been made and contained in disaster risk assessment documents, how to deal with disasters, how to save themselves and save disaster-prone victims such as small children, pregnant women, and the elderly, and through this capacity building a Disaster Preparedness Team has been formed in each Disaster Resilient Village to be able to work independently in the event of a disaster before the rescue team comes to help."

6. Implementation of Disaster Management

The implementation of disaster management is a series of activities carried out by the government, community and related parties in order to prepare for, cope with and restore the situation after a natural disaster in order to reduce the negative impacts arising from the disaster. The purpose of implementing disaster management is to increase preparedness in the face of natural disasters, minimize material losses and casualties, and accelerate the recovery of disaster-affected areas. Mr. Ronald Maka Ndolu, S.Pt as Head of the Prevention and Preparedness Division of BPBD Rote Ndao Regency said "the implementation of disaster management in pre-disaster management that has been carried out by the Regional Disaster Management Agency of Rote Ndao Regency is socialization, disaster training, mapping disaster risk areas, distributing logistics to disaster-affected communities, forming Disaster Resilient Villages, forming Disaster Preparedness Teams."

Supporting and Hindering Factors in Pre-Disaster Management of Tropical Cyclone Seroja in Rote Ndao Regency

External factors that are supporting factors for pre-disaster management are the weather conditions and situation of Rote Ndao Regency which can facilitate pre-disaster activities and the people of Rote Ndao Regency who are enthusiastic and participate in pre-disaster management activities. Factors that hinder the Seroja Tropical Cyclone pre-disaster management activities in Rote Ndao Regency are funding. Funding for preparedness and prevention activities comes from Budget Implementation Document funds and related non-governmental organizations.

Pre-disaster management is a critical process in reducing the negative impacts of disasters before they occur. Rote Ndao Regency, which is prone to natural disasters such as Tropical Cyclone Seroja, faces significant challenges in implementing pre-disaster management. This article will identify the enabling and constraining factors in pre-disaster management efforts in the region, based on recent literature.

1. Supporting Factors

a. Availability of Data and Information

Accurate meteorological and climatological data is essential for disaster prediction and early warning. BMKG plays a major role in providing this information. According to Harjadi et al. (2020), modern technology in meteorology allows for more accurate weather predictions, helping governments and communities better prepare for the threat of tropical cyclones.

b. Community Preparedness
Disaster training and simulation programs improve community preparedness. Surya et al. (2019) emphasized that regular education and training can increase community awareness and ability to deal with disasters, reducing the risk of loss of life and property.

c. Support from Government and Related Institutions
The existence of regulations and policies that support disaster management is very helpful in mitigating the impact of disasters. Research by Nugraha et al. (2021) shows that a strong policy framework from the local and central government contributes significantly to the effectiveness of pre-disaster management.

d. Cooperation and Collaboration
Collaboration between the government, NGOs, the international community, and the private sector is an important factor in disaster management. According to Rini et al. (2022), this cooperation increases local capacity and provides additional resources needed for disaster mitigation.

e. Infrastructure and Resources
The development of disaster-resistant infrastructure and the availability of adequate monitoring tools are key factors in disaster risk mitigation. Kusuma et al. (2021) note that investment in disaster-resistant infrastructure can significantly reduce material losses and loss of life when disasters occur.

2. Inhibiting Factors

a. Budget Limitations
Limited funds are a major obstacle in implementing disaster mitigation and preparedness programs. According to Arifin et al. (2020), low budget priority for disaster management at the local level often hinders effective program implementation.

b. Limited Human Resources
The lack of experts and professionals trained in disaster management is also a significant barrier. The study by Wulandari et al. (2019) shows that this limitation reduces the effectiveness of disaster response and mitigation.

c. Vulnerable Infrastructure
Public buildings and facilities that do not meet disaster-resistant standards increase the risk of damage. According to Rahardjo (2020), much of the infrastructure in remote areas such as Rote Ndao has not been designed to withstand the impact of major disasters such as tropical cyclones.

d. Lack of Effective Coordination
Lack of coordination between government agencies and between government and non-government organizations often leads to ineffective responses. The study by Yulianto et al. (2021) emphasizes the importance of good coordination to ensure a quick and efficient response.

e. Dependence on External Aid
Dependence on assistance from outside the region or abroad can hinder local preparedness. According to Kurniawan (2020), efforts to build local capacity to handle disasters independently are essential to reduce this dependency.

f. Climate Change and Natural Factors

a. Climate change that increases the frequency and intensity of tropical cyclones makes prediction and mitigation more challenging. The study by Setiawan et al. (2019) shows that global climate change contributes to the increased risk of natural disasters in vulnerable areas such as Rote Ndao.

CONCLUSION

Based on the results of the analysis, it is known that the pre-disaster management of tropical cyclone Seroja in realizing Disaster Resilient Areas in the Rote Ndao Regency area carried out by BPBD Rote Ndao Regency, has been running well until now despite several obstacles to the course of Preparedness and prevention activities in the realization of Disaster Resilient Areas in Rote Ndao Regency.

The author concludes three things in the pre-disaster management of Seroja tropical cyclone in order to realize disaster resilient areas in Rote Ndao Regency, East Nusa Tenggara Province, namely as follows:

1. Pre-disaster management of Seroja tropical cyclone in Rote Ndao Regency is carried out with 3 stages, namely preparedness, early warning and mitigation. Preparedness is an attitude and action taken to prepare for unexpected or emergency situations or events, early warning is a system used to provide early information about the possibility of a disaster endangering human safety, and mitigation is an effort to reduce or minimize the impact.
2. Activities carried out in the three stages are socialization and disaster training in the community to increase the capacity of the community in resilience in the face of future disasters, preaching early warnings before disasters occur to the public through mail, radio, and via whatsapp, and carrying out infrastructure development to support an area in resilience in dealing with disasters.
3. The realization of Disaster Resilient Areas in Rote Ndao Regency is by strengthening the components of Destana which consist of legislation, planning, institutions, funding, capacity building, and the implementation of disaster management. BBPBD Rote Ndao Regency runs the Destana program based on these components in order to realize Rote Ndao Regency as a Disaster Resilient Area.

Pre-disaster management in Rote Ndao District faces various challenges and opportunities. By identifying and addressing inhibiting factors and strengthening supporting factors, the effectiveness of disaster management can be improved, so that the impact of Tropical Cyclone Seroja and other disasters can be minimized. Further research and continued investment in infrastructure, education and inter-agency coordination are essential to creating more disaster-resilient communities.

This research has major limitations, namely research time and costs. With a short period of time, the author took only a few informants to interview. The author realizes that the research findings are still preliminary, therefore the author suggests that further research can be carried out at similar locations related to the pre-disaster management of tropical cyclone Seroja in realizing Disaster Resilient Areas in the Rote Ndao Regency area implemented by the Regional Disaster Management Agency of Rote Ndao Regency, to find more in-depth results.

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