



STRATEGY OF THE REGIONAL DISASTER MANAGEMENT AGENCY IN FLOOD DISASTER MANAGEMENT IN MANDAILING NATAL REGENCY

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Abstract

This study analyzes the strategy of the Regional Disaster Management Agency (BPBD) of Mandailing Natal Regency in managing flood disasters. The focus of this research includes four main stages: mitigation, preparedness, emergency response, and post-disaster recovery. The research method used is qualitative with a case study approach, through in-depth interviews, observations, and documentation analysis. The results of the study show that BPBD has implemented various strategies, such as river normalization, embankment construction, community education, the formation of volunteer teams, and the provision of an early warning system. However, constraints such as budget constraints, hard-to-reach geographical conditions, and low community participation hampered the effectiveness of this strategy. In the emergency response phase, BPBD coordinated with various agencies for evacuation and aid distribution, although access to some remote areas was still limited. In the recovery stage, BPBD carries out infrastructure rehabilitation and economic empowerment for affected residents, but this process is also constrained by limited funds. Overall, the BPBD strategy is considered quite comprehensive, but it needs to be strengthened in terms of collaboration between institutions, resource capacity building, and community-based approaches so that flood disaster management is more optimal. This study provides recommendations to improve the effectiveness of flood management strategies in Mandailing Natal.

Key words: Strategy, Disaster Management, Flood

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INTRODUCTION

Indonesia is an archipelagic country that is prone to various types of natural disasters, such as earthquakes, volcanic eruptions, landslides, and floods (Qodrifuddin et al., 2022). One of the areas that is often affected by flood disasters is Mandailing Natal Regency, North Sumatra. This district has geographical characteristics that make it easy to experience flood disasters, especially when the rainy season arrives. High-intensity rain can cause rivers to overflow and inundate residential areas, agriculture, and other infrastructure. This condition not only threatens the safety of the community, but also affects the sustainability of economic and social life in the area.

The Regional Disaster Management Agency (BPBD) of Mandailing Natal Regency has an important role in handling and managing flood disaster risks in the region. BPBD is tasked with planning, coordinating, and implementing various strategies aimed at minimizing the impact of disasters, including floods (Fitriani et al., 2021). This role is increasingly important considering that the frequency of floods in Mandailing Natal Regency tends to increase in recent years due to climate change and environmental degradation.

Flood disaster management requires a holistic and sustainable approach (Haris et al., 2023). This includes aspects of mitigation, preparedness, emergency response, and post-disaster recovery. Mitigation is carried out to reduce risks before disasters occur, such as by normalizing rivers, building embankments, and relocating people in vulnerable areas (Lestari et al., 2024). Meanwhile, preparedness includes education to the public so that they are able to respond quickly and appropriately when a disaster occurs.

In the context of Mandailing Natal Regency, one of the main challenges of BPBD is the low level of public awareness of the importance of disaster preparedness. Many residents still view floods as natural events that cannot be prevented, so they do not take preventive measures. In fact, with the right approach, the risk of flood impacts can be reduced. BPBD must play an active role in providing education and accurate information about the importance of mitigation and preparedness.

In addition to the public awareness factor, the geographical condition of

Mandailing Natal Regency which is in the form of lowlands and borders large rivers is also a challenge in itself. Some areas were isolated when the flood occurred, making it difficult for the response team to reach. Inadequate infrastructure conditions, such as road and bridge access, also hampered BPBD's efforts to respond to disasters quickly.

BPBD Mandailing Natal Regency realizes the importance of collaboration with various parties, such as the local government, the TNI, the National Police, non-governmental organizations, and the community. This collaboration aims to strengthen the disaster management system through a clear division of tasks and optimal use of resources. Each party has a strategic role that can support the success of disaster management, from providing funds, counseling, to rescuing victims when floods occur.

Flood disaster management efforts are also inseparable from the limited budget and resources owned by BPBD. Therefore, BPBD needs to develop an effective and efficient strategy in order to maximize the use of the existing budget (Ghozali, 2023). The strategy includes prioritizing the handling of flood-prone areas, the use of technology for monitoring, and training for field officers. Technology, such as early warning systems, can help reduce the impact of disasters by providing information to the public before floods hit.

On the other hand, global climate change that results in extreme weather and high rainfall is also a challenge for BPBD in predicting the time and scale of floods that occur (Rahmawati et al., n.d.). This condition forces BPBD to be more adaptive and always ready to respond to disasters. One form of adaptation is by conducting periodic flood risk assessments and updating disaster-prone maps. The map can assist BPBD in determining priority areas for emergency mitigation and response.

No less important, the role of the community in flood disaster management is also a key factor. BPBD cannot work alone without support from the community. Therefore, intensive socialization is needed to increase public understanding of the dangers of flooding and its prevention measures. Community readiness to deal with floods can reduce casualties and material losses that may occur.

Through measurable and collaborative strategies, the BPBD of Mandailing Natal

Regency is expected to be able to significantly reduce flood risk. The success of BPBD in managing flood disasters can also be an example for other regions that have similar problems. The strategy implemented by BPBD Mandailing Natal is not only reactive, but also proactive in maintaining the safety and welfare of the community.

In this study, further studies will be conducted on the strategies implemented by the Mandailing Natal Regency BPBD in managing flood disasters. This research is expected to provide a comprehensive overview of the efforts that have been and are being made by BPBD and the challenges faced. In addition, this study also aims to provide recommendations that can strengthen the flood disaster management system in the future. By understanding and evaluating the strategies that have been implemented, it is hoped that this research will be able to make a positive contribution to efforts to increase the capacity of BPBD in dealing with the threat of flooding in Mandailing Natal Regency.

METHODOLOGY

This study aims to analyze the strategies implemented by the Regional Disaster Management Agency (BPBD) of Mandailing Natal Regency in flood disaster management. To achieve this goal, the research method used is qualitative descriptive (Sugiyono, 2013). This approach was chosen to gain a deep understanding of the processes, strategies, challenges, and efforts made by BPBD in dealing with the flood disaster in Mandailing Natal Regency.

1. Type of Research

This type of research is qualitative descriptive, which is research that aims to describe and analyze a phenomenon in depth through qualitative data collection (Sugiyono, 2016). This method is in accordance with the needs of research that focuses on analyzing strategies, processes, and efforts made by BPBD in the context of flood disaster management.

2. Location and Time of Research

This research was conducted in Mandailing Natal Regency, North Sumatra, which is an area with a fairly high flood frequency. The research period lasted for six months, starting from January to June 2024. The selection of this

location is based on the high intensity of flood disasters in this region and the important role of BPBD in handling it.

3. Research Subject and Informant

The subject of this study is BPBD Mandailing Natal Regency as an institution that has authority in flood disaster management. The informants in this study consist of:

- Head of BPBD Mandailing Natal Regency,
- Officers and staff in charge of the division related to mitigation, preparedness, and emergency response,
- People who live in flood-prone areas as beneficiaries of the BPBD program,
- Representatives of local governments and related agencies who support BPBD in disaster management.

The selection of informants is carried out purposively, namely based on their relevance and role in flood disaster management.

4. Data Collection Techniques

The data collection techniques in this study include (Muhson, 2006):

- In-depth Interview: In-depth interviews are conducted with the main informants, namely BPBD officials and staff, as well as people affected by the floods. This interview aims to obtain detailed information about the strategies and challenges faced by BPBD in dealing with flood disasters.
- Field Observation: The researcher made observations in flood-prone locations and in areas that have received treatment from BPBD. This observation aims to see firsthand the field conditions and actions that have been taken by BPBD in emergency mitigation and response efforts.
- Documentation Study: The researcher collects related documents, such as BPBD activity reports, maps of flood-prone areas, disaster management plans, and other relevant data. This documentation study aims to understand BPBD's policies and procedures in handling flood disasters.

5. Data Analysis Techniques

The data obtained from this study were analyzed using a qualitative analysis method, which involved several stages (Jogiyanto Hartono, 2018):

- **Data Reduction:** Data collected from the results of interviews, observations, and documentation will be selected, simplified, and categorized according to the focus of the research.
- **Data Presentation:** The data that has been reduced is then presented in the form of narratives, tables, or diagrams that make it easier for researchers to draw conclusions. This presentation aims to provide a clear overview of BPBD's strategy in flood disaster management.
- **Drawing Conclusions and Verification:** The researcher draws conclusions based on the data that has been presented. Verification is carried out by re-checking the data and information collected to ensure its accuracy and validity.

6. Data Validity Test

To ensure the validity of the data, this study uses a triangulation technique, namely by comparing data from various sources and data collection methods. The triangulation carried out includes:

- **Source Triangulation:** Comparing information from various informants, such as BPBD staff, the community, and local governments, to ensure data consistency.
- **Triangulation Techniques:** Using more than one data collection technique (interviews, observations, and documentation) to verify the results obtained.
- **Time Triangulation:** Repeating the data collection process at different times to see the consistency of the information.

RESULT AND DISCUSSION

This study produces an overview of the strategies, challenges, and effectiveness of flood disaster management carried out by the Regional Disaster Management Agency (BPBD) of Mandailing Natal Regency. The results of this study are based on data obtained from in-depth interviews, field observations, and documentation studies, which are then analyzed by qualitative data analysis methods. The following are the results of the research which are divided into several subsections based on the focus of the study, namely mitigation strategies, preparedness, emergency response, recovery, and challenges

faced by BPBD.

1. Mitigation Strategies

Based on the results of interviews with the BPBD and field observations, it was found that the BPBD of Mandailing Natal Regency has implemented several mitigation efforts to reduce flood risk. This strategy includes:

- **River Normalization:** BPBD in collaboration with the Public Works Office conducts regular river dredging to prevent sedimentation and overflow of river water when the rainy season arrives. The observation results show that river dredging has been carried out in several flood-prone areas, although the implementation is still constrained by budget limitations.
- **Construction of Embankments and Dams:** In some vulnerable areas, BPBD has built embankments to prevent water overflow. The observation results show that the built embankment is able to hold water in light rain situations, but the existing embankment is still insufficient to deal with very high rainfall.
- **Relocation of Residents in Flood-prone Areas:** Based on the results of interviews with affected communities, several families living in the most vulnerable areas have been relocated with the help of the local government. However, many residents are reluctant to be relocated due to economic reasons and attachment to their current living environment.

Mitigation is an effort made to reduce risk before a disaster occurs. Haddow's theory of disaster risk management, (Auwal, 2024) explained that mitigation is a step that must be taken to reduce vulnerability to disasters, one of which is through infrastructure, such as embankments, dams, or river dredging. The findings of this study show that BPBD has made efforts to normalize rivers and build embankments as mitigation measures, which is in accordance with structural mitigation theory. However, as the study found (Noor, 2014), budget constraints are often an obstacle in completing mitigation projects, which also happened in Mandailing Natal. This condition causes many river dredging projects and embankment construction to only be carried out in priority areas, so their effectiveness is still limited.

Research by (Saiman et al., 2022) It also emphasizes the importance of community-based mitigation that actively involves residents in prevention efforts. In this context, BPBD has tried to relocate residents in flood-prone areas, although there are still challenges in the form of resistance from residents who are reluctant to be moved. This indicates the need for a more participatory approach so that residents feel involved and support the mitigation strategies implemented. Community involvement in flood-prone areas is also needed to reduce the impact of floods, as explained in the study (Paton & Auld, 2006) about the role of public participation in disaster mitigation.

2. Community Preparedness and BPBD

BPBD Mandailing Natal Regency has made various efforts to increase community preparedness to face floods. These efforts include:

- Education and Training for the Community: BPBD routinely holds socialization and disaster simulations to residents, especially in flood-prone areas. The results of interviews with the community showed that some residents already had basic knowledge about evacuation procedures. However, it was found that not all residents took part in this training, especially people living in remote areas.
- Establishment of Disaster Response Village Volunteer Team: BPBD has formed volunteer teams in several villages tasked with assisting with evacuation and emergency handling at the village level. The results of the observations show that this volunteer team is quite effective in responding to small-scale disasters, although it still requires additional training.
- Use of Early Warning System: BPBD has installed several early warning devices at several flood-prone points, but there are still areas that have not been reached by this system. Some residents admitted that they did not receive early warning information consistently, so BPBD needed to improve the communication system so that information reached the entire community quickly.

Preparedness is a measure taken to

increase public awareness and preparation for disasters. According to the theory of disaster management by Alexander in (Kusumawardani, 2017), community preparedness is the key to reducing casualties and property losses in flood disasters. The findings of this study show that BPBD has conducted education, training, and simulation for residents, as well as formed a volunteer team at the village level. This is in accordance with Alexander's theory which emphasizes the importance of increasing community capacity to be ready to respond to disasters.

However, as stated in the study by (Cahyadi et al., 2024), the effectiveness of preparedness programs is often hampered by low levels of citizen participation. In the context of Mandailing Natal Regency, this study also found that not all residents participated in preparedness training for various reasons, such as remote locations and lack of understanding of the importance of flood mitigation. This shows that BPBD needs to develop a more inclusive approach and pay attention to cultural and economic factors of the community so that the preparedness program can reach all levels of citizens.

3. Emergency

In the emergency response phase, the Mandailing Natal Regency BPBD implements the following steps:

- Inter-Institutional Coordination: BPBD collaborates with the TNI, Polri, and related agencies to deploy personnel and resources when floods occur. Based on interviews with BPBD, this coordination is considered effective, but there are several obstacles in the field related to accessibility and communication, especially in areas far from the city center.
- Victim Evacuation and Rescue: Based on observations and interviews with affected communities, BPBD has carried out rapid evacuation of flood victims and prioritized the elderly, children, and other vulnerable groups. However, evacuations in some isolated villages are often hampered by road access cut off by floods and landslides, which slows down the rescue process.
- Provision of Temporary Shelters: BPBD collaborates with local governments to provide shelters for residents whose

houses are affected by floods. Based on interviews with the community, the shelter is quite adequate although there are still shortcomings in terms of sanitation and clean water supply.

In the emergency response phase, the BPBD of Mandailing Natal Regency has coordinated between institutions, evacuated victims, and provided temporary shelters. Based on the emergency response theory by (Lubis, 2024), rapid response in evacuation of victims and distribution of aid is a crucial step in disaster management. This study shows that BPBD coordination with the TNI, the National Police, and related institutions is quite effective in mobilizing resources to respond to floods. However, as found in research by (Dewi et al., 2024), hard-to-reach geographical conditions often hinder the smooth evacuation and distribution of aid.

Research by (Third, 2006) highlighting the importance of an early warning system to minimize casualties, and in this case, the Mandailing Natal Regency BPBD has installed early warning devices at several flood-prone points. However, this system does not cover the entire area, and suboptimal communication results in warning information not always reaching residents quickly. This shows the need to expand the reach of the early warning system and improve the emergency communication system to be more effective and inclusive.

4. Post-Disaster Recovery

After the flood subsided, the BPBD of Mandailing Natal Regency carried out a recovery program to restore the condition of the community to its original state. Recovery efforts include:

- **Rehabilitation of Damaged Infrastructure:** BPBD coordinates with relevant agencies to repair damaged infrastructure, such as roads and bridges affected by floods. However, budget constraints have caused several rehabilitation projects to be delayed, so residents' access to essential facilities is still disrupted.
- **Social Assistance for Flood Victims:** Based on interviews with affected residents, BPBD and local governments have distributed assistance, such as food, clothing, and other basic needs.

Residents find this aid very helpful, although the distribution is sometimes late in some remote areas.

- **Post-Disaster Economic Empowerment:** BPBD holds business capital assistance and job training programs for flood-affected communities. The results of interviews with the community show that this program helps them recover economically, but there is still a need for increased support so that the community can become economically independent.

Recovery is a step taken after a disaster to restore the condition of the community to its original state. According to the theory of recovery by (Fajri et al., 2024), recovery efforts must include infrastructure rehabilitation, social assistance, and economic empowerment so that affected communities can recover comprehensively. The findings of this study show that the BPBD of Mandailing Natal Regency has rehabilitated roads and bridges and distributed social assistance for flood victims. Economic empowerment programs are also given to affected residents to restore their economy. However, the challenge in this recovery is budget constraints that have led to some rehabilitation projects being delayed. This is in line with research by (Ulum, 2014), which states that budget constraints in disaster-prone areas often hamper infrastructure recovery efforts. Therefore, BPBD needs to strengthen cooperation with local governments and donor institutions so that the recovery program can run more optimally.

5. Challenges and Obstacles

From the results of this study, several challenges and obstacles faced by BPBD Mandailing Natal Regency in flood disaster management were found:

- **Budget Limitations:** Limited budgets hinder BPBD from implementing several mitigation and rehabilitation programs optimally. Several flood management infrastructure development projects have been delayed due to lack of funding.
- **Challenging Geographical Conditions:** The geographical condition of Mandailing Natal Regency, which consists mostly of lowlands and borders on rivers, makes flooding difficult to prevent completely. Some villages

located far from the city center are also difficult to reach, so emergency handling is often hampered.

- **Low Community Participation Rate:** There are still people who do not understand the importance of mitigation and preparedness to face floods. Based on interviews, some residents consider floods as unavoidable natural events, so they are reluctant to participate in training and education programs provided by BPBD.

The results of this study identify several main challenges, namely budget constraints, hard-to-reach geographical conditions, and low community participation in mitigation and preparedness efforts. According to (Rijanta et al., 2018), socio-economic and geographical factors can affect the effectiveness of disaster management strategies. In the context of Mandailing Natal Regency, budget constraints hinder BPBD in implementing a comprehensive strategy, while geographical conditions hinder access to evacuation and aid distribution.

The constraints of low community participation are also in accordance with the findings (Paton & Auld, 2006) which explains that public participation is highly dependent on public understanding and awareness of disaster risk. Residents who do not consider flooding as a serious threat tend to participate less in the education and simulation programs held by BPBD. Therefore, BPBD needs to take a culture-based approach to increase citizen awareness and participation, as recommended in Paton's research.

CONCLUSION

This study discusses the strategy of the Regional Disaster Management Agency (BPBD) of Mandailing Natal Regency in flood disaster management. Based on the results of the research, the disaster management strategy by BPBD includes four main stages: mitigation, preparedness, emergency response, and post-disaster recovery. Each of these stages shows BPBD's commitment to reducing the impact of floods on the community, although there are still various challenges that need to be overcome. In terms of mitigation, BPBD has made efforts to normalize rivers, build embankments, and relocate residents in flood-prone areas. However, budget constraints are the main obstacle that causes the

implementation of this project to only be carried out at a few priority points. In the preparedness stage, BPBD has carried out socialization, training, and the formation of a team of village volunteers to increase community readiness in dealing with floods. Despite the preparedness programme, community participation has been uneven, especially in remote areas, demonstrating the need for a more inclusive approach.

In the emergency response phase, BPBD collaborates with various agencies to evacuate, provide shelters, and mobilize the necessary resources. Coordination between agencies is considered quite effective, although geographical conditions that are difficult to reach and limited early warning systems are challenges in the distribution of information and assistance. In the post-disaster recovery stage, BPBD has carried out infrastructure rehabilitation, social assistance distribution, and economic empowerment programs for affected residents. However, budget constraints have again become an obstacle that hinders the rehabilitation process in several regions. The main challenges faced by BPBD in this overall strategy include budget constraints, difficult geographical conditions, and low levels of community participation. The results of this study show that these obstacles affect the effectiveness of the strategies implemented. Based on previous theories and research, increasing the capacity of BPBD, strengthening collaboration between institutions, and a culture-based approach in community education are needed so that flood disaster management can run more optimally.

Overall, this study emphasizes that the strategy of the Mandailing Natal Regency BPBD is quite comprehensive, but still needs improvement in various aspects so that flood disaster management can run more effectively. It is hoped that the results of this study can be an evaluation and reference material for BPBD and local governments in improving preparedness and management of flood disasters in the future.

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