

## Capacity Analysis of Coastal Abrasion Disasters in North Galesong District, Takalar

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### Abstract

Community capacity is closely related to disaster risk reduction efforts, consisting of mitigation, preparedness and survival capabilities. This study aims to determine the level of capacity against coastal abrasion disasters in North Galesong District. The analytical method used is the coastal abrasion disaster risk capacity index which consists of regulations, institutions, early warning systems, disaster mitigation efforts and preparedness. The results showed that overall, the villages in the coastal area of North Galesong District were included in the low capacity category. The low category capacity level represents the low ability of the region and the community to take action to reduce the level of threat and level of losses due to coastal abrasion disasters.

**Keywords:** Capacity, Mitigation, Disaster, Coastal Abrasion, North Galesong



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### INTRODUCTION

Currently, many people unconsciously live and live in areas prone to disasters, besides that people's behavior does not reflect the level of knowledge about disasters. One of the areas that often experience disasters is the coastal area, disasters that often occur in this coastal area are floods, abrasion, sedimentation, and tsunamis.[1]. Abrasion is a problem for ecosystems and settlements in coastal areas. The impact of abrasion is the decline of the coastline which can threaten the buildings and ecosystems behind the coastline[2]. Mitigation efforts need to be carried out to avoid casualties, as well as the impact of potential disasters, so that steps and preparedness are obtained before a disaster occurs.[3].

One of the efforts to reduce disaster risk as stated in Law Number 24 of 2007 concerning Disaster Management is mitigation activities. Mitigation activities are carried out as an effort to reduce disaster risk, both through physical development and awareness and capacity building to face disaster threats[4]. Characteristics of disasters can be known through disaster risk assessment and assessment of an area by considering aspects of disaster threats, aspects of regional and community vulnerability and aspects of capacity in disaster management.[5].

Disasters occur when a community has a lower level of ability than the level of threat that may occur to it. A threat becomes a disaster if the community is vulnerable, or has a capacity lower than the level of the hazard, or even becomes one of the sources of the threat[6]. Disasters can be reduced if the community and the higher social systems that work on it do not have the capacity to manage the threats that occur to them[7]. Regional capacity in disaster management is an important parameter to determine success for disaster risk reduction. Regional capacity in disaster management must refer to the National Disaster Management System as stated in Law Number 24 of 2007 concerning Disaster Management and its derivative rules.[8].

Capacity is defined as a combination of all the strengths that exist in a community, social or organizational group that can reduce the impact of a risk or impact of a disaster.[9].

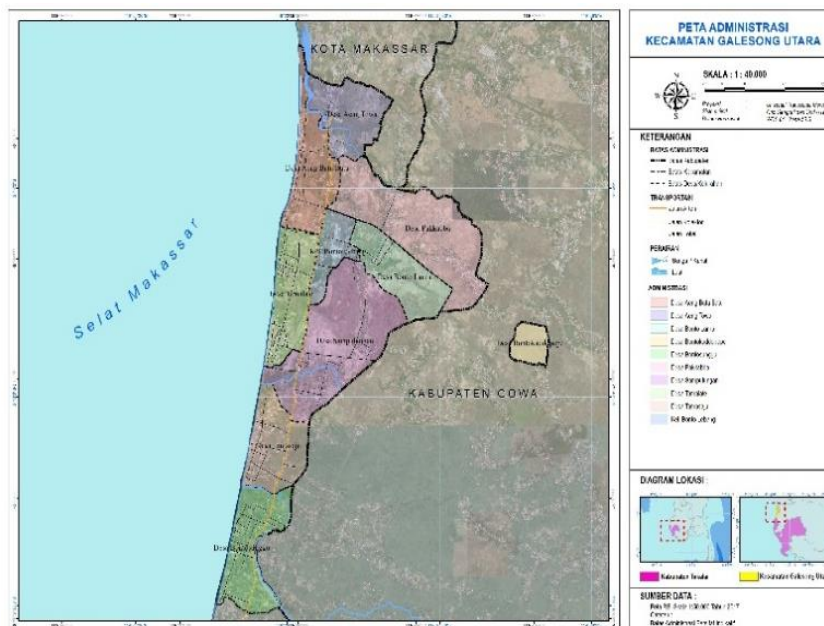
Community capacity is closely related to efforts to reduce disaster risk, which consists of mitigation, preparedness in dealing with disasters, and the ability to survive[10]. Research on the level of community capacity in dealing with disasters is very important to do, as an effort to prevent the occurrence of material losses and casualties due to disasters[11].

Every year the land along the coast along Galesong is eroded due to coastal abrasion. At the beginning of 2020, dozens of houses were damaged and cemeteries were uncovered due to abrasion and waves[12]. Seeing the high potential threat of coastal abrasion, as well as the rapid development and population growth in the coastal area of North Galesong District, efforts to overcome coastal abrasion are needed based on the characteristics of the disaster.[13]. This study aims to determine the level of capacity for coastal abrasion disasters and the direction of the community's capacity to deal with coastal abrasion disasters in North Galesong District, Takalar Regency.

**RESEARCH METHODS**

**Research Object Location**

The location of the object of this research is in the District of North Galesong, Takalar Regency which is on the equator between 5°19'30" South latitude and 119° 21'30" East Longitude. Administratively, Galesong District consists of 12 villages/kelurahan with a land area of 25.93 km<sup>2</sup> or about 4.5% of the total area of Takalar Regency. The administrative area is bordered on the north by Makassar City, on the east by Gowa Regency, on the south by Galesong District and on the west by the Makassar Strait.



**Figure 1. North Galesong District Administration Map**

**Data Types and Sources**

**Data type**

To support the analysis process, several types of data that will be used in this study include: Primary data was carried out by taking the coordinates of the research location in North Galesong District as well as observations and documentation of coastal conditions in North Galesong District. Secondary data were obtained from various agencies and literature studies, consisting of: image data, wave height data, current velocity data, mangrove vegetation presence data, shoreline shape data and beach characteristics data.

**Data source**

Sources of data that will be used in this research include: Primary data obtained is by conducting field surveys through photographs of coastal conditions and damage due to abrasion. Secondary data obtained from the literature in the form of image data and related and relevant agency data.

**Data analysis technique**

**Capacity index analysis**

The coastal area capacity index in the coastal abrasion disaster risk assessment consists of regulatory components in the form of regulations, disaster management institutions and development of disaster early warning systems, components of disaster mitigation efforts and components of preparedness in dealing with disasters. Analysis of the capacity index of coastal areas against coastal abrasion disasters using the capacity assessment table issued by the Head of BNPB Regulation No. 1 of 2012 as modified by the author. The analysis of the assessment of the coastal area's capacity index in dealing with disasters is seen in the table below:

**Table 1. Capacity Index Rating Parameters**

No.	Component	Indicator	Index Class			Weight (%)
			Low (1)	Medium (2)	Tall (3)	
1	Regulation	Disaster management rules and institutions	there isn't any yet	already a draft policy	The rules and institutions for disaster management have been ratified	25
		Preparation of disaster risk assessment documents	there isn't any yet	there is already a draft disaster risk study	the study draft has been approved	20
2	Disaster mitigation	early warning system development	there is no early warning system	there is an early warning system plan	there is a system early warning system used for disasters	10
		Structural and non-structural mitigation development	there is a development plan and mitigation	there is a structural mitigation development	there is construction of structural mitigation with DRR concept	30
3	Preparedness	Disaster education and training	no training yet	government officials and citizens began to take part in training	there are simulation practices, logistics and equipment for PB	15

Source: Head of BNPB Regulation No. 1 year 2012 modified

To calculate the level of capacity of each study site in facing the threat of coastal erosion, use the following equation (Regulation of the Head of BNPB No. 2 of 2012).

$$C_{Tot} = \sum_{i=1}^5 C_i = C_1 + C_2 + C_3 + C_4 + C_5$$

Dimana :  $C_i = S_i \times B_i$

Information:

CTot = Total capacity value

C1 = Regional regulation on disaster management

C2 = Parameter of disaster risk assessment document

C3 = Parameter of disaster early warning system

C4 = Parameters of disaster mitigation activities

C5 = Disaster education and training parameters

$B_i$  = Indicator Weight  $i$

$S_i$  = Parameter Class Value  $i$

Classification of the level of capacity of each study site in facing the threat of coastal abrasion disaster presented in the following table:

**Table 2. Classification of disaster capacity levels**

No.	Total V Value Range	Class
1	1.0 - 1.66	Low
2	1.67 - 2.34	Currently
3	2.35 - 3.0	Tall

Source: Head of BNPB Regulation No. 2 of 2012

## RESULTS OF RESEARCH AND DISCUSSION

Capacity or resilience is the resources, knowledge, skills, and strengths possessed by a person or community that enable them to defend and prepare for, prevent and mitigate, cope with adverse impacts, or quickly recover from disasters. Community capacity in dealing with disasters is an important factor in reducing disaster risk, both reducing the number of casualties and the damage and losses caused when a disaster occurs.

In this study, the authors took several parameters to calculate the level of community capacity in dealing with coastal abrasion disasters in coastal areas. Among them are the regional regulations of Takalar Regency which regulate disaster management along with supporting documents for disasters. In addition, community knowledge in dealing with disasters, environmental infrastructure built to reduce the impact of disasters and training and early warning systems used when dealing with disasters are included in the category for assessing the capacity of an area.

Capacity data collection was carried out by direct surveys to the field and interviews with several relevant stakeholders. The data on community capacity in the research location is presented in the following table:

1. Regional regulations governing disaster management already exist in Takalar Regency which are marked by the formation of a body that handles disasters, namely the Takalar Regency Regional Disaster Management Agency and is also made in the regent's decision regarding Formation of the Rapid Response Team (TRC) at the Takalar Regency Regional Disaster Management Agency in 2019.

2. The disaster risk assessment document has been prepared by the National Disaster Management Agency (BNPB), but specifically the district disaster risk assessment has not been made in local regulations.
3. In all coastal villages/kelurahan in North Galesong District, none of them have built an early warning system to deal with coastal abrasion disasters.
4. Several villages have built structural and non-structural mitigations in the form of concrete/beach walls and natural stone structures.
5. Disaster training and education have never been carried out in villages/kelurahan in the coastal area of North Galesong District.

### Capacity Index Data Collection

Capacity data obtained in the field using stakeholder interviews and visual survey methods, then scored using a capacity table. The results of the analysis of capacity parameters are presented in the following table:

#### a. Disaster Management Rules and Institutions

**Table 3. Scoring of the analysis of the capacity of disaster management institutions and regulations**

No.	Village/Ward	Disaster Management Regulations and Agencies	Index Score Score	Score	Category
1	Bontosunggu	Regent Decree No. 128 Year 2019 About Formation of a Rapid Response Team (TRC) at the Regional Disaster Management Agency of Takalar Regency	3	0.75	Tall
2	Tamasaju		3	0.75	Tall
3	Tamalate		3	0.75	Tall
4	Aeng Batu-Batu		3	0.75	Tall
5	Sampulungan		3	0.75	Tall

Source: Data Analysis Results, 2022

Based on the results of an interview survey with relevant stakeholders, the results obtained are that the rules and institutions of the disaster management agency in Takalar Regency have been formed in 2016 regarding the formation and composition of regional apparatus and in 2019 a regent's decision letter regarding Formation of a Rapid Response Team (TRC) at the Regional Disaster Management Agency of Takalar Regency which has the task of conducting a quick and precise assessment of the coverage of disaster locations, the number of victims, damage to facilities and infrastructure, disruption of the function of public and government services, determining the status of disaster emergencies and carrying out rescue operations. and evacuation of disaster victims in Takalar Regency, including North Galesong sub-district. Based on this, the entire coastal area of North Galesong District is included in the high category capacity.

#### b. Disaster risk assessment

**Table 4. Assessment capacity parameter analysis scoring disaster risk**

No.	Village/Ward	Disaster risk assessment document	Index Score Score	Score	Category
1	Bontosunggu	There isn't any yet endorsement document	1	0.20	Low
2	Tamasaju		1	0.20	Low
3	Tamalate		1	0.20	Low
4	Aeng Batu-Batu		1	0.20	Low
5	Sampulungan		1	0.20	Low

Source: Data Analysis Results, 2022



The results of the analysis of the disaster risk assessment, especially the coastal abrasion disaster, have not yet entered the stage of ratifying the study document. The Takalar Regency Regional Disaster Management Agency does not yet have a special program for assessing the risk of coastal abrasion. Based on this, the capacity of coastal areas in terms of aspects of the study and disaster risk assessment documents is included in the low category. The risk assessment document is an important aspect for planning disaster risk reduction activities.

c. Development of an early warning system

Early warning is a systematic and equipment used to anticipate the arrival of a type of disaster. Early warning can describe the signs of an impending disaster as well as the characteristics of an impending disaster. Early warning has great benefits for reducing the number of victims exposed when a disaster occurs because the community has mature readiness to save themselves and evacuate when a disaster occurs. Early warning parameter scoring is presented in the following table:

**Table 5. Wave Height Parameter Analysis**

No.	Village/Ward	early warning system	Index Score Score	Weight Value	Category
1	Bontosunggu	there isn't any yet	1	0.1	Low
2	Tamasaju	there isn't any yet	1	0.1	Low
3	Tamalate	there isn't any yet	1	0.1	Low
4	Aeng Batu-Batu	there isn't any yet	1	0.1	Low
5	Sampulungan	there isn't any yet	1	0.1	Low

Source: Data Analysis Results, 2022

From the results of the survey and analysis, the coastal abrasion disaster early warning system for the coastal area of Takalar Regency has not yet been approved by the Takalar Regency Regional Disaster Management Agency. This affects the capacity level of the coastal area of North Galesong District when viewed from the aspect of developing an early warning system which is in the low category.

d. Disaster Mitigation Activities

**Table 6. Scoring of activity capacity parameter analysis disaster mitigation**

No.	Village/Ward	early warning system	Index Score Score	Weight Value	Category
1	Bontosunggu	planning	1	0.1	Low
2	Tamasaju	yes, activity	1	0.1	Currently
3	Tamalate	yes, activity	1	0.1	Currently
4	Aeng Batu-Batu	planning	1	0.1	Low
5	Sampulungan	planning	1	0.1	Low

Source: Data Analysis Results, 2022

Disaster mitigation activities on the coast of North Galesong District have been carried out at several points in Tamalate Village and Tamasaju Village, while in other villages it has not been fully carried out, but the goal of mitigation development is not to prevent the occurrence of coastal abrasion disasters but more generally for disaster mitigation. Structural mitigation that has been carried out in the form of coastal wall construction, groyne construction and stone installation. Based on the analysis results, most of the coastal villages/kelurahan in North Galesong District have low capacity when viewed from the aspect of disaster mitigation activities.

e. Disaster education and training

**Table 7. Educational capacity parameter analysis score and disaster training**

No.	Village/Village	early warning system	Index Score	Score	Weight Value	Category
1	Bontosunggu	never	1		0.15	Low
2	Tamasaju	never	1		0.15	Low
3	Tamalate	never	1		0.15	Low
4	Aeng Batu-Batu	never	1		0.15	Low
5	Sampulungan	never	1		0.15	Low

Source: Data Analysis Results, 2022

Disaster education and training, especially for coastal abrasion, have not been fully carried out by the Takalar Regency Regional Disaster Management Agency. From the results of interviews with relevant stakeholders, disaster training has never been carried out. Based on the results of the analysis, it was found that the capacity level of the coastal area of North Galesong District which was viewed from the aspect of disaster education and training was included in the low category.

**Capacity Level Assessment**

To get the capacity value of a coastal area, the results of the analysis and scoring of the capacity index parameters are added up to get the total capacity value. The total capacity value will then be classified to determine the capacity level of each village/kelurahan. The results of the analysis of the capacity index parameters and the total value of the capacity value of each village/kelurahan in the coastal area of North Galesong District are presented in the following table:

**Table 8. Total value of coastal area capacity North Galesong District**

No.	Village/Village	C1	C2	C3	C4	C5	CTotal
1	Bontosunggu	0.75	0.20	0.1	0.1	0.15	1.3
2	Tamasaju	0.75	0.20	0.1	0.1	0.15	1.3
3	Tamalate	0.75	0.20	0.1	0.1	0.15	1.3
4	Aeng Batu-Batu	0.75	0.20	0.1	0.1	0.15	1.3
5	Sampulungan	0.75	0.20	0.1	0.1	0.15	1.3

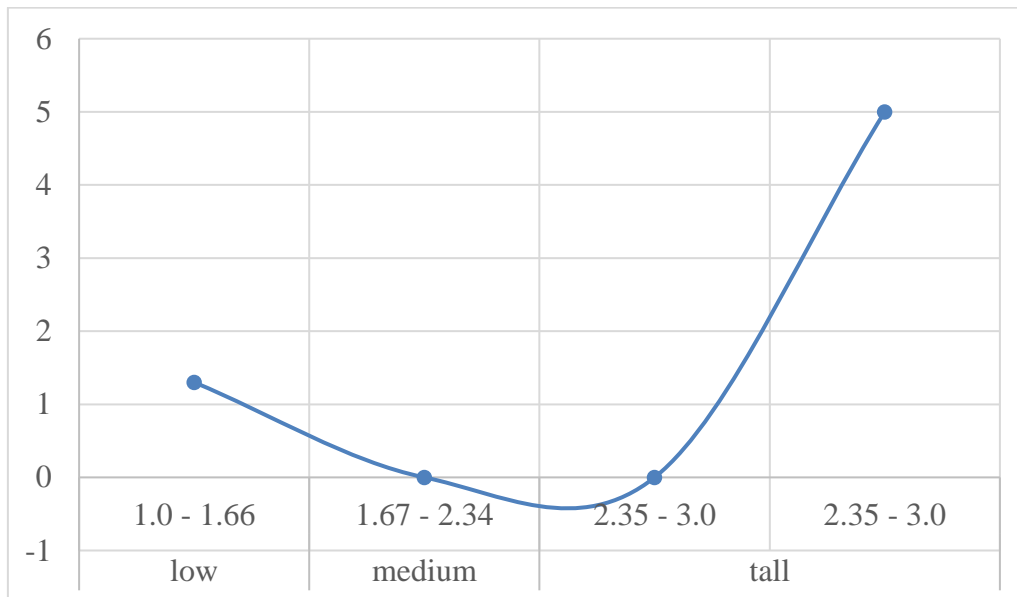
Source: Data Analysis, Year 2022

To see the differences in the level of coastal areas in North Galesong District in the threat of coastal abrasion, the total capacity value of each village/kelurahan is classified into three classes, namely low, medium and high. The results of the analysis and categorization of the capacity level of the coastal area of North Galesong District are presented in the following table:

**Table 9. Coastal area capacity level North Galesong District**

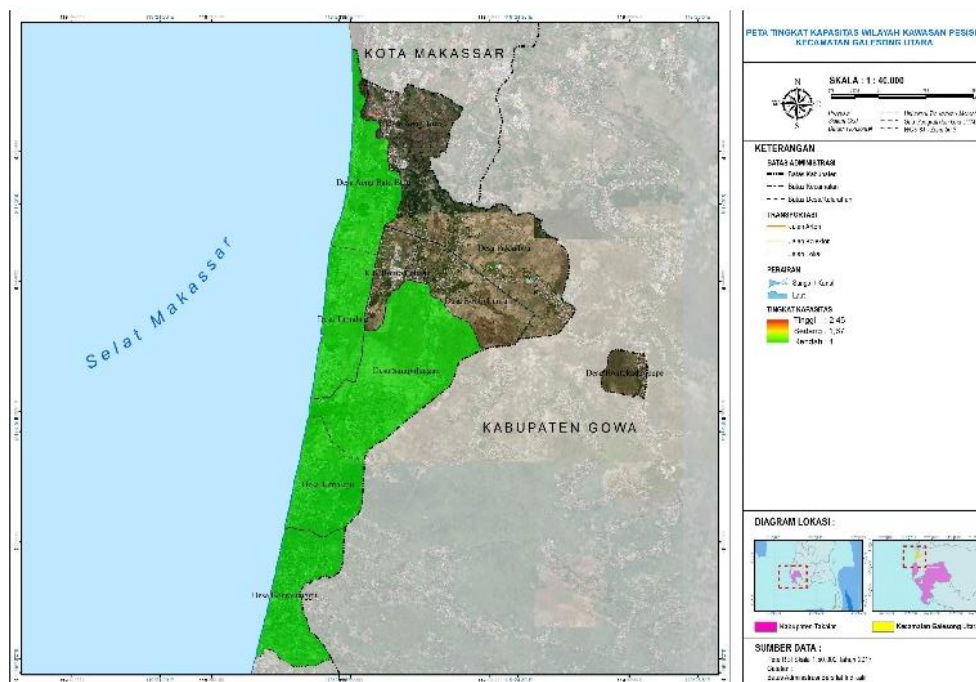
No.	Village/Village	Rated Capacity (CTotals)	Category
1	Bontosunggu	1.3	Low
2	Tamasaju	1.3	Low
3	Tamalate	1.3	Low
4	Aeng Batu-Batu	1.3	Low
5	Sampulungan	1.3	Low

Source: Data Analysis, Year 2022



**Figure 2. Abrasion Disaster Capacity Level**

Based on the results of the analysis and classification of the capacity index parameters, all coastal villages in the North Galesong District are included in the low capacity category. The description of the condition of coastal abrasion disaster capacity on the coast of North Galesong District is presented in the following figure:



**Guidance on community capacity for coastal abrasion disaster**

1. Community Capacity Building. Capacity building activities can be carried out by building preparedness in the face of disaster threats. Activities that can be carried out are to build a culture of disaster preparedness for coastal communities through increasing knowledge regarding self-rescue efforts and disaster risk reduction efforts. Capacity building can involve relevant stakeholders who have key roles in coastal communities in North Galesong District. Capacity building can be carried out for people who live and carry out economic



business activities so that they do not carry out settlement development activities in areas prone to abrasion.

2. Building an early warning system for disasters. The early warning system is an important aspect in improving community preparedness in facing disaster threats. With early warning, the occurrence of abrasion disasters can be known to the public earlier so that the loss of life and material losses can be minimized. The early warning mechanism can be agreed upon by the community and the government through the decision of the regional disaster management agency in Takalar Regency and North Galesong District, which prioritizes coastal areas that have a high level of disaster threat. Early warnings are made, taking into account the climate and rainfall information issued by the Meteorology, Climatology and Geophysics Agency (BMKG) region IV Makassar regarding the warning of wave heights and bad weather that are dangerous for shipping.
3. Socializing disaster risk reduction activities to coastal communities. Disaster risk reduction activity programs need to be disseminated to the community, especially vulnerable groups, fishermen and communities living in coastal areas, who receive the direct impact of the abrasion disaster. This is intended to garner support from all parties to get involved and cooperate in disaster management efforts in coastal areas. In addition, socialization also aims to reduce development efforts and activities that can increase the threat of disasters in coastal areas. Dissemination of disaster risk reduction activities can be done in several ways including:
  - a. Installation of information boards for coastal abrasion hazards in areas that have a high level of threat and risk of disasters, including information boards for early warning signs of an impending disaster.
  - b. Posting news on print and electronic media regarding coastal abrasion disasters that threaten the coastal area of North Galesong District and are dangerous for fishermen who carry out fishing activities.
  - c. The Takalar Regency Government in this case the Takalar Regency Regional Disaster Management Agency (BPBD) can work together with universities to conduct disaster studies, especially coastal abrasion disasters.

## CONCLUSION

Based on the results of the analysis and classification of the capacity index parameters, all villages in the coastal area of North Galesong District are included in the low capacity category. The low category capacity level is the low ability of the region and the community to take action to reduce the level of threat and the level of losses due to coastal abrasion disasters in North Galesong District. Capacity building activities can be carried out by building preparedness in the face of disaster threats. Activities that can be carried out are to build a culture of disaster preparedness for coastal communities through increasing knowledge regarding self-rescue efforts and efforts to reduce disaster risk. Besides that, it is also necessary to build an early warning system to face disasters and socialize disaster risk reduction activities to coastal communities.

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