Geographica: Science & Education Journal
GSEJ
Website: http://usnsj.com/index.php/geographica
Email: geographicausn@gmail.com

COASTAL ADAPTATION OF THE TIDAL FLOOD IN KALIWLINGI VILLAGE, INDONESIA

AUTHORS INFO

Vindiawati Tontoiyo
Master Program in Planning and Management of Coastal and Watershed, Faculty of Geography, Universitas Gadjah Mada, Yogyakarta, Indonesia
tontoiyovindy@gmail.com
085327976660

Muh Aris Marfai
Department of Environmental Geography, Faculty of Geography, Universitas Gadjah Mada, Yogyakarta, Indonesia
arismarfai@ugm.ac.id
081227355920

ARTICLE INFO

ISSN: 2716-4837
Vol. 1, No. 2, July 2020
URL: http://usnsj.com/index.php/Geographica

Suggestion for the Citation and Bibliography
Citation in Text:
Tontoiyo and Marfai (2020)
Bibliography: Tontoiyo, V., Marfai, M.A. (2020). Coastal Adaptation of the Tidal Flood in Kaliwlingi Village, Indonesia. *Geographica: Science & Education Journal, 1* (2, July), 55-61.

Abstract

The coastal region is one of the areas directly affected by climate change. Coastal communities are the ones with the highest level of vulnerability to the effects of climate change. Kaliwlingi Village is one of the coastal areas in Brebes Regency which is vulnerable to tidal flood disasters. This study aims to determine the impact of tidal floods in Kaliwlingi Village, Brebes Regency and determine the community's approach to tidal floods. This research uses a qualitative method with a descriptive narrative approach. In this case study the data analysis was obtained from Miles and Huberman's analysis in terms of data reduction, data presentation and conclusion drawing. Based on the results of the study note that tidal floods affect various aspects of life such as physical aspects, economic aspects and environmental aspects. Most people adapt to tidal flooding by raising their houses, making embankments and roadside and planting mangroves.

Keywords: Adaptation, tidal flood, coastal

A. Introduction

Climate change has a vast impact on people's lives. The rise of Earth temperature not only impacts the rising temperature of the Earth but also changes the climate system affecting various aspects of natural and human life changes. One of the impacts of climate change is rising sea level. Rising sea level causes the tide to take place into settlements that can interfere with community activities (IPCC, 2007).

Rob floods is a flood event caused by the inclusion of seawater to the mainland as a result of high tide (Marfai & King, 2008). Rob floods will not be a threat when it does not interfere with community activity. Rob floods can be a threat to coastal areas because they cause damage to settlements, public facilities and land use.

One of the villages that often occurs a rob flood is Kaliwlingi village. Precisely located in Brebes District Central Java province which is geographically located between 108□41 ' – 109□11 ' East longitude and 6□44 ' – 7□21 ' south latitude. The area of Brebes 1,902.37 Km^2 consists of mountains and coastal areas. The length of the beach is ± 72.93 km which has a priceless potential for society. Coastal waters are not only a productive source of food, but also as a mineral warehouse, cruise flows, recreational places and also as a tank of outcrops of human activity. The magnitude of natural resources contained in it, biological and non-biological as well as various uses of the double is proof that the resource is the focus of human expectations in the effort to fulfill the needs of food that continues to increase in Future.

Brebes is an alluvial region with a relatively flat topography. Slope of slope is ramps with the dominance of slope 0 – 3%. So that the area with such slope is easily affected by the flood that led to the settlement of public settlements therefore Kaliwlingi village often occurs because the flood is adjacent directly to the Sea of Java. (Fig. 1). The high potential of disaster in the region resulted in the community of Brebes Regency especially Kaliwlingi Village doing various adaptations to the environment in order to survive. Based on the fact, the purpose of this research (1) is to know the impact of the flood in Kaliwlingi Village (2) Knowing the adaptation of the community in the flood.

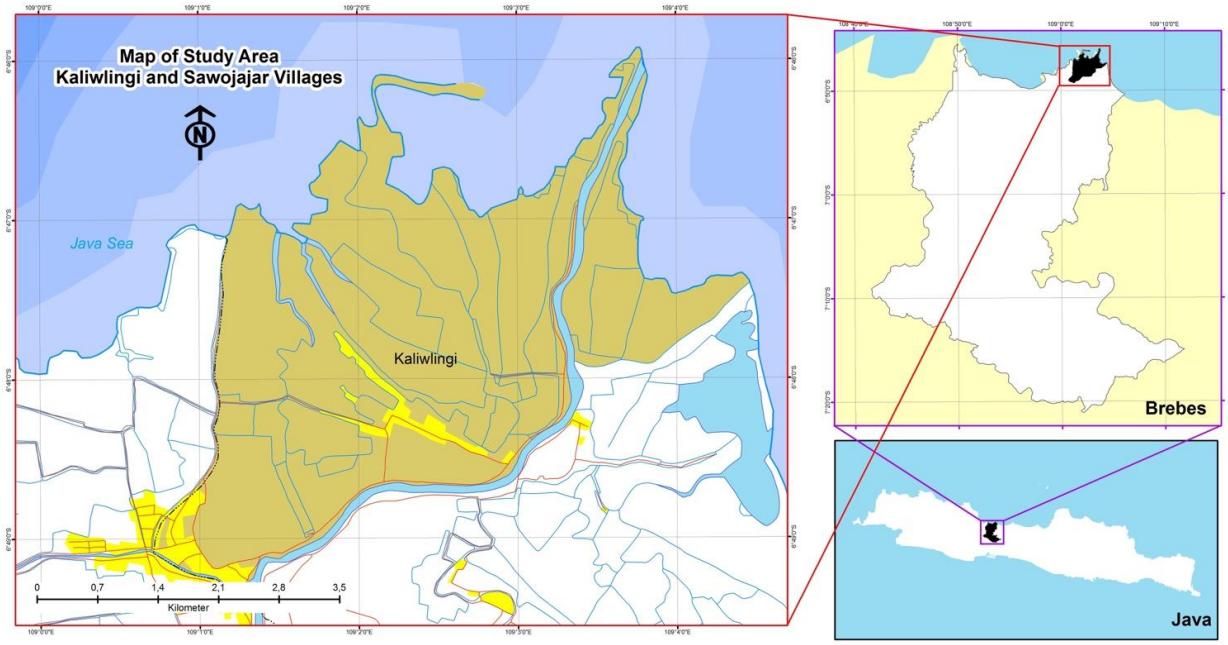
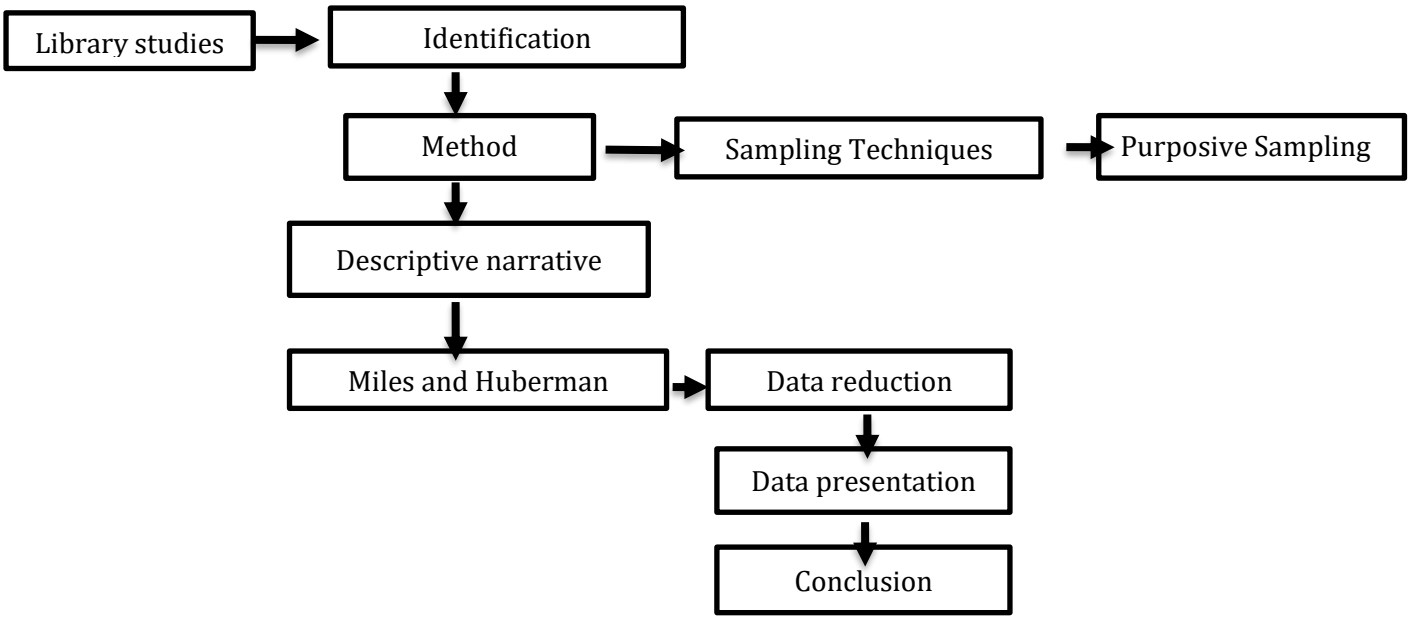


Figure 1. Research location
(Source: Brebes Regency BAPPEDA)

B. Methodology

1. Research Design



2. *Instruments*

In this study used a qualitative approach with a descriptive method. The descriptive method according to (Sugiyono, 2005) is a method used to describe or analyse a research result but is not used to make a broader conclusion. The advantage of the descriptive method is that it is easy to implement, the information obtained is important and many, do not require comparison of objects where other research.

Data to be collected is primary data and secondary data. Primary Data is obtained directly in the field with interview techniques and field observations. The collection of primary data using direct interviews from the speaker is Dinas environment, Public Works Office, regional disaster Management Agency and society. Secondary data in the form of regional Spatial Plan (RTRW) Brebes year 2010-2030, geographical map of research location, village monograph data.

Data collection techniques in the selection of samples to informants who will be interviewed using purposive sampling. This technique is carried out by completing information from initial data that is felt to be unsupportive and clarifying the truth then can be supplemented with new sources of information from other informants. The results of the field interviews are to find out matters relating to research problems that are expected to provide information with speakers who are considered capable and understand the research problem. Interviews can be used to strengthen the results of observations so as to explain how the community adaptation to flooding in the Kaliwlingi Village.

3. *Technique of Data Analysis*

Analysis of the data used in this study is qualitative data analysis with descriptive methods, by directly describing the facts that are seen based on the conditions of the Kaliwlingi Village in accordance with the research objectives. Presentation of the data in this study is more narrative so that it can convey the results of the research clearly by answering the research objectives. The activities in data analysis include:

1. Data reduction. Record all findings data in the field (primary and secondary data) for further reduction / reduction of data which means summarizing, selecting main points, focusing on important matters, looking for themes and patterns (categorization).

2. Presentation of data. The presentation of qualitative data is carried out systematically and structured to facilitate the understanding of the reader. In this study, researchers prioritize the presentation of data in the form of narrative texts.

3. Drawing conclusions and verification. Verification is done because the initial conclusions put forward are still temporary, and will change if not found strong evidence that supports the next stage of data collection, but if the conclusions raised at an early stage, supported by valid and consistent evidence when the researcher back to the field collecting data, the conclusions presented are credible conclusions. These three types of activities can be described as shown in Figure 2.

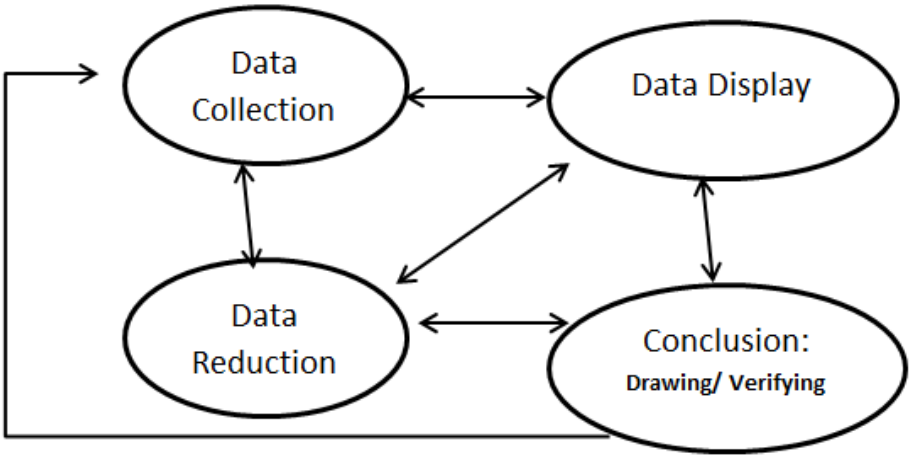


Figure 2. component analysis
Source: (Miles & Huberman, 1984)

C. Findings and Discussion

1. Findings

a. Impact of tidal flooding

- Physical impact. The tidal flood that occurred in Kaliwlingi Village resulted in the inundation of a number of houses due to high tide for days (Figure 3) as a result of the damage to parts of the house and some furniture damaged. In addition, damage also occurred to public infrastructure and facilities. Settlement infrastructure is a minimal physical network: such as roads and access to pedestrians, water sources and sewerage, electricity and telecommunications (McDonald & McMillen, 2011). The impact of floods on residential infrastructure is felt both by flood victims and other infrastructure users. Some damage to infrastructure and public facilities that occurred include damage to roads, damage to educational facilities such as school buildings and damage to places of worship.

Figure 3. Tidal condition in Kaliwlingi
Source: Field survey

- Economic impact.

The tidal flood that occurred in December 2017 in Kaliwlingi Village resulted in the sinking of approximately 120 hectares of residents' ponds and submerged half of the village area to a depth of half a meter. According to (Azahro & Ardi, 2017) the impact of tidal floods and extreme weather resulted in changes in the sources of community livelihoods in Kaliwlingi Village, which were originally farmers and fishermen working as laborers, as well as damage to public facilities and infrastructure that impacted on education, health and community economic problems. . The impact of the disaster also caused social problems in the community.

- Environmental impact.

The environmental impact due to tidal floods is the amount of scattered garbage and mud, especially in the riverbanks. Tidal floods also affect the need for clean water. Ground water has turned salty and clean water equipment is quickly damaged by corrosion. The distribution of tidal floods in Kaliwlingi Village is shown in Figure 4.

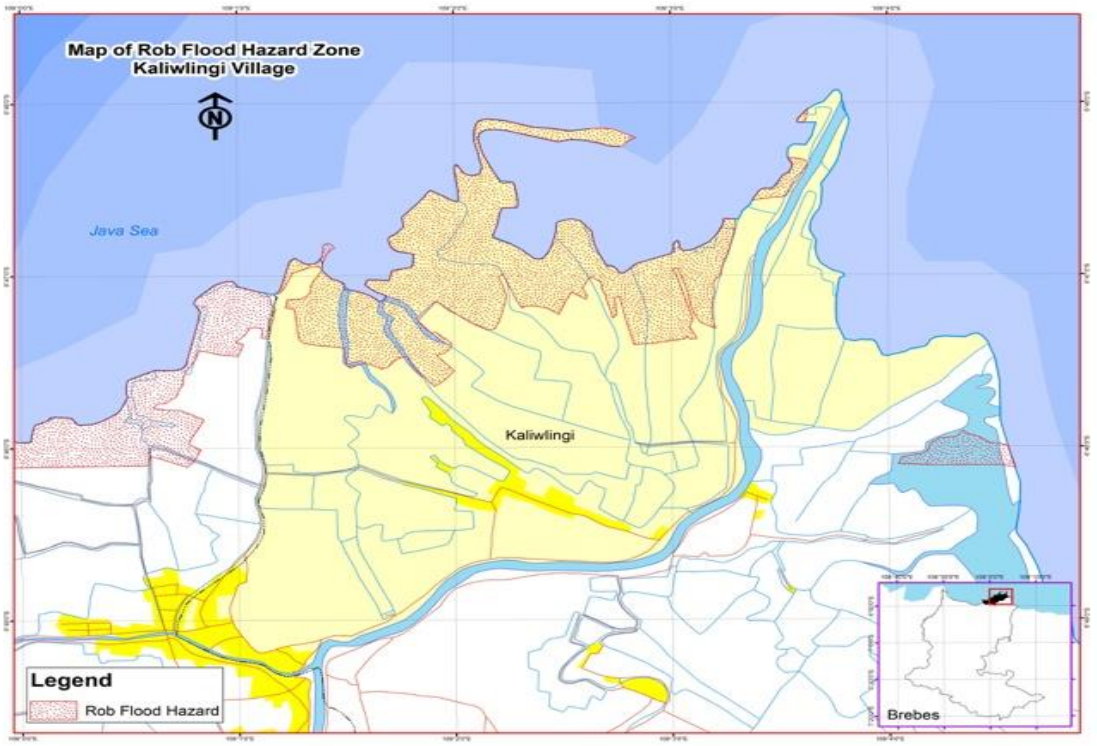


Figure 4. Tidal distribution in Kaliwlingi
(Source: Secondary data analysis)

b. Community adaptation of tidal floods
Kaliwlingi Village is one of the villages in Brebes Regency that is experiencing tidal flood problems. Adaptation is a method or strategy which is a form of effort made by humans to maintain their survival. Following are the adaptation efforts that have been made by the people who live in the coastal area of Kaliwlingi Village:
- Elevation of the building floor.
  One of the most effective ways for people to do it is to raise their house higher than the road. This is to prevent tidal water from entering the house, as shown in Figure 5 one of the houses which experienced weathering on the walls of a community home due to tidal flooding. Whereas poor people usually build a barrier at the door of the house. Elevation of the floor or foundation of this house is a citizen initiative and the cost is also from the residents themselves without any assistance from the government.

Figure 5. Weathered buildings due to tidal flood
(Source: Field survey)

- Making embankments and curbside.
  Making embankments and roadside is one of the government programs in handling tidal flooding in Kaliwlingi Village This program is a program from the Ministry of Maritime Affairs and Fisheries (KKP) in the form of the Formidable Coastal Development Program (PKPT). Kaliwlingi Village is one of the villages chosen in the program. It is hoped that the village will become independent and be able to increase resilience by minimizing the impact of areas vulnerable to disasters due to climate change in coastal areas.

Figure 6. Curbside

- Mangrove planting.
  Mangrove planting along the coast of Kaliwlingi village was originally aimed at maintaining the mangrove tourism area, but on the other hand mangrove planting also had a positive impact including physical aspects, namely reducing the impact of sea level rise, reducing the occurrence of coastal erosion, sediment capture, reducing the impact of ROB flooding, reducing the impact or a large wave barrier if a tsunami comes, and a buffer against sea water intrusion. The function of mangrove containment from the biological aspect can include the habitat of various species of shrimp and fish, a place to look for food, a place of care and rearing, and spawning grounds. The function of mangroves in terms of economic aspects has a significant role in improving economic conditions and the level of welfare of people in coastal areas. The function of mangrove from this economic aspect can be used as a producer of firewood, producer of building wood or shipbuilders, as food and beverage material, as a medicinal material, as fertilizer, as animal feed, as a material for making paper, as a maker of household appliances , as a place of recreation, and as a fishing spot.

2. Discussion

Coastal area of Kaliwlingi village experienced several natural disasters. One of the disasters that often occur is the flood tides. The disaster has had a significant impact in the form of damage to human settlements, loss of land, economic loss due to ponds and damage to several public facilities such as roads, schools, and so on. Residents of the Kaliwlingi coastal area affected by the disaster responded by adapting or familiarizing themselves with the situation. Among the adaptation efforts undertaken by residents are elevation of building floors, construction of road sides and embankments, construction of houses on stilts and mangrove forest rehabilitation.

Research on analysis of distribution, impacts and adaptation societies flood rob in the eastern district of Semarang and Semarang Gayamsari District that Adaptations that can be done in handling flooding include raising the floor of the house, relocating settlements, making embankments, and planting mangroves. In the relocation of settlements not all people who want to move. this is because it is influenced by livelihoods. the average community occupying the coastal area has a job as a fisherman, so that when relocation is carried out not all people agree on that (Ikhsyan et al., 2017)

D. Conclusion

Tidal floods have an impact on physical aspects in the community, including damage to housing, damage to public facilities and educational facilities. besides it also affects the community's economy, the sinking of community ponds will affect people's income. Another impact is on the environmental aspects. where many trash transported due to flooding.

Community adaptation to tidal floods including elevation of building floors, making embankments and roadside and mangrove planting.

E. References

Hazen, D. S., Roeder, W. P., Boyd, B. F., Lorens, J. B., & Wilde, T. L. (1995). Weather impact on launch operations at the Eastern Range and Kennedy Space Center. In *Conference on Aviation Weather Systems, 6 th, Dallas, TX* (pp. 270-275).

Kuk, B., Kim, H., Ha, J., Lee, H., & Lee, G. (2012). A fuzzy logic method for lightning prediction using thermodynamic and kinematic parameters from radio sounding observations in South Korea. *Weather and Forecasting*, *27*(1), 205–217. https://doi.org/10.1175/WAF-D-10-05047.1

Litta, A. J., Mary Idicula, S., & Mohanty, U. C. (2013). Artificial Neural Network Model in Prediction of Meteorological Parameters during Premonsoon Thunderstorms. *International Journal of Atmospheric Sciences*, *2013*, 525383. https://doi.org/10.1155/2013/525383

Rajasekaran, S., & Pai, G. V. (2003). *Neural networks, fuzzy logic and genetic algorithm: synthesis and applications (with cd)*. PHI Learning Pvt. Ltd.

Spiridonov, V., & Curic, M. (2003). A three-dimensional numerical simulation of sulfate transport and redistribution. *Canadian Journal of Physics*, *81*(9), 1067–1094. https://doi.org/10.1139/p03-067.

Suparta, W., Putro, W. S., & Singh, M. S. J. (2017). An Assessment of Malaysian eArly warNing of ConvectIve System (MANCIS) to Predict Thunderstorm Activities. *Advanced Science Letters*, *23*(2), 1428-1432.

Suparta, W., Putro, W. S., Singh, M. S. J., & Asillam, M. F. (2015). Characterization of GPS and meteorological parameters for mesoscale convective systems modelover Tawau, Malaysia. *Advanced Science Letters*, *21*(2), 203-206.

Suykens, J. A. K. (2001). Nonlinear modelling and support vector machines. *IMTC 2001. Proceedings of the 18th IEEE Instrumentation and Measurement Technology Conference. Rediscovering Measurement in the Age of Informatics (Cat. No.01CH 37188)*, *1*, 287–294 vol.1. https://doi.org/10.1109/IMTC.2001.928828