



Enhancing Public Understanding of Riverbank Management and Regulations for Flood Control in Tabelo River

Dewardha Mas Agastya^{1*}, Ery Setiawan¹, I Wayan Yasa¹, Evrianti Syntia Dewi¹

¹Department of Civil Engineering, Faculty of Engineering, University of Mataram, Mataram, Indonesia.

Received: April 13, 2025
Revised: May 19, 2025
Accepted: June 14, 2025
Published: June 30, 2025

Corresponding Author:
Dewardha Mas Agastya
dewardhamas96@staff.unram.ac.id

DOI: [10.29303/ujcs.v6i2.968](https://doi.org/10.29303/ujcs.v6i2.968)

© 2025 The Authors. This open access article is distributed under a (CC-BY License)



Abstract: Flood disasters in Kuta Village, Central Lombok Regency, are caused by high rainfall intensity, sedimentation, land-use changes, and low public awareness of river conservation. This study evaluates flood mitigation strategies for the Tabelo River through structural and non-structural approach. Hydrological analysis indicates that the river's cross section is inadequate to handle flood discharge, leading to frequent overflows. Structural measures include sediment dredging to a depth of 1,45 m and constructing 4 m high embankments. Hydraulic modeling using HEC-RAS support these interventions to reduce flooding. Non-structural measures involve community outreach on riverbank regulations based on Ministerial Regulations No. 28 of 2015. This initiative aims to increase public awareness, prevent illegal riverbank constructions, and promote sustainable river management. The enforcement of riverbank regulations is expected to reduce flood risks, improve water quality, and minimize erosion and sedimentation. Additionally, educational posters have been developed to reinforce awareness of flood control and river construction. Integrating structural and non-structural strategies is crucial to mitigating floods and fostering environmental responsibility in Kuta Village.

Keywords: Riverbank, Flood Control, Regulations, Conservation, Environmental.

Introduction

The climate in Central Lombok Regency is tropical, influenced by the western winds, and has a very short dry season duration. The rainfall intensity in this regency is quite high. The number of rainy days per month in Central Lombok Regency ranges from 3 to 22 days. The recorded rainfall ranges from 4 mm to 319 mm. Meanwhile, on March 23, 2022, rainfall with an intensity of 35 mm was recorded by ARR SEZ Mandalika, causing a flood disaster. The flood disaster inundated several hamlets in Kuta Village, including Merendeng, Baturiti, Mong and Lenser Hamlets. The floodwater level reached 1,2 meters. To mitigate flooding, both structural and non-structural measures are required. The structural efforts undertaken include conducting a planning study for normalization and constructing levees along the Tabelo River. The initial measures involved surveying and investigating the

conditions of the affected areas around the Tabelo River. The field survey results indicate that the existing river cross-section is unable to accommodate the flood discharge, which occurs every time it rains with moderate or high intensity. The reduced river storage capacity is caused by significant sedimentation, resulting in a shallower river depth. Based on hydrological analysis, the design flood discharge values for return periods of 25, 50 and 100 years are 71,16 m³/s, 82,24 m³/s, and 90,70 m³/s, respectively. After conducting hydraulic modeling using HEC-RAS software on the Tabelo River with a total length of ± 2,5 km, it was found that overflow occurs from the upstream to the river mouth. The recommended structural mitigation measures include river normalization and the construction of river embankments. Sediment dredging or normalization will be carried out to a depth of 1,45 m, while the embankment height is planned to be 4 m from the

How to Cite:

Mas Agastya, D., Setiawan, E., Yasa, I. W., & Syntia Dewi, E. (2025). Enhancing Public Understanding of Riverbank Management and Regulations for Flood Control in Tabelo River. *Unram Journal of Community Service*, 6(2), 312-317. <https://doi.org/10.29303/ujcs.v6i2.968>

foundation depth. The average cross-sectional width of the river is 10,20 m (Agastya, 2024).

Based on social observations in the affected area, several major issues in the community can be identified, including a lack of public awareness regarding river cleanliness and proper river management. The lack of outreach activities explaining local regulations on riverbank areas. One effort to support structural rehabilitation activities is conducting outreach programs on riverbank regulations for flood control. The outreach activities involve the community and village heads to enhance public understanding of riverbank area management (Kiptiah, 2021).

Method

The area targeted for the implementation of socialization activities on river border regulations for flood control is Kuta Village, Central Lombok Regency. The selection of this village was based on the fact that in 2022, a flood disaster occurred due to the silting of the Tabelo River cross-section caused by sedimentation and significant land-use changes during the development of the Mandalika Special Economic Zone. The approach method to be implemented as a non-structural effort is the socialization of river border utilization for flood control. This socialization activity consists of preparation and implementation phases. The following are the preparation and implementation activities aimed at enhancing public understanding of river border regulations for flood control.

The preparation stage includes determining the theme, socialization location, and collaboration partners. It involves discussions on the community's main issues and providing solutions for non-structural efforts that can be undertaken for flood control (Arif et al., 2023). Additionally, a preliminary survey is conducted at the Tabelo River and the socialization activity location. Meanwhile, the implementation of the socialization activity is carried out by explaining the material on river border requirements, legal foundations, and considerations regulated by the Ministry of Public Works and Housing. This is followed by a discussion session with the residents of Kuta Village. Figure 1 and Figure 2 shows the location of the Kuta Village Office and the Tabelo River.



Figure 1. Location of the Kuta Village Office, Central Lombok Regency, West Nusa Tenggara Province, Indonesia

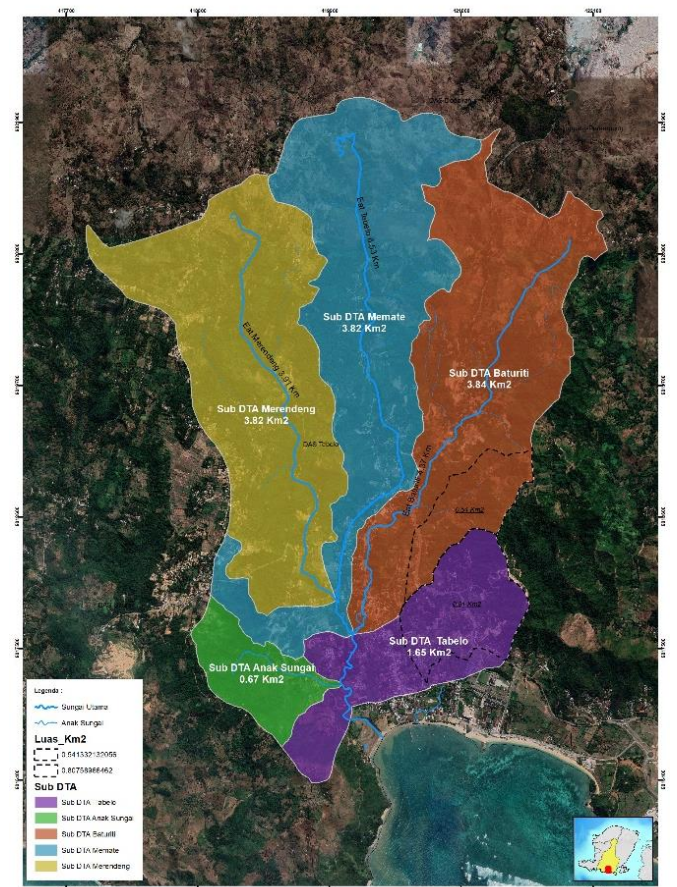


Figure 2. Map of the Tabelo River Watershed

Result and Discussion

Flood Disaster in Kuta Village

On January 30, 2021, a flood disaster occurred in six villages in Central Lombok Regency. One of the affected villages was Kuta Village. The water level during the flood reached 1,2 meters. The flood also impacted the construction site of the Mandalika Circuit. Furthermore, in 2022, another flood disaster occurred in Kuta Village on March 25, 2022. The flood was caused by

the narrowing of the river flow and drainage due to improper waste disposal, increased sedimentation, and land-use changes. During the survey of the Tabelo River, it was found that the construction of houses and supporting facilities by residents around the river had narrowed the river's cross section. Several hamlets affected in Kuta Village include Baturiti Hamlet, Mong 1 Hamlet, Memate Hamlet, Merendeng Hamlet, and Mengalung Hamlet. The flood event also affected the development of the Mandalika Special Economic Zone. Figure 3 represents documentation of the preliminary survey activities at the Tabelo River after the 2022 flood (a), and for the preparation of community service activities (b).



(a)



(b)

Figure 3. Documentation of survey and inventory activities at the Tabelo River in 2022 (a) and the preliminary survey for community service activities (b).

The discussion with the Head of Kuta Village provided several key insights: a) flooding caused by river overflow occurs annually during the rainy season when high-intensity rainfall happens, affecting six hamlets in Kuta Village, b) it was suggested that flood mitigation efforts include constructing retaining walls

on both sides of river at several locations prone to overflow. Additionally, sediment dredging is a maintenance action that must be carried out to maintain the river's capacity. Structural flood control efforts implemented in the Tabelo River include river normalization, embankment reinforcement using stone or concrete structures, and the construction of a jetty at the river mouth.

Socialization of River Border Regulations

The material to be socialized to the residents of Kuta Village relates to river and lake border regulations as stated in Minister of Public Works and Housing Regulation No. 28 of 2015. The purpose of this socialization activity is to enhance public understanding of river borders, river border requirements, legal foundations and considerations, and the criteria for determining river border lines. The socialization event was held on April 4, 2025, at the Kuta Village Office, Central Lombok Regency, West Nusa Tenggara Province, Indonesia.

The determination of river border lines aims to: a) ensure that river functions are not disrupted by human activities around the river, b) optimize utilization and conservation efforts to maintain the sustainability of river functions, c) limit the destructive impact of water on the environment along both sides of the river border, d) protect the river's function so that it can sustainably support human life, domestic water needs, tourism, fisheries, power generation, and ecosystems. Article 4 states that river border lines are classified into four types: a) non-embanked rivers within urban areas, b) non-embanked rivers outside urban areas, c) embanked rivers within urban areas, and d) embanked rivers outside urban areas (Lopa, 2020).

Article 5 states that the river border line for non-embanked rivers within urban areas is set at a distance of 10 meters from the right and left edges of the riverbed along the river course if the river depth is approximately ± 3 meters. If the river depth is more than 3 meters but up to 20 meters, the distance from the riverbed to the left and right banks is 15 meters. Meanwhile, the river border is set at 30 meters from the left and right edges of the riverbed if the depth exceeds 20 meters. For large rivers with a watershed area greater than 500 km², the river border is set at a distance of 100 meters for non-embanked rivers outside urban areas. On the other hand, the river border for small rivers with a watershed area of less than 500 km², is set at 50 meters from the left and right edges of the riverbed along the river course. For embanked rivers, the river border is set at 3 meters within urban areas and 5 meters outside urban areas along the river course (Arif et al., 2023). The illustration of regulations for river boundaries with and without embankments can be seen in Figure 5 and Figure 6.

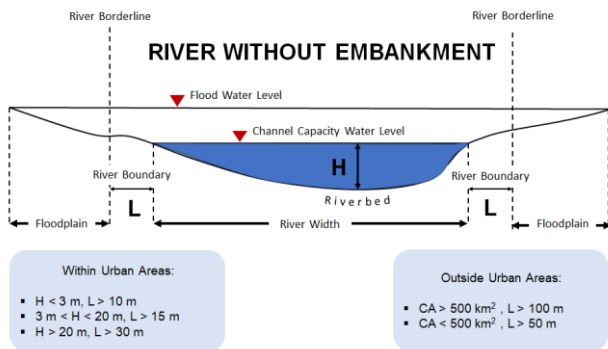


Figure 4. Regulations for River Boundaries without Embankments

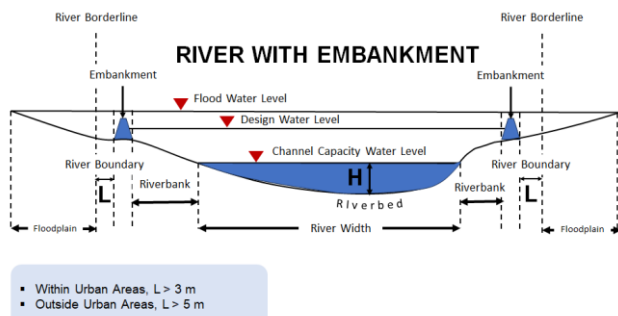


Figure 5. Regulations for River Boundaries with Embankment

Impacts and Potential of River Border Regulation Implementation

The implementation of regulations on river borders has a significant impact on flood control and environmental conservation. The impacts of implementing river border regulations include: a) Flood Risk Reduction – establishing river borders prevents construction in areas that should function as water absorption zones, thereby reducing flood risks, b) Improved Water Quality – preventing activities that may pollute the river in border areas, such as waste disposal or intensive agriculture, helps maintain water quality and supports public health, c) Prevention of Erosion and Sedimentation – the presence of natural vegetation along river borders helps retain soil, prevent erosion, and reduce sedimentation, which can disrupt river flow and increase flood risks (Budhiana et al., 2023).

The potential of implementing river border regulations in the Tabelo River includes the development of green open spaces, which can be used for recreation, enhance the city's aesthetics, and provide space for community social activities. Increasing awareness and community participation – through the dissemination of river border regulations, the community can understand the importance of river borders, thereby encouraging participation in

environmental conservation (Muslimin, 2018). Furthermore, strengthening law enforcement – the effective implementation of regulations requires consistent law enforcement against violations, such as illegal construction in river border areas (Rahmadhani, 2023). The effective implementation of river border regulations requires collaboration between the government, the community, and other stakeholders to ensure that the ecological, social, and economic benefits of these areas are realized optimally.

Poster on Flood Control and River Border Regulations

Creating posters about flood control and riverbank regulations is an effective method of conveying information to the public in a visually appealing and easily understandable way. Posters serve as an educational and socialization tool to raise awareness about the importance of preserving rivers, complying with riverbank regulations, and understanding the consequences of violating existing rules (Rahmayanti et al., 2021).

The purpose of creating posters is to provide concise, clear, and engaging information about flood control and the importance of preserving riverbanks, raise public awareness of the significance of rivers and their surrounding ecosystems, prevent illegal construction along riverbanks that could have negative impacts, encourage communities to actively participate in maintaining river cleanliness and sustainability, and disseminate information about government-established riverbank regulations (sari et al., 2020).

The poster effectively conveys information through an engaging and informative title "**Jaga Sempadan Sungai, Lindungi Lingkungan dan Cegah Banjir!**". Additionally, the poster features an illustration comparing a well-preserved riverbank with one overcrowded by illegal buildings, along with a brief explanation of riverbank regulations and Ministerial Regulation No. 28 of 2015 issued by the Ministry of Public Works and Housing regarding riverbank zoning rules. The final section of the poster presents solutions and encourages people to avoid building houses or other structures on riverbanks, keep rivers clean by not disposing of waste into them, comply with government regulations on riverbank protection, and participate in greening activities around rivers (Kusriantari Fenny A, Refranisa, 2020). Figure 6 presents a poster aimed to enhancing public understanding of non-structural efforts that can be undertaken to prevent flooding.



Figure 6. A poster on non-structural efforts for flood control

Conclusion

The flood disaster in Kuta Village, Central Lombok Regency, can be attributed to high rainfall, increased river sedimentation, land-use changes, and a lack of public awareness in maintaining the river. The planned structural measures include river normalization through sediment dredging and the construction of embankments along the Tabelo River. Meanwhile, the non-structural approach is carried out through the socialization of riverbank regulations to enhance public understanding of the importance of preserving river functions, preventing illegal construction along riverbanks, and raising environmental awareness. The implementation of riverbank regulations provides significant benefits, including flood risk reduction, improved water quality, erosion and sedimentation prevention, and the development of green open spaces for ecological and social purposes. As an effective educational method, posters on flood control and riverbank regulations have been developed to convey information visually and in an easily understandable way. The goal is to raise public awareness of the importance of maintaining river cleanliness, preventing illegal construction along

riverbanks, and participating in environmental conservation. With the combination of structural and non-structural strategies, the flood risk in Kuta Village is expected to be significantly reduced, while public awareness of river and environmental protection continues to increase.

Acknowledgments

We sincerely express our gratitude to the University of Mataram, especially the Department of Civil Engineering, the Ministry of Public Works and Housing – Balai Besar Wilayah Sungai Nusa Tenggara I Mataram, as well as the Head of the Village and the community of Kuta Village, Central Lombok Regency, for their support and contributions to this community service project. Your collaboration and dedication have been invaluable in the successful implementation of this program.

References

- Arif, N., Hidayati, U., Hanum, F. F., & Rahmawati, L. (2023). Upaya Pengelolaan Bantaran Sungai Berbasis Ecobehaviour. *JMM (Jurnal Masyarakat Mandiri)*, 7(4), 3493. <https://doi.org/10.31764/jmm.v7i4.16097>
- Budhiana, J., Dewi, R., Janatri, S., Dwi, S., Sekolah, F., Ilmu, T., Sukabumi, K., & Sukabumi, I. (2023). Membangun Kesiapsiagaan Masyarakat Dalam Menghadapi Bencana Melalui Sosialisasi Dan Edukasi Modal Sosial Building Community Preparedness for Disaster Through Social Capital Education and Outreach. *Abdimas Galuh*, 5(2), 1269–1276.
- Agastya, D.M., Yasa, I.W., Saidah, H., Budianto, M.B., & Jayanegara, I.D.G. (2024). *Pengendalian banjir sungai bengkok untuk mendukung kawasan ekonomi khusus mandalika*. December. <https://doi.org/10.35327/gara.v18i4.1110>
- Kiptiah, M. (2021). Sosialisasi kesadaran hukum lingkungan Pada Masyarakat Pinggiran Sungai di Kabupaten Barito Kuala. *Bubungan Tinggi: Jurnal Pengabdian Masyarakat*, 3(1), 42–47. <https://doi.org/10.20527/btjpm.v3i1.1801>
- Kusriantari Fenny A, Refranisa, A. M. H. (2020). Satu Atraksi Wisata Pada Kampung Ekowisata Keranggan. *Jurnal Pengabdian Masyarakat Berkemajuan*, 4(November), 349–355.
- Lopa, R. T. (2020). Sosialisasi Peraturan Daerah Sempadan Sungai Dalam Rangka Pengendalian Banjir Sungai Maros. *JURNAL TEPAT: Applied Technology Journal for Community Engagement and Services*, 3(1), 109–117. https://doi.org/10.25042/jurnal_tepat.v3i1.120
- Muslimin. (2018). *Sosialisasi Tanggap Bencana Pada Masyarakat di Kec. Lemito, Kab.Pohuwato untuk*

Mewujudkan Desa Tangguh Bencana Melalui Pendekatan Komunikasi Efektif dengan Bahasa yang Santun. November, 6.

Rahmadhani, R. (2023). *Strategi dan Program Pencegahan Banjir di Indonesia Strategi dan Program Pencegahan Banjir di Indonesia. May, 0-6.*

Rahmayanti, H., Azwar, S. A., Ichsan, I. Z., Ilyasa, F., & Nasrun, A. (2021). Pemberdayaan Keterampilan Mitigasi Banjir Masyarakat Jakarta Melalui Penyuluhan (Kegiatan Pengabdian Saat Pandemi Covid-19). *ETHOS: Jurnal Penelitian Dan Pengabdian Kepada Masyarakat, 9(1)*, 72-78. <https://doi.org/10.29313/ethos.v9i1.6463>

Sari, U. Adrian, Yasri, H. L., & Arumawan, M. M. (2020). *Jmm 2087-9012-1-Pb (2020). Sosialisasi Mitigasi Bencana Banjir Melalui Pendidikan Kebencanaan Berbasis Kearifan Lokal , 4(4), 519-526.*