Jurnal Geografi 22(1) (2025) 15-24

JURNAL GEOGRAFI
https://journal.unnes.ac.id/nju/index.php/JG

Enhancing Community Disaster Resilience in Tourism Villages: Insights from West Nusa Tenggara, Indonesia

Osmar Shalih[1], Heni Marta Diana Matita Putti[2], Sania Indah Kirana Falisha[2]

[1]Badan Nasional Penanggulangan Bencana (BNPB), Jakarta, Indonesia/Gadjah Mada University, Indonesia
[2]Amcolabora Institute, Depok Indonesia

Article Info

Article History
Submitted 2025-01-10
Revised 2025-03-13
Accepted 2025-03-18

Keywords
Tsunami, Coastal Hazards, Mitigation plan, Community Resilience, Tourism Area

Abstract

Historical records show that Lombok experienced significant damage from a tsunami triggered by geological activity in 1977. Kuta Village, located in southern Lombok, faces a high risk of earthquakes and tsunamis. This research aims to develop mitigation and preparedness recommendations for the area. Data was collected using a community preparedness survey in Kuta Village, observation with town watching, and focus group discussions. The results of the Household Preparedness Survey showed low scores in terms of knowledge, early warning, emergency response plans, and resource mobilization. Mitigation schemes in Kuta Village should prioritize improving both structural and non-structural aspects of the area. Structural measures should involve cooperation between local communities and the district government to maintain coastal vegetation. Non-structural approaches to mitigation include implementing tsunami mitigation measures into village development plans, improving community capacity, strengthening local government, and utilizing community-based early warning systems. To improve community capacity, the establishment of disaster-resilient tourism villages would be beneficial. In addition, promoting disaster-resilient families and raising tsunami awareness through locally sourced knowledge would also be useful.

Abstrak

Catatan sejarah menunjukkan Lombok mengalami kerusakan signifikan akibat tsunami yang dipicu aktivitas geologis tahun 1977. Desa Kuta di Lombok Selatan menghadapi risiko tinggi gempa bumi dan tsunami. Penelitian ini bertujuan menyusun rekomendasi mitigasi dan kesiapsiagaan untuk wilayah tersebut. Pengumpulan data dilakukan melalui survei kesiapsiagaan masyarakat, pemantauan desa (town watching), dan diskusi kelompok terfokus (focus group discussion). Hasil Survei Kesiapsiagaan Rumah Tangga menunjukkan skor rendah pada aspek: (1) pengetahuan kebencanaan, (2) sistem peringatan dini, (3) rencana tanggap darurat, dan (4) mobilisasi sumber daya. Skema mitigasi harus memprioritaskan peningkatan aspek struktural dan non-struktural. Mitigasi struktural melibatkan kerja sama komunitas-pemerintah kabupaten dalam pemeliharaan vegetasi pesisir. Pendekatan non-struktural mencakup: integrasi mitigasi tsunami ke rencana pengembangan desa, peningkatan kapasitas komunitas (melalui sistem peringatan dini berbasis masyarakat dan pengembangan desa pariwisata tangguh bencana), penguatan pemerintah lokal, promosi keluarga tangguh bencana, serta peningkatan kesadaran tsunami berbasis pengetahuan lokal.

E-mail: osmar.shalih@gmail.com

p-ISSN 2549-3078 e-ISSN 2549-3094

INTRODUCTION

Kuta Village is officially part of the Pujut area in Central Lombok, West Nusa Tenggara with a population of 10,904 people (Department of Population and Civil Registration, 2023). It is positioned in the southern region of Central Lombok, spanning an area of 1,951.91 hectares and directly facing the Indonesian Ocean. This location makes Kuta a hotspot for beautiful beaches and distinctive waves, drawing in many visitors (Kementerian Dalam Negeri, 2023). The Kuta area becoming the Mandalika Tourism Area (MTA) which is included in the special economic area. Tourism has had a big impact on the growth of Kuta Mandalika Beach and the surrounding community. This impact can be seen in the economy, social and cultural aspects, and the environment. As Kuta Mandalika develops, it is not just the beach that benefits – other nearby tourist spots also see positive changes. Businesses like hotels, restaurants, tour guides, travel agencies, shops, and other tourism services get a boost in their capacity. This interconnected growth between Kuta Mandalika and the surrounding tourist businesses shows how local progress can affect the larger tourism scene. Understanding these effects helps us see how tourism development influences both the community and the overall tourism sector (Haris & Ningsih, 2020; Nilawati & Umar, 2019).

While Kuta Village is growing as a tourist spot, it is also in an area where there is a high risk of tsunamis (BNPB, 2023). The village of Kuta is located in a major tectonic convergence zone, specifically between the Indo-Australian and Eurasian tectonic plates. Considering the geographical location, rock types, tectonic activity, topography, and bathymetry, Central Lombok Regency exhibits several potential tsunami generation sources, notably, at least two sources pose a threat to the region-namely, the Flores Back-arc Thrust and the Indo-Australian Subduction, both historically linked to seismic activity capable of generating tsunamis (Horspool et al., 2014; Latief et al., 2000; Pusat Studi Gempa Nasional (PuSGeN), 2017). Through prior assessment research, the tsunami generation source stemming from the Indo-Australian Subduction has been identified as having the most significant impact on Central Lombok Regency (Felix et al., 2022; Pradjoko et al., 2015; Wardani et al., 2021). Consequently, this paper focuses on the further examination of tsunami modelling with the Indo-Australian Subduction source. Furthermore,a back-arc thrust fault exists off the northern coast of Lombok, constituting another local tsunami source area.

The historical record of tsunami disasters in the Lombok region, particularly in Kuta Village, is inextricably linked to the August 1977seismic event in Sumba, East Nusa Tenggara (Kato and Tsuji, 1995; Pusat Studi Gempa Nasional (PuSGeN), 2017). This seismic event, measuring 8.0 on the Richter scale, caused a 15-meter-high tsunami. The earthquake and tsunami were felt in three other coastal villages, including Kuta Village in Central Lombok, with wave heights reaching up to five meters. Hence, it is crucial for the people in Kuta Village to be ready for possible tsunami disasters and reduce the impact in the future. Kuta Village must take action to lessen the effects of disasters, particularly because it is adjacent to a region that is vulnerable to earthquakes and tsunamis. Constructing temporary shelters in Kuta that enable individuals to rescue themselves as quickly as possible in the event of a tsunami is one of the doable precautions. The principal objective of this study is to formulate self-evacuation plans and establish disaster-resilient tourism villages, with the overarching goal of augmenting community capacity and fostering disaster resilience within families through the integration of locally sourced knowledge.

METHODS

The study used a mixed method approach. Quantitative approach to the preparedness assessment design refers to the concept developed by LIPI-UNESCO/ISDR for household-level evaluations. The observations articulated in the guideline regarding the components and index system of evacuation preparedness suggest that the likelihood of the population initiating a timely evacuation is significantly diminished when lacking informed warning guidance and appropriate evacuation infrastructure. Additionally, a dearth of public comprehension regarding tsunami hazards, particularly their distinctive characteristics, coupled with an unclear understanding of the degree of exposure, markedly diminishes the likelihood of commencing evacuation. These findings are imperative for comprehending human behavior in response to tsunami early warnings and underscore the importance of establishing effective early warning and response structures (LIPI et al., 2011).

Based on these indices, the survey conducted for this research will also evaluate four components of household preparedness (Figure 1), encompassing parameters of knowledge, early warning, emergency response management, and resource mobilization (Shalih et al., 2020).

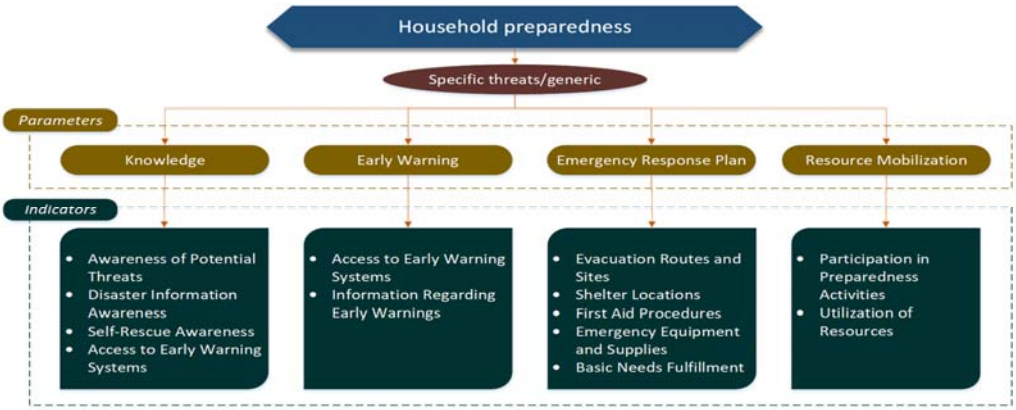

Figure 1. Structure of the Preparedness Index Assessment Questionnaire

Although the preparedness assessment tool employed follows a household-oriented approach, the survey on preparedness in non-residential structures employs the same set of questions. The preparedness survey was carried out from February to March 2023, employing interview methods and securing a respondent count of 3,293 persons. The assessment of disaster preparedness in Kuta Village involves four key parameters, each revealing distinct indicators influenced by various factors. The survey was conducted using the InariskPersonal BNPB mobile app tool.

A qualitative approach using participatory planning in the preparation of mitigation plans was conducted through expert Focus Group Discussions as well as public discussions in the field with relevant stakeholders. Focus Group Discussions aim to convey the results of the risk assessment analysis and the draft mitigation plan to the community, and a dialogue is conducted to find an agreement. In addition, Town Watching was conducted as a process of validating the results of mapping and simulation of mitigation plans on the results of analyses conducted by the Local Government, village officials and community leaders in Kuta Village (Yoshida et al., 2009). This activity was carried out by involving representatives from the Local Government, the village community, including representatives of vulnerable groups in Kuta Village.

RESULTS AND DISCUSSION

He Affected the Population

Based on the survey results within the tsunami hazard zone, the total population and community members actively engaged in daily activities and exposed in the delineated area amounted to 10,007 individuals, comprising 5,246 females and 4,761 males. Among them, 1,250 individuals belong to vulnerable groups, including 952 toddlers, 41 elderly individuals (aged 70 and above), 31 persons with disabilities, and 226 individuals living in poverty. The gender ratio in Kuta Village is 91, signifying that for every 100 females, there are 91 males (Table 1).

Table 1. Distribution of Population Exposed to Tsunami

Group	Detail	Person
Gender	Female	5.246
	Male	4.761
	Total	**10.007**
Vulnerable Groups	Elderly	41
	Toddlers	952
	Persons with disabilities	31
	Individuals with Chronic Illnesses	-
	Impoverished Population	226
Time	Day	8.745
	Night	2.123

Compared to the total population residing in Kuta Village, the potential population exposed is nearly exhaustive. This condition is highly likely, influenced by the socio-cultural dynamics prevailing in the local area. It is recognized that Kuta Village is renowned as one of the regions in Central Lombok Regency with diverse tourist destinations, encompassing cultural, religious, and natural attractions, including the presence of the

Special Economic Zone (SEZ) Mandalika. Naturally, this attracts a considerable influx of visitors, both local and international (Haris & Ningsih, 2020).

Community Preparedness

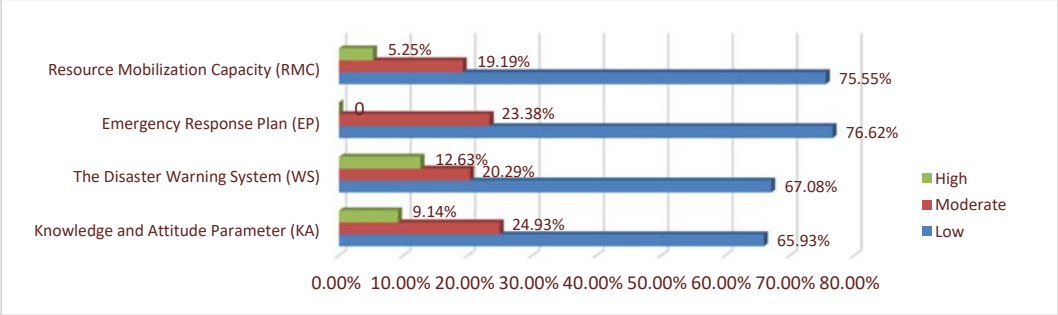

Figure 2. Kuta Village Preparedness Survey Results

The 2006 LIPI-UNESCO/ISDR instrument (Paramesti, 2011) is used for the assessment of community preparedness for each indicator. It is modified based on the type of disaster chosen (for example, only tsunami disasters are shown in (Figure 2), yielding a weighting score of 0–100% that is then included in the interval class (Table 2), with criteria ranging from Low to high.

Table 2. Interpretation of Disaster Preparedness scores

Interval	Criteria
≤ 0,333	Low
0,334 – 0,666	Moderate
0,667 – 1	High

When viewed in the form of an index on a maximum scale of 1, the household preparedness condition in tsunami-prone areas, as depicted in (Figure 3), indicates insufficiencies across the four preparedness aspects. The figure reveals that overall, respondents need improvement in the indices of knowledge, early warning, emergency response management, and resource mobilization. In this context, the respondents must enhance their knowledge index, as evidenced by a value of 0.26, signifying a limited understanding among the majority regarding tsunami disaster preparedness.

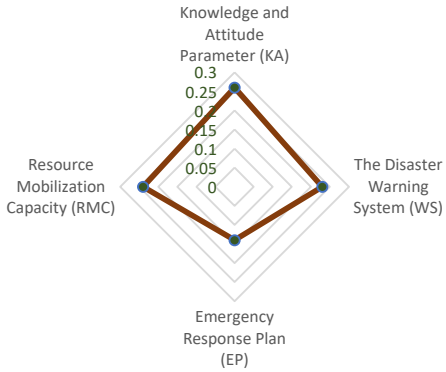

Figure 3. Community Preparedness Index

On the other hand, the early warning aspect has a value of 0.23, indicating a limited understanding among respondents regarding the Tsunami Early Warning System/TEWS developed by the government. In terms of emergency response management with a value of 0.14, it suggests that the majority of respondents lack emergency response plans, including the necessary preparations at the family level, in the event of a tsunami disaster. The mobilization aspect has a value of 0.24, explaining that a small number of respondents have participated in seminars/training related to disasters. The results of the assessment in Kuta Village, similar to those in Aceh and Jogja, show that the Tsunami Early Warning System and community emergency plans are also low aspects of community preparedness (Adiyoso & Kanegae, 2018).

To mitigate the impact of a tsunami disaster, improvement is crucial across these four components. Enhancing disaster knowledge is imperative to ensure that communities are aware of potential tsunami threats in their areas,

recognize natural signs that may precede a tsunami, and understand self-rescue measures during a tsunami event. Additionally, improving access to early warning systems is essential to enable communities to receive and respond effectively to tsunami hazard warnings.

Enhancing Risk Knowledge Pillar

The importance of education and knowledge in the risk management of tsunamis cannot be underestimated. Effective disaster risk reduction strategies can be developed and implemented through the involvement of communities, considering their local wisdom and traditional knowledge. For example, in disaster early warning through the reading of natural signs and notification of events through local language and beating traditional objects such as "kentongan" that make a sound to signal a disaster (Taufik & Pujayanti, 2024).

This concept of disaster education should be integrated into both formal and non-formal education systems, ensuring that all individuals have access to the necessary knowledge and skills (Triastari et al., 2021). community knowledge shapes the level of community preparedness. Efforts to disseminate knowledge through socialisation programmes and the active involvement of stakeholders have contributed to increased community awareness (Benazir et al., 2023).

Based on the survey results of household preparedness, it is evident that the knowledge capacity of the community in Kuta Village regarding tsunami disaster risk is still relatively low, with an index of 0.26. Despite Kuta Village having a historical experience of tsunamis, this condition does not seem to influence the local community's level of risk knowledge significantly. The close connection of the people in Kuta Village to coastal life, both in daily activities and various cultural rituals, does not provide a significant impact on the local community's disaster risk knowledge based on local wisdom. Given this context, the following recommendations are proposed to enhance the community's capacity in the knowledge pillar of disaster risk (Table 3).

Table 3. Knowledge Enhancement Recommendations

Enhancement Needs	Recommendations
Personal Knowledge of Potential Threats	• Regular and integrated tsunami hazard education in the community • Integration of Disaster-Based Education (tsunami) into school curricula • Socialization of tsunami hazard knowledge through social media, electronic platforms, etc.
Family-level knowledge of potential threats	• Tsunami hazard education by educated family members to others • Empowerment of disaster preparedness communities to disseminate knowledge of potential threats
Knowledge of tsunami warning signs	• Education on natural signs of a tsunami • Establishment of community groups concerned about tsunamis • Providing locally informed knowledge about determining the timing of maritime activities based on the lunar cycle affecting tidal movements.
Knowledge of self-rescue from disasters	• Installation of tsunami map information boards in crowded areas, public facilities, and tourist destinations • Periodic socialization and simulations • Education using visually engaging materials in the local language is easily understood by the community

Enhancing Early Warning Pillar

Early warning systems play a crucial role in tsunami mitigation efforts. By providing timely and accurate information about impending tsunamis, these systems can help communities enact evacuation plans, minimize loss of life, and reduce property damage. Furthermore, early warning systems can contribute to the overall preparedness of communities and enhance their resilience in the face of tsunami threats (Dias et al., 2024; Haigh et al., 2018).

Assessing tsunami risk mapping including tsunami arrival time pivotal for tsunami

preparedness, contributing to more effective early warning systems and evacuation strategies (Benazir & Oktari, 2024). Based on the results of the survey assessing the level of household preparedness, it is evident that the community's capacity in Kuta Village during tsunami disaster emergency response is still relatively low, with an index of 0.23. Therefore, the recommended community capacity-building measures (Table 4).

Table 4. Early Warning Enhancement Recommendations

Enhancement Needs	Recommendations
The effectiveness of disseminating early warnings from official sources.	Teaching people to listen/seek, and respond to early warnings from official sources

Enhancing Emergency Response Pillar

With the increasing frequency of tsunamis and their potential for devastating impacts, it is crucial to develop effective emergency response plans for tsunami mitigation. These plans should include personal evacuation plans, household evacuation plans, safe evacuation route plans, joint evacuation destination plans, provision of family health equipment, first aid capability, safekeeping of essential documents, preparation of emergency equipment and supplies, and access to clean water sources and emergency sanitation facilities (Angove et al., 2019; Nikolić et al., 2020).

The outcomes of the family preparedness survey reveal that the emergency response capacity of the community in Kuta Village regarding tsunami disasters is relatively low, with an index of 0.14. Despite prior evacuation simulations in Kuta Village, these efforts have proven insufficient in elevating the community's emergency response capabilities. Consequently, recommendations for enhancing community capacity in the domain of emergency response (Table 5). Similar patterns were observed in Aceh and Jogja, which had lower collective community capacity to respond to the tsunami threat (Adiyoso & Kanegae, 2018).

Table 5. Emergency Response Plan Enhancement Recommendations

Enhancement Needs	Recommendations	Implementers
Personal Evacuation Plans	• Develop understanding of self-protection techniques • Formulate individual evacuation strategies • Prepare personal disaster preparedness kits • Conduct periodic evacuation simulations	• Community, including vulnerable groups • Village Government • District Government
Household Evacuation Plan	• Planning how to evacuate the family • Prepare a family disaster preparedness bag	Community, including vulnerable groups
Safe Evacuation Route Plan	Develop a community evacuation procedure	Village Government
Joint Evacuation Destination Plan in the Event of a Disaster	Set evacuation destination with family agreement	Community, including vulnerable groups
Provision of Family Health Equipment	Provide and place family health kits that are easily accessible to all family members	Community, including vulnerable groups
First Aid Capability	• First aid education and socialization • Prepare a first aid kit per family • Prepare public health facilities to serve in emergencies	Village Government and District Government

Enhancement Needs	Recommendations	Implementers
Safekeeping of Essential Documents in a Secure Location	Formulating and agreeing upon designated areas for the storage of essential documents in secure locations	Community, including vulnerable groups
Preparation of Emergency Equipment and Supplies	Establishing and concurring on locations for the storage of emergency equipment and supplies that are easily accessible to all family members	Community, including vulnerable groups
Access to Clean Water Sources and Emergency Sanitation Facilities (MCK) for Use During Emergency Conditions	Providing and maintaining a clean water source and sanitation facilities (WASH) on a regular basis	Village Government

Enhancing Resource Mobilization Pillar

Based on the survey results on household preparedness, it is evident that the community capacity in the aspect of resource mobilization in Kuta Village is relatively low, indicated by an index of 0.24. Given that a significant portion of the community engages in informal livelihoods, recommendations for enhancing community capacity in resource mobilization (Table 6).

Table 6. Resource Mobilization Enhancement Recommendations

Enhancement Needs	Recommendations	Implementers
Disaster socialization and simulation	• Conducting periodic disaster preparedness socialization and simulations. • Evaluating the outcomes of regular disaster preparedness socialization and simulations.	Village Government and District Government
Ownership of assets that can be used when a disaster occurs	• Implementing integrated disaster financing strategies. • Establishing insurance coverage for home, vehicle, and/or productive land ownership. • Empowering communities for self-sustainable economic enhancement, given that a significant portion of the population engages in informal livelihoods.	• Local Government • District Government • Village Government

In the effort to enhance the utilization of this disaster risk study along with its resulting recommendations derived from root cause analysis and needs assessment, it is recommended to strengthen the aspects of program planning and governance. According to the Ministry of Home Affairs Regulation No. 114 of 2014, concerning Village Development Guidelines, Village Development Planning (PRD) refers to a step-by-step process organized by the village government involving the Village Consultative Body (BPD) and community stakeholders in a participatory manner for the utilization and allocation of village resources to achieve development goals. The mainstreaming of tsunami mitigation in village development planning involves integrating tsunami mitigation programs into the village development plan. Effective governance includes clear policies, coordination among stakeholders, and regular updates to disaster management plans (Sari & Soesilo, 2020). By integrating these tsunami mitigation programs, their implementation can become binding, more structured, and systematic, following the framework of the Village Development Plan (RPJM) applicable for a period of 6 years, which is then cascaded into the Village Work Plan (RKPD) for a one-year duration. RPJM and RKPD are established through Village

Regulations. Subsequently, RPJM and RKPD become prerequisites for determining the priority allocation of village funds for mitigation and disaster management programs, aligning with the village's authority. Learning from previous studies, programs such as The Disaster Preparedness Village (Kampung Siaga Bencana) in Yogyakarta Province emphasizes local leadership and government collaboration. Effective local leadership has empowered communities, facilitated resource utilization, and enhanced disaster management efforts (Ruslanjari et al., 2024)

Mitigation Recommendations

In the Medium-Term Development Plan of Central Lombok Regency for the period 2021-2026, Kuta Village has been identified as a tsunami-prone area. However, the effectiveness of disaster mitigation and management in this region is deemed suboptimal. Furthermore, the availability of mitigation facilities and infrastructure remains limited. The quantity and quality of disaster management personnel also require improvement. This presents a substantial agenda for the Central Lombok Regency government as a whole, with specific emphasis on the government of Kuta Village. It is crucial to note that systematic and directed disaster mitigation, particularly for tsunamis in Kuta Village, is imperative. Given Kuta's role as a driving force in the Mandalika Special Economic Zone with a focus on coastal tourism, it becomes paramount to address the heightened risk of tsunamis along the coastal areas. Strategic coastal management planning can be explored to serve as a protection zone for surrounding areas, including the coastal area of Kuta Village. Mitigation vegetation has emerged as an appropriate solution to mitigate the impact of tsunamis. In this regard, the effectiveness of coastal tsunami disaster mitigation, contributing to the stability of coastal ecosystems. (Benazir et al., 2024). Some of the recommended coastal vegetation includes in situ plants and pavement plants that can withstand tsunami waves such as *Hibiscus tiliaceus*, *Terminalia catappa*, *Acacia auriculiformis* (Benazir et al., 2024). Preserving natural resources like coastal forests can provide natural barriers against tsunamis and support long-term adaptation (Villagra et al., 2024).

The selected coastal vegetation not only has the function of resisting tsunami waves (environmental function) but also has the value (economic function) of supporting tourism in Kuta Village.

Non-structural mitigation involves a series of measures designed to reduce the risk or negative impact of natural disasters or events outside changes to buildings, infrastructure, and physical facilities. Non-structural mitigation focuses on efforts involving humans, communities, and management systems to reduce vulnerability to disasters. The basis for non-structural mitigation recommendations is the result of a family preparedness survey. Non-structural mitigation is crucial for enhancing individual and community preparedness, helping to reduce vulnerability, and minimizing the impact of disasters, such as casualties and property loss. Non-structural forms of mitigation include disaster education with local content, community capacity building through simulations and tsunami disaster preparedness drills. Building local capacity through training and education is essential. The experience from the Great East Japan Earthquake and Tsunami shows that capacity building at the local level enhances preparedness and adaptability (Pooyan & Hokugo, 2023). A combination of structural and non-structural mitigation measures is recommended as an effective strategy to prevent or minimize the consequences of hazards (Agussaini et al., 2022; Strusińska-Correia, 2017).

CONCLUSION

In general, community preparedness for tsunami threats based on the parameters of knowledge, early warning, emergency response management, and resource mobilization is relatively low. The research has identified significant gaps in the community's capacity for disaster preparedness, particularly in the areas of knowledge, early warning systems, emergency response, and resource mobilization. The household preparedness survey revealed low scores in these critical aspects, indicating a need for comprehensive measures to enhance the community's resilience to tsunami disasters. In conclusion, it is imperative to prioritize both structural and non-structural mitigation measures in Kuta Village to address the identified vulnerabilities.

The integration of tsunami mitigation programs into the village development plan is crucial for ensuring the systematic and binding implementation of these measures. This integration aligns with the Ministry of Home Affairs Regulation No. 114 of 2014, emphasizing the participatory process involving the Village Consultative Body and community stakeholders in

the allocation of village resources for disaster management programs. Furthermore, the study recommends enhancing disaster risk knowledge through formal and non-formal education systems, integrating disaster-based education into school curricula, and socializing tsunami hazard

knowledge through various platforms. Early warning systems and emergency response plans should also be strengthened, with a focus on community capacity-building measures to improve the effectiveness of disseminating early warnings and enhancing emergency response capabilities. However, the challenge in implementing these recommendations is the low level of public understanding of tsunamis and the tendency to not be aware of tsunami disasters because they are considered to hamper economic activities, including tourism, which is sensitive to the issue of tsunami hazard.

In addition to these measures, the study emphasizes the importance of implementing both structural and non-structural mitigation recommendations, such as maintaining coastal vegetation, developing personal and household evacuation plans, and providing access to clean water sources and emergency sanitation facilities. These recommendations aim to reduce vulnerability and minimize the impact of tsunamis on the community. Overall, the conclusions and suggestions highlight the need for a comprehensive and multi-faceted approach to enhance the community's disaster resilience and preparedness in tsunami-prone areas. By addressing the identified gaps and implementing the recommended measures, Kuta Village can significantly improve its capacity to mitigate the impact of tsunami disasters and protect the well-being of its residents.

However, in similar areas, such as tsunami-prone coastal areas where tourism is developing, such as Kuta Village, the recommendations could potentially be applied with adaptations. In addition, the primary survey also experienced limitations in terms of aspects and parameters of community-level preparedness such as culture and local wisdom, as well as other aspects of preparedness. Another limitation of this research is that numerical modelling of tsunamis was not conducted.

DAFTAR PUSTAKA

Adiyoso, W., & Kanegae, H. (2018). Tsunami-Resilient Preparedness Index (TRPI) as a Key Step for Effective Disaster Reduction Intervention. In *Sustainable Future for Human Security* (pp. 369–384). Springer Singapore. https://doi.org/10.1007/978-981-10-5433-4_25

Agussaini, H., Sirojuzilam, Rujiman, & Purwoko, A. (2022). A New Approach of the Tsunami Mitigation Strategies for the City of Banda Aceh, Indonesia. *Indonesian Journal of Geography*, *54*(1), 62–69. https://doi.org/10.22146/ijg.66500

Angove, M., Arcas, D., Bailey, R., Carrasco, P., Coetzee, D., Fry, B., Gledhill, K., Harada, S., von Hillebrandt-Andrade, C., Kong, L., McCreery, C., McCurrach, S. J., Miao, Y., Sakya, A. E., & Schindelé, F. (2019). Ocean observations required to minimize uncertainty in global tsunami forecasts, warnings, and emergency response. *Frontiers in Marine Science*, *6*(JUN). https://doi.org/10.3389/fmars.2019.00350

Benazir, & Oktari, R. S. (2024). Assessing tsunami risk along the Aceh coast, Indonesia: a quantitative analysis of fault rupture potential and early warning system efficacy for predicting arrival time and flood extent. *Natural Hazards*, *120*(5), 4875–4900. https://doi.org/10.1007/s11069-024-06401-x

Benazir, Syamsidik, Idris, Y., & Putra, N. P. (2023). Connecting community's perspectives on tsunami risk to anticipated future tsunamis: a reflection from a progress of tsunami preparedness from a coastal community in Aceh-Indonesia after 19 years of the 2004 Indian Ocean Tsunami. *Geoenvironmental Disasters*, *10*(1), 21. https://doi.org/10.1186/s40677-023-00252-7

Benazir, Triatmadja, R., Yuwono, N., Rahardjo, A. P., Kuswandi, Triatmodjo, B., & Nizam. (2024). Investigating the tsunami-mitigating properties of vegetated coastal areas in Pacitan Bay, Indonesia: A synergistic approach of numerical modelling and field observations. *Journal of Earth System Science*, *133*(1), 37. https://doi.org/10.1007/s12040-023-02242-7

BNPB. (2023). *Risiko Bencana Indonesia : Memahami Risiko Sistemik di Indonesia*.

Department of Population and Civil Registration. (2023). *Data {Kependudukan}*. Ministry of Home Affairs of the Republic of Indonesia. https://gis.dukcapil.kemendagri.go.id/peta/

Dias, N., Haigh, R., Amaratunga, D., & Rahayu, H. (2024). A review of tsunami early warning at the local level - Key actors, dissemination pathways, and remaining challenges. *International Journal of Disaster Risk Reduction*, *101*(December 2023), 104195. https://doi.org/10.1016/j.ijdrr.2023.104195

Felix, R. P., Hubbard, J. A., Bradley, K. E., Lythgoe, K. H., Li, L., & Switzer, A. D. (2022). *Tsunami hazard in Lombok and Bali , Indonesia , due to the Flores back-arc thrust*. 1665–1682.

Haigh, R., Amaratunga, D., & Hemachandra, K. (2018). A capacity analysis framework for multi-hazard early warning in coastal communities. *Procedia Engineering*, *212*(2017), 1139–1146. https://doi.org/10.1016/j.proeng.2018.01.147

Haris, A., & Ningsih, N. H. I. (2020). Impact Of Tourism On Community Development And Income In Kuta Mandalika Beach Kuta Village, Pujut District, Central Lombok. *JISIP (Jurnal Ilmu Sosial Dan Pendidikan)*, *4*(3), 353–362. https://doi.org/10.58258/jisip.v4i3.1225

Horspool, N., Pranantyo, I., Griffin, J., Latief, H., Natawidjaja, D. H., Kongko, W., Cipta, A., Bustaman, B., Anugrah, S. D., & Thio, H. K. (2014). A probabilistic tsunami hazard assessment for Indonesia. *Natural Hazards and Earth System Sciences*, *14*(11), 3105–3122. https://doi.org/10.5194/nhess-14-3105-2014

KATO, K., & TSUJI, Y. (1995). Tsunami of the Sumba earthquake of August 19, 1977. *Journal of Natural Disaster Science*, *17*(2), 87–100.

Kementerian Dalam Negeri. (2023). *Data Kependudukan*. Data Kependudukan.

Latief, H., Imamura, F., & Puspito, N. (2000). Tsunami Catalog and Zones in Indonesia. *Journal of Natural Disaster Science*, *22*(1), 25–43. https://doi.org/10.2328/jnds.22.25

LIPI, DLR, & UNU-EHS. (2011). GUIDELINE FOR TSUNAMI RISK ASSESSMENT IN INDONESIA SCIENTIFIC PROPOSAL FOR PRACTITIONER AND END USERS Indonesian-German Working Group on Tsunami Risk Assessment. *Provided by the Indonesian – German Working Group on Tsunami Risk Assessment*.

Nikolić, V., Galjak, M., & Taradi, J. (2020). Disaster risk management and community resilience. *Sigurnost*, *62*(2), 151–160. https://doi.org/10.31306/s.62.2.3

Nilawati, & Umar, G. (2019). Study of the Potential of Kuta Mandalika Beach. *Science and Environmental Journals for Postgraduate*, *1*(2), 32–38.

Paramesti, C. A. (2011). Kesiapsiagaan Masyarakat Kawasan Teluk Pelabuhan Ratu Terhadap Bencana Gempa Bumi dan Tsunami. *Journal of Regional and City Planning*, *22*(2), 113. https://doi.org/10.5614/jpwk.2011.22.2.3

Pooyan, Z., & Hokugo, A. (2023). *Community Resilience Through Recovery: Capacity Building and Sustainability* (pp. 321–344). https://doi.org/10.1007/978-3-031-24541-1_15

Pradjoko, E., Kusuma, T., Setyandito, O., Suroso, A., & Harianto, B. (2015). The Tsunami Run-up Assesment of 1977 Sumba Earthquake in Kuta, Center of Lombok, Indonesia. *Procedia Earth and Planetary Science*, *14*, 9–16. https://doi.org/10.1016/j.proeps.2015.07.079

Pusat Studi Gempa Nasional (PuSGeN). (2017). *Peta Sumber dan Bahaya Gempa Indonesia Tahun 2017*. Balitbang Kementerian PUPR.

Ruslanjari, D., Putri, R. A. P., Puspitasari, D., & Sulistiyo, S. (2024). Embracing leadership of local actors and community in disaster risk reduction of Yogyakarta. *Jàmbá: Journal of Disaster Risk Studies*, *16*(1). https://doi.org/10.4102/jamba.v16i1.1679

Sari, D. A. P., & Soesilo, T. E. B. (2020). Measuring Community Resilience to the Tsunami Disaster (Study of Sukarame Village, Carita District, Pandeglang Regency). *IOP Conference Series: Earth and Environmental Science*, *448*(1), 012092. https://doi.org/10.1088/1755-1315/448/1/012092

Shalih, O., Setiadi, H., Nurlambang, T., & Sumadio, W. (2020). Toward a community resilience framework for disaster risk management. a case study: Landslide Cisolok in Sukabumi 2018 and Sunda strait tsunami in Pandeglang 2018. *E3S Web of Conferences*, *156*. https://doi.org/10.1051/e3sconf/202015601011

Strusińska-Correia, A. (2017). Tsunami mitigation in Japan after the 2011 Tōhoku Tsunami. *International Journal of Disaster Risk Reduction*, *22*(February), 397–411. https://doi.org/10.1016/j.ijdrr.2017.02.001

Taufik, M. Z., & Pujayanti, L. P. V. A. (2024). Kearifan Lokal Dalam Penanggulanganan Bencana Gempa Bumi Dan Sistem Pewarisannya di Pulau Lombok Nusa Tenggara Barat. *Jurnal Ilmu Pemerintahan Suara Khatulistiwa*. https://api.semanticscholar.org/CorpusID:275395806

Triastari, I., Dwiningrum, S. I. A., & Rahmia, S. H. (2021). Developing Disaster Mitigation Education with Local Wisdom: Exemplified in Indonesia Schools. *IOP Conference Series: Earth and Environmental Science*, *884*(1). https://doi.org/10.1088/1755-1315/884/1/012004

Villagra, P., Lillo, O. P. y, Herrmann-Lunecke, M. G., Aranguiz, R., & Baez, A. (2024). A nature-based exploration of resilience capacity in coastal settlements exposed to tsunamis along the southern Pacific coast. *International Journal of Disaster Risk Reduction*, *114*, 104978. https://doi.org/10.1016/j.ijdrr.2024.104978

Wardani, N. N. S. K., Suarbawa, K. N., & Kusnandar, R. (2021). Penentuan jenis sesar pada gempa bumi Lombok tanggal 1 Juli sampai 31 Desember 2018 menggunakan metode mekanisme fokus determination of fault type of Lombok earthquakes from July 1 to using focal mechanism method. *Buletin Fisika*, *22*(2), 91–96.

Yoshida, Y., Takeuchi, Y., & Shaw, R. (2009). *Chapter 10 Town watching as a useful tool in urban risk reduction in Saijo* (pp. 189–205). https://doi.org/10.1108/S2040-7262(2009)0000001014