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Original Article

The Coordination and Capacity: Evaluation of Institutional Preparedness for Tsunami Risk Reduction in the Coastal Tourism Destination of Pacitan Bay, East Java

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ABSTRACT
Institutional preparedness for tsunamis in coastal tourism destinations, such as Pacitan Bay, is a critically understudied area. This qualitative research evaluates this preparedness through in-depth interviews with ten key stakeholders, including government agencies (BMKG, BPBD, BAPPEDA), local tourism offices, community groups (POKDARWIS), the private sector, and local business owners. A consensus exists on the high tsunami risk, attributed to the bay's morphology and tectonic activity. While core strategies like hazard mapping, contingency planning, and early warning systems have been initiated, their implementation is hindered by three main constraints: (1) limited budgets leading to poor infrastructure maintenance, (2) weak and sporadic cross-sector collaboration, and (3) a lack of vertical evacuation facilities and tourist-specific education. The study concludes that institutional preparedness is at a developmental stage with multidimensional challenges. Therefore, it recommends an integrated intervention framework built on three pillars: (a) sustainable budgeting in local government and village funds, (b) structured collaboration using the Penta-helix model, and (c) local capacity strengthening via regular drills and a digital tourist information system. These recommendations are designed to bridge the gap between planning and action, thereby building operational resilience for the long-term sustainability of the Pacitan Bay coastal tourism destination.

KEYWORDS
Institutional Preparedness; Coastal Tourism; Tsunami; Pacitan Bay

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INTRODUCTION

Tourism defined as a temporary travel activity for recreation (Mahdayani, 2009) supported by various facilities (Law No. 10 of 2009), serves as a crucial driver of regional economies (Karini, 2018). Tourism is a travel activity undertaken by an individual or group of people with the aim of visiting a place for recreation, personal

development, or to experience the unique attractions of the destination within a relatively short or temporary period (Irsanti & Aliyah, 2020).Here are four key factors in tourist travel: (1) it is temporary, (2) it involves travel to another location, (3) it is related to recreation, and (4) the traveler does not seek a livelihood at the destination. This distinguishes tourists from migrants or commuters. The UNWTO defines a visitor as a person traveling outside their usual environment for no more than 12 months without the purpose of employment. Meanwhile, Isdarmanto (2017) explains that the elements of tourism include: (1) tourist attractions (natural or artificial), (2) supporting facilities (accommodation, transportation, culinary), (3) accessibility (means to reach the destination), and (4) hospitality : destination and management (Suwena & Widyaatmaja, 2017).

Coastal tourism, specifically, is a significant regional economic engine that simultaneously faces systemic vulnerability (Calgaro, Dominey-Howes, & Goff, 2014). Its inherent characteristics such as high infrastructure density, reliance on image, and spatial concentration—render it acutely vulnerable to natural disaster shocks (Hizbaron, Kurniawan, & Setiawan, 2018). In Indonesia, over 50% of priority tourist destinations are coastal, yet only 35% possess specific tsunami contingency plans (Bappenas, 2020). This risk is multifaceted: tsunamis threaten not only lives and physical assets but also damage a destination's image and can trigger prolonged economic losses of up to 70% of local tourism GDP, as evidenced after the 2006 Pangandaran tsunami (Min, Lee, & Chung, 2020). Consequently, building resilience through robust preparedness is no longer an option but a strategic imperative for coastal areas like Pacitan Bay.

Tsunami waves, triggered by sudden deformation on the seabed (BNPB, 2018; Maemunah et al., 2023), pose a direct threat to the concentration of tourism activities and settlements along the Pacitan Bay coastline. Therefore, the primary urgency of this research is to build resilience in this vital tourism sector by strengthening institutional preparedness, a key determinant in reducing disaster vulnerability and impact (Rosyidie, 2004; UNISDR, 2015). Currently, tsunami risk studies in Indonesia remain dominated by technical-physical approaches, such as inundation modeling and early warning systems (Latief & Hadi, 2000; Muhari et al., 2017). In contrast, the global tourism disaster management literature more frequently discusses the emergency response and recovery phases in mature destinations (Orchiston, Prayag, & Brown, 2016).

A critical analytical gap exists: there has been no study that integrates an analysis of "collaborative institutional governance with specific tsunami preparedness systems in the context of Indonesia's secondary coastal destinations." Previous studies tend to be fragmented: Hizbaron et al. (2018) measured tourism spatial vulnerability, Marpaung, Hayati, and Febriandi (2024) discussed post-disaster recovery strategies, yet in-depth analysis of the dynamics, barriers, and synergy patterns among multi-stakeholder institutions in the pre-disaster phase remains highly limited.

The novelty of this research lies in the "Analysis of multi-stakeholder institutional configuration and its effectiveness in building specific tsunami preparedness in a secondary coastal tourism destination." Pacitan is selected as a theoretically significant case study because it represents a rapidly developing destination typology (with a 48% growth in visits over 4 years), is heavily reliant on coastal tourism economics (over 60% of local businesses are tourism-related), faces a tangibtectonic threat with a potential tsunami arrival time of less than 30 minutes (BMKG, 2019), yet possesses relatively limited institutional capacity and resources compared to primary destinations. This context allows the research to uncover the realities of preparedness governance in resource-constrained areas, which in fact represent the condition of the majority of Indonesia's coastal destinations.

This study addresses this gap by proposing and testing a conceptual model that integrates three key elements: (1) the systemic characteristics of coastal tourism destinations, (2) preparedness capacity, and (3) the configuration of collaborative governance.The framework by Hystad and Keller (2008) on collaborative disaster governance in tourism is critically adapted to the context of tsunami threats in Indonesia, emphasizing dimensions of coordination, distribution of authority, and integration of resources among stakeholders. Figure 1.

Based on the figure, the hierarchical structure of tourism disaster preparedness stakeholders consists of three tiers: primary stakeholders (disaster management authorities and tourism authorities) as top-level policymakers, who then interact with secondary stakeholders through coordination and facilitation. Subsequently, these secondary stakeholders coordinate with tertiary stakeholders, namely tourism businesses as operational implementers in the field, forming a flow of communication and policy implementation from the strategic to the practical level.

The objectives of this research are to: (1) evaluate the extent of institutional tsunami preparedness in Pacitan Bay based on four pillars: policy, planning, resources, and coordination; (2) assess collaboration among key stakeholders within the preparedness system; and (3) identify inhibiting and enabling factors for institutional effectiveness, along with strategic recommendations for strengthening integrated preparedness governance.

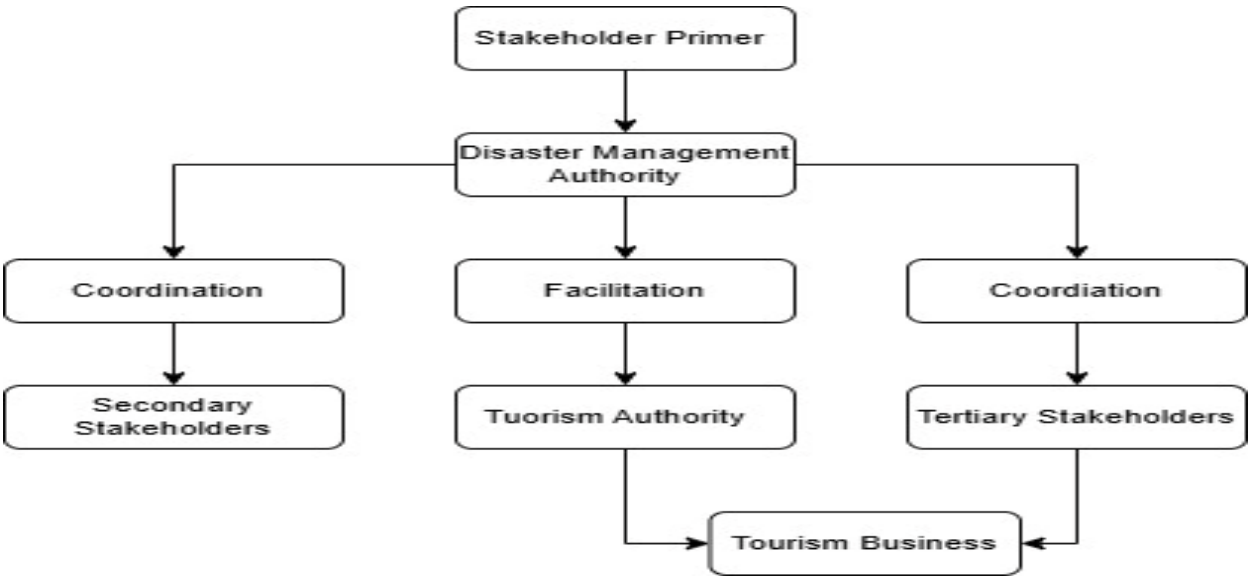

Figure 1. Collaborative Governance in Tourism Pre-Disaster Management
Source: Adapted from Hystad and Keller (2008)

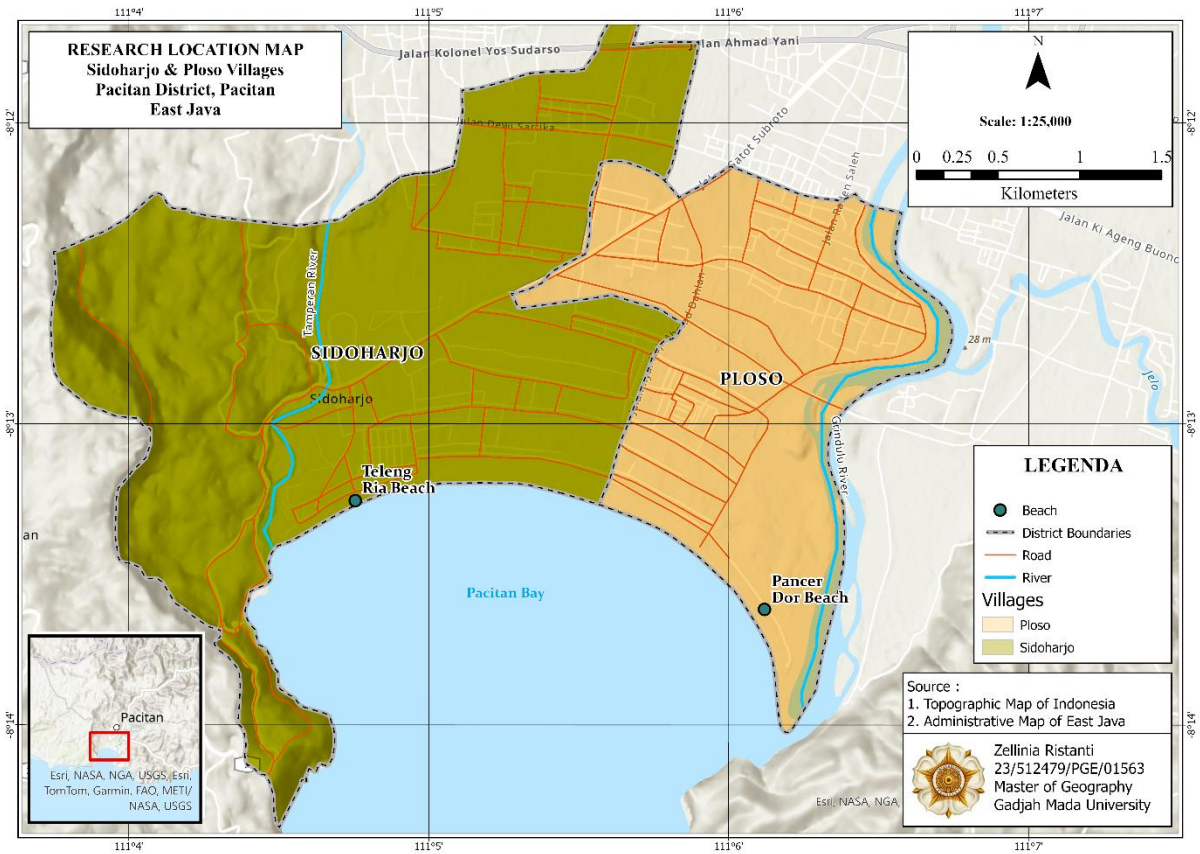

Figure 2. Research Location

Source: Research Data Processing Results in 2025

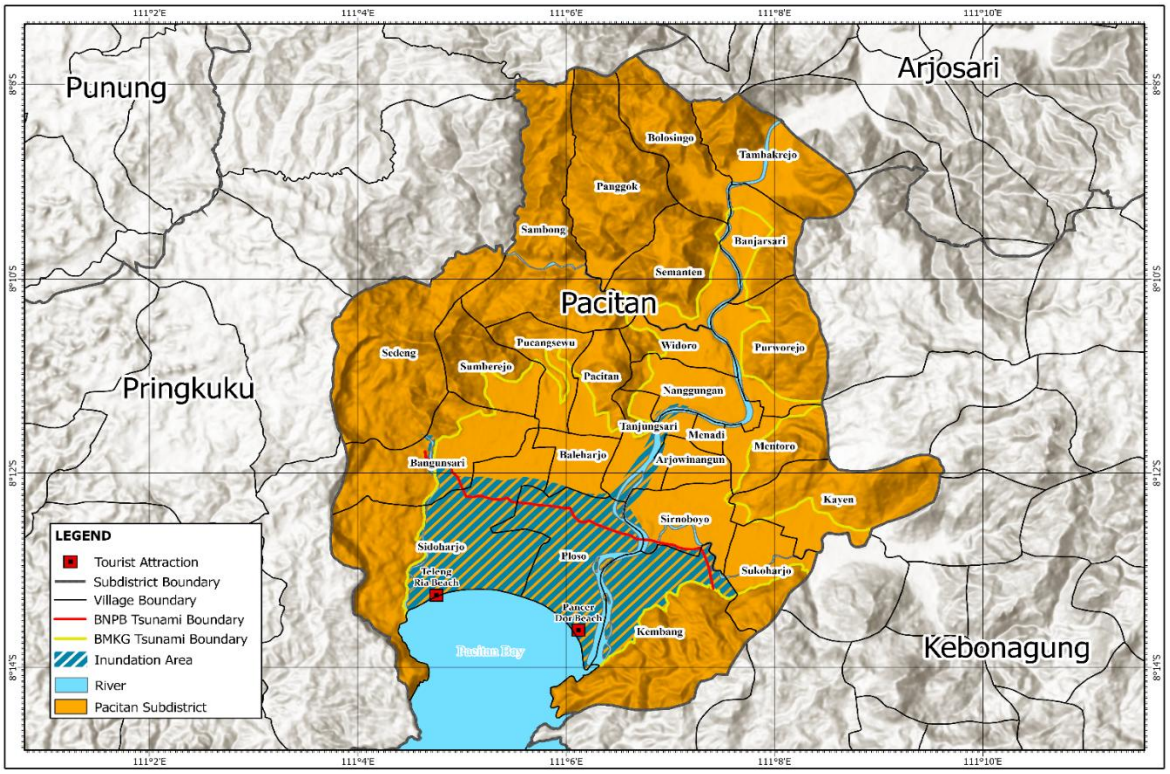

Figure 3. Tsunami Inundation Map of Pacitan Bay
Source: Research Data Processing Results in 2025

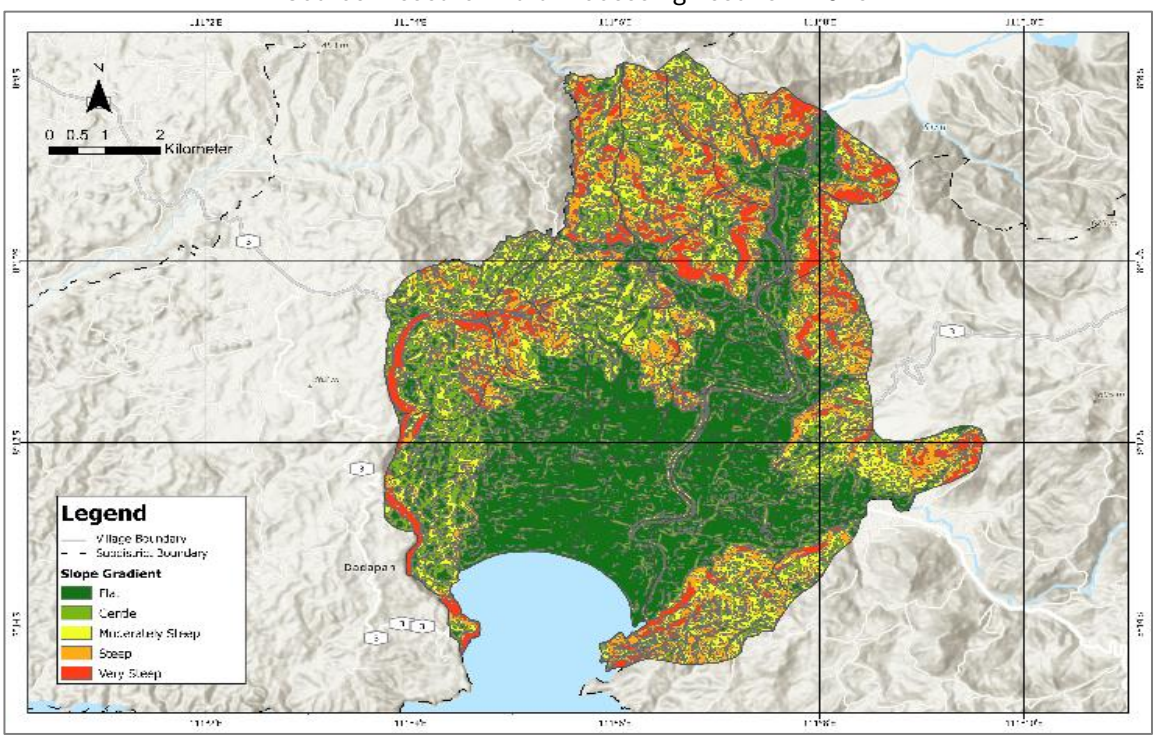

Figure 4. Slope Gradient Map of Pacitan Bay
Source : Research Data Processing Results in 2025

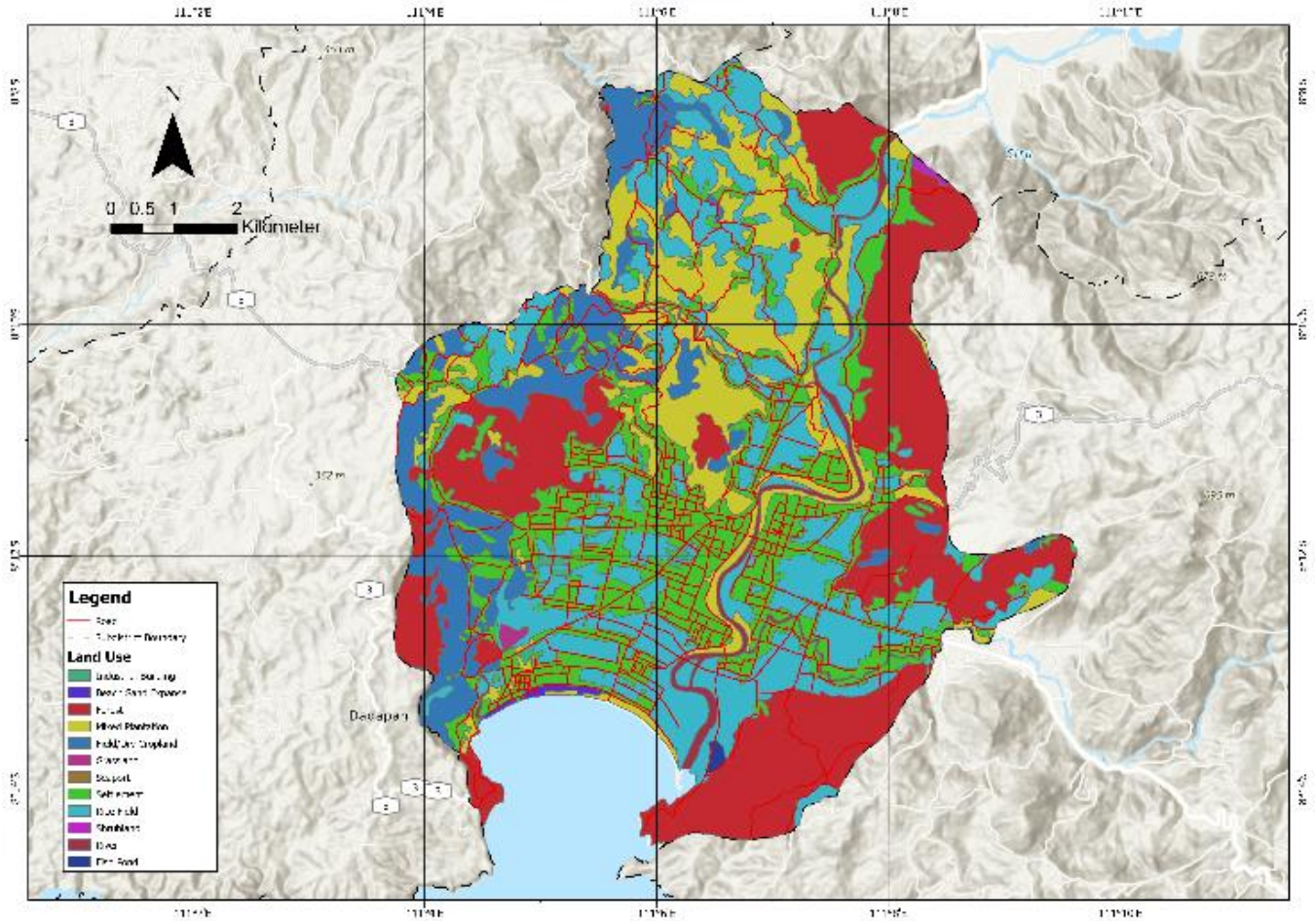

Figure 5. Land Use Map of Pacitan Bay
Source : Research Data Processing Results in 2025

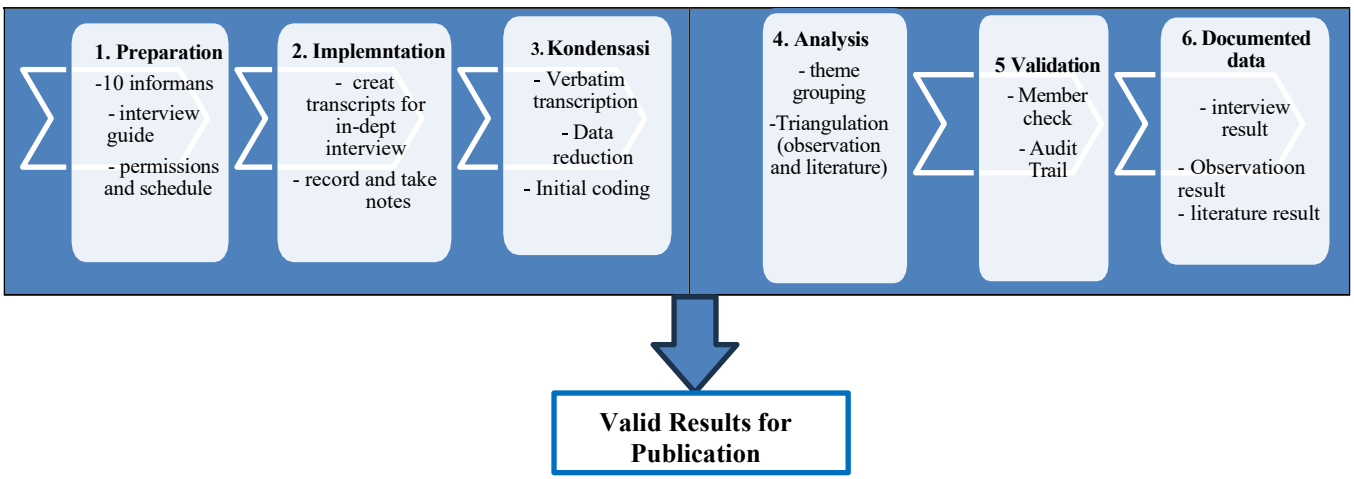

Figure 6. Research Procedure
Source: Research Data Processing Results in 2025

METHOD

Research Location

This study was conducted in Pacitan Bay, which includes two urban villages (*kelurahan*), namely Ploso and Sidoharjo, within the Pacitan District, located at 8° - 8.5° S and 111° - 111.5° E. The selection of this location is based on its unique geomorphological characteristics as a semi-enclosed bay on the southern coast of Java, directly facing the Indian Ocean, resulting in complex coastal and marine dynamics. Pacitan Bay is part of the Gombong Karst (Sewu Mountains) area, forming a wide, open basin along Java's southern coast. Its position, flanked by karst hills and directly exposed to the Indian Ocean, makes it ecologically sensitive, with significant fishing and tourism activities for the local community. Understanding the oceanographic conditions and ecosystem of this bay is crucial as a foundation for sustainable coastal area management (Damayanti et al., 2019; Purwanto et al., 2020). The research subjects were 10 key informants selected for in-depth interviews based on the framework by Hystad and Keller (2008): primary (BMKG, BPBD, BAPPEDA), secondary (Tourism Office, PT. El-John Tirta Emas), and tertiary (Tourism Awareness Group/POKDARWIS, hotel business owners, culinary establishment managers).

Research Approach

This study employs a qualitative approach with a case study design in the coastal tourism area of Pacitan Bay, East Java. According to Sutikno and Hadisaputra (2020), a qualitative approach is a process for selecting, classifying, and organizing data, and then interconnecting these data to draw conclusions. Although a questionnaire survey will be conducted at two beach locations, the preparedness analysis results are generalized for the entire research area (Kanhai et al., 2016). Questions related to institutional preparedness include:

1. Perception of Threat Risk
2. Views on Preparedness Plans
3. Evaluation and Infrastructure Plans
4. Preparedness Strategies: Implemented and Pending
5. Barriers to Preparedness
6. Attitude towards Collaboration Among Stakeholders

Research Procedure

In general, this research was conducted in several stages, with six main stages (preparation, implementation, kondensasi, analysis, validation, documented data) carried out in this study as shown in Figure 6.

Data Collection Instruments

Primary data were collected through in-depth interviews with ten key informants using a research instrument, namely an in-depth interview guide containing questions on: 1) Threat Risk Perception, 2) Views on Preparedness Plans, 3) Evaluation and Infrastructure Plans, 4) Preparedness Strategies (Implemented and Pending), 5) Barriers to Preparedness, and 6) Attitudes Towards Inter-Stakeholder Collaboration. The interviews focused on risk perception, preparedness strategies, barriers, inter-agency collaboration, and related data (coordinate points and area conditions) based on field surveys with area plotting. Secondary data used included: (1) Tsunami Disaster Vulnerability Maps from the Pacitan Regency BPBD via the official Inarisk website, (2) Historical Tsunami Data from the Pacitan Regency BPBD, (3) Tsunami-related Hazard Maps by BMKG or BPBD, (4) Regency-level Tsunami Contingency Plan Documents from BPBD, (5) Relevant laws and regulations, and (6) Government standing protocols or other reports related to tsunami preparedness planning.

Data Analysis

Interview data were input into the NVIVO application, then analyzed thematically according to specific themes and examined using descriptive statistical techniques. The findings were presented in tables and figures to enhance clarity. The process was conducted manually, beginning with the creation of response codes from informants based on general themes. These codes were then reviewed, refined, and described, and a category matrix (Miles & Huberman, 1994) was utilized to ensure consistency.

Analysis Stages:

1. Transcription and Familiarization: Interview recordings were converted into verbatim text and read repeatedly to understand the context.
2. Semantic (In-Vivo) Coding: Codes were created based on the explicit meaning of informants' responses (e.g., code "C1": "Cross-sectoral coordination is not yet

optimal").

3. Theme Development: Codes were grouped into deductive themes according to the research questions, for example, the theme "Institutional Barriers" (includes codes B1, B2).
4. Emerging Latent Themes: Latent themes that arose outside the interview questions were also noted. These require in-depth analysis to uncover underlying ideas, assumptions, or paradigms not explicitly stated by informants. Example of a latent theme:
    - Transcript data (explicit): "We have coordinated with the Tourism Office, but they are busy with tourism promotion agendas."
    - Semantic Theme: "Cross-sectoral coordination is hindered by busy schedules."
    - Latent Theme: "Economic development priorities are considered more urgent than disaster mitigation," or "The weak position of BPBD within the regional government hierarchy."
5. Thematic Validation: Themes were reviewed by comparing responses across informants and conducting member checks with participants.

RESULT AND DISCUSSION

This study examines risk perception, strategies, barriers, collaboration, and the significance of tsunami preparedness in the Pacitan Bay tourism destination. Field findings are critically discussed with relevant theories and previous research to provide academic context and validity. In general, despite the presence of risk awareness and various strategic efforts, the implementation of preparedness still faces significant challenges related to coordination, budget, and sustainability.

a. Tsunami Risk Perception

Based on the interviews, all stakeholders acknowledged that the tsunami potential along the coast of Pacitan Bay is high. However, nuances in understanding varied according to their roles and knowledge. Emergency authorities provided scientific explanations linking the hazard to the concave coastal morphology (bay) and the subduction activity of the Indo-Australian and Eurasian plates. This explanation aligns with the findings of Muhari et al. (2015), which indicate that coastal morphology, particularly a concave bay shape, is a key factor in amplifying tsunami wave height and extending inundation reach. Meanwhile, the tourism sector and the Community and Village Empowerment Office (PMD) tended to associate the risk more generally with the bay's geographical position. At the community and business actor level, awareness of this potential was often accompanied by reliance on the mitigation efforts of agencies such as BPBD, coupled with a form of risk acceptance blended with vigilance and certain beliefs. This variation in perception confirms the findings of Karmila (2022) in Palu, which show that community knowledge about tsunamis can be high but does not always correlate proportionally with adequate preparedness attitudes and behavior. This phenomenon highlights a critical gap between cognitive understanding and tangible action.

The risk perception of coastal communities and businesses around the tourism destination is heavily influenced by public information and community literacy, which have shaped a distinct social reality. This aligns with the study by Putri et al. (2025), which states that geographical proximity to hazard sources, such as in the coastal area of Pacitan Bay, plays a crucial role in shaping risk awareness and the preparedness of local communities. Information obtained from the media is essential for building vigilance. However, on the other hand, excessive media coverage has the potential to cause anxiety and even skepticism, ultimately impacting tourist visits and the local economy. This finding is consistent with research by Marliani et al. (2019) in Pangandaran, which revealed that media reporting on tsunami threats can significantly influence tourist risk perception and travel decisions. This complexity underscores the need for appropriate risk communication strategies to promote proactive preparedness without triggering panic or indifference.

Based on the official report from BMKG (2021), seismic activity in Pacitan has increased significantly, with a predicted potential for an 8.7 Mw megathrust earthquake that could trigger a tsunami of up to 22 meters.Recent seismic analysis indicates the presence of a seismic gap in the Java southern subduction zone, with the potential to trigger a significant megathrust earthquake relevant to Pacitan (Griffin et al., 2020; Muhari et al., 2022). Should such an event occur, the semi-enclosed bay morphology of Pacitan Bay has the potential to amplify the height and reach of tsunami waves, thereby extending its destructive impact (Putra et al., 2023). This combination of threat characteristics and the vulnerability of the coastal tourism area makes the strengthening of institutional preparedness a strategic imperative (Daryono, 2021). Warnings of this scenario

have influenced public risk perception and reinforced the urgency of building a resilient preparedness system.

b. The Importance of Tourism Preparedness Planning

All stakeholders agree that tsunami preparedness planning is crucial for the sustainability of tourism in Pacitan Bay. The reasoning is multidimensional, encompassing safety, economic, and marketing aspects. From a safety perspective, preparedness is a mandatory preventive measure (BMKG) to protect lives, in line with the basic principles of responsible tourism (Wilks et al., 2017). This simultaneously builds a sense of safety and trust among tourists, which is a key factor in their decision to visit (Rittichainuwat & Chakraborty, 2012).

Regarding economic and marketing aspects, BAPPEDA and the Tourism Office view this investment as a strategy to protect assets and ensure business continuity. This perspective aligns with a paradigm shift that sees preparedness not as a burden but as an investment in destination resilience (Cahyanto et al., 2016). Destinations perceived as prepared and safe have higher competitiveness and recover more quickly after a disaster (Calgaro et al., 2014).

Warnings from the PMD Office and PT El-John about the risk of economic devastation and regional vulnerability emphasize that disaster impacts are systemic (Ghaderi et al., 2022). Meanwhile, statements from the Tourism Awareness Group (POKDARWIS) on the importance of integrating preparedness without disrupting tourism elements identify the real challenge in risk communication, also found in other destinations (Orchiston & Hughes, 2020). This consensus indicates a good level of awareness. However, the next step is to translate this awareness into tangible action by mainstreaming preparedness into every aspect of sustainable tourism planning and development (UNDRR, 2019).

c. Preparedness Strategies

Tsunami preparedness in the Telengria Beach and Pancer Dor tourism destinations involves various cross-sectoral stakeholders, with BMKG and BPBD playing dominant roles in strategy formulation.

One of BMKG's primary strategies is the development of tsunami hazard maps, which serve as a foundation for understanding regional characteristics, potential resources, and considerations in development planning and mitigation. These maps visually illustrate the potential and worst-case impact scenarios of tsunamis in Pacitan Bay, aiming to ensure maximum preparedness so that the community can better face smaller-scale tsunamis and minimize casualties should the worst-case scenario occur. These findings align with the academic study by Jumadi et al. (2024), which modeled three tsunami scenarios in Pacitan Bay using seismic data and GIS analysis. That study predicted wave heights between 3.5 and 6.28 meters and identified areas prone to inundation as well as the locations.

BPBD primary strategy has been to integrate Contingency Plans, conduct training, and develop the Indonesian Tsunami Early Warning System (InaTEWS). However, field implementation faces real challenges. BPBD has also prepared evacuation route maps through collaboration with third parties, but these maps have not been installed in every sub-district.The evacuation route map, developed in collaboration with a third party, is only available in Sidoharjo Sub-district with outdated information, while in Ploso Sub-district the map is not installed due to the presence of hazardous footpaths under the JLS bridge that are unsuitable as evacuation routes.

Figure 7. Evacuation Route Map in Sidoharjo Sub-district
Source: Field Documentation (2025)

From an infrastructure standpoint, the distribution of evacuation signs is uneven (11 signs in total), and the evacuation route map is only available in one sub-district. There are 8 signs in Ploso and 17 signs in Sidoharjo, along with 8 early warning devices across the regency. However, one device in Cuwik, Ploso Sub-district, was reported as damaged based on a January 2025 test. As a follow-up, the installation of two new command-based tsunami sirens in Sidoharjo Sub-district is currently

underway. The availability of tsunami early warning sirens in Pacitan remains limited and is prone to damage due to coastal corrosion and insufficient maintenance budgets. This condition has the potential to reduce the effectiveness of early warning dissemination and lower the community's level of preparedness. This finding aligns with research by Syamsidik et al. (2020), which emphasizes the importance of reliable information and communication technology, as well as Spahn et al. (2010), who state that implementing an early warning system, though a government responsibility, requires the active involvement of all community components. The condition of the existing early warning devices in Pacitan Bay can be seen in Figures 8 and 9 below.

Based on tsunami sign data from BPBD available in Pacitan Bay, there are a total of 11 signs: 8 in Ploso Sub-district and 3 in Sidoharjo Sub-district, as shown in the following figures 10 - 12.

Figure 8. Damaged Tsunami EWS in Cuwik, Ploso Sub-district
Source: Pacitan Regency BPBD (2025)

Figure 9. EWS 1 in Teleng Area, Sidoharjo Sub-district
Source: Pacitan Regency BPBD (2025)

Figure 10. Evacuation Sign at Telengria Beach, Sidoharjo Sub-district
Source: Researcher Documentation (2025)

Figure 11. Evacuation Sign at Pancer Dor Beach, Ploso Sub-district
Source: Researcher Documentation (2025)

Figure 12. Evacuation Sign (Assembly Point) at Pancer Dor Beach, Ploso Sub-district
Source: Researcher Documentation (2025)

Figure 13. Interview with the Community and Village Empowerment Office (Dinas PMD)
Source: Researcher Documentation (2025)

Figure 14. Processed Products from BUMDES
Source: Researcher Documentation (2025

The Community and Village Empowerment Office

(Dinas PMD) has outlined a strategy for developing processed products from Village-Owned Enterprises (BUMDES) for emergency situations. This aligns with promoted ecosystem-based mitigation initiatives, such as mangrove planting. This approach is supported by the study by Alongi (2008), which demonstrated the effectiveness of mangrove forests in dissipating tsunami wave energy, thereby not only reducing physical risk but also building socio-economic resilience within the community.

d. Preparedness Strategies That Have Not Been Implemented

BMKG has established a tsunami-ready program; however, this program has not yet been fully implemented, with efforts concentrated on only one village. The Tourism Awareness Group (POKDARWIS) at Pancer Dor Beach also noted the absence of efforts to measure abnormally receding ocean water levels—a precursor to tsunamis or the observation of sea level anomalies using tide gauges and sirens, which are not available at all key points. According to the Tourism Office and PMD, there has been no notification or educational outreach to beach visitors regarding potential disasters. Additionally, improvements are needed in road access to tourist sites and public facilities around the beaches. Community training with BPBD on disaster preparedness in vulnerable areas is not conducted regularly, occurring only 2–3 times a year and limited to agency personnel.

This aligns with the statement from the owner of a conservation area and hotel at Pancer Dor Beach, who mentioned that while some mitigation training had been conducted, they were never involved as it was only targeted at vendors. Furthermore, beach visitors have never received briefings on disasters; warnings are limited to wave conditions and education on suitable surfing spots. Additionally, according to a culinary business manager at Telengria Beach, they are unaware of the existence of designated temporary or final evacuation sites, nor have earthquake-resistant buildings been established. Field observations confirmed the absence of Final Evacuation Sites, with only a few assembly points and limited earthquake-resistant structures available. Many visitors remain uninformed about the disaster risks along Pacitan Bay, which is a significant setback in self-protection efforts and preparedness for potential tsunamis.

This research reveals a substantial gap between planned and implemented strategies. Several key strategies have never been executed, such as tourist education, training involving all business actors, and the development of adequate Temporary/Final Evacuation Sites (TES/TEA). This gap reflects common challenges also identified by Esteban et al. (2017) in their study of tsunami preparedness across various countries, namely the complexity of multi-stakeholder coordination and limited resources at the local level.

e. Barriers

This study identifies barriers in tsunami preparedness planning, influenced by the diverse characteristics of stakeholders. The main barriers are multidimensional and interrelated. Chronic budget constraints are the root cause (LIPI-UNESCO/ISDR, 2006), directly impacting the maintenance of vulnerable early warning infrastructure, unsustainable socialization programs, and the construction of vertical evacuation facilities (Temporary/Final Evacuation Sites). This is a common phenomenon in disaster-prone areas with limited fiscal capacity (Djalante et al., 2017). Consequently, preparedness programs often take the form of incidental projects dependent on central or donor funding, rather than being part of routine local budgets (Muttarak & Pothisiri, 2013).

This budgetary barrier has a cascading effect on institutional and coordination aspects. Inter-agency coordination, particularly between technical sectors (BMKG, BPBD) and the tourism sector and business actors, tends to be weak and incidental, as identified in studies of Bali destinations (Calgaro et al., 2014). This weakness is exacerbated by irregular and incomplete socialization, so knowledge does not become internalized into automatic responsive attitudes and behaviors (Paton et al., 2008). Research by Nugroho et al. (2020) in Southern Java also notes that without regular drills, knowledge of evacuation procedures is quickly forgotten. At the community level, barriers are reinforced by traditional mindsets and high place attachment, which can reduce risk perception and lead to resistance to relocation or the construction of mitigation infrastructure (Gaillard et al., 2019). This constellation of institutional, financial, and socio-cultural barriers closely resembles the findings of the national study by LIPI-UNESCO/ISDR (2006).

A particular complexity in tourism areas arises from the dynamic tourist population with minimal understanding. Tourists are often far less prepared than local residents, as reported in studies of earthquake-

prone Mediterranean regions (Bird et al., 2010). The absence of formal mechanisms to deliver disaster information to visitors, such as through hotel check-ins or tour operators, represents a major gap in the warning system (Becken & Hughey, 2013). Therefore, developing digital information systems and integrating safety modules into tourism business certification is necessary (Priyanto et al., 2021). Specifically at the study site, the absence of a Village-Owned Enterprise (BUMDES) at Pancer Dor Beach hinders the potential for local fundraising and self-management of community-based preparedness programs. This reinforces the findings of Daly et al. (2017) that the presence of strong local institutions is a key factor in the sustainability of preparedness. Thus, the barriers in Pacitan Bay are not an isolated phenomenon, but a reflection of systemic challenges exacerbated by the specific context of being a tourism destination. This finding supports the literature emphasizing the need for an integrated approach that addresses not only technical aspects but also institutional, financial, and socio-cultural barriers simultaneously (Shaw, 2020).

f. Collaborative Attitudes

Multi-sector collaboration is crucial for building tsunami preparedness capacity in the Pacitan Bay tourism destination. The study finds that collaboration within the tourism sector itself (between the Tourism Office and the Tourism Awareness Group/POKDARWIS) remains minimal. Meanwhile, cross-sector collaboration, particularly between tourism authorities and BPBD, is already underway in the form of planning coordination, training, and contingency plan development meetings. However, cooperation between tourism authorities and BMKG is still constrained by budgetary limitations, resulting in activities being conducted only once or twice a year. Collaboration also involves external actors, such as third parties in the creation of evacuation maps (BPBD), students in the Tsunami Ready Community program (BMKG), and support from local communities.

The Pentahelix collaboration model—involving academia, business, government, community, and media, as proposed by Ratri & Hizbaron (2020) in the context of disaster risk reduction presents an ideal framework. However, the findings of this study indicate that at the operational level of the Pacitan tourism destination, this collaborative model is not yet functioning optimally. Collaboration is still dominated by the government with limited participation from the private/tourism sector and the community, a pattern also observed by Mulyadi & Yunus (2021) in their study on disaster governance in tourism areas.

g. Strategic Recommendations

An analysis of the findings within the context of disaster literature reveals four critical points for discussion on effective preparedness in Pacitan Bay:

1. There is a paradox between the scientific understanding of risk at the authority level and the knowledge-behavior gap at the community and business actor levels. This underscores the need for persuasive and contextual risk communication approaches, leveraging digital media and local wisdom (Paton, 2003).
2. Dependence on early warning infrastructure that is vulnerable to damage, without robust backup scenarios, represents a systemic weakness. The principle of "Don't Wait, Evacuate Immediately" promoted by BMKG becomes crucial. Education on self-evacuation based on natural signs (strong shaking, receding seawater) must be a primary focus, especially for tourists. This approach aligns with the findings of Fraser et al. (2012) in Samoa, which concluded that local knowledge and community self-response were more decisive in saving lives than formal early warning systems when a near-source earthquake occurs.
3. Increasing community awareness and strengthening existing local wisdom systems in Pacitan, such as the traditional practice of building "Rumah Panggung" (stilt houses) using strong yet flexible wooden materials and elevated floors as found in the coastal areas of West Lampung, reflects a form of ecological adaptation. These houses not only provide structural resilience to seismic shaking but also function as protective spaces during floods and high tides (Herlina et al., 2024).
4. Budgetary and collaboration barriers are cyclical: limited budgets weaken collaboration, which in turn hampers advocacy for increased funding. To break this cycle, policy interventions are needed, such as specific budget allocations and permanent collaborative platforms supported by global frameworks (UNISDR, 2015).
5. The integration of preparedness into the economic value of tourism remains weak. Disaster resilience needs to be made part of destination branding, where

preparedness information in tourism promotion can build long-term trust, in line with crisis management principles for tourist destinations (Pforr & Hosie, 2008).

The recommendations of this study encompass three levels of intervention to strengthen tsunami preparedness in the Pacitan tourism destination:

1. Local Government Policy and Budgeting:
   - Mandate a dedicated and sustainable budget allocation for disaster preparedness through the Village Fund (*Dana Desa*), Regional Budget (*APBD*), and contingency funds.
   - Integrate preparedness funding into planning documents (*APBDes/APBKel*) and establish inter-village cooperation for resource sharing.
2. Operational Cross-Sector Collaboration:
   - The Tourism Office, in collaboration with BPBD, must incorporate a tsunami safety module into tourism business certification and visitor welcome packages.
   - Integrate the early warning system with a digital platform featuring clear self-evacuation messages.
   - Strengthen collaboration with universities, NGOs, and the private sector (CSR) for technical assistance and resource support.
3. Local-Level Capacity Strengthening:
   - Conduct regular training and simulation drills involving local communities, vendors, and employees as first responders.
   - Strengthen local institutions by reactivating Village Disaster Preparedness Teams (*Tim Siaga Bencana Desa*), appointing preparedness cadres in each neighborhood unit (*RT/RW*), and effectively implementing the Disaster Resilient Village (*Destana*) program.
   - Ensure that evacuation signage is easily understood, weather-resistant, and strategically placed, and promote the principle of "Don't Wait, Evacuate Immediately."

Overall, building preparedness in Pacitan requires a simultaneous and integrated approach to strengthen policy, institutional, infrastructural, and cultural aspects. Based on these findings and analysis, this study compiles a "Policy and Implementation Strategy Recommendation Matrix as a concrete action framework for stakeholders." This matrix is designed to bridge the gap between risk knowledge and collective action, and to serve as a research value proposition instrument for advocacy and sustainable development planning in Pacitan Bay, as presented in the following table.

POLICY AND IMPLEMENTATION STRATEGY RECOMMENDATION MATRIX

Objective: To Realize a Resilient and Tsunami-Ready Pacitan Bay Tourism Destination.

No	Intervention Level & Key Stakeholders	Policy/Program Recommendation	Concrete Implementation Strategy	Success Indicator (Output)
1	Policy & Institutional Regent, DPRD, BAPPEDA, BPBD	a. Mandate for Special Budget Allocation: Mandate sustainable budgeting for disaster preparedness within the Regional Budget (*APBD*, Disaster Post) and Village Budget (*APBDes*).	• Revise Regional Regulations/Regent Decrees on Disaster Management. • Develop technical guidelines for village-level preparedness budgeting. • Conduct political lobbying and advocacy by Bappeda, BPBD, and the Regional Legislative Council (DPRD).	• Establishment of a permanent budget line in the APBD and ≥80% of APBDes. • Availability of reserve (contingency) funds.

No	Intervention Level & Key Stakeholders	Policy/Program Recommendation	Concrete Implementation Strategy	Success Indicator (Output)
	BAPPEDA, Public Works Agency, Tourism Office, BPBD	b. Integration into Development Plans: Incorporate risk maps and evacuation plans into RDTR, RIPARDA, RPJMDes.	• Cross-agency coordination (Public Works, Tourism, BPBD) for document review. • Socialize risk maps to business actors and investors	• Tsunami hazard map becomes a mandatory annex to the RDTR. • Preparedness module is included in the RIPARDA document.
2	Collaboration & Operational Tourism Office, BPBD, Hotel and Restaurant Association (PHRI).	a. Disaster-Resilient Tourism Business Certification: Mandate the inclusion of a preparedness module in the certification for accommodation and restaurant businesses.	• BPBD & the Tourism Office develop SOPs and training modules. • Provide incentives (tax breaks, promotion) for certified businesses. • Integrate evacuation information into welcome packages.	• ≥70% of key tourism businesses are certified within 3 years. • Evacuation information boards are present in every room/public area.
	BPBD, BMKG, Communications and Informatics Office, Tourism Managers	b. Hybrid Early Warning System: Develop a system that integrates official technology (sirens, BMKG info) with community networks and digital media.	• Conduct routine siren maintenance with a dedicated budget. • Establish WhatsApp/SMS broadcast groups for village heads & tourism managers. • Develop a disaster information chatbot for tourists.	• Siren functionality ≥95%. • Emergency communication networks established in 100% of sub-districts. • Chatbot accessible via QR codes in tourism areas.
3.	Capacity & Culture BPBD, Indonesian Red Cross (PMI), Disaster Preparedness Cadres (Tagana), Tourism Awareness Group (Pokdarwis), Universities.	a. Tourism First Responders: Establish and train preparedness teams consisting of vendors, motorcycle taxi drivers, and hotel staff.	• Conduct regular training (every 6 months) on first aid, crowd management, and evacuation guidance. • Provide symbolic attributes and incentives for cadres. • Conduct annual table-top simulations and drills involving tourists	• Preparedness teams are established in each evacuation zone (Pancer Dor Beach, Telengria). • ≥80% of team members complete the training and understand their roles.
	Tourism Office, BPBD, Local Creative Community	b. Contextual Tourist Education: Develop easily understandable educational materials tailored to the holiday context.	• Create pictograms and short animated videos (30 seconds) about "Don't Wait, Evacuate Immediately." • Install interactive Augmented Reality (AR)-	• Educational videos are played at ticket counters and the destination's social media accounts. • There are 2-3 AR points at each main beach.

No	Intervention Level & Key Stakeholders	Policy/Program Recommendation	Concrete Implementation Strategy	Success Indicator (Output)
			based evacuation maps at key points. • Conduct socialization through local influencers and Tourism Office social media.	• Improvement in tourist knowledge scores (pre- and post-tests).
4.	Supporting Infrastructure	a. Vertical Evacuation Facilities (TES/TEA): Construct or designate tsunami-safe multi-story buildings as shelters.	• Audit public/private buildings that meet safety criteria. • Establish MoUs with building owners for emergency access. • Label buildings with "Vertical Evacuation Point" signage.	• Availability of ≥1 TES/TEA building per 500 meters in the hazard zone. • Availability of SOPs for shelter management during emergencies.
		b. Maintenance of Signage & Evacuation Routes: Ensure the clarity and guaranteed access of evacuation paths.	• Designate personnel responsible for sign maintenance in each village. • Conduct routine trail cleaning on evacuation routes to assembly points. • Involve youth organizations (*Karang Taruna*) in monitoring.	• Signage visibility and condition ≥90% good. • Evacuation routes are free from physical obstructions.

Source: Research Data Processing Results in 2025

Implementing the recommendations in this matrix requires a tiered commitment and sustained synergy among stakeholders. An integrated approach that links the aspects of policy, collaboration, capacity, and infrastructure within a single, measurable framework will transform preparedness from a static document into a living, operational resilience. This transformation can also serve as a unique selling point for a responsible and sustainable Pacitan Bay tourism sector.

CONCLUSION

This study concludes that the level of institutional preparedness for tsunamis in the Pacitan Bay tourism area remains in a developmental stage, with several fundamental strengths and weaknesses. In general, all stakeholders including government authorities, business actors, and the community recognize the high potential tsunami threat due to the bay's morphology and tectonic activity. They also agree on the importance of preparedness planning for tourism sustainability. Several key strategies have been initiated, particularly by BMKG and BPBD, such as hazard mapping and contingency planning, installation of signage, and the development of an early warning system. However, the implementation of these strategies is not yet optimal and faces significant barriers. Coordination and collaboration among institutions, especially between the tourism sector and technical agencies like BMKG, remain weak and incidental. Chronic budget constraints are the root cause, impacting the maintenance of vulnerable early warning infrastructure, unsustainable socialization and training programs, and the lack of vertical evacuation facilities (TES/TEA) and tourist-specific education. These barriers are exacerbated by traditional mindsets among some community members and the low awareness of visitors, creating a gap between risk knowledge and adequate preparedness behavior.

Based on these findings, this study recommends three strategic intervention frameworks. First, at the policy level, political commitment is needed to allocate dedicated and sustainable budgets for preparedness within APBD and APBDes and to integrate them into tourism development planning. Second, at the operational level, Pentahelix collaboration must be institutionalized through permanent forums involving government, business actors, academia, media, and the

community. This cooperation can be realized by incorporating tsunami safety modules into tourism business certification, developing digital-based warning systems, and engaging the private sector through CSR programs. Third, at the local capacity level, priority should be given to regular education and training involving all community members, vendors, and employees as first responders, as well as the construction and maintenance of reliable self-evacuation support infrastructure. Without an integrated approach that simultaneously strengthens policy, institutional, infrastructural, and disaster response culture, preparedness in Pacitan Bay risks remaining a static and ineffective document, failing to protect lives, economic assets, and the sustainability of the tourism destination when an actual disaster strikes.

In addition to the findings and recommendations, this study has several limitations that present opportunities for future research. First, the scope of the study focuses on institutional perspectives and key stakeholders and has not quantitatively measured the preparedness level of the general public and individual tourists through comprehensive survey methods. Second, the analysis is a snapshot at a single point in time, thus unable to capture the long-term dynamics and effectiveness of preparedness programs. Third, this study has not yet thoroughly examined the specific vulnerability aspects of tourism infrastructure (such as hotels, restaurants, and homestays) to particular tsunami scenarios. Therefore, it is suggested that future research could: (1) conduct a quantitative study with a broader sample scope to measure the community preparedness index and tourist risk perception, (2) implement longitudinal research or post-intervention evaluation studies to measure the impact of the recommended capacity-building programs, and (3) develop tsunami impact modeling and detailed physical vulnerability analysis of key economic assets in the Pacitan Bay tourism area to formulate more targeted mitigation plans.

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