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Article

Integrating Local Knowledge into Floods Impact Assessment: A Case Study from Gemereh, Segamat, Johor

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Abstract: This study assesses the impact of floods on rural communities in Gemereh, Segamat, Johor, Malaysia, by integrating local knowledge into the assessment process. Malaysia. Unlike previous research that focused solely on hydrological models and government data, this study emphasizes community-based perspectives aligned with the Sendai Framework for Disaster Risk Reduction (2015–2030). The study, which surveyed 81 people in three villages, shows that using local knowledge such as providing river dredging priority along with improving drainage infrastructure provides more practical and locally-specific solutions. According to the results, 82% of respondents said that floods had a significant impact on their lives, mostly in terms of property losses and interruptions to regular activities like business operations, education, and transportation. The findings demonstrate weaknesses in currently flood management, highlighting the need for more all-encompassing, locally-based approaches that address infrastructure vulnerabilities and community preparedness. The research examined flood mitigation options, with residents suggesting river dredging, improvement of drainage systems, and the establishment of retention ponds. Most of the respondents suggested that the government should consider widening and dredging the river to reduce the impact of flooding. The findings highlight the significance of integrating local community knowledge into flood mitigation actions, as it offers important perspectives into specific risks and feasible mitigation alternatives compare conventional strategies. By emphasising local perceptions, policymakers and disaster management practitioners can create more focused, effective, and sustainable initiatives, thereby substantially improving community resilience and mitigating the negative effects of flooding.

Keywords: Flood; rural; mitigation; Malaysia; infrastructure; community

Introduction

The majority of natural hazards in Malaysia are weather-related, with floods being the most prevalent. Despite being considered less susceptible to disasters, Malaysia remains vulnerable to flooding, landslides, and mudslides (Ramli et al., 2023). Currently, flooding has become the prevailing catastrophe worldwide, resulting in substantial destruction to both property and the environment (Zeleňáková et al., 2019). Floods, generally recognized as natural disasters, can have significant impacts on communities, including financial damages, disruptions to daily routines, and possible risks to public health (DID, 2024; Rosmadi et al., 2023). Malaysia

is highly susceptible to floods, especially during the Northeast Monsoon, which often impacts states on the East Coast of Peninsular Malaysia such as Kelantan, Pahang, and Johor (Tobi et al., 2023).

Segamat, located in northern Johor, is among the districts most frequently affected by floods, particularly during the Northeast Monsoon. The floods disaster of 2006 and 2011 resulted in widespread displacement and property loss, highlighting the area's vulnerability. In response, various structural and non-structural mitigation measures have been introduced by government agencies, including the construction of embankments and drainage improvements. However, despite these efforts, flooding remains a persistent issue—suggesting that existing top-down strategies alone are insufficient.

Gaining a comprehensive understanding of the precise consequences of floods on these communities is essential for developing efficient measures to reduce the damage and adjust to the situation. As stated in the Sendai Framework 2015 - 2030, promoting disaster risk management efforts by encouraging the involvement of local communities is essential for enhancing disaster management in every country (UNISDR, 2015). Local perspectives are very important for assessing the effects of flooding in disaster risk reduction (DRR) because they give first-hand information about how vulnerable communities are, how they cope, and what they need. This makes it easier to come up with effective and useful ways to reduce the risk. Including local viewpoints improves the precision and usefulness of disaster impact studies, making sure that solutions are tailored to the specific problems and needs of communities that have been affected (Turan & Oral, 2023). Although there are many flood impacts studies in Malaysia, current research predominantly depends on standard hydrological modelling and government assessments that frequently neglect essential local perspectives. There remains a significant research gap concerning the integration of community-based perspectives and local knowledge into formal flood impact assessments. This lack of attention is significant because the community members have detailed, practical knowledge of vulnerabilities, coping techniques, and effective local solutions that established scientific methods may overlook. Recent studies have reinforced this, noting that community-based inputs can significantly improve the effectiveness of flood response planning and early warning systems (Sa'adi et al., 2024). Identifying this weakness is crucial for obtaining a more thorough and precise flood risk assessment, hence improving the effectiveness and sustainability of a disaster mitigation strategies.

Therefore, this study attempted to understand the flood impact assessment in Gemereh area based on the local view and understanding The main objective of the study is to highlight a comprehensive and community-focused strategy to reducing and managing hazards associated with floods in Malaysia and other areas. This will be achieved by include the viewpoints of local residents in flood impact assessments. The results of this study can provide valuable insights for developing policy interventions and community-based measures to reduce the negative impacts of floods and strengthen the ability to cope with them in places that are at high risk.

Literature Review

1. Flood in Malaysia

Flooding in Malaysia is predominantly caused by heavy rainfall during the monsoon season, which leads to the overflow of rivers and the inundation of low-lying area. Segamat, a district in Johor, has experienced recurring floods, with the most severe occurrences recorded in 2006 and 2011. This disaster events resulted in substantial loss of life, property, and agricultural damage. The floods also triggered social and economic disruptions, such as displacement, interruption of daily activities, and loss of livelihoods. Recent floods in the region, such as the 2023 floods, further underscore the continued vulnerability of Segamat to flood events.

Community-based strategies for disaster risk reduction (DRR) highlight the need of comprehending local knowledge and viewpoints in the evaluation and management of flood hazards. Building upon these community-based approaches, recent studies have highlighted the critical role of integrating local knowledge directly into flood impact assessments to improve disaster planning and resilience. The Sendai Framework for Disaster Risk Reduction 2015-2030 emphasises the necessity of engaging local communities in disaster management to enhance resilience and establish sustainable disaster risk reduction measures. The vulnerability of communities to flooding is influenced by multiple factors, including geographic location, socioeconomic position, and the capacity to respond to and recover from flood disasters. Research shows that communities

with limited resources and infrastructure are especially vulnerable to floods, as they lack of capacity to adapt to and manage flood hazards. Local perspective on flood impacts offer important understanding of community resilience and their support needs. Research by Onimis et al. (2024) emphasises the need of obtaining firsthand information from people, as this information can facilitate the identification of effective solutions adapted to the community's individual requirements. In Segamat, people' perspectives on the factors contributing to flooding, including closeness to rivers and inadequately maintained drainage systems, can guide the development of more focused flood mitigation strategies.

Diverse techniques have been proposed and executed to alleviate the effects of flooding in flood-prone regions of Malaysia. Structural interventions, including river dredging, embankment construction, and retention pond development, are frequently employed to mitigate flood risk. River dredging has been widely implemented as a structural flood mitigation measure to increase river conveyance capacity, reduce sediment build-up, and improve water flow during extreme rainfall events (Stępień et al., 2019). In flood-prone areas like Segamat, residents often advocate for dredging as an immediate and visible solution to recurring floods. Research conducted by Quadroni et al. (2023) indicates that although river dredging may enhance flood management, it can also adversely affect local ecosystems, potentially resulting in environmental degradation. In some cases, dredging has been linked to the decline of native fish species and the spread of invasive aquatic plants. Non-structural solutions, such as enhanced flood forecasting and early warning systems, are essential for mitigating flood risks and facilitating prompt responses (Wang et al., 2024).

The local government in Segamat is implementing a Flood Mitigation Plan designed for reducing flood hazards in the area, which includes the establishment of retention ponds and river embankments. Local inhabitants frequently express worries regarding the insufficiency of the drainage system and the reduction of water retention areas resulting from development in cities (Samad et al., 2024). Consequently, flood mitigation plans must be holistic, including both structural and non-structural measures, while also tackling the underlying causes of flooding as recognised by the local population.

2. Integrating Local Knowledge in Flood Risk Management

Integrating local community knowledge into flood impact assessments provides critical ground-level insights that complement conventional scientific and technical analyses. Community observations, coping mechanisms, and historical memories offer valuable perspectives in identifying vulnerabilities and response gaps often overlooked by formal modeling approaches. Recent Malaysian studies further emphasize that empowering local communities and enhancing disaster knowledge are essential for effective disaster risk management (Sarahaqilah et al., 2024; Soon Singh et al., 2018). In line with this approach, integrating local perspectives into flood impact assessments significantly enhances flood preparedness and adaptive capacity, as demonstrated in recent resilience-focused studies in Malaysia (Rameli et al., 2024; Sa'adi et al., 2024). These findings collectively support the broader objectives of the Sendai Framework for Disaster Risk Reduction, reinforcing the importance of community-centered strategies in disaster planning and management.

Several international case studies have demonstrated the effectiveness of integrating local knowledge into flood risk assessments and disaster preparedness strategies. In Bangladesh, for instance, communities have long relied on indigenous forecasting methods—such as animal behavior and river level observations—which have been integrated into formal early warning systems to improve evacuation response (Paul & Routray, 2010). Similarly, in the Philippines, community-based flood mapping and participatory planning have led to more effective flood adaptation strategies that are culturally appropriate and locally sustainable (Gaillard & Mercer, 2013). In contrast, Malaysia's flood risk assessments have historically leaned more toward technical modeling and top-down planning, with limited systematic incorporation of local perspectives (Alias et al., 2020). While recent policy frameworks such as the National Disaster Risk Reduction Policy (2022) and the adoption of the Sendai Framework indicate growing awareness, implementation remains inconsistent. This highlights a critical opportunity for Malaysia to adopt and adapt community-driven models from regional neighbours to enhance its flood management strategies through inclusive governance and participatory approaches.

3. Theoretical Frameworks

This study adopts a theoretical framework adapted from Dekens (2007a) and informed by the Knowledge Integration Framework by Mercer et al. (2010) to illustrate how local knowledge systems contribute to flood risk assessment and disaster preparedness. The framework conceptualizes local knowledge as being composed of environmental observations, community memory, and coping strategies, influenced by governance structures and institutions. Situated in the context of recurring flood events in Segamat, this knowledge system results in risk perceptions and adaptive behavior that are grounded in daily lived experiences. It is based on observation (e.g., water levels, rainfall patterns) and informal communication (e.g., storytelling, intergenerational transfer), producing outcomes that enhance community resilience and inform more targeted, community-driven flood mitigation strategies.

This framework aligns with the principles of Community-Based Disaster Risk Reduction (CBDRR), which advocates for participatory and inclusive approaches to disaster planning. Integrating local knowledge with scientific flood models enables the co-production of risk assessments that are more context-sensitive, socially relevant, and operationally effective. It also supports global frameworks like the Sendai Framework for Disaster Risk Reduction (2015–2030), which emphasizes the value of incorporating traditional and indigenous knowledge in disaster management. This theoretical lens reinforces the rationale for engaging local communities in flood impact assessments and policy design in Malaysia. Figure 1 shows the theoretical framework for this study.

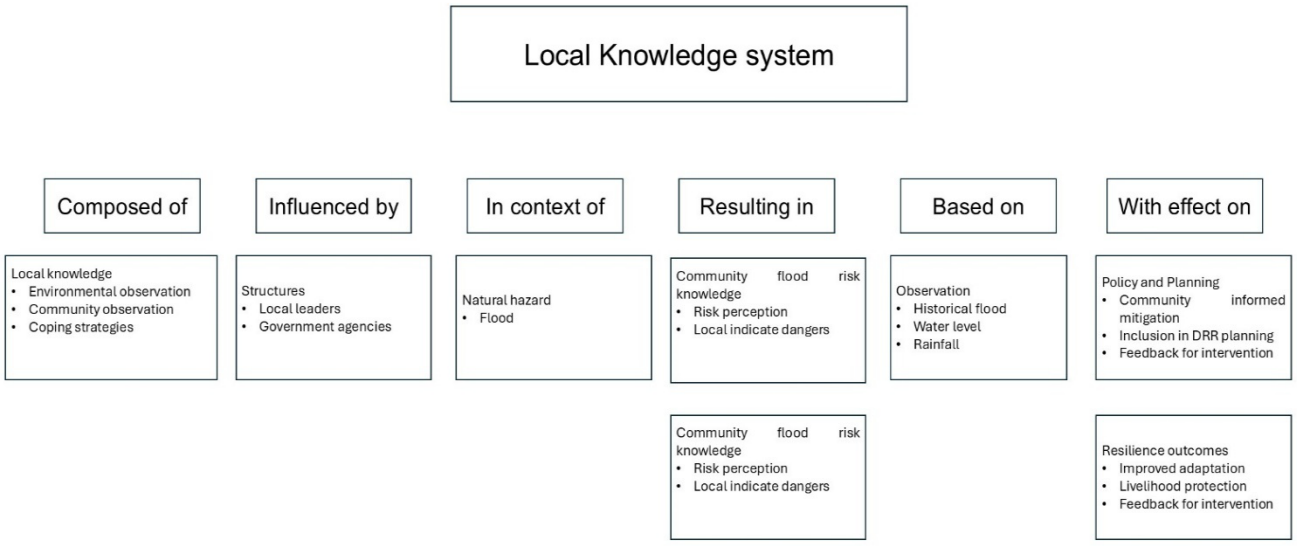

Figure 1. Framework for local knowledge on flood assessment

4. Study Area

Segamat is one of the districts in Johor that is located in the north part of Johor. This district is one of the most flood-prone areas in the state, along with Kota Tinggi and Batu Pahat. Historical records show a series of floods that have occurred since the 1950s, with the most severe floods occurring in 2006 and 2011. Approximately 31,000 individuals were compelled to leave during the flood that occurred in 2011, resulting in multiple fatalities (Romali et al., 2018). Segamat consists of twelve different subdistricts: Bekok, Buloh Kasap, Chaah, Gemas, Gemereh, Jabi, Jementah, Labis, Pogoh, Sermin, Bandar Segamat and Sungai Segamat. However, this study focuses only on the Gemereh subdistrict.

Gemereh Subdistrict is one of the subdistricts located in the Segamat District, Johor. Gemereh Subdistrict is the smallest subdistrict in the Segamat District and has the lowest population in this district.

Roughly, this subdistrict has a population of 6070 residents. It is situated along the Segamat River and at the confluence of the Segamat River and the Muar River. This subdistrict is divided into five main villages, namely Kampung Berata, Kampung Gudang Garam, Kampung Gemereh, Kampung Lubuk Batu, and Kampung Batu Badak. For this study, the focus area is only on three main villages, namely Kampung Gemereh 3, Kampung Lubuk Batu, and Kampung Batu Badak, which are located near the Segamat River and the Flood Mitigation Plan project implemented in this area. These three villages are classified as areas prone to flooding in the Segamat River area. Figure 2 shows the map of the study area.

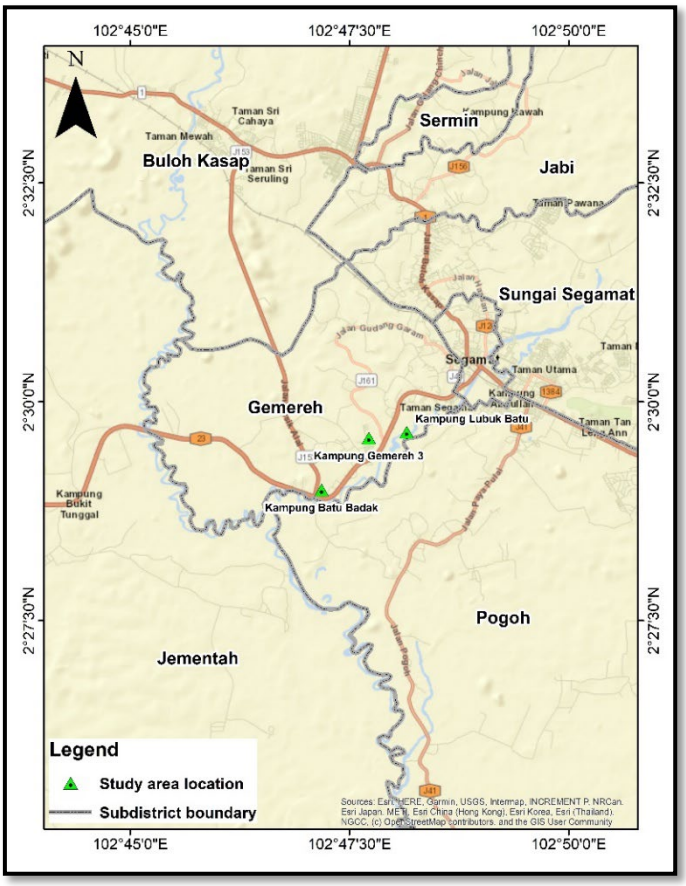

Figure 2. Study area

Methodology

1. Questionnaire Development

A series of important questions was designed to evaluate the impact of flooding on rural communities in three villages. The questionnaires consisted of eight short questions mainly seeking yes or no answers, supplemented by specific open-ended questions. The pilot survey aims to obtain understanding of the community's comprehension of the questions being asked. Subsequently, a more comprehensive follow-up questionnaire, designed for a larger public survey, was carefully developed. The modified survey underwent a thorough evaluation after being tested by experts in the field, including scholars and local agency experts. The pilot study aimed to detect and clarify any difficult or inaccurate technical phrases, ensuring that the questionnaire remained comprehensible to non-experts while generating relevant and unbiased outcomes. The time that was required for participants to answer the questions was also carefully considered. The questionnaire was finally created in its final form. This study aims to assess the impact of floods on the rural community in three specific villages: Kampung Batu Badak, Kampung Gemereh 3, and Kampung Lubuk Batu. This study focuses on a specific and well-chosen group of important questions, which are explained and analyzed in detail. The sample size of this study comprises 81 respondents, which corresponds to the total number of families directly affected by the most recent and frequent flood events in the three selected villages:

Kampung Gemereh 3, Kampung Lubuk Batu, and Kampung Batu Badak. These villages were purposively selected due to their classification as flood-prone zones by local authorities and their proximity to the Segamat River. The 81 families surveyed represent all known flood-affected households in these areas, making this a complete enumeration of the impacted community rather than a random sample from a larger population. This approach ensures that the data reflects the lived experiences and insights of those most vulnerable to flood risks. The questions are shown in Table 1.

The study used a purposive sampling approach, focusing on households in three villages—Kampung Gemereh 3, Kampung Lubuk Batu, and Kampung Batu Badak—that were directly impacted by recent and frequent flood events. While the sample included a range of respondents across age groups, occupations, and household sizes, it slightly leaned toward older male heads of households who were available during data collection. These individuals were also perceived to possess longer-term knowledge and experience with flood events in the area. This may introduce some bias in terms of age and gender representation, though the focus on firsthand flood experience helped ensure that the insights collected were relevant to the study's objectives. Future studies could complement this approach by incorporating stratified or randomized sampling for broader demographic balance. Accurate determinations from study findings rely heavily on determining an adequate sample size (Memon et al., 2020). Several studies have established the minimal sample size necessary for research projects. According to the study conducted by Krejcie and Morgan (1970), a minimum of 60 samples is required for a population size of 900. Cochran (1977) suggested a method for calculating the margins of error when predicting the sample size. Thus, according to the guidelines provided by Krejcie & Morgan (1970), the Raosoft online calculator determined that a minimum of 63 samples is necessary, with a 10% margin of error. In this investigation, a total of 81 samples were obtained. The sample size mentioned above was determined using the formula SSadjusted = (SS) / 1 + [(SS – 1) / population], as proposed by Cochran. This calculation resulted in a margin of error of 8%.

2. Data Analysis And Approach

The responses from the survey were analyzed using descriptive statistics, including frequency counts, percentages, and graphical representations. This approach was selected to clearly illustrate the overall trends and experiences of the flood-affected communities in the study area. The descriptive analysis provided insights into the types of flood impacts experienced, the challenges faced, and the mitigation strategies suggested by respondents. No inferential statistical tests (e.g., chi-square, correlation, or regression models) were conducted in this study, as the primary objective was to capture community-level patterns and perceptions rather than to establish statistically significant relationships between variables. Nonetheless, future studies may benefit from incorporating such methods to explore correlations between demographic factors and vulnerability levels or mitigation preferences.

Table 1. Surveys questions related flood impact assessment in Gemereh, Segamat, Johor

No	Question	Answer
Q4	Have you incurred property losses due to flooding?	1. Yes 2. No
Q5	What forms of losses have you experienced as a result of flooding?	1. House 2. Vehicles 3. Crops 4. Furniture or electoral appliances 5. Livestock 6. Others
Q6	What difficulties do you face when flooding occurs in your area?	1. Inability to work 2. Children unable to attend school 3. Disruption of business operations 4. Disruption of transportation and communication with the outside 5. Hindered social activities Other

Q7	What are the effects of flooding on the surrounding area of your residence	1. Damage to roads 2. Damage to bridges 3. Accumulation of debris 4. Other
Q8	In your opinion, what steps should be taken to reduce the impact of flooding in your area?	1. Constructing retention ponds 2. Dredging and widening rivers 3. Building walls or embankments along riverbanks 4. Clearing clogged drains 5. Repairing drainage systems 6. 7. Other

Discussion

The research area, which is located in the Segamat district, is well known for being prone to regular flooding, especially in the Gemereh Subdistrict. The first findings provide information on the effects of flooding on respondents in Q1 and Q2, as well as the frequency of flood events in the area. The percentage distribution of respondents affected by floods is shown in Figure 2a, where 82% of respondents reported being involved. This indicates that 82% of respondents said they had flooded their homes, with the remaining 18% reporting no problems. Residents who are directly affected by floods therefore make up the majority of those who responded to the a survey. As far as the frequency of floods in the area is concerned, most respondents (i.e., 80%) felt that floods happened once every five years. (Figure 2b). After that, 15% believe that floods happen once every two years, 2% believe that they happen once a year, and a further 2% believe that they happen more than once a year. According to Rosmadi et al. (2023), floods in Malaysia frequently occur during the monsoon seasons due to heavy and continuous rainfall, resulting in rivers overflowing and the land being submerged in water.

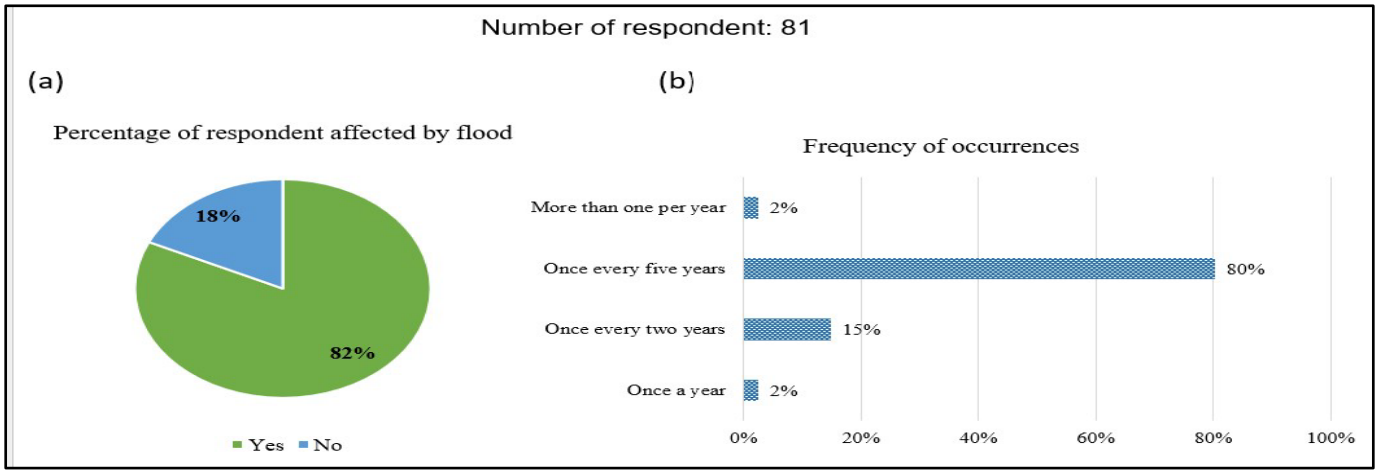

Figure 2. General flood information (a) People experience affected by flood (b) The frequencies of flood occurrences.

Opinion of respondent on 'what are the causes of flooding in your area' were also investigated in Q3. Based on the result shows in Figure 3 the factor that causes flood in their area is with 30% agree that continuous rainfall this is one of the factors that causes flood in the area. Meanwhile, low-lying areas were also selected by 24% as one of the causes of flooding in this study area. Additionally, other contributing factors chosen include proximity to rivers (18%), poorly maintained drainage systems (9%), insufficient water retention pond (6%), tidal s (7%), and others (5%). Other causes stated by respondents include development and housing projects around this study area, leading to a shortage of water catchment areas. Some respondents also mentioned road upgrading projects in this area and flood control measures causing frequent minor floods in the area. According to this research, the main causes of floods in the Gemereh region were low-lying terrain, constant high rainfall, closeness to rivers, and poor drainage. These results are consistent with earlier studies showing that insufficient drainage infrastructure and natural topographical weaknesses are important variables affecting flood severity in rural Malaysia. For example, a research by Abd Majid et al. (2020) showed that

flood risks in Malaysian regions are increased by the combination of high rainfall and inadequate drainage infrastructure. On the other hand, research on urban flood environments, such that done by(D'Ayala et al. (2020), has shown that impermeable surfaces and urbanization are major causes of flooding in cities. The current research highlights how natural geomorphology continues to influence rural flood risk, indicating that flood mitigation plans in rural areas need to be designed to concurrently address natural and infrastructure vulnerabilities.

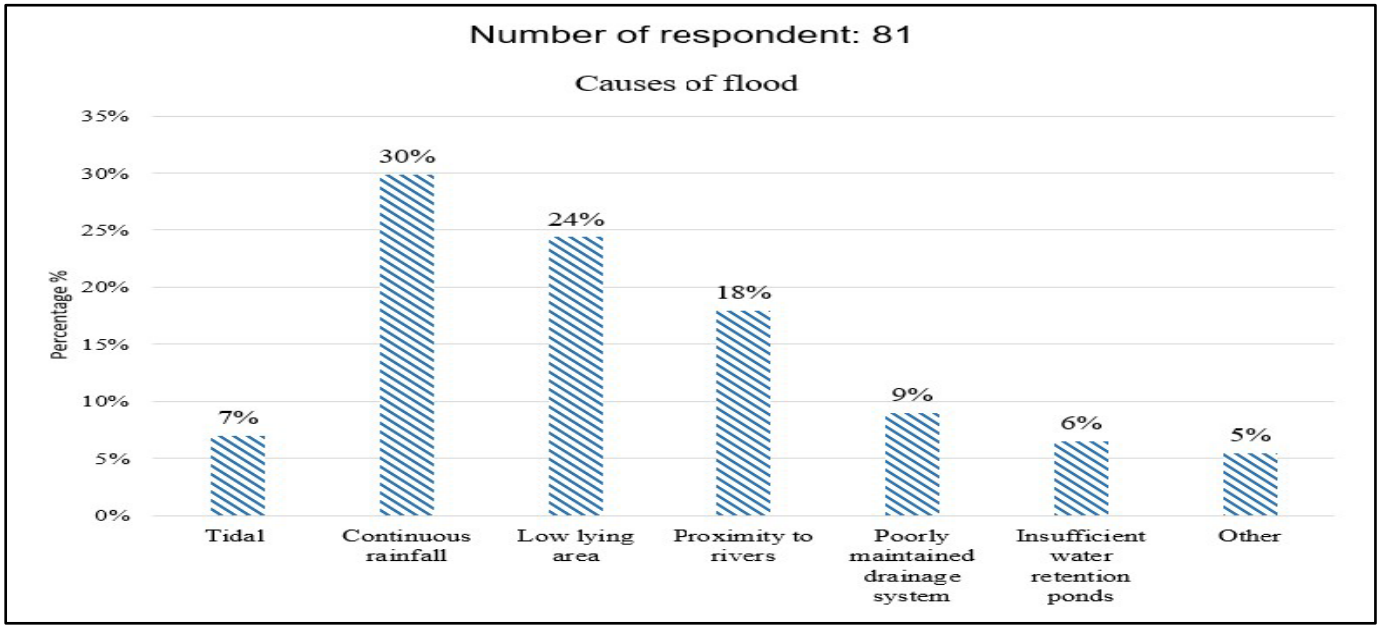

Figure 3. Causes of the flood

Two significant questions on the property losses cause of flood were asked in the questionnaire (Table 1). The first question Q4 was on the general question if the community experience property losses cause by flood. The second question for this part Q5 was related to the specific type of losses cause by flood. Analysis of the response to Q5 majority (69%) have incurred property losses causes by flood (Figure 4a). Of the 69% of people answering, most type of property losses choose by respondent is damage to houses by 41% and followed by vehicles by 29%. Other type of property includes Crops (7%), Furniture and electrical appliances (15%), livestock (6%) and others (3%) (Figure 4b). The other miscellaneous property losses covered include equipment or items used for business purposes.

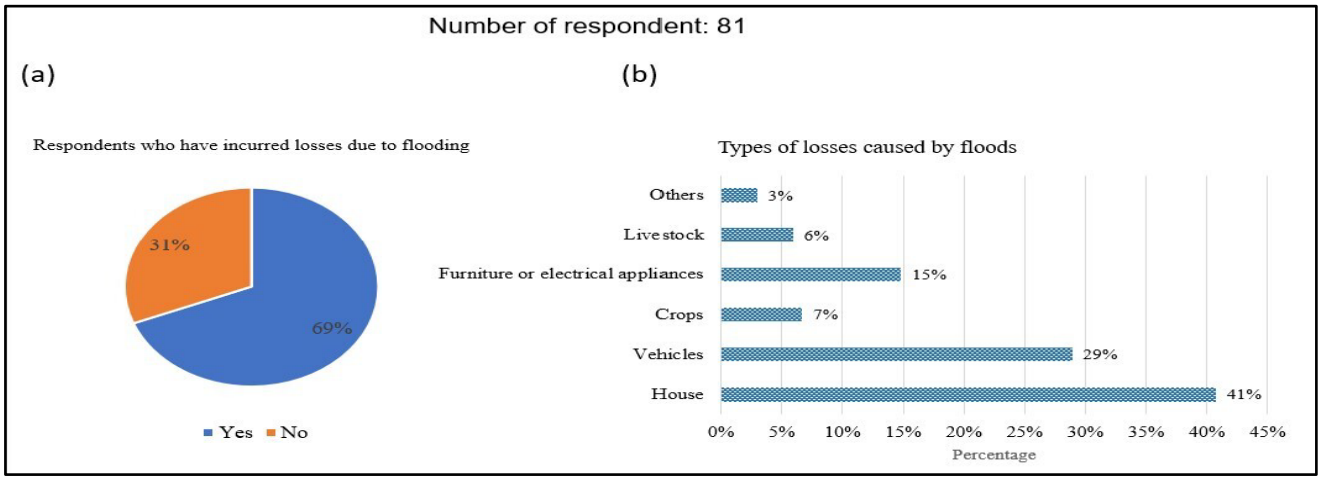

Figure 4. Property damage losses (a) Experienced of properly losses cause by flood (b) Type of property losses

Floods not only cause property damage but can also disrupt and hinder flood victims from carrying out their daily activities as usual. Diagram 5a shows that the main difficulties faced include transportation and

disrupted external communication, which account for 25%. In addition, 18% mention that floods have also disrupted their children's schooling activities, and 18% were unable to go to work. Other difficulties faced by flood victims include disruptions to social activities (21%), inability to conduct business activities (10%), and other issues (7%). Furthermore, floods also have a significant impact on the environment and infrastructure in this area. The most pronounced effect reported by respondents in this area is the accumulation of debris. 59% of respondents agree that the accumulation of debris has an environmental impact after floods. Other environmental and infrastructure effects include road damage (21%), bridge damage (11%), and others (9%). Other effects stated by respondents include infectious diseases such as leptospirosis and dengue. Most respondents reported significant property losses and everyday disruptions, especially in transportation and education. Ismail & Ghani (2017) found that flooding damages roads and bridges, causing mobility issues in affected towns. Diya et al. (2014) found that 17% of respondents cited transit disruption as a major effect of floods, highlighting its influence on daily life. Much of the literature focuses on economic damages, but this study underlines the importance of social disruptions including transportation and education barriers as essential components of flood vulnerability in rural Malaysia.

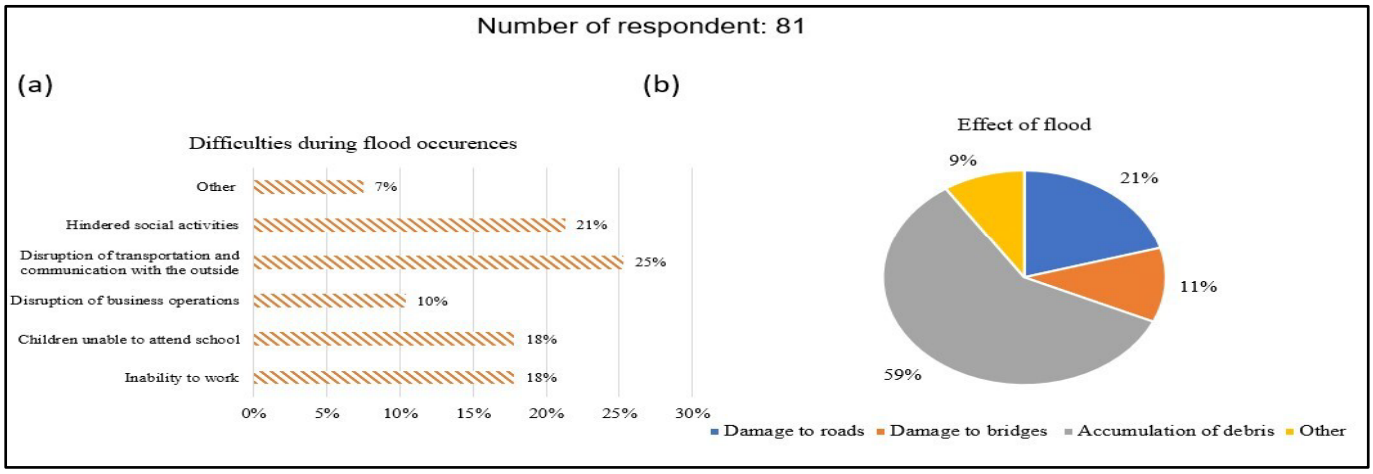

Figure 5. Impact of flood (a) Difficulties during flood occurrences (b) Effect of flood to surrounding area

The respondents' opinions on ways to mitigate flooding in this area are shown in Figure 6. Out of the 81 respondents, 40% of them fully agree that the best way to prevent or lessen floods in the research area is to dredging and widening rivers. According to Stępień et al. (2019), river dredging can be good for controlling floods, but it can hurt the plants that live in the river by destroying their habitats and making it hard for some to grow back. Additional recommended actions consist of unclogging drains (18%), constructing walls and barriers (18%), enhancing drainage systems (16%), creating retention ponds (5%), and other (3%). One of the notable trends observed in this study is the community's preference for dredging and widening of rivers (40%) as the most effective flood mitigation strategy, compared to less emphasis on non-structural measures such as early warning systems. This prioritization may stem from several contextual factors. First, dredging is a tangible and highly visible intervention that residents have previously witnessed being carried out by local authorities, reinforcing its perceived effectiveness. Second, communities may associate physical infrastructure with immediate and lasting results, while early warning systems may be seen as temporary or unreliable—especially if past warnings were delayed or absent. Third, limited digital access, low technological literacy, or lack of communication infrastructure in rural villages may further explain the lower prioritization of warning systems. This highlights a gap in awareness and capacity building, suggesting that future disaster risk reduction efforts must not only implement early warning systems but also invest in community education and participatory risk communication.

While a significant proportion of respondents (40%) suggested dredging and widening of rivers as the most effective way to reduce flood impact, it is essential to recognize the potential ecological trade-offs associated with this approach. Dredging, if not managed carefully, can lead to destruction of aquatic habitats, increased turbidity, and reduction of biodiversity, as noted in studies by Stępień et al. (2019) and Quadroni et

al. (2023). Over time, frequent dredging may also cause channel instability and increased downstream sedimentation. As sustainable alternatives, the study suggests the implementation of nature-based solutions such as retention ponds, green buffer zones, reforestation in upstream areas, and improved stormwater drainage systems. These methods not only reduce flood risk but also support long-term ecological integrity. Integrated watershed management that combines structural and non-structural strategies, while involving community input, could provide a more resilient and environmentally responsible solution to flood challenges in Segamat and other vulnerable areas.

The flood-related challenges reported by residents in Segamat—particularly the emphasis on structural mitigation such as dredging and river widening, and concerns over infrastructure damage and daily disruption—are broadly consistent with findings from other flood-prone states in Malaysia. For instance, a study by Tobi et al. (2023) in Kelantan and Pahang also found that communities heavily favored structural solutions over early warning systems due to perceived effectiveness and government visibility. Similarly, research by Rosmadi et al. (2023) in urban areas like Shah Alam highlighted comparable concerns over poorly maintained drainage, damage to residential properties, and disruption to livelihoods. However, what distinguishes Segamat is the continued vulnerability of smaller rural communities despite government interventions—suggesting that community-based input and local adaptation remain underutilized in long-term flood management. These findings reinforce the need for a more inclusive and decentralized approach to flood risk planning across the country.

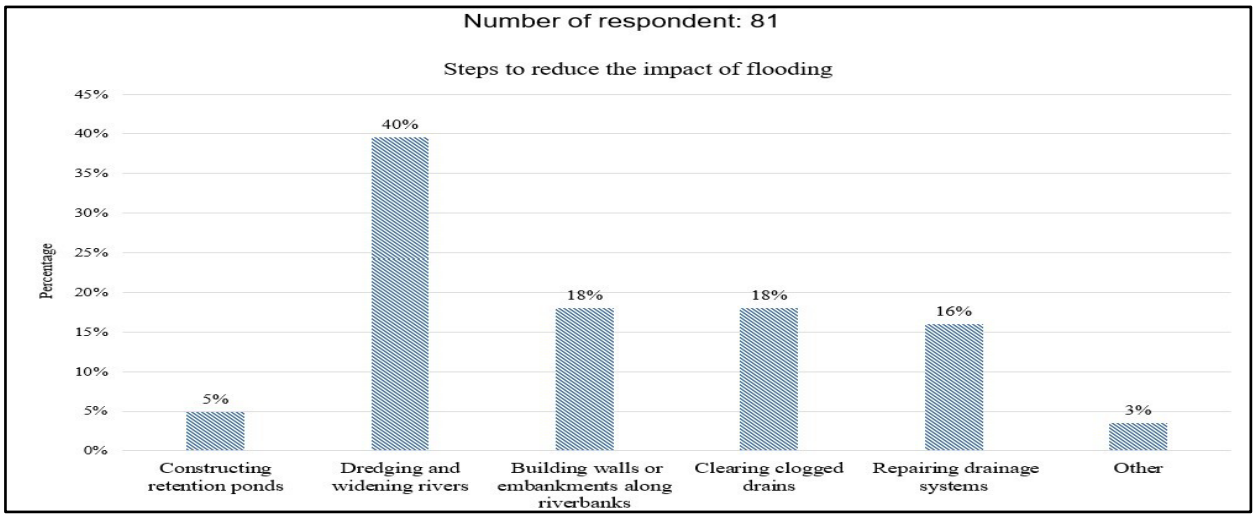

Figure 6. Steps to reduce the impact of floods

Conclusion

In conclusion, the study thoroughly investigated the significant effects of floods on rural communities, namely in the Gemereh area in Segamat, Johor, Malaysia. After an in-depth analysis, it was determined that floods continue to be a hazard to the area, with historical data showing that there were some particularly significant flooding episodes in 2006 and 2011. Floods still disturb daily life and cause significant property damage, environmental issue such as rubbish, and disturbing social activity despite of a number of government efforts to reduce them. To institutionalize local knowledge in flood risk planning, government agencies should implement structured and participatory mechanisms that embed community insights into formal disaster management frameworks. First, community risk mapping exercises and vulnerability assessments should be made standard components of flood mitigation planning, ensuring that local indicators and experiences inform early warning and response strategies. Second, agencies should establish local disaster risk committees comprising village representatives, NGOs, and district-level planners to provide continuous feedback and localized data. Third, government training modules for disaster officers should include content on recognizing and applying indigenous and community knowledge, ensuring a shift from top-down to co-produced risk assessments. Additionally, digital tools such as mobile applications and village-level reporting platforms can facilitate the real-time integration of local observations into flood monitoring systems. These measures would

align national disaster policies with the Sendai Framework's priority for inclusive, community-based risk reduction, promoting more resilient and context-sensitive disaster governance across Malaysia.

While this study employed a structured survey approach to assess the impact of floods and community perspectives, future research should consider integrating qualitative methods to capture deeper insights into the lived experiences and adaptive knowledge of residents. Techniques such as semi-structured interviews, focus groups, and participatory mapping can help uncover localized flood indicators, traditional coping mechanisms, and social dynamics that shape community resilience. These methods would complement quantitative findings and enable the development of more nuanced, inclusive, and culturally grounded flood risk reduction strategies. Additionally, longitudinal studies could track how local knowledge evolves in response to changing climate and urban pressures. Overall this study highlighted how important it is to include local perspectives in flood impact assessment since they offer vital information about susceptibility, coping strategies, and required actions. The results also highlight the importance of community-based approaches to disaster risk reduction, which are consistent with international frameworks like the Sendai Framework 2015–2030. Adaptable strategies and broad engagement can be used to reduce flood risks, build resilience, and lessen the negative effects of floods on communities that are already at risk. Going ahead, it is imperative that policymakers, local authorities, and stakeholders give precedence to community involvement and proactive measures in order to address the complex issues presented by flooding. This will ensure sustainable development while also protecting the health and wellbeing of the impacted population.

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