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A SYSTEMATIC REVIEW OF DISASTER RISK MANAGEMENT STRATEGIES AND CHALLENGES IN MALAYSIA (2020–2024)

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Abstract:

Malaysia faces escalating disaster risks due to rapid urbanization, environmental degradation, and climate change, necessitating an effective Disaster Risk Management (DRM) framework. This systematic review aims to analyze the present state of DRM in Malaysia, identify key challenges, and propose actionable recommendations for enhancing resilience. Malaysia's increasing susceptibility to natural disasters such as floods, landslides, and storms underscores the urgent need for a robust and inclusive DRM framework. A comprehensive literature search was performed via databases including Scopus and PubMed, adhering to PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses) guidelines. The research selected 40 publications from 2020 through 2024 after conducting a thorough screening according to established eligibility criteria. The findings were divided into three themes: (1) Disaster Preparedness and Community Adaptation, (2) Technological Approaches in DRM, and (3) Vulnerability and Risk Assessment of Natural Disasters. The analysis highlights critical gaps in institutional coordination, public awareness, and integrating Disaster Risk Reduction (DRR) into urban planning and policies. Malaysia has introduced early warning systems and community-based disaster preparedness programs yet inconsistent execution along with limited resources reduces their effectiveness. The review concludes that addressing these gaps requires a paradigm shift towards proactive, inclusive, and adaptive DRM approaches underpinned by robust policy frameworks, community engagement, and cross-sectoral partnerships. The obtained findings provide essential knowledge to enhance Malaysia's disaster resilience for both policymakers, researchers and practitioners.

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Keywords:

Disaster Risk Management (DRM), Framework, Malaysia, PRISMA

Introduction

In a geographically stable region, Malaysia is nonetheless vulnerable to various natural hazards, including floods, landslides, and tsunamis. The 2004 Indian Ocean Tsunami, for instance, highlighted the country's susceptibility to seismic activities, causing significant loss of life and property damage (Ahmadun, et al., 2020). Floods, however, remain the most frequent and impactful natural disaster, particularly during the monsoon seasons, leading to substantial economic losses and affecting millions of people (Haraty, & Utaberta, 2018; Rosmadi et al., 2023). The increasing frequency and intensity of these hazards necessitate a robust Disaster Risk Management (DRM) framework to mitigate their impacts effectively.

DRM in Malaysia has traditionally been government-centric, focusing primarily on structural measures and emergency response (Chan, 2015). However, this approach has proven insufficient in addressing the multifaceted nature of disaster risks. The need for a more integrated and proactive disaster risk assessment framework has been recognized, leading to the development of the Integrated Disaster Risk Assessment Framework (IDRAF) (Ramle, et al., 2021). This framework aims to enhance the government's efforts in Disaster Risk Reduction (DRR) by incorporating multi-hazard and multi-dimensional vulnerability assessments, thereby providing a comprehensive tool for decision-makers to evaluate and mitigate risks effectively.

Moreover, the role of community involvement and cultural integration in disaster management has gained attention. The shift from a top-down approach to a more community-based disaster management strategy is crucial for increasing public awareness and resilience (Chong, & Kamarudin, 2018; Haraty, & Utaberta, 2018). Youth involvement, in particular, has been identified as a key factor in DRR, given their physical and mental agility, as well as their capacity for embracing new ideas and technologies (Rahman, 2020). By empowering local communities and integrating cultural and indigenous knowledge into disaster management plans, Malaysia can build a more resilient society capable of adapting to and mitigating natural hazard impacts.

Methodology

Identification

This research followed essential steps from systematic review methodology to collect important relevant research. The research process kicked off by choosing keywords followed by connecting terms with help from dictionaries and thesauri along with encyclopedias as well as existing research studies. All relevant search terms were identified to develop search strings that Scopus and PubMed databases utilized (Table 1 presents these search strings). The initial database screening yielded 306 publications directly related to the study topic from Scopus and PubMed.

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Table 1: The Search String

Scopus	**TITLE-ABS-KEY (disaster AND Malaysia AND hazards AND risk) AND PUBYEAR > 2019 AND PUBYEAR < 2025 AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (AFFILCOUNTRY , "Malaysia"))** **Date of Access: Nov 2024**
Pubmed	(disaster AND Malaysia AND hazards AND risk) Filters applied: Free full text, Randomized Controlled Trial, Published Erratum, Veterinary, Randomized Controlled Trial, American Recovery and Reinvestment Act, Research Support, Research Support, N.I.H., Extramural, Research Support, N.I.H., Intramural, Research Support, Non-U.S. Gov't, Research Support, U.S. Gov't, Non-P.H.S., Research Support, U.S. Gov't, P.H.S., Research Support, U.S. Gov't, English. Date of Access: Nov 2024

Screening

Potentially pertinent research items are assessed in the screening step to ensure they support the predetermined research question or questions. During this stage, research topics are frequently chosen using DRM in Malaysia. At this point, duplicate documents are eliminated. After 235 publications were discarded, 71 papers were left for additional analysis following inclusion and exclusion standards (refer to Table 2). Note that literature was the first criterion because it is the primary source of helpful advice. This criterion includes book series, reviews, meta-syntheses, meta-analyses, conference proceedings, and chapters not included in the most recent study. Only English-language publications from 2022 to 2024 were included in the review. Due to duplication, five publications in total were rejected.

Table 2: The Selection Criterion Is Searching

Criterion	Inclusion	Exclusion
Language	English	Non-English
Timeline	2020 – 2024	< 2020
Literature type	Journal (Article)	Conference, Review, Book
Publication Stage	Final	In Press
Country	Malaysia	Besides Malaysia

Eligibility

The eligibility phase of step three involved preparing a total of 66 articles for review. The researchers examined titles together with key contents of all articles during this phase to verify their alignment with both the study objectives and the inclusion criteria. The research excluded 34 articles that failed to meet the criteria due to insufficient field relevance and unimportant titles and nonrelated abstracts and absent empirical evidence full-text access. Correspondingly, 40 articles were retained for the next review.

Data Abstraction and Analysis

The research incorporated an integrative analysis as among the assessment approaches to combine diverse quantitative research designs. This competent research's aim was to establish key areas as well as supporting subtopics. Note that the initial step concerning theme

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development began with the data collection process. The authors undertook a systematic review of 40 publications to extract relevant content regarding the research topics (see Figure 2). The authors conducted an evaluation of recent vital studies focused on DRM in Malaysia during this phase. The current investigation evaluates research methodologies together with the achieved findings from each study. Consequently, the author, as well as other co-authors worked together to build themes from the evidence within this study's context. A data analysis log tracked thoughts and insights and problem statements that emerged during the interpretation of data. The authors performed a final step to verify if the theme design process revealed any inconsistencies between the results. The authors engage in internal discussions whenever they encounter conceptual disagreements.

Quality of Appraisal

According to the guidelines proposed by Kitchenham and Charters, once the authors had selected the primary studies, they had to assess the quality of the research they presented and quantitatively compare them. In this study, the authors apply a Quality Assessment (QA) from Abouzahra et al., 2020, comprising six QAs for our SLR. The scoring procedure for evaluating each criterion involves three possible ratings: “Yes” (Y) with a score of 1 if the criterion is fully met, “Partly” (P) with a score of 0.5 if the criterion is somewhat met but contains some gaps or shortcomings, and “No” (N) with a score of 0 if the criterion is not met at all.

i. QA1. Is the purpose of the study clearly stated?
ii. QA2. Is the interest and the usefulness of the work clearly presented?
iii. QA3. Is the study methodology clearly established?
iv. QA4. Are the concepts of the approach clearly defined?
v. QA5. Is the work compared as well as measured with regard to other similar studies?
vi. QA6. Are the limitations concerning the work clearly stated?

Specific evaluation criteria guide the QA process which serves to assess research studies according to the table. Three experts examine the study by evaluating it against defined criteria which receive (Y) for "yes," (P) for "partly," or (N) for "no" ratings. Here is a thorough explanation:

Is The Purpose of The Study Clearly Stated?

The purpose measurement verifies that the study clearly defines and states its objectives. The research direction and boundary become clear through an established purpose.

Is The Interest and Usefulness of The Work Clearly Presented?

The evaluation of this criterion examines how well the research explains its relevance as well as potential future contributions. This criterion evaluates both the research significance as well as its impact on the field.

Is The Study Methodology Clearly Established?

The research methodology should show clear definitions which demonstrate its appropriateness for reaching study objectives. The study depends on clear methodology for its reproducibility as well as validity.

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Are The Concepts of The Approach Clearly Defined?

The assessment of theoretical elements focuses on clear definitions within the framework and key concepts. The study requires clear definitions to help readers understand its research approach.

Is The Work Compared as Well as Measured with Regard to Other Similar Studies?

The current study compares itself to other research to demonstrate its position within existing academic work. Other studies serve as benchmarks to understand how the current work fits into academic research and demonstrate its added value.

Are The Limitations Concerning the Work Clearly Stated?

The experts examine the study independently and their scores are combined to calculate the final mark. A study must qualify for the following process only when its total combined scores from three experts exceed 3.0. The established threshold allows research of appropriate quality to advance to the next stage of evaluation.

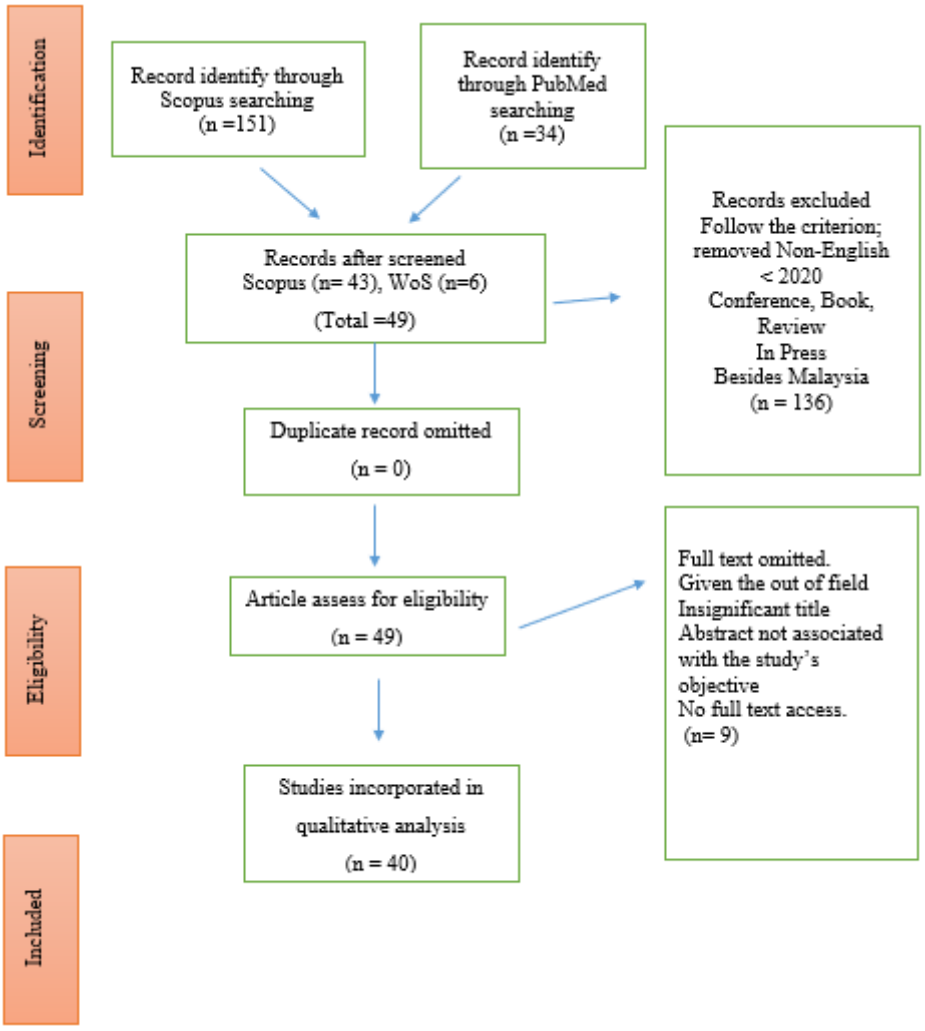

Figure 1. Flow Diagram with Regard to the Proposed Search Study [1]

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Result and Finding

The selected study's background: referring to QA, Appendix A presents the assessment performance result concerning selected primary studies.
Following is the QA table with respect to the selected papers:
Summary

- **Highest Score**: The paper by (Sulaiman et al., 2022; Rashid et al., 2023; Usman et al., 2021; Madnor et al., 2024; Mohamed et al., 2021; Bernhofen et al., 2022) achieved the highest score of 100% due to concise purpose articulation, usefulness, methodology, defined concepts, comparison with other work, as well as mention of limitations.
- **Lowest Score**: The research by (Jaafar et al., 2022; Lehan, 2022) scored the lowest (66.67%), as it partly met the criteria for the concepts of approach and comparison with other work and did not mention the limitations.

Discussion

Disaster Preparedness and Community Adaptation

In addressing the theme of **disaster preparedness and community adaptation** in Malaysia, multiple studies have focused on the impacts of flood hazards and the strategies local communities employ to mitigate these risks. Recent years have seen increased focus on disaster preparedness and community adaptation because natural disasters especially floods are becoming more frequent and intense throughout Malaysia. Community awareness and adopting protective behaviors are key to effective DRR. Despite the various flood-prone regions in Malaysia, there is a notable gap in flood preparedness, especially among communities in Melaka. According to Sufian et al. (2022), residents in Melaka exhibit a low level of flood preparedness, even though various organizations are actively promoting flood risk awareness. This study utilized the Adoption of Protective Behavior (APB) scale and found a significant correlation between flood preparedness and the adoption of protective measures. However, despite these efforts, the preparedness level among Melaka residents remains insufficient. These findings highlight the critical need for increased awareness programs and community education to enhance preparedness in flood-prone areas across Malaysia. Similarly, Jafar et al. (2020) and Adi et al. (2022) highlight the role of community adaptation in flood management, with local populations using coping strategies such as building houses on stilts and owning boats to reduce their vulnerability to flooding.

Flood risk assessments and community coping strategies significantly manage frequent floods in areas like Beaufort Sabah. Jafar et al. (2020) conducted a risk assessment using Geographic Information Systems (GIS) to categorize flood risk levels in Beaufort. The study identified high-risk areas but highlighted that the community's resilience to these hazards is driven by their adaptive strategies, as evidenced by the coping mechanisms identified in Jafar et al. (2022). This finding highlights that even in areas with frequent floods, community adaptation, through practices such as the construction of elevated houses, contributes to mitigating the effects of floods. These findings align with Adi et al. (2022), who explored community adaptation strategies. They note that despite the constant flood risks, local inhabitants in Beaufort have developed practical coping mechanisms that allow them to coexist with flood hazards.

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In the Johor River Basin, perceptions of climate change and its associated health impacts reveal how communities recognize the consequences of extreme weather events like floods and haze. Chu et al. (2024) assessed the perceptions of indigenous and non-indigenous communities in the Johor River Basin regarding the health impacts of climate change. The study determined that while both groups expressed concern about the potential health risks posed by extreme weather, Indigenous respondents perceived these risks as more immediate than non-indigenous groups. This difference in risk perception illustrates how different communities perceive the urgency of disaster preparedness, with those most directly affected by frequent weather-related events demonstrating a greater sense of urgency and preparedness. Ahmadun et al. (2020) review the impacts of the 2004 Indian Ocean tsunami in Malaysia, which serves as a case study for understanding the broader challenges faced by disaster-prone regions in the country. The tsunami's aftermath prompted the Malaysian government to establish a more structured disaster management system, including creating tsunami hazard zones and forming the National Disaster Management Agency (NADMA). This establishment reflects a broader trend toward strengthening disaster risk governance, as also discussed by Madnor et al. (2024), who argue for the integration of Climate Change Adaptation (CCA) into DRR strategies. On the other hand, Madnor et al. (2024) emphasize the need for a multi-level governance approach to disaster management, which includes local-level actors, enhancing disaster preparedness and ensuring community participation in resilience-building efforts.

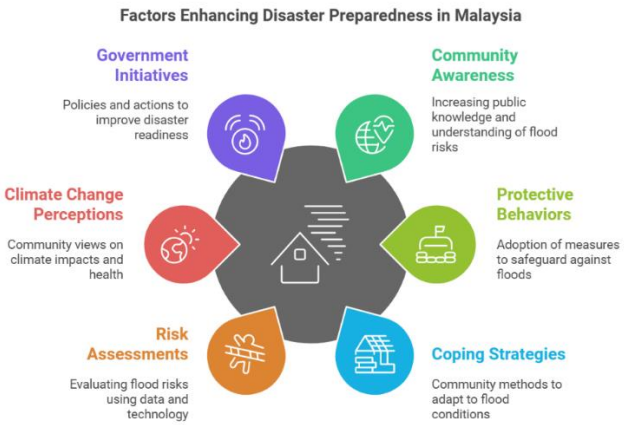

Figure 2: Factors Enhancing Disaster Preparedness in Malaysia

Technological Approaches in Disaster Risk Management

Geospatial tools like GIS and Remote Sensing (RS) have proven invaluable in DRR by enabling accurate hazard mapping, risk assessments, and preparedness planning. Research by Sulaiman et al. (2022) and Affandi et al. (2023), highlight the integration of geoscience data with GIS to improve urban resilience, particularly in cities like Kuala Lumpur, which face hazards such as floods and landslides. The application of sustainable infrastructure, such as Low Impact Development (LID) techniques explored by Kuok et al. (2024), has shown effectiveness in mitigating urban flood risks, while participatory approaches, like the geospatial Indicator-based Model (IBM) developed by Usman et al. (2021), enhance the accuracy of vulnerability assessments. Seismic risk management, as demonstrated by Sauti et al. (2021) and Ramzanee et al. (2022), also benefits from GIS-based models, which provide critical data for mitigation strategies. Moreover, addressing compounded risks from natural and industrial hazards, as emphasized by Yahaya et al. (2024), requires improved infrastructure and updated safety protocols. Innovative frameworks like the IDRAF and advanced forecasting systems,

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such as the Flood Impact-Based Forecasting System (FIBF) proposed by Wee et al. (2023), further illustrate the role of technology in improving DRM. As climate change exacerbates the frequency and severity of disasters, integrating geospatial tools, sustainable infrastructure, participatory methods, and targeted adaptation measures remains essential for building resilience and safeguarding communities in disaster-prone regions.

Technological progress in DRM has markedly strengthened community resilience to natural hazards in Malaysia, with geospatial technologies—specifically GIS and RS—demonstrating critical utility in DRR. A systematic review conducted by Sulaiman et al. (2022) underscores the role of GIS and RS in synthesizing spatial data from diverse sources, thereby enhancing the accuracy of hazard mapping, the robustness of risk assessments, and the efficacy of disaster preparedness strategies. These technologies allow authorities to visualize and analyze disaster-prone areas more accurately, facilitating better decision-making and resource allocation. Affandi et al. (2023) emphasize integrating geoscience data with GIS to enhance urban resilience, particularly in cities like Kuala Lumpur, which are vulnerable to multiple hazards, including landslides and floods. In Malaysia, these technological approaches have been increasingly adopted to improve risk reduction strategies and support the development of resilient urban infrastructure.

Urban flooding, exacerbated by rapid urbanization and increased impermeable surfaces, remains a significant challenge. Their study showed that these practices significantly reduced runoff peaks and improved water quality, with bioretention systems proving the most efficient. This effectiveness aligns with the results of Yahaya et al. (2024), which underscore the role of green infrastructure in managing stormwater and mitigating urban flooding. These technologies contribute to reducing the impacts of urbanization on flood risks, particularly in equatorial regions where heavy rainfall is common. Furthermore, seismic risk assessment is vital in disaster preparedness, particularly in regions like Pahang, which face potential seismic hazards. Sauti et al. (2021) utilized GIS-based spatial models to assess seismic vulnerability by integrating exposure, resilience, and capacity indicators, identifying areas with the highest seismic risk. Their findings showed that districts like Bentong were particularly vulnerable, while others like Pekan and Jerantut exhibited lower vulnerability. Similarly, Ramzanee et al. (2022) conducted a GIS-based seismic vulnerability assessment in Bukit Tinggi, revealing varying vulnerability levels across the area and providing essential data for mitigation strategies and informed development plans. These studies demonstrate the efficacy of GIS tools in assessing and mapping seismic risks, facilitating the implementation of effective risk-reduction measures**.**

In addition to GIS applications in seismic and flood assessments, integrating participatory approaches has proven to enhance the accuracy and relevance of vulnerability assessments. Usman et al. (2021) developed a geospatial IBM for evaluating physical flood vulnerability in Kota Bharu, Kelantan, employing a participatory Analytical Hierarchy Process (AHP). Their findings showed that 98% of the buildings in the area had moderate to low flood vulnerability, highlighting the effectiveness of incorporating expert knowledge and local input into disaster risk assessments. This approach allows for creating more context-specific vulnerability maps, informing the development of tailored flood mitigation strategies. Beyond flood and seismic risks, Yahaya et al. (2024) emphasized the compounded threats posed by climate change and industrial hazards, focusing on coastal industrial areas in Kuala Selangor, Malaysia. Their study revealed that manufacturing industries were highly vulnerable to floods due to insufficient

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flood protection measures and inadequate hazardous material storage. This vulnerability underscores the need for local authorities to address both natural and technological risks by enhancing flood protection infrastructure and updating safety protocols for hazardous materials.

In conclusion, GIS and RS technologies are transforming DRM in Malaysia by improving hazard assessments, vulnerability mapping, and preparedness strategies. Integrating sustainable infrastructure like bioretention systems and participatory approaches further strengthens disaster mitigation efforts. As climate change amplifies the frequency and severity of natural disasters, the continued use of these technologies, alongside targeted adaptation measures, is critical for building resilience in disaster-prone regions. Moreover, addressing the compounded risks from natural and technological hazards, particularly in industrial zones, is essential for minimizing disaster impacts and safeguarding communities.

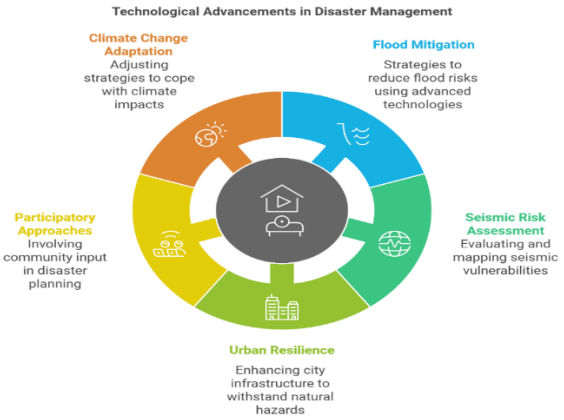

Figure 3: Technological Advancements in Disaster Management

Vulnerability and Risk Assessment of Natural Disasters

In recent studies concerning disaster vulnerability and risk assessments in Malaysia, various natural hazards, particularly landslides, earthquakes, and floods, have been extensively analyzed, highlighting the need for improved disaster management strategies. The works of Zulkafli et al. (2023) and Selamat et al. (2023) emphasize the physical characteristics influencing landslide occurrences in urban settings like Kuala Lumpur, with findings showing that slope angle and proximity to roads, streams, and urban areas are critical risk factors. Furthermore, the importance of data accuracy and availability in assessing disaster risk is highlighted in several studies. Bhuiyan et al. (2023) stress the inadequacy of existing landslide databases in Malaysia, revealing significant gaps in critical information such as damage data and hazard specifics. This data shortfall hinders effective DRR efforts, emphasizing the need for comprehensive and reliable data systems. Usman Kaoje et al. (2020) and Muhamad et al. (2021) similarly examine flood vulnerability in urban areas, using GIS and indicator-based approaches to assess building vulnerability in Kota Bharu and Kuala Lumpur, respectively. Their findings suggest that while flood hazard mapping is crucial, integrating detailed vulnerability data—such as building structure and surrounding environmental factors—can significantly enhance disaster preparedness and response planning.

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In addition to physical hazard assessment, several studies (Rashid et al., 2023; Rosli et al., 2021; Mohamed et al., 2021) focus on improving disaster preparedness, particularly in high-risk industries and UNESCO World Heritage areas. Rashid et al. (2023) evaluate disaster preparedness in LPG Liquefied petroleum gas storage facilities, revealing a substantial gap in response capacity across Malaysia. Similarly, Rosli et al. (2021) assess the cascading geohazards triggered by the 2015 Ranau earthquake in Sabah, emphasizing the role of RS technologies in understanding local risks such as debris flow. Meanwhile, Mohamed et al. (2021) advocate leveraging multidisciplinary expertise, including ICT (Information and Communications Technology), in assessing landslide hazards, particularly around the Batu Caves area. These findings advocate for a broader, interdisciplinary approach to DRM, incorporating technological tools and industry-specific preparedness strategies. Finally, as Ramli et al. (2023) proposed, comprehensive risk assessments utilize a multi-dimensional vulnerability index to evaluate urban areas in Selangor. Their study highlights that most regions are classified as highly vulnerable, primarily due to rapid urbanization and insufficient disaster mitigation strategies. The findings call for integrated DRR approaches, emphasizing the need for local governments to adopt proactive policies and strategies that consider the multifaceted nature of vulnerability, including social, economic, and environmental factors.

Natural disasters in Malaysia, such as landslides, floods, and earthquakes, continue to pose significant challenges to the safety and well-being of communities. Recent studies have highlighted the importance of risk and vulnerability assessments in addressing these hazards effectively. Researchers discovered significant differences in risk acceptance by analyzing the perceptions of both communities and experts on landslide risks. Non-experts typically exhibited a lower tolerance for landslide risks than experts who understood the complexity of creating an ideal low-risk environment. Gender, occupation, and education were identified as key demographic factors influencing risk acceptance, with experts more willing to accept higher risks given the socio-political context in Malaysia. This study suggests that integrating expert knowledge into risk evaluation criteria and modifying existing criteria can help decision-making and reduce losses in landslide-prone areas (Sim et al., 2023). Similarly, other studies have emphasized integrating local knowledge and expert assessments in hazard mapping and risk reduction strategies to enhance community preparedness (Mudashiru et al., 2022; Badrolhisham & Latiff, 2021).

Seismic risk assessments in Malaysia have also highlighted the need to integrate social vulnerability into hazard analysis. Studies conducted in Pahang and Sabah utilized GIS-based approaches to map vulnerability levels and identify districts at higher risk of earthquake exposure. In Pahang, a social vulnerability index was constructed to assess factors such as income levels, housing conditions, and accessibility to emergency services, which influence residents' ability to cope with seismic events (Sauti et al., 2020). Similarly, a more detailed multi-dimensional approach was used in Sabah to assess earthquake vulnerabilities, integrating socio-economic factors and geospatial data to develop a risk classification map. These analyses identified high-risk areas that require targeted mitigation strategies to reduce exposure and improve resilience (Sauti et al., 2022). Therefore, integrating these vulnerability indicators with seismic hazard maps can improve disaster preparedness and mitigation efforts, ensuring that resources are allocated to the most at-risk communities. The role of disaster insurance, particularly in agriculture, has also been explored as a risk management tool in Malaysia. Alam et al. (2020) discussed the potential of agriculture insurance to reduce disaster risks in Malaysia's agro-production sector. Despite challenges such as limited insurance products and

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high operational costs, they proposed a framework that involves public-private partnerships to improve insurance availability and effectiveness. This framework could help farmers mitigate the financial impacts of floods, droughts, and other climate-related disasters. Risk financing mechanisms are crucial for ensuring sustainable development and reducing vulnerability in disaster-prone regions.

Integrating multidisciplinary risk assessments, including expert and community perspectives, socio-economic vulnerability, and risk reduction measures, is crucial for enhancing disaster resilience in Malaysia. By combining hazard identification with social vulnerability mapping and promoting DRR through effective policies and risk financing, Malaysia can strengthen its preparedness and response strategies for various natural disasters.

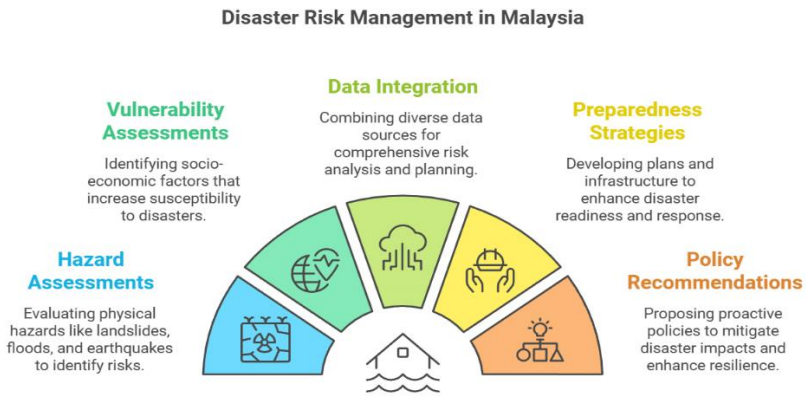

Figure 4: Disaster Risk Management in Malaysia

Conclusion

While Malaysia has made progress in disaster management and community resilience, significant challenges remain in ensuring comprehensive preparedness and adaptation. The diverse nature of flood risks across different regions necessitates context-specific approaches integrating local knowledge and adaptive strategies. The escalating climate-related hazard threats require an evolution of disaster risk governance, ensuring that communities, especially those in high-risk areas, are adequately equipped to reduce vulnerability and respond effectively to future disasters. The continued application of GIS, RS, and other advanced technologies, such as impact-based forecasting systems, is pivotal in enhancing Malaysia's

DRR and response efforts. Combined with localized knowledge and multi-hazard models, implementing these technologies strengthens the country's capacity to manage natural and technological risks. As the frequency and severity of disasters increase due to climate change, ongoing adaptation and integration of sustainable infrastructure will be vital for building resilient communities and mitigating disaster impacts. In conclusion, enhancing disaster resilience in Malaysia requires a comprehensive, multi-dimensional approach that incorporates physical hazard assessments, socio-economic vulnerability mapping, improved data collection, and risk financing mechanisms, ultimately strengthening disaster preparedness, response, and mitigation efforts to reduce the impacts of natural hazards on vulnerable communities.

Conflicts of Interest

The authors declare no relevant conflicts to publish in this study work.

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References

Abouzahra, A., Sabraoui, A., & Afdel, K. (2020). Model composition in Model Driven Engineering: A systematic literature review. *Information and Software Technology, 125*(May), 106316. https://doi.org/10.1016/j.infsof.2020.106316

Ahmad, A., et al. (2021). Model for community-based disaster preparedness in Malaysia. *Springer Nature Environmental Studies*, pp. 325–345.

Ahmadun, F., Wong, M. M. R., & Said, A. M. (2020). Consequences of the 2004 Indian Ocean Tsunami in Malaysia. *Safety Science, 121*, 619–631. https://doi.org/10.1016/J.SSCI.2019.05.016

Alaba, B. P., et al. (2023). A 3D model of flood risk for flood risk management in the urban area of Larkin, Johor Bahru, Malaysia. *Geocarto International, 38*(12), 1823–1839. https://doi.org/10.1080/10106049.2022.2024517

Ali, M. M., Yusof, N. M., & Jamaludin, N. (2022). Geospatial modelling for landslide susceptibility mapping in the steep hilly region of Kuala Lumpur, Malaysia. *International Journal of Disaster Risk Reduction, 66*, 102502. https://doi.org/10.1016/j.ijdrr.2021.102502

Baizid, I., & Shahar, A. M. (2023). Review of flood disaster resilience. *Disaster Management and Risk Reduction, 5*(1), 57–69. https://doi.org/10.1016/j.drmr.2023.103249

Bej, S. B., Koyanagi, S., & Nomura, S. (2022). Disaster risk reduction framework for flood-prone residential areas in the vicinity of Malaysia: Mapping vulnerability using GIS techniques. *Environmental Sustainability, 16*(3), 243–254. https://doi.org/10.1007/s42398-022-00249-4

Bernhofen, M. V., et al. (2022). The role of global data sets for riverine flood risk management at national scales. *Water Resources Research, 58*(4). https://doi.org/10.1029/2021WR031555

Bhuiyan, T. R., Er, A. C., Muhamad, N., & Pereira, J. J. (2021). Flood mapping of Gombak, Malaysia using UAV technology. *Sustainability, 13*(10), 5520. https://doi.org/10.3390/su13105520

Chan, N. (2015). Impacts of disasters and disaster risk management in Malaysia: The case of floods. In *Handbook of Disaster Risk Reduction* (pp. 239–265). https://doi.org/10.1007/978-4-431-55022-8_12

Chong, N. O., & Kamarudin, K. H. (2018). Disaster risk management in Malaysia: Issues and challenges from the perspective of agencies. *Planning Malaysia Journal*. https://doi.org/10.21837/PM.V16I5.415

Cheong, M. S., & Yusof, S. (2022). Assessing effectiveness of mitigation measures of landslide disaster in Penang, Malaysia: A case study. *Geomatics, Natural Hazards and Risk, 13*(7), 1834–1850. https://doi.org/10.1080/19475705.2022.2126955

International Journal of Innovation and Industrial Revolution
IJIREV
EISSN: 2637-0972
Volume 7 Issue 22 (September 2025) PP. 131-155
DOI 10.35631/IJIREV.722010
Haraty, H. J. S., & Utaberta, N. (2018). The Importance of Culture in Disaster Management in Malaysia. In *Advanced Civil Engineering Materials* (pp. 7). https://doi.org/10.1007/978-981-13-2511-3_7

Hassan, N. M., Mohd Yusof, R., Khamis, N. M., & Md, N. (2023). Analysis of Landslide Hazard in Hulu Langat District, Malaysia. *Sains Malaysiana, 52*(7), 2025–2038. https://doi.org/10.17576/jsm-2023-5207-18

Ho, K. K. S., Lacasse, S., & Picarelli, L. (2017). Preparedness for climate change impact on slope safety. In *Slope Safety Preparedness for Impact of Climate Change* (pp. 1–42). CRC Press. https://doi.org/10.1201/9781315387789

Jafar, A., Sakke, N., Hung, C. V., Mappa, M. T. M., Ibrahim, M. H., Hashim, M. H., ... & Maseleno, A. N. D. I. N. O. (2020). Flood risk assessment in Beaufort, Sabah, Malaysia. *Int J Pharm Res*, *12*(4), 2772-2783.

Kaoje, I. U., Abdul Rahman, M. Z., Idris, N. H., Razak, K. A., Wan Mohd Rani, W. N. M., Tam, T. H., & Mohd Salleh, M. R. (2021). Physical flood vulnerability assessment using geospatial indicator-based approach and participatory analytical hierarchy process: A case study in Kota bharu, Malaysia. *Water*, *13*(13), 1786.

Kaoje, I. U., Rahman, M. Z. Abdul, Idris, N. H., Tam, T. H., & Mohd Sallah, M. R. (2020). Physical flood vulnerability assessment of buildings in Kota Bharu, Malaysia: An indicator-based approach. *International Journal of Disaster Resilience in the Built Environment, 12*(4), 413–424. https://doi.org/10.1108/IJDRBE-05-2020-0046

Kaur, M. J., & Shamsuddin, S. (2021). Disaster and risk reduction management of coastal flooding: Malaysian perspective. *International Journal of Environmental Science and Technology, 18*(10), 1-12.

Keele, S. (2007). *Guidelines for performing systematic literature reviews in software engineering* (Vol. 5). Technical report, ver. 2.3 ebse technical report. ebse.

Khudri, H. B. M., Akma, S. N. S., Ruhaida, A., & Hisyam, K. K. (2024). Factors contributing to participation in community-led DRR programmes in Malaysia. *Disaster Advances, 17*(8), 41–48. https://doi.org/10.25303/178da041048

Kumar, M., Gopalakrishnan, R., & Al Naggar, E. (2024). Risk management practices for flood hazards in Malaysia. *International Journal of Environmental Research and Public Health, 21*(5), 2501.

Kuok, K. K., Chiu, P. C., Chin, M. Y., Rahman, R., & Bakri, M. K. B. (2024). Effectiveness of bioretention system and vegetated swale for reducing urban flood risk in equatorial region: a case study in Kuching, Malaysia. *Sustainable Water Resources Management*, *10*(2), 76.

Lehan Nur Fadzlina Aini, M., Azahari, R. K., & Hisyam, K. K. (2020). Business continuity and resiliency planning in disaster-prone areas of Sabah, Malaysia. *Disaster Advances, 13*(7), 25–32.

Lockwood, C., Munn, Z., & Porritt, K. (2015). Qualitative research synthesis: Methodological guidance for systematic reviewers utilizing meta-aggregation. *International Journal of Evidence-Based Healthcare, 13*(3), 179–187. https://doi.org/10.1097/XEB.0000000000000062

Maqtan, R., Othman, F., Wan Jaafar, W. Z., Sherif, M., & El-Shafie, A. (2022). A scoping review of flash floods in Malaysia: Current status and the way forward. *Natural Hazards, 114*(3), 2387–2416. https://doi.org/10.1007/s11069-022-05486-6

Masud, M. M., Sackor, A. S., Alam, A. S. A. F., Al-Amin, A. Q., & Ghani, A. B. A. (2018). Community responses to flood risk management: An empirical investigation of the marine protected areas (MPAs) in Malaysia. *Marine Policy*.

International Journal of Innovation and Industrial Revolution
IJIREV
EISSN: 2637-0972
Volume 7 Issue 22 (September 2025) PP. 131-155
DOI 10.35631/IJIREV.722010
Madnor, M. S., Harun, A. N., & Ros, F. C. (2024). Integrating adaptation of climate change to strengthen Malaysia's disaster risk governance. *Environmental and Social Psychology, 9*(4). https://doi.org/10.54517/esp.v9i4.2189

Mohamed, Z., Abd Ghani Rafek, Mingwei Zhang, Yanlong Chen, Goh Thian Lai*, Khamarrul Azahari & Zakaria Mohamad. (2021). Leveraging on multidisciplinary expertise for landslide disaster risk reduction and management: A case study of a limestone hill rockfall hazard assessment, Batu Caves, Selangor, Malaysia. *Sains Malaysiana, 50*(8), 2179–2191. https://doi.org/10.17576/jsm-2021-5008-04

Ong, M. C., & Johari, N. A. (2023). Analysis of critical infrastructure systems for flood risk management in Malaysia. *International Journal of Disaster Risk Reduction, 78*. https://doi.org/10.1016/j.ijdrr.2023.102353

Osman, R., & Cheah, C. H. (2023). Economic impact assessment of flood disasters in Malaysia. *Journal of Economic Structures, 12*(9). https://doi.org/10.1186/s40008-023-00277-1

Osti, R., & Nakasu, T. (2016). Lessons learned from southern and eastern Asian urban floods: From a local perspective. *Journal of Flood Risk Management*.

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., ... & Moher, D. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *bmj*, *372*.

Ramli, M. W. A., Alias, N., Yusof, H. M., Yusop, Z., & Taib, S. (2021). Development of a local, integrated disaster risk assessment framework for Malaysia. *Sustainability, 13*(19), 10792. https://doi.org/10.3390/su131910792

Rashid, R. M., Umar, R. Z. R., & Ahmad, N. (2019). Research trends on control of industrial major accident hazard occurrence in Malaysia: A thematic review. *Journal of Legal, Ethical and Regulatory Issues, 22*(1).

Rashid, R. M., Umar, R. Z. R., & Ahmad, N. (2023). Major hazard industries disaster preparedness: An empirical study of liquefied petroleum gas storage facilities. *International Journal of Critical Infrastructures, 19*(1), 17–39. https://doi.org/10.1504/IJCIS.2023.10038939

Rahman, H. A. (2020). Youth and disaster management in Malaysia. *International Journal of Academic Research in Business and Social Sciences, 10*(16), 8318. https://doi.org/10.6007/IJARBSS/V10-I16/8318

Razali, N. N., Harun, A. N., & Mohamed, H. (2020). Investigating potential socio-economic vulnerability to climate change adaptation and mitigation in Penang, Malaysia. *Springer, Proceedings of the International Conference on Business Management*. https://doi.org/10.1007/978-981-15-1220-2_24

Rosmadi, H. S., Ahmed, M., Mokhtar, M., & Lim, C. (2023). Reviewing challenges of flood risk management in Malaysia. *Water, 15*(13), 2390. https://doi.org/10.3390/w15132390

Rosli, M. I., Kamal, N. A. Mohd, & Razak, K. A. (2021). Assessing earthquake-induced debris flow risk in the first UNESCO World Heritage in Malaysia. *Remote Sensing Applications: Society and Environment, 23*. https://doi.org/10.1016/j.rsase.2021.100550

Sharir, K., & Roslee, R. (2023). Analysis of physical, social and environmental flood vulnerability index in Kota Belud area, Sabah, Malaysia. *Sains Malaysiana, 52*(6), 1619–1633. https://doi.org/10.17576/jsm-2023-5206-02

Sauti, N. S., Daud, M. E., Kaamin, M., & Sahat, S. (2022). Earthquake risk assessment of Sabah, Malaysia based on geospatial approach. *International Journal of Integrated Engineering, 14*(5), 38–48. https://doi.org/10.30880/ijie.2022.14.05.004

International Journal of Innovation and Industrial Revolution
IJIREV
EISSN: 2637-0972
Volume 7 Issue 22 (September 2025) PP. 131-155
DOI 10.35631/IJIREV.722010
Sauti, N. S., Daud, M. E., & Kaamin, M. (2020). Construction of an integrated social vulnerability index to identify spatial variability of exposure to seismic hazard in Pahang, Malaysia. *International Journal of Design & Nature and Ecodynamics, 15*(3), 365–372. https://doi.org/10.18280/ijdne.150310

Sauti, N. S., Daud, M. E., Kaamin, M., & Sahat, S. (2021). GIS spatial modelling for seismic risk assessment based on exposure, resilience, and capacity indicators to seismic hazard: A case study of Pahang, Malaysia. *Geomatics, Natural Hazards and Risk, 12*(1), 1948–1972. https://doi.org/10.1080/19475705.2021.1947903

Shah, S. S. S., & Zainuddin, Z. (2023). The roles of local government in enhancing flood resilience: A Malaysian context. *Environmental Management & Health, 44*(1), 312-325. https://doi.org/10.1108/147778092022-22757

Sufian, A., Chi, C. J., Azman, H., Aziz, N. A. A., Fen, F. S., & Zamri, A. A. M. (2022). Assessing residents' flood preparedness through adaptation of protective behaviour in Melaka, Malaysia. *Environmental and Ecological Research, 10*(3), 334–345. https://doi.org/10.13189/eer.2022.100302

Sulaiman, N., Abdullah, N. M., Nazir, U., Ismail, M., Latib, S. K. K. A., & Mahmud, N. P. N. (2022). Geographical information system (GIS) and remote sensing (RS) applications in disaster risk reduction (DRR) in Malaysia. *International Journal of Integrated Engineering, 14*(5), 25–37. https://doi.org/10.30880/ijie.2022.14.05.003

Thiruchelvam, S., Ng, Y. J., Husin, N. B. M., Chong, S. T., Ghazali, A., & Kadir, A. K. (2019). Towards societal engagement: Building human resilience by engaging communication about flood-prone areas. *International Journal of Innovation, Creativity and Change, 8*(7), 14–26.

Yahaya, N. S., Pereira, J. J., Taha, M. R., & Yaacob, W. Z. W. (2024). Natech potential due to emerging climate hazards and awareness of the local stakeholders in the coastal industrial site of Kuala Selangor, Malaysia. *Chemosphere, 367*. https://doi.org/10.1016/j.chemosphere.2024.143551

Zarai, Z. I., & Shamsuddin, A. M. (2022). A comprehensive overview of flood forecasting technologies in Malaysia. *Geocarto International, 35*(8), 1592–1607.

Zulkafli, S. A., Majid, N. A., Zakaria, S. Z. S., Razman, M. R., & Ahmed, M. F. (2023). Influencing physical characteristics of landslides in Kuala Lumpur, Malaysia. *Pertanika Journal of Science and Technology, 31*(2), 995–1010. https://doi.org/10.47836/pjst.31.2.18

International Journal of Innovation and Industrial Revolution
EISSN: 2637-0972
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DOI 10.35631/IJIREV.722010

Quality Assessment Result (Appendix A)

No.	Authors	Title	Year	Journal	Type of Disaster	Hazard and risk	Type of Disaster Management	Percentage (%)
1	Sufian et al., 2022	Assessing Residents' Flood Preparedness through Adaption of Protective Behaviour in Melaka, Malaysia	2022	Environment and Ecology Research	Flood	Flooding. Inadequate preparedness leading to property damage and loss of lives	Preparedness and Adaptation	66.7
2	Sulaiman et al., 2022	Geographical Information System (GIS) and Remote Sensing (RS) Applications in Disaster Risk Reduction (DRR) in Malaysia	2022	International Journal of Integrated Engineering	General Disaster Risk Reduction	Various (Flood, Landslide, etc.). Limited application of GIS/RS technologies in disaster risk reduction.	Risk Reduction, Technology Integration	100
3	Zulkafli et al., 2023	Influencing Physical Characteristics of Landslides in Kuala Lumpur, Malaysia	2023	Pertanika Journal of Science and Technology	Landslide	Landslide. Infrastructure damage and disruptions in urban areas	Risk Assessment and Physical Mitigation	83.3
4	Kuok et al., 2024	Effectiveness of bioretention system and vegetated swale for reducing urban flood risk in equatorial region: a case study in Kuching, Malaysia	2024	Sustainable Water Resources Management	Flood	Flooding. Inadequate drainage systems increasing flood risk	Mitigation (Infrastructure Solutions)	91.7
5	Yahaya et al., 2024	Natech potential due to emerging climate hazards and awareness of the local	2024	Chemosphere	Natural Hazard (Natech)	Technological and Environmental Hazards. Industrial	Risk Assessment, Awareness,	91.7

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		stakeholders in the coastal industrial site of Kuala Selangor, Malaysia				accidents exacerbated by climate hazards.	and Preparedness	
6	Rashid et al., 2023	Major hazard industries disaster preparedness: an empirical study of liquefied petroleum gas storage facilities	2023	International Journal of Critical Infrastructures	Industrial Disaster	Hazardous Materials (LPG). Potential explosions and gas leaks due to poor disaster preparedness.	Preparedness and Response (Industrial Hazards)	100
7	Rosli et al., 2021	Assessing Earthquake-induced Debris Flow Risk in the first UNESCO World Heritage in Malaysia	2021	Remote Sensing Applications: Society and Environment	Earthquake	Earthquake-induced debris flow. Damage to heritage sites and loss of cultural significance.	Risk Assessment and Mitigation	83.3
8	Usman et al., 2020	Physical flood vulnerability assessment of buildings in Kota Bharu, Malaysia: an indicator-based approach	2020	International Journal of Disaster Resilience in the Built Environment	Flood	Flood vulnerability. Vulnerable buildings leading to structural collapse.	Vulnerability Assessment and Preparedness	83.3
9	Sauti et al., 2021	GIS spatial modelling for seismic risk assessment based on exposure, resilience, and capacity indicators to seismic hazard: a case study of Pahang, Malaysia	2021	Geomatics, Natural Hazards and Risk	Earthquake	Seismic hazard. Seismic vulnerability of communities and infrastructure.	Risk Assessment and Capacity Building	83.3
10	Jafar et al., 2020	Flood risk assessment in beaufort, Sabah, Malaysia	2020	International Journal of	Flood	Flood. Insufficient risk assessments leading to	Risk Assessment	66.7

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				Pharmaceutical Research		unprepared communities.		
11	Bhuiyan et al., 2023	Assessing damage data availability in national landslide databases for SFDRR reporting: a case study of Kuala Lumpur as a local-level application	2023	Landslides	Landslide	Landslide. Incomplete damage databases reducing effectiveness in risk management	Damage data availability for reporting in SFDRR	91.7
12	Ramzanee et al., 2022	GIS based seismic vulnerability assessment in tourist attractions area: a case study in Bukit Tinggi, Pahang, Malaysia	2022	Disaster Advances	Earthquake	Seismic vulnerability. Seismic risks in tourist areas impacting safety and local economy.	Seismic vulnerability assessment using GIS	83.3
13	Jafar et al., 2022	The Adaptive Capacity in Flood Hazards and Enhancement of Local Knowledge among Floodplain Community in Beaufort District, Sabah, Malaysia	2022	International Journal of Climate Change: Impacts and Responses	Flood	Flood hazards (e.g., flooding, inundation). Lack of local knowledge integration into flood adaptation	Adaptive capacity and local knowledge enhancement for flood hazards	83.3
14	Kaoje et al., 2021	Physical flood vulnerability assessment using geospatial indicator-based approach and participatory analytical hierarchy process: A case study in Kota Bharu, Malaysia	2021	Water (Switzerland)	Flood	Flood hazards (e.g., flooding, inundation). - Damage to infrastructure and properties - Increased physical vulnerability in flood-prone areas	Geospatial vulnerability assessment and participatory approach for flood hazards	100

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						- Displacement and economic disruption		
15	Selamat et al., 2023	The spatial relationship between landslide and land use activities in Langat River Basin: A case study	2023	Physics and Chemistry of the Earth	Landslide	Landslides (e.g., slope failure, rockfall, soil erosion. Land use activities increasing landslide occurrences	Spatial relationship between landslides and land use activities	75
16	Chu et al., 2024	Perceptions of climate change and associated health impacts among communities in Johor River Basin, Malaysia	2024	Medical Journal of Malaysia	Climate Change	Climate-related hazards (e.g., flooding, heatwaves, drought, health impacts). Health impacts, including vector-borne diseases and heat stress	Perceptions of climate change and associated health impacts	75
17	Ahmadun et al., 2020	Consequences of the 2004 Indian Ocean Tsunami in Malaysia	2020	Safety Science	Tsunami	Tsunami (e.g., coastal flooding, storm surges, infrastructure damage). Loss of lives and economic disruption due to inadequate early warning systems.	Consequences and impacts of the 2004 Indian Ocean Tsunami	75

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18	Madnor et al., 2024	Integrating adaptation of climate change to strengthen Malaysia's disaster risk governance	2024	Environment and Social Psychology	Climate Change	Climate-related hazards (e.g., flooding, extreme weather events). Poor governance reducing adaptive capacity.	Strengthening disaster risk governance through climate change adaptation	100
19	Mohamed et al., 2021	Leveraging on multidisciplinary expertise for landslide disaster risk reduction and management: A case study of a limestone hill rockfall hazard assessment, batu caves, selangor, malaysia	2021	Sains Malaysiana	Landslide	Landslides (e.g., slope failure, rockfall, soil erosion. Risks to residents near limestone hills.	Rockfall hazard assessment for landslide risk reduction and management	100
20	Muhamad et al., 2021	Exposure Elements in Disaster Databases and Availability for Local Scale Application: Case Study of Kuala Lumpur, Malaysia	2021	Frontiers in Earth Science	General (multiple disasters)	Various hazards (e.g., flooding, landslides, heatwaves, earthquakes). Lack of local data reducing disaster response efficiency.	Exposure elements in disaster databases for local-scale application	75
21	Lehan et al., 2020	Business continuity and resiliency planning in disaster prone area of sabah, malaysia	2020	Disaster Advances	Natural Disaster. Floods, Earthquakes, Landslides.	Floods, Earthquakes, Landslides. Poor business continuity planning in disaster-prone areas.	Risk Reduction, Resilience Planning	66.7

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22	Affandi et al., 2023	Integration of Geoscience Information for Disaster Resilience in Kuala Lumpur, Malaysia	2023	Applied Sciences (Switzerland)	Natural Disaster. Floods, Earthquakes, Landslides.	Floods, Earthquakes, Landslides. Limited use of geoscience data for disaster resilience.	Disaster Resilience, Risk Reduction	83.3
23	Bhuiyan et al., 2021	The socioeconomic impact of climate-related hazards: flash flood impact assessment in Kuala Lumpur, Malaysia	2021	Natural Hazards	Climate-related Disaster	Flash Floods. Socioeconomic disruptions and urban vulnerabilities.	Impact Assessment, Climate Adaptation	83.3
24	Ramli et al., 2023	Spatial multidimensional vulnerability assessment index in urban area- A case study Selangor, Malaysia	2023	Progress in Disaster Science	Urban Disaster	Floods, Urban Hazards, Environmental Hazards. High vulnerability due to population density.	Vulnerability Assessment, Risk Mapping	91.7
25	Pereira et al., 2023	Advancing science, technology and innovation for disaster risk reduction: The Kuala Lumpur Consensus on Disaster Risk Reduction	2023	Warta Geologi	General Disaster Risk	Various hazards (climate-related, earthquakes, floods, etc.). Insufficient innovation in disaster risk reduction	Disaster Risk Reduction (DRR), Science & Technology	83.3
26	Sim et al., 2023	Perception on landslide risk in Malaysia: A comparison between communities and experts' surveys	2023	International Journal of Disaster Risk Reduction	Natural Disaster	Landslides. Gaps in risk perception between communities and experts.	Risk Perception, Community Engagement	83.3

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27	Adi et al., 2022	Assessing flood risks and the coping strategy: a community adaptation in floodplain areas at Beaufort district in east Malaysia	2022	Disaster Advances	Flood Disaster	Floods. Uncoordinated community coping strategies	Risk Assessment, Coping Strategies, Community Adaptation	75
28	Badrolhisham & Latif 2021	Integrated seismic hazard analysis of southwest penang island through horizontal-to-vertical spectral ratio and probabilistic seismic hazard assessment	2021	Bulletin of the Geological Society of Malaysia	Earthquake Disaster	Earthquakes. Insufficient seismic hazard assessments	Seismic Hazard Analysis, Risk Assessment	75
29	Wee et al., 2023	A flood Impact-Based forecasting system by fuzzy inference techniques	2023	Journal of Hydrology	Flood Disaster	Floods. Ineffective flood forecasting systems.	Forecasting, Early Warning Systems	75
30	Bernhofen et al., 2022	The Role of Global Data Sets for Riverine Flood Risk Management at National Scales	2022	Water Resources Research	Flood Disaster	Riverine Floods. Inadequate use of global datasets for flood management.	Flood Risk Management, Data Integration	100
31	Sauti et al., 2021	Development of an exposure vulnerability index map using GIS modeling for preliminary seismic risk assessment in Sabah, Malaysia	2021	International Journal of Design and Nature and Ecodynamics	Earthquake Disaster	Earthquakes. - Structural damage to buildings and infrastructure - Injuries or fatalities due to collapsing structures - Economic loss and displacement	Seismic Risk Assessment	91.7

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32	Sauti et al., 2021	The Role of Geospatial Technologies in Earthquake Disaster Management for Malaysia	2021	ASM Science Journal	Earthquake Disaster	Earthquakes. - Challenges in disaster management and response - Inefficient resource allocation - Increased vulnerability due to inadequate mapping	Earthquake Disaster Management	75
33	Ramli et al., 2021	Development of a local, integrated disaster risk assessment framework for Malaysia	2021	Sustainability (Switzerland)	General Disaster Risk	Various hazards (earthquakes, floods, landslides). - Ineffective disaster risk management - Increased vulnerability due to lack of integrated frameworks - Uncoordinated response efforts	General Disaster Risk Assessment	91.7
34	Ramli et al., 2024	Multi-hazard, multidimensional disaster risk validation in selangor's three urban districts, Malaysia	2024	Geomatics, Natural Hazards and Risk	Multi-hazard Disaster	Floods, Landslides, Earthquakes, Urban Hazards. - Overlapping risks in urban areas - Greater exposure to cascading hazards	Multi-hazard Disaster Risk Management	91.7

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						- Social, economic, and infrastructural vulnerability in urban districts		
35	Mudashiru et al., 2022	A comparison of three multi-criteria decision-making models in mapping flood hazard areas of Northeast Penang, Malaysia	2022	Natural Hazards	Flood Disaster	Floods. Poor decision-making in hazard area mapping.	Flood Hazard Mapping	91.7
36	Sauti et al., 2020	Construction of an Integrated social vulnerability index to identify spatial variability of exposure to seismic hazard in Pahang, Malaysia	2020	International Journal of Design and Nature and Ecodynamics	Earthquake Disaster	Earthquakes. Social vulnerability due to varying exposure to seismic hazards - Disruption of community infrastructure and services - Economic losses	Seismic Risk Assessment	75
37	Norizan et al., 2021	Strengthening flood resilient development in malaysia through integration of flood risk reduction measures in local plans	2021	Land Use Policy	Flood Disaster	Floods. Lack of integration of flood risk reduction in urban planning	Flood Risk Reduction	91.7
38	Sauti et al., 2022	Earthquake Risk Assessment of Sabah, Malaysia Based on Geospatial Approach	2022	International Journal of Integrated Engineering	Earthquake Disaster	Earthquakes. - Structural vulnerabilities in earthquake-prone areas - Increased disaster impact due to	Seismic Risk Assessment	83.3

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						insufficient spatial planning		
39	Alam et al., 2020	Agriculture insurance for disaster risk reduction: A case study of Malaysia	2020	International Journal of Disaster Risk Reduction	Agricultural Disaster	Climate-related Hazards, Floods, Droughts. Financial losses for farmers due to natural hazards.	Agricultural Disaster Risk Reduction	83.3
40	Lim & Foo, 2021	Hazard identification and risk assessment of the organic, inorganic and microbial contaminants in the surface water after the high magnitude of flood event	2021	Environ Int	Flood Disaster	Floods. Health risks from organic, inorganic, and microbial pollutants	Flood Risk Assessment	91.7