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Assessing Disaster Risk Management at the Kelantan State Museum, Malaysia

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ABSTRACT

This paper investigates fire and flood risk management in the Kelantan State Museum, Malaysia. Protecting artefacts from hazards like fires and floods is crucial, as a museum plays a vital role in preserving cultural heritage. However, there is a lack of current disaster risk management practices at the museum, highlighting the need for improved protocols. Additionally, comprehensive guidelines for managing these risks are absent, leaving the museum vulnerable to potential disasters. This study aims to identify areas for enhancement in disaster preparedness and management protocols. This study delves into a qualitative research approach at the Kelantan State Museum by analysing risks, staff competencies, and existing protocols. Data were gathered through semi-structured interviews with four museum personnel and expert panel assessments. Additionally, this research used thematic analysis by utilising the Braun and Clark model to interpret the findings. The study identifies key areas requiring improvement in staff preparedness and institutional safety measures, particularly in managing fire and flood risks. These findings strengthen the museum's capacity to safeguard artefacts, ensure visitor safety, and improve emergency response. It also contributes to the development of more resilient disaster management strategies for cultural heritage institutions and offers policy-aligned recommendations to support sustainable preservation efforts.

Keywords: Disaster risk management, fire hazards, flood management, Kelantan State Museum

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INTRODUCTION

The growing impact of climate change and the advancing threat of global warming increase the urgency for effective disaster

risk management to preserve cultural heritage assets both nationally and internationally. Floods, fires, and extreme weather events place these assets at greater risk, challenging efforts to protect a nation's cultural identity, historical narratives, and legacy (ICCROM, 2012a). In Malaysia's Kelantan state, climate change and severe flooding pose significant challenges. The 2014 Yellow Flood exemplifies the peril to cultural heritage assets, causing substantial damage to institutions like the Kelantan State Museum and inflicting a heavy financial burden (Clark, 2020). The Kelantan State Museum, along with other museum institutions, prioritises compliance with international standards, procedures, and ethics regarding disaster risk management. The International Council of Museums (ICOM) has set rigorous protocols for historic institutions, such as museums, to ensure the safety of structures, cultural artefacts, personnel, and the well-being of visitors or tourists (ICOM, 2017).

Greater emphasis should be placed on preserving heritage structures, such as the Kelantan State Museum, which has been in existence for nearly three decades. Prior to its transformation into a museum, this edifice served as an office block exclusively designated for the Kota Bharu Municipal Council. Since 1952, the Kelantan State Government has formed the Kelantan State Museum Committee to facilitate the development of this museum, which was later officially recognised as one of the historic structures protected by the (National Heritage Act 2005) The Kelantan State Museum building is susceptible to a range of calamities that pose a threat to its ability to safeguard cultural treasures. Flooding poses a significant hazard, frequently affecting Kelantan during the rainy season. Floods can infiltrate building structures, causing harm to building materials like wood and brick and posing a risk to precious historical artefacts housed in museums. Moreover, historical edifices like the Kelantan State Museum, which predominantly employs wood and combustible materials in its fundamental construction, have a significant susceptibility to fire hazards in the absence of sufficient safety precautions (Hua, 2015; Nor et al., 2018).

The urgency of addressing fire safety in heritage buildings, especially museums, in Malaysia remains a critical concern. Structural deficiencies in many of these buildings pose risks to visitor safety, compounded by the country's flood-prone regions, requiring comprehensive emergency strategies. With a recent increase in fire accidents and floods, preserving invaluable collections becomes even more challenging. Climate change exacerbates these risks, highlighting the need for proactive, coordinated strategies. This study aims to bridge theory and practice, offering insights and suggestions to museums and policymakers to mitigate risks and preserve cultural heritage assets effectively. Emphasising an interdisciplinary approach, it aligns with the ICCROM (2012b)'s perspective on addressing heritage conservation amidst conflict or disaster, providing practical guidelines

and strategies. The findings aim to inform authorities, cultural heritage managers, and communities in their efforts to safeguard and maintain cultural heritage in challenging circumstances.

Museums play an increasingly vital role in promoting sustainability and contributing to the Sustainable Development Goals (SDGs), particularly through community engagement and risk preparedness. Ecomuseums, for example, foster local knowledge, climate action, and social inclusion while aligning with the broader sustainability agenda (McGhie, 2022). Similarly, heritage sites such as Bam in Iran illustrate how cultural landscapes and traditional systems like the qanat can support disaster recovery, though tensions between preservation and modern regulations remain a challenge (Ravankhah et al., 2017). The importance of adaptive and interdisciplinary approaches is also emphasised in international guidance for museum preparedness in disaster-prone contexts (McGhie, 2023). As sustainability becomes central to museum practice, green architecture and environmentally responsible design are also exemplified by institutions like the Qatar National Museum and the Grand Egyptian Museum, highlighting the sector's shift toward ecological resilience (Ahmad Omran, 2022). In Italy, the National Museum System reflects a growing emphasis on cultural sustainability as both a managerial input and an institutional outcome, signalling museums' evolving social responsibilities beyond visitor numbers (Cerquetti & Montella, 2021). Together, these studies highlight the need for museums to integrate risk management and sustainable development into their operational frameworks, strengthening their role as resilient, inclusive, and forward-looking cultural institutions.

Therefore, this study focusses on disaster risk management at the Kelantan State Museum, particularly concerning flood and fire risks, and represents a crucial effort in tackling these challenges. It aims to develop appropriate protocols to assist the museum and similar institutions in effectively managing potential floods and fire disasters in the future.

LITERATURE REVIEW

Climate Change and Global Warming

In recent years, climate change and global warming have become the centre of attention when the world has been alarmed by a series of natural disasters such as Australia's bushfires 2019-2020, Greece's 2021 wildfires, Turkey's 2020 wildfires, European floods 2021 and many more, which caused loss of human lives and property damage. However, it may not only be contributed to by climate change and global warming, such as in the case of the Australian wildfire, as it was also reported to be associated with deforestation, rising temperatures, fuel load and the decline of the practice of native burning, where many plant species depend upon fire for habitat, germination, and distribution. The situation caused soil fuel production, which showed the impact of poor management of the wildfires (Clark, 2020).

The Intergovernmental Panel on Climate Change (IPCC) predicts that as greenhouse gas concentrations in the atmosphere rise, these occurrences will become even more frequent and extreme (IPCC, 2018). Disasters such as flooding and wildfires happen anytime and within an unexpected event, requiring a strategic plan and disaster risk management. In the case of cultural heritage properties, for example, the United Nations Educational, Scientific and Cultural Organisation (UNESCO) has come out with the list of World Heritage in Danger to protect and inform the international community of conditions that threaten the characteristics for which a property was inscribed on the World Heritage List and to encourage corrective action (UNESCO, 2011).

International Guidelines on Disaster Risk Management

This situation also calls for other cultural institutions to plan and manage disaster risk, such as the museum. Museum buildings, monuments, and archaeological sites are directly harmed by the increased frequency and intensity of rainfall, flooding, wildfires, and temperature swings brought on by climate change (Gombas, 2021). Disasters are commonly perceived as sudden occurrences that inflict damage within a matter of seconds, hours, or days. Conversely, some disasters unfold so gradually that their onset often goes unnoticed by observers for an extended period (Y.W.D.D, 2021). When a calamity strikes, safeguarding both the museum's artefacts and its patrons becomes exceedingly challenging, underscoring the necessity for a robust disaster management plan (Kannan, 2003). At the international level, the International Council of Museums (ICOM) has implemented an initiative and established mechanisms for emergency preparedness and response. This effort is designed to assist museums and other cultural institutions in recovering from disasters and planning for emergency scenarios. Specifically, Articles 1.6 and 2.21 of the ICOM Code of Ethics for Museums mandate that museums safeguard their collections against both natural and human-made disasters (ICOM, 2017). In response to cultural heritage emergencies, ICOM develops programs to raise awareness about at-risk heritage and post-disaster scenarios, while its Disaster Risk Management Committee mobilises museum professionals to support affected nations. This committee emphasises damage containment through preventive conservation, risk mitigation, and rapid interventions. A notable example of such proactive efforts is Japan’s decentralisation of its museum infrastructure following the 3.11 Great East Japan Earthquake, tsunami, and nuclear disaster on March 11, 2011, aiming to reduce future disaster impacts (Maly & Yamazaki, 2020). Baek (2019) mentioned the action taken in Korea to develop natural disaster preparedness planning to prepare for serious disasters that can likely occur in the future. Pinheiro (2022) categorised fire as a disaster and characterised the museum fire as a great moment of destruction and destabilisation of a museum institution.

Fire and Flood Management Plan in the Museum

Recent studies highlight the growing need for comprehensive disaster risk management (DRM) and preventive conservation strategies for cultural heritage. Dişli et al. (2025) and Dişli & Merve Kilit (2024) Provide case studies from Turkey, applying international frameworks such as ISO 31000 and the RE-ORG method. While Dişli et al. (2025) report medium risk levels in Konya's museums with low intervention priority, Dişli and Merve Kilit (2024) identify a more critical scenario at the Hatuniye Madrasa, which faces high risks due to abandonment and structural decay. Similarly, Foglieni (2023) emphasises institutional preparedness in libraries, archives, and museums, highlighting the importance of emergency planning, digitisation, and inter-agency collaboration. Expanding to the urban scale, Etinay et al. (2018) critique current global frameworks like the Sendai Framework and SDGs for overlooking small-scale and slow-onset disasters. The study proposes a preparedness model using the UN-Habitat Urban System Approach to strengthen resilience in built environments. Collectively, these works stress the importance of integrating site-specific assessments, institutional readiness, and policy-level coordination to protect cultural heritage from diverse risks.

Meanwhile, in Malaysia, Kelantan has also been affected by a massive flood in 2014, which has also impacted the heritage objects and institutions. Very recently, flash floods from the heavy afternoon downpour caused a water surge and landslides in Gunung Jerai, while three districts, such as Yan, Kuala Muda and Bandar Baharu in Kedah, were also hit by the flash floods (Trisha, 2021) National Disaster Command Centre (NADMA) had reported a record number of 123,304 victims in September 2022 due to the flood calamity of the east coast monsoon 2022/2023 that had started on 7th November 2022. Furthermore, 32 fire incidents were reported in Malaysia for 2022, with the highest cases involving 653 victims in Tawau, Sabah on 18th March 2022 (NADMA 2022). This situation is seen as destructive and endangers the nation's natural heritage, heritage sites, heritage objects and institutions such as museums. Fire safety management is crucial to preserving our nation's historic structures, which house invaluable and priceless artefacts. Past research shows little evidence of disaster risk management, specifically in the National Museum of Malaysia and other states in Malaysia. Salleh and Ahmad (2009) figured out through their survey that most of the museums in Malaysia still have poor fire safety management.

A study by Zainal et al. (2021) developed a fire safety management plan for the Museum Stadhuys Complex, aiming to enhance fire safety management efficiency. Another research by Salleh and Ahmad (2009) focused on museum buildings in Malaysia, identifying fire safety weaknesses that could jeopardise both people and heritage properties. Similarly, Salleh (2011) investigated fire safety in heritage buildings, highlighting case studies illustrating various

weaknesses. In the Malacca World Heritage Sites, Akashah et al. (2016) conducted a fire risk assessment, revealing widespread fire hazards such as inadequate escape routes and insufficient fire safety measures. Recommendations included implementing a fire safety policy, improving housekeeping, and regular inspection and maintenance of fire safety systems.

Nor et al. (2018) focused on identifying essential defects in heritage buildings, revealing a high prevalence of severe defects in museum areas that could impact aesthetic value. This aligns with the findings of Roslan & Said (2017), who examined fire safety management systems in Malaysian heritage buildings. Their data indicated a low level of fire safety management, with inadequate application of fire safety equipment and systems not meeting legislative requirements. Furthermore, the conservation process often fails to adapt fire safety measures to the buildings' new functions after adaptive reuse. Many studies concluded that management teams of heritage buildings lacked effective fire safety planning and management systems.

Mydin et al. (2014) evaluated fire hazards and safety management in heritage buildings in Georgetown, Penang, highlighting the need for enhanced fire protection systems in ancestral temples due to the invaluable heritage elements at risk. Additionally, flood disaster impacts on tourism providers in Kota Tinggi were assessed, revealing significant economic and cultural losses (Hamzah et al., 2012). To address flood threats to heritage buildings in Malaysia, a vulnerability model was developed, focusing on Kampung Baru in Kuala Lumpur (D'Ayala et al., 2020). This research suggested solutions to improve flood vulnerability and emphasised the importance of developing proper flood management guidelines to protect lives and prevent financial losses (Muzamil et al., 2022).

Kelantan Museum Fire and Flood Management Plan

Previous literature has primarily focussed on the functionality of old heritage buildings regarding fire safety management, with limited emphasis on disaster risk management, particularly in the event of floods, which are prevalent in Malaysia's east coast regions. This lack of focus on disaster preparedness could impact heritage assets, including those in museums. In Kelantan, known as the 'cradle of Malay culture,' preserving tangible and intangible heritage is paramount, as highlighted by Karim et al. (2020) in their study at Kelantan Jahar Palace Museum. With around ten museums under the supervision of Kelantan Museum Corporation, building defects in Kelantan museums, such as critical issues with the apron and gas system, have been reported (Nor et al., 2018). These conditions emphasise the need for further research on crisis preparedness, especially regarding floods and fires. Effective disaster risk management planning is crucial to prevent the loss of national heritage assets and properties (Zuraidi et al., 2020). Therefore, assessing building structures for potential

hazard mitigation, disaster preparedness, and understanding potential hazards is essential for preserving museum establishments and their valuable collections.

MATERIALS AND METHODS

This research adopted a qualitative approach with a particular emphasis on a case study of the Kelantan State Museum, as outlined in Figure 1.

Based on Figure 1, in the initial phase, the research focussed on exploring methods to characterise demographic profiles using case study techniques. These included observations, interviews, photo documentation, and field memos to identify profiles of state museums in Kelantan. An extensive literature review was conducted, spanning books, journals, and government data.

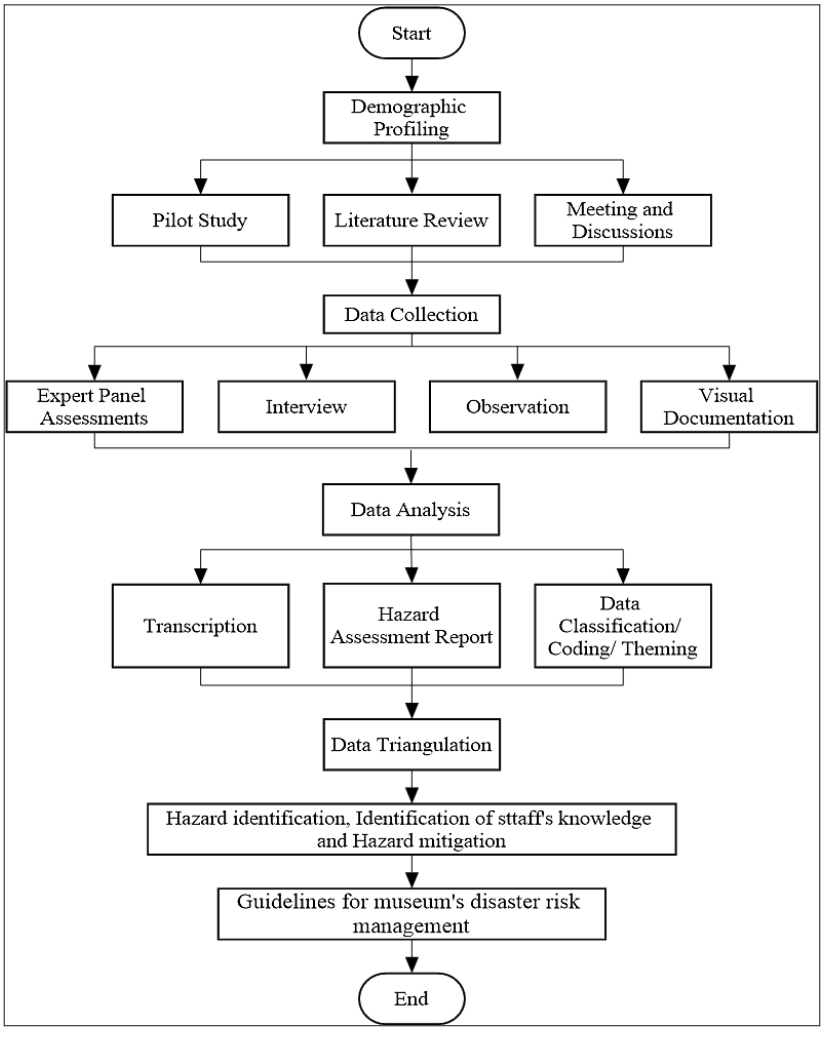

Figure 1. Research flow

A pilot visit was undertaken, guided by information from previous literature. Subsequently, data collection aimed to validate the chosen methodology using purposive sampling. Interactions with museum management during pilot visits facilitated discussions on data collection procedures, observations, and interviews with four museum staff. Data collection involved interviews, observations, and documentation of field memos, structured around thematic questions aligned with research objectives and analysed through thematic analysis. Informants' backgrounds are depicted in Table 1.

Based on Table 1, four informants comprising a Head of Museum Assistant, Curator, Museum Supervisor, and Museum Keeper were purposively selected for their in-depth expertise in museum management, ensuring rich and reliable data for thematic analysis. During this phase, field memos served as a researcher's diary to capture ideas and perceptions related to the research. Museum observations included photograph documentation of both exterior and interior spaces to understand informants' perspectives and actions comprehensively. An expert panel assessment, involving certified safety officers, chemists, and engineers, produced an environmental inspection report focussing on occupational safety and health guidelines for disaster management at the Kelantan State Museum, specifically concerning fire and flood preparedness. Subsequently, collected data were transcribed into audio format and analysed using thematic analysis, following the Braun & Clarke (2006) method. Unique codes were formed to create themes derived from research objectives, such as hazardous conditions and disaster management guidelines for fire and flood events. The analytical investigation involved clustering and classification of data, resulting in the emergence of new codes and themes. Themes were organised to identify repetitive patterns, with repetitive themes removed and emerging themes and concept patterns developed for discussion in the findings section. Finally, a framework for disaster risk management in the event of fire and flood was developed, integrating theoretical and empirical information. The writing-up phase involved integrating and explaining fieldwork data, interview results, safety inspection reports, and observations, with occasional quotations used to provide elaborative explanations.

Table 1
Informants' background

No.	Informants	Position
1.	Informant 1	Head of Museum Assistant
2.	Informant 2	Curator
3.	Informant 3	Museum Supervisor
4.	Informant 4	Museum Keeper

RESULTS AND DISCUSSION

Hazardous Identification

The State Museum of Kelantan faces numerous hazardous conditions that can lead to fires and floods, including issues with building wiring, ageing infrastructure, seasonal facility conditions, materials used in display cases and artefacts, limited emergency routes, blocked main drainage systems, fixture malfunctions, and the location of main doors. Outdated wiring in museum buildings poses a significant fire and flood risk, as it can lead to hazardous situations such as frayed wires and inadequate grounding. It is crucial to monitor and upgrade the wiring system to ensure the safety of the building and its occupants. The outdated wiring at the State Museum of Kelantan increases the risk of trips and short circuits, further exacerbating the potential for fires and floods.

The design and installation of museum displays also pose risks that could lead to fires (Figure 2). Observations at the Kelantan State Museum revealed that several exhibit components, including wooden and plastic cabinets, racks, and displays, were made of flammable materials.

Additionally, the age of the building contributes to fire hazards, particularly in older structures with outdated wiring systems (Figure 3) and a lack of modern fire-resistant materials. This increases the likelihood of flames engulfing the premises. Furthermore, the museum's amenities, such as lamps, air conditioners (Figure 3), and refrigerators, can potentially cause electrical trips, leading to fires.

For instance, there was a case of a fire in the museum attributed to prolonged use of the air conditioning system, as reported by Informant 1.

Figure 2. Exhibition materials made of paper and display racks made of wood and plastic

Figure 3. Museum amenities that could potentially cause electrical trips, leading to fires, include unmaintained lighting and outdated wiring systems

In terms of fire safety, we are still retaining some old equipment, such as the air conditioning. So, there has been a minor incident where the air conditioning was damaged and caused a fire, but we were able to control the situation (Informant 1, personal communication, 21 September 2023).

During emergencies, having multiple unobstructed escape routes is crucial for safe evacuation, directing individuals away from fire, smoke, or heat risks. However, the State Museum of Kelantan has been found to have limited escape routes, potentially endangering both visitors and staff. Moreover, the main door's location poses a flood risk, as it is situated on the main flood route, putting museum staff and visitors in jeopardy. Prevention measures must be taken to control water entry during floods. Additionally, flooding in older buildings can result from blockages in the main drainage system, causing severe damage and safety concerns. Regular gutter maintenance can prevent debris build-up and drainpipe clogging, reducing the risk of flooding. Vandalism or dropping large objects down manholes can also block sewer mains, potentially leading to water erosion and structural damage. Blocked fixture systems can cause water backup and overflow, leading to water damage and mould formation, posing health hazards to occupants. Regular water quality testing is essential to ensure residents' safety. Maintaining vigilance and proactive measures are crucial to prevent such problems in older buildings.

Staff's Knowledge and Skills in Disaster Risk Management

The effectiveness of crisis management during fire and flood incidents relies heavily on the knowledge and competency of staff (Weichselgartner & Pigeon, 2015; White et al., 2001). Staff members play a crucial role in swiftly and efficiently executing coordinated actions to ensure community safety and minimise potential damage. According to informants, potentially hazardous situations may arise simultaneously in the Kelantan State Museum due to the presence of flammable materials such as paper, wood, and plastic. However, they demonstrate a theoretical understanding of how to respond to these challenges and are knowledgeable about standard operating procedures (SOP), including maintaining a comfortable and conducive workplace environment, known as the Public Sector Conducive Ecosystem (EKSA), to cope with disasters in their workplace. Moreover, their clarity in understanding job descriptions enables them to identify appropriate actions in the presence of hazardous conditions like fire and flood. The finding supports Odiase et al. (2020)'s argument on the important relationship between risk perception and risk preparedness.

> Anyone can do it, but they need guidance. For every museum, each of our museum assistants... Before that, we usually conduct training at the National Museum... There's an SOP for it, so we guide them on how to handle the materials, including

the need to wear gloves and all that (Informant 2, personal communication, 21 September 2023).

According to the interview, informants are well-versed in the Kelantan State Museum's hazardous situation management plans. However, the importance of robust financial management in museums, particularly during hazardous situations, cannot be overstated. As expressed by Informant 4, the budget constraints can limit essential expenditures, with funds often kept at a basic level of RM10,000.00 and above. This financial constraint affects various aspects, including purchasing decisions and space management within the museum.

Sufficient financial resources are essential for implementing vital safety measures, training personnel, acquiring specialised equipment, and ensuring a swift and effective response to emergencies, thus safeguarding the museum's unique artefacts and cultural heritage. These findings align with Mechler's (2016) assertion that the economic benefits of investing in Disaster Risk Management (DRM) far exceed the costs, underscoring the imperative for implementing DRM measures to mitigate losses from diverse hazards. Additionally, having sufficient funds enables the museum to enhance visitor safety measures and accessibility, as highlighted by Informant 4's emphasis on considering the needs of people with disabilities in interior design proposals. Further adherence to guidelines ensures safe access and proper handling of hazardous materials, thus mitigating potential disasters effectively.

Based on the interview findings, the study reveals that the staff's implementation of fire and flood crisis control measures is only moderate. This is attributed to limited communication opportunities for distributing information among staff members. Furthermore, informants acknowledge that information on effective flood and fire control measures is disseminated to selected personnel, suggesting a lack of awareness or clarity among lower-level employees regarding their roles and responsibilities in handling such crises. *"*We really don't know... Okay, regarding this, it might be something for the higher-ups, perhaps as officials... from the headquarters, perhaps..." (Informant 1, personal communication, 21 September 2023). Lower-level employees often lack exposure to dangerous situations within their job scope and receive limited practical training for dealing with floods, fires, and other hazardous conditions in their work environment. For instance, while there have been some staff training sessions conducted in the past, they are infrequent and not comprehensive enough to adequately prepare staff for emergencies. Additionally, hazard assessments and briefings seem to primarily target lower-level staff, with limited involvement or awareness among higher-level employees. "As far as I know, it's meant to be implemented by us… for subordinate… like us..." (Informant 2, personal communication, 21 September 2023). Overall, there is a clear need for enhanced training programs and better communication channels to ensure that all staff members are sufficiently

prepared and informed about their roles and responsibilities in effectively managing fire and flood crises. This aligns with the findings of Alcántara-Ayala and Moreno (2016), who emphasise the importance of effective communication in increasing awareness and preparedness to address such challenges.

The museum's personnel exhibit exceptional skills in crisis management, demonstrating awareness of their roles and responsibilities in handling hazardous situations. For instance, Informant 1 highlights the potential causes of fire hazards in the museum and the presence of fire extinguishers to empower staff to control such situations effectively. “Perhaps the cables overheated or there was a gas leak, resulting in a fire. However, we have installed fire extinguishers so that our staff can control the situation if a fire starts” (Informant 1, personal communication, 21 September 2023). Similarly, Informant 2 mentions the designated chargeman's ability to address electrical issues promptly, indicating a proactive approach to maintenance and safety. “…our staff member whom we refer to as the chargeman. When a trip or damage occurs, he knows exactly where... the switches that need to be repaired” (Informant 2, personal communication, 21 September 2023).

However, the study also reveals a lack of initiative among staff members to enhance their ability to manage dangerous conditions in the workplace. While programs like 5S/EKSA are implemented to promote safety and organisation, staff members may not consistently engage in efforts to improve their skills and preparedness for emergencies. Informant 4 emphasises the importance of regular reinforcement and collective efforts in maintaining a safe and organised environment. “Sometimes, they might find it difficult to recall every day… but when it's reinforced every year, the need for organising everything becomes clear” (Informant 4, personal communication, 21 September 2023). Additionally, the unexpected occurrence of floods in 2014 underscores the need for proactive measures and solutions to address potential hazards effectively. The responses from museum staff members highlight the Kelantan State Museum's proactive approach to safeguarding artefacts during flood disasters. Staff members demonstrate readiness and preparedness to protect heritage items, particularly by taking measures to lift smaller objects to higher levels to prevent damage. “Yes, artefacts... particularly heavy things, are beyond our capabilities. Smaller objects, such as textiles, must be lifted to higher levels; otherwise, they may be broken/defective” (Informant 1, personal communication, 21 September 2023). The proactive stance, as evidenced by research conducted by Maly and Yamazaki (2020), demonstrates the museum's commitment to safeguarding artefacts from natural disasters and other hazards. However, Fauzie and Sariffuddin (2017) argue that initiatives are mostly driven by individual efforts rather than collective actions. Nevertheless, these endeavours underscore the museum's dedication to preserving the nation's cultural heritage.

Hazard Mitigation

In the event of crisis management during floods and fires at the Kelantan State Museum, it is essential to emphasise the significance of having clear and proper guidelines for fire and flood management. The quality of hazard mitigation plans is shaped by numerous factors, including resource availability, political backing, local expertise, experience, educational levels, and knowledge (Frazier et al., 2013). Informant 1's account underscores the experience gained from dealing with the 2014 flood, emphasising the need to open a flood operation room and prepare for potential floods during the monsoon season. "We had to open our flood operation room, and it is truly disheartening to know that floods were approaching Kota Bharu, and all of us had to be prepared" (Informant 1, personal communication, 21 September 2023). Additionally, staff are responsible for relocating artefacts to higher ground and securing them.

Informant 2 emphasises the necessity of annual training sessions to enhance staff awareness and readiness in handling flood and fire crises. However, it is noted that there are currently no specific written guidelines established within the museum institution, as mentioned by Informant 2. "I personally believe that there should be an annual training session to enhance our awareness of our surroundings and readiness to handle crises related to floods and fires" (Informant 2, personal communication, 21 September 2023). This absence underscores the immediate need for attention and the development of comprehensive written guidelines to ensure staff preparedness and effective crisis management protocols, as affirmed by Informant 3. "We have yet to establish written guidelines thus far" (Informant 2, personal communication, 21 September 2023).

These expert suggestions provide valuable insights into enhancing disaster risk management in museum establishments. A breakdown of each item is listed in Table 2:

The proposed guidelines for disaster risk management at the Kelantan State Museum cover various aspects of fire safety and emergency preparedness. Enhancing the placement and signage of fire safety equipment, along with providing clear guidelines for their usage, can significantly improve response efficiency during a fire emergency. Installing emergency lighting, especially in areas without natural lighting and on stairways, is crucial for ensuring safe evacuation routes during power outages. Switching to LED lamps from fluorescent lamps and Compact Fluorescent Lamps (CFLs) with ballasts can reduce the risk of fire and explosion, making the museum environment safer for both visitors and staff. Placing fire extinguishers in viewing rooms ensures that these critical firefighting tools are easily accessible in case of an emergency. These recommendations underscore the importance of proactive measures to mitigate fire hazards and enhance emergency response capabilities within the museum premises. By implementing these guidelines, the

Kelantan State Museum can better protect its valuable artefacts, ensure visitor safety, and minimise potential damage during fire emergencies.

The proposed safety improvements outlined in Table 2 align with national-level disaster preparedness frameworks. NADMA (2024), Instruction No. 1, outlines a comprehensive disaster management mechanism across all phases and specifies the responsibilities of technical, response, and support agencies in mitigating risks, including within heritage institutions. Concurrently, Strategy 1.5 under Pillar 1 of the National Fire and Rescue Policy (DKPN) 2021-2030 advocates the development of programmes that enhance self-regulatory compliance in premises management (Ministry of Housing and Local Government Malaysia, 2021). These directives support proactive measures such as improving emergency signage and lighting placement, ensuring safe evacuation routes, and displaying exit plans—key steps identified in Table 2 as necessary for the Kelantan State Museum. Such actions are critical for addressing site-specific vulnerabilities and strengthening institutional preparedness through policy-aligned risk reduction strategies.

Table 2
Proposition on guidelines for disaster risk management at the Kelantan state museum

No.	Items	Descriptions
1.	Fire signs	Improve the location of fire signage for better visibility and guidance during emergencies Enhance the placement method and signage for fire extinguishing equipment, along with clear guidelines for their usage
2.	Additions and replacements	Add emergency lighting in areas without natural lighting, particularly during power outages Install emergency lighting on stairways to ensure safe evacuation routes Replace emergency exit signs with illuminated signs for visibility during power outages Replace fluorescent lamps with Light-emitting diodes (LED) to reduce the risk of fire or explosion Place fire extinguishers strategically in viewing rooms for immediate access during emergencies
3.	Plans	Create emergency exit plans and display them in prominent locations for public awareness and guidance Install illuminated emergency exit signs at the main entrance and exit doors to ensure visibility during emergencies
4.	Flooding	Provide mechanisms for easy relocation of items to higher levels to prevent damage during floods Implement measures such as floodgates, water barrier tubes, and sandbags to prevent water ingress through doors and piping channels Ensure the main electrical supply switch is promptly turned off to mitigate electrical hazards during flooding

CONCLUSION

In conclusion, this paper sheds light on the hazardous conditions facing the Kelantan State Museum, particularly concerning fire and flood risks. Outdated wiring, flammable exhibit materials, and limited emergency routes pose significant threats, necessitating urgent attention to mitigate potential disasters. Despite some level of staff awareness and crisis management knowledge, there are notable deficiencies in practical training and communication, highlighting the need for improved staff preparedness and clear guidelines. Furthermore, financial constraints and the absence of written guidelines exacerbate the challenges faced by the museum in effectively managing fire and flood crises.

Due to that, proactive measures such as enhancing fire safety signage, installing emergency lighting, and creating emergency exit plans can significantly improve response capabilities. The Malaysian Fire and Rescue Department should conduct periodic, rigorous, and comprehensive risk assessments to identify potential threats to the valuable national heritage assets housed within the Kelantan State Museums. Given the study's indication that the museum is highly vulnerable to risks that could endanger its rich historical and cultural artefacts, prioritising effective safety measures is essential. Additionally, flood prevention measures such as providing mechanisms for relocating items to higher levels and implementing flood barriers are essential for mitigating flood risks. In summary, the proposed guidelines for disaster risk management provide valuable insights into enhancing safety measures and emergency preparedness at the Kelantan State Museum. By implementing these recommendations, the museum can better protect its artefacts, ensure visitor safety, and minimise potential damage during fire and flood emergencies. Ultimately, proactive measures and comprehensive planning are imperative to safeguarding cultural heritage and preserving it for future generations.

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