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CONSIDERATION OF CULTURAL HERITAGE IN GLOBAL DISASTER RISK REDUCTION FRAMEWORKS: A QUALITATIVE SURVEY

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ABSTRACT

The impact of the disaster on cultural heritage assets was prominent. Despite the fact that disaster risk reduction (DRR) frameworks were developed to aid nations in combating disaster risk, cultural heritage protection continues to receive little consideration in the overall guidelines. As a result, the previous researcher discovered that cultural heritage needs are frequently not prioritized in the overall disaster management plan. This paper examined the consideration of cultural heritage requirements in the global disaster management plan in light of this concern. A qualitative survey was conducted to investigate the obstacles to appropriately integrating DRR into heritage site management in disaster-prone regions. The 30 respondents agreed that cultural heritage sites should be included in the disaster risk reduction plan; however, the current disaster management practice has not adequately incorporated the heritage sites requirement into the plans and requires significant improvements to combat the disaster risk, particularly in the realm of climate change. It is recommended that future research identify the currently established heritage management instruments that have incorporated disaster risk reduction.

1. INTRODUCTION

Catastrophes have long-term effects on human life, the natural environment, and the built environment. The impact of the catastrophe increased the vulnerability of tangible assets, such as cultural heritage sites (Jigyasu, 2019; Coningham, 2018). As was the case with the Tel Heriz settlement and the Mississippi Gulf Coast, there is historical evidence that the disaster affected not only the physical damage of cultural heritage assets but also the geographical changes of the heritage sites, resulting in their being undiscovered for thousands of years (Gaili et al., 2019; Lewis, 2000). To make matters worse, Anderson et al. (2017) reveal that the sea level will rise significantly over the next few centuries, causing the majority of heritage sites, particularly those near the coast, to be submerged.

Here is where the worry entered the picture. Heritage sites were renowned for their great historical importance value, but the effect of the catastrophe was considered to be the worst threat since it would not only severely destroy the properties physically but also make it hard to repair the significant value of the heritage sites. Rosa et al. (2021) argued that heritage management methods and strategies to protect assets from danger were still essential while being greatly challenged by an unexpected tragedy. At the same time, Garcia (2021) and Bonanza et al. (2018) agreed that because of the focus on the humanitarian emergency, cultural heritage was frequently not taken into account when planning for disasters as a whole.

This paper investigates how cultural heritage criteria are considered in disaster management plans. The following research question will direct this review to meet this goal:

RQ1: To what extent have the cultural heritage requirements been considered in the global disaster risk reduction plan?

2. LITERATURE REVIEW

2.1 Disaster Impact on Cultural Heritage Sites

In the 21st century, preserving the world's cultural heritage sites has become increasingly difficult. The vulnerability of cultural heritage sites in a disaster-prone area is identically increased. However, the current climate change rendered the catastrophic scenario more uncertain. During the 29th Session of the World Heritage Committee in 2005 (Dastgerdi et al., 2019), UNESCO identified climate change as a significant hazard to numerous cultural and natural heritage sites worldwide. This is also corroborated by a recent report that, as of 2023, 56 out of 1199 World Heritage Sites were designated as "threatened" by UNESCO due to various threats, including climate

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change (UNESCO,2019; UNESCO, 2021a). Since it was first brought to the attention of the World Heritage Committee in 2005 (UNESCO, 2007), extensive discussion was made, which led to the revisions of the provision in the 'Operational Guideline' document in 2011 to acknowledge the impact of climate change towards the World Heritage properties as stated in the below table:

Table 1: *Revision of the "Operational Guideline" provision*

Year	Provision
Operational Guidelines Rev. 2008	Paragraph 179 (b) (vi): "*gradual changes due to geological, climatic or other environmental factors*."
Operational Guidelines Rev. 2011	Paragraph 179 (b) (vi): "***threatening impacts of climatic****, geological or other environmental factors*."

(Source: UNESCO (2011))

The worry about the effects of climate change on heritage sites was eligible because of increased research on this issue (Sesana et al.,2021), even if it was mainly focused on Europe (Orr et al.,2021; Sesana et al.,2018). On the other hand, studies have suggested that the immediate impact of climate change that threatened the world's heritage monuments was recognized as rising sea levels and rising temperatures (Dastgerdi et al.,2019; Guzman et al.,2020). Based on the recent report, Venice city was one of the heritage sites that severely faced the consequences of sea-level rising due to climate change, which may cause the historical city to be listed in UNESCO's 'List of Danger' (Veltman, 2023).

Ironically, climate change indirectly also triggers the long threat of natural hazards to these vulnerable heritage sites. World has witnessed an increase in natural hazards affecting some of the major historical sites (Ravankhah et al.,2019; Sitzia et al.,2022; Frodella et al.,2022), including the latest earthquake event that destroyed many historical sites in Turkiye in February 2023 (Karatas et a.,2023; Kocaman,2023; Masliakova,2023). A similar scenario occurred in Malaysia, where the increasing flood disaster frequency and affected area triggered new warnings within the local community and experts. Climate change caused inconsistent patterns of monsoon flood hazards in Malaysia's geography and affected more frequent flash floods and mud floods, especially for the locality within the river and mountain area (Razali &Parzi,2019; BERNAMA,2021). According to Hambretch and Rockman (2017), disasters not only cause physical harm to cultural heritage objects but may also result in the loss of priceless value to local, national, and global populations.

2.2 Disaster Risk Reduction

The United Nations Office for Disaster Risk Reduction (UNDRR) will ultimately play a significant role in supporting worldwide governments in reducing catastrophe impact by building disaster risk reduction frameworks. Several disaster risk reduction framework revisions have been established over the last three (3) decades, beginning with the first adoption of The Yokohama Strategy in 1994, the Hyogo Framework for Action in 2005, and the current Sendai Framework in 2015 (UNDRR,2015; Tozier et al.,2015; Murao & Sakaba,2016). However, even after the frameworks and standards underwent multiple iterations, the demand for heritage site conservation remained a minor part of the overall plans (UNDRR,2015; UNFCC,2022). Furthermore, while disaster risk reduction encompasses broad knowledge and skill capacities (Izumi et al.,2019), cultural heritage and disaster management remain separate disciplines (Garcia,2019; De Paoli et al.,2020) and have insufficiently been emphasize as essential assets to be considered in the overall disaster risk protection (Zin & Ismail, 2023). The circumstances were comparable when most disaster risk management was primarily planned to minimize damages, protect human casualties, and reduce socioeconomic loss to the community (Omar Chong et al., 2017), and Garcia (2021) believes that heritage site protection has yet to be considered in disaster risk management overall planning.

Knowing high-vulnerable properties, the risk of damages due to natural hazards towards the cultural heritage is irreversible (Dembedza et al.,2022) where the damages not only on the physical aspects but also jeopardize the 'Outstanding Universal Value' or historical value of the cultural heritage properties (Pavlova et al.,2017; Bonazza et al.,2018). Furthermore, Fiorentino et al. (2018) and Granda and Ferreira (2019) established that risk mitigation for cultural heritage sites was technically more difficult due to constraints on the two inherent characteristics of historical value and vulnerability. However, this shall not remain an excuse to ignore that the cultural heritage properties deserve the same treatment and protection from disaster harm. Preserving cultural heritage properties is even more complex, as it involves securing both tangible and intangible components of the irreplaceable properties (Daniela et al.,2023). This is why adopting disaster risk reduction in overall disaster management and heritage management shall be integrated broadly. Where hazardous circumstances are inevitable, integrating disaster risk reduction into cultural heritage protection is vital to minimizing the damage to the properties. Based on these comments, coherent approaches combining cross-discipline activities are necessary to anticipate more resilient preservation strategies for protecting historic assets from catastrophic damage.

3. METHOD

For this study, a qualitative method was chosen because it is often used in historical knowledge and research, which is usually specific to a particular place, unlike science knowledge, which is based on numeric data (Dekens, 2007). The survey method was traditionally considered a quantitative study method (Sukamolson, 2007). However, this study looks at the possibility of a qualitative survey focusing on various topics in the group of interest (Boyatzis, 1998; Groves et al., 2004). Purposive sampling was used because it fits the scope of the study. A small sample size was chosen until data saturation because the goal was only to cover important diversity in a population described empirically (Jansen, 2010).

The author prepared a set of questionnaires containing nine (9) queries for this investigation concerning the inclusivity of cultural

heritage site protection in the current adopted Sendai Framework as the assessment method for global disaster risk reduction. The questionnaire has been divided into two sections: Section A for demographic information and Section B for questions about the main issue. For the paperless survey, the survey form was disseminated digitally via a Google form link and QR code. This instrument was chosen due to its adaptability in contacting domestic or foreign respondents. A close-ended questionnaire was adopted for this qualitative survey due to the purpose of this survey was to validate the variables retrieved through a comprehensive literature review conducted in the earlier stage. Also, this method was suitable when minimizing social contact was still strongly encouraged in the post-pandemic outbreak.

This qualitative survey was conducted during the Global Platform of Disaster Risk Reduction (GPDRR) conference held in Bali, Indonesia, from the 22nd until the 29th of May 2022 and prolonged to another two (2) weeks due to the post-response by the conference participants. The respondents were selected through purposive sampling among the conference attendees. The selection criteria for the targeted respondents were among the disaster management or heritage experts who attended the conference. The reason GPDRR was selected as the venue for this data collection was that this is the global conference organized by the United Nations of Disaster Risk Reduction (UNDRR), which gathers all the experts, researchers from various backgrounds, country policies makers coming from all 187 states parties that signed on the Sendai Framework 2015-2030 to combat the disaster impact, including Malaysia.

reSULTSThe three (3) weeks qualitative survey was conducted with the final participation of 30 experts in heritage preservation and disaster management out of 45 questionnaires has been disseminated. The number of respondents was guided by the theory of Roscoe (1975), which determined the sample size shall be greater than 30, and less than 500 was common for behavioral studies. This survey received responses from seven (7) countries whose experts are actively engaged in comparable research disciplines, including Indonesia, Italy, Nepal, India, Turkey, and the United Kingdom. In addition, due to the intention of the author to identify the issues in their local context, Malaysian respondents were also included. Even though the number of respondents only met the minimum requirement for such research, the participants' locality strongly supported the research's background, where those countries mainly accommodated prominent heritage sites and were among the disaster-prone countries in the world.

According to the question's intended responses, the collected data was then organized into four (4) primary categories: 1) Disaster impact on heritage locations, 2) Importance of disaster risk reduction, 3) Current disaster risk management practices, and 4) The Implementation of Sendai Framework. The outcome was tabulated as demonstrated in Table 2:

Table 2: *Compilation of Qualitative Survey Questionnaires*

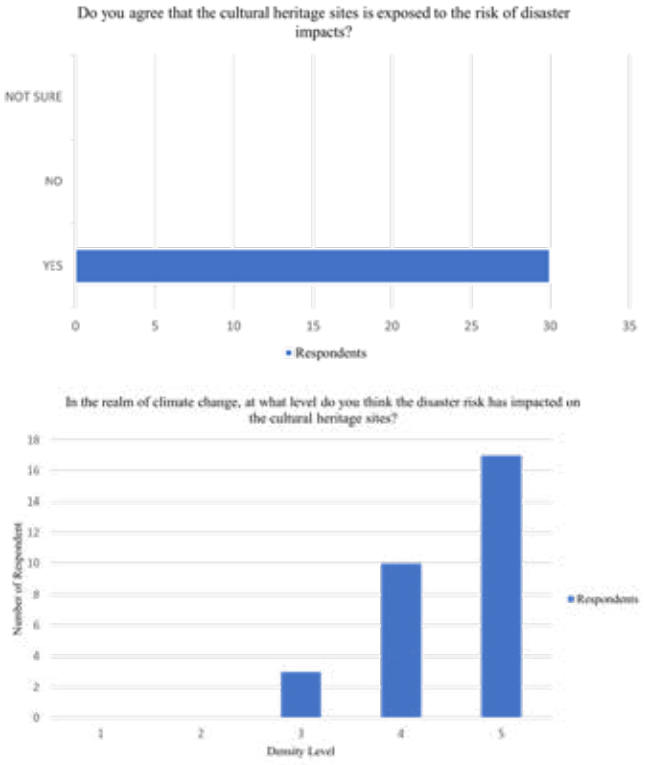
Topic	**Questions**
Disaster Impact on Heritage Sites (Phase 1)	*Do you agree that cultural heritage sites are exposed to the risk of disaster impacts?*
	In the realm of climate change, at what level do you think the disaster risk has impacted the cultural heritage sites?
Importance of Disaster Risk Reduction (Phase 2)	*Is it significant to consider DRR in heritage site management?*
	Are there any specific disaster risk reduction assessment tools that review the heritage sites' preservation in relation to disaster risk reduction?
Current Disaster Risk Management Practice (Phase 3)	*Do you think that the current DRM has sufficiently included the consideration of heritage site protection?*
	Do you think the current DRM requires improvement to accommodate heritage site protection specifically?
	Do you think heritage site protection has been included in the disaster risk management (DRM) plan?
The Implementation of the Sendai Framework (Phase 4)	*Overall, do you think that the Sendai Framework 2015-2030 has widely considered cultural heritage sites in disaster risk reduction?*
	In your opinion, should the Sendai Framework consider adding an emphasis on cultural heritage protection regarding disaster risk reduction?

(Source: Author)

In a hierarchy, Phase 1 questions initially aim to identify the level of awareness of the disaster impact on the heritage sites among the experts from disaster management and heritage conservation backgrounds. Moving to Phase 2 and Phase 3, the questionnaires focus on the sufficiency of disaster risk reduction towards heritage sites protection from the disaster impacts. This phases also aim to identify the availability of disaster risk assessment tools that have been adopted for heritage site preservation in the context of disaster risk reduction. Then in Phase 4, the aim was to determine whether the currently adopted disaster risk reduction frameworks have extensively considered heritage site protection. While DRM shall include multi-disciplines researchers and experts, heritage site requirements must be emphasized due to their unique characteristics in terms of the significant value, vulnerable condition, and preservation method that require special treatment compared to conventional post-disaster reconstruction methods.

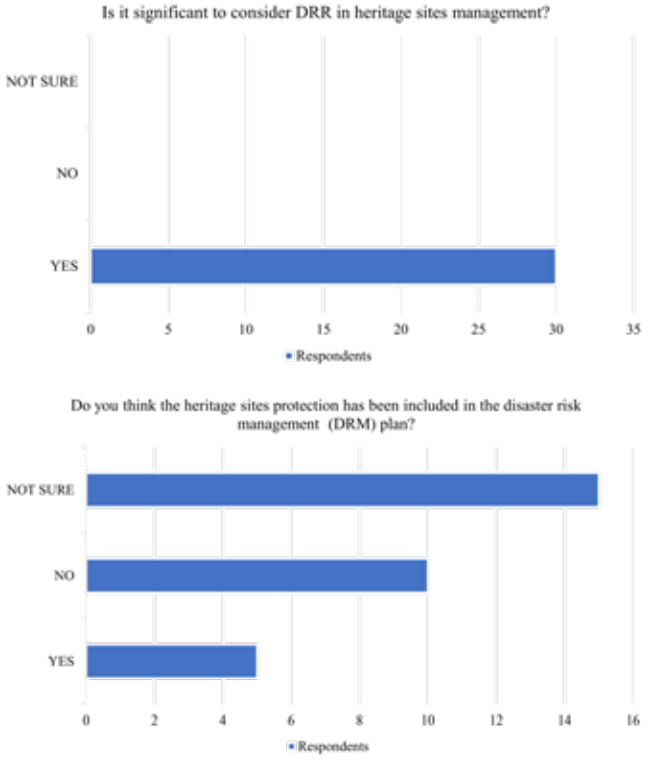
As a starter, Phase 1 questionnaires mainly aimed to identify the level of awareness of disaster impact on heritage sites among the respondents. As shown in Figure 1, all 30 respondents strongly concurred that cultural heritage sites are extremely vulnerable to the effects of disasters. At the same time, 27 of 30 respondents concurred that climate change had increased the frequency of natural hazards worldwide and their impact on sites of cultural significance.

The result was consistent with collective findings through the literature review (D'Ayala et al.,2020; Quesada-Ganuza et al.,2021; Sesana et al.,2021; Durrant et al.,2022) where the vulnerability of the heritage sites was threatened not only due to the increase of the disaster frequency caused by changing of global climate but also the severity of the disaster impacts towards the heritage sites and their significant value.



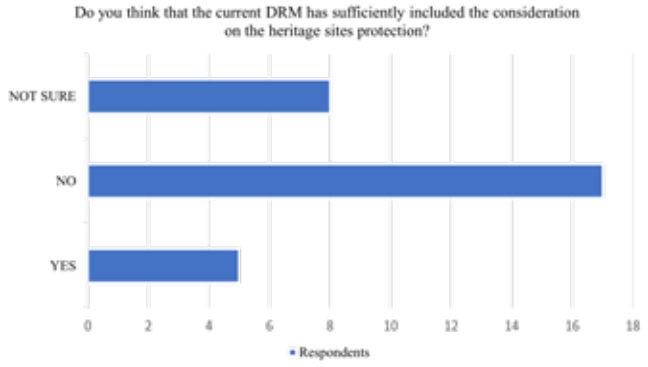
(Source: Author)
Figure 1: Phase 1 Question Answer

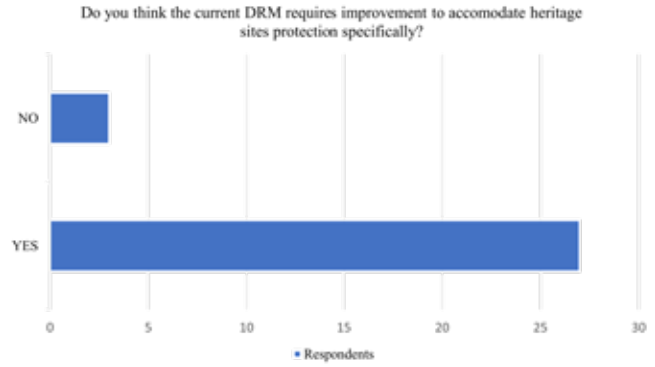
In Phase 2, the objective was to determine the significance of disaster risk reduction in historic site management. Again, all 30 respondents acknowledged the significance of incorporating disaster risk reduction into the overall management of historic sites. On the other hand, ten (10) respondents indicated that specific DRR assessment methods for preserving heritage sites are unavailable in the actual scenario. In comparison, five(5) respondents concur on the inclusiveness of heritage site protection in DRM, while 15 respondents remain unsure of the provisions. The five(5) responses were probably eligible if referring to the '*Managing Disaster Risks for World Heritage*' documents published by UNESCO in 2010. However, those manuals specifically circulate among the heritage site personnel or stakeholders who are managing the heritage sites. Whereas a disaster risk management plan for a particular area shall consider every scope within its perimeter, thus, this important document shall be incorporated into the overall DRM and shall be understood by all the relevant parties involved in the planning of DRM.

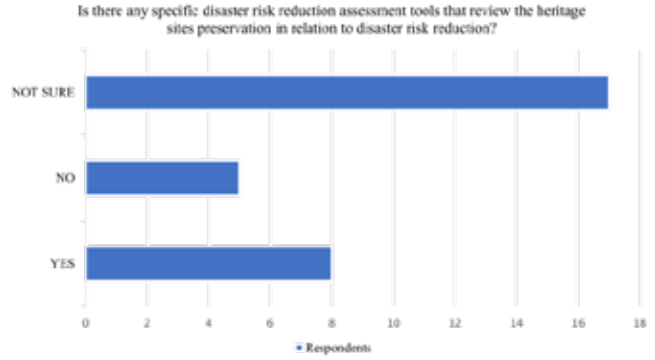


(Source: Author)
***Figure 2:** Phase 2 Question Answer*

The next phase elaborates on the current practice of catastrophe risk management in the context of protecting heritage sites. As shown in Figure 3, 17 respondents brought up the fact that heritage site protection was frequently not considered in the initial disaster management plan, particularly during the recovery periods. In worsened cases, only eight (8) respondents acknowledged that there were specific disaster risk reduction assessment tools for the heritage sites in the major disaster-prone area. According to UNESCO records, there are over 1157 World Heritage Sites globally, thousands of gazetted heritage sites regionally, and 55 World Heritage Sites have been listed in the 'Danger List.' Therefore, it is unsurprising that over 25 respondents had opined that the current DRM required an improvement to accommodate the heritage sites protection in specific for future engagement.



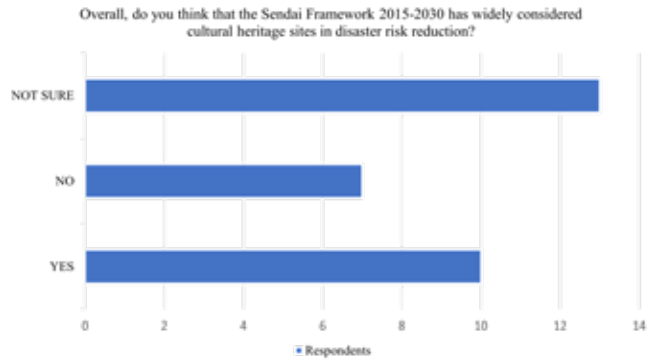


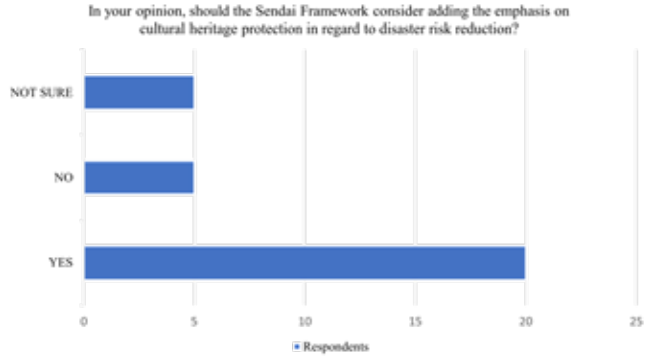


(Source: Author)

Figure 3: *Phase 3 Questions Answer*

The final phase of the survey examines the sufficient implementation of the Sendai Framework for preserving heritage sites. Even though most respondents were engaged due to their attendance at GPDRR, which focuses on the Sendai Framework Mid-Term review and discussion, only ten respondents concurred that the Sendai Frameworks necessitate less consideration of heritage sites. Despite their understanding and awareness of the provisions listed in the Sendai Framework, 20 respondents remain unsure on the consideration of heritage site protection in the current practice of DRR frameworks. However, despite their various opinions in the earlier questionnaire, 20 respondents agreed that the Sendai Framework required consideration to emphasize cultural heritage protection regarding disaster risk reduction.





(Source: Author)

Figure 4*: Phase 4 Questions Answer*

Thus, the author has extracted the cultural heritage specification from the Sendai Framework to support this assertion. Table 2 shows the part of the Sendai Framework allotted for cultural heritage needs, which is clearly insufficient to help heritage management competence in site preservation efforts. The Sendai Frameworks, consisting of FOUR (4) Priorities on disaster risk reduction for global performance, include cultural assets only in Priority 1 and 3. However, this approach is considered superior to the previous Hyogo Framework for Action. This advancement demonstrates the growing understanding of the need for historical asset preservation in DRR frameworks, even if it still requires significant efforts to make cultural heritage more included in the overall disaster risk management strategy.

Table 3: *Inclusivity of Cultural Heritage in the Sendai Framework*

Expected Outcome
"The substantial reduction of disaster risk and losses in lives, livelihood, and health and the economic, physical, social, ***cultural*** *and environmental assets of persons, business, communities, and countries."*
Content Description
PARAGRAPH 5 - *"It is urgent and critical to anticipate, plan for and reduce disaster risk to more effectively protect persons, communities and countries, their livelihoods, health,* ***cultural heritage****, socioeconomic assets, and ecosystems, and thus strengthen their resilience."* ***PRIORITY 1, Paragraph 24 (d)****; To systematically evaluate, record, share, and publicly account for disaster losses and understand the economic, social, health, education, environmental and* ***cultural heritage*** *impacts, as appropriate, in the context of event-specific hazard-exposure and vulnerability information.* ***PRIORITY 3, Paragraph 29 (d);*** *To protect or support the protection of cultural and collecting institutions and other sites of historical,* ***cultural heritage****, and religious interest.* ***Target C-6;*** *"Direct economic loss to* ***cultural heritage*** *damaged or destroyed attributed to disasters."*

(Source: Author)

4. CONCLUSION

Despite the less inclusion of cultural heritage protection in the latest Sendai Framework, the findings show that the framework is still insufficient to provide adequate guidelines for the protection of heritage sites from the massive disaster impact. Disaster risk reduction in the context of cultural heritage site conservation appears to have necessitated a thorough grasp of both heritage and disaster management competence. The synchronization of such knowledge is critical to building a robust disaster management strategy for sensitive cultural sites. In this stand, every discipline involved in disaster risk reduction plans shall compromise each other on their knowledge and expertise to ensure severe consequences can be avoided.

Taking steps similar to the Sendai Framework, which translates "words into action," disaster risk reduction for heritage sites must be revisited, particularly by all sectors involved in heritage site conservation, to establish an early risk-action plan. While most heritage sites only receive proper mitigation treatment upon disaster occurs, a preventive disaster management plan shall be provided instead. Jelenski (2018) also opined a similar concern where the usual responses primarily focused on port-event impacts. The concern was eligible because heritage sites were exposed to the highest vulnerability, known as an inherited property that has been built for hundreds or thousands of years, which carries the cultural identity of a specific locality in this world. Any damages to the heritage property not only jeopardize their significant value but also potentially cannot be rebuilt due to obsolete some of the original building materials and ancient construction skills. UNESCO, for instance, has significantly updated the heritage site management guidelines (UNESCO,2010; UNESCO,2021a; UNESCO,2021b; UNESCO,2021c) since climate change was acknowledged as one of the threads to the world heritage sites' existence. Taking into conclusion, a significant enhancement shall be made on the current practicing heritage management to widely integrate disaster risk reduction into the overall assessment methods and tools to ensure a better conservation of heritage sites globally. The future researcher proposed measuring the adoption of disaster risk reduction based on the category of cultural heritage sites. Depending on the kinds of heritage sites, the impact of the catastrophe could unquestionably vary.

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REFERENCES

BERNAMA (2021, August 19). Kedah Isytihar Yan,Kuala Kedah Sebagai Kawasan Bencana Tahap 1. *Astro Awani*. https://www.astroawani.com/berita-malaysia/kedah-isytihar-yan-kuala-muda-sebagai-kawasan-bencana-tahap-1-314923 Retrieved on 2nd April 2022.

Bonazza, A., Maxwell, I., Drdácký, M., Vintzileou, E., & Hanus, C. (2018). Safeguarding Cultural Heritage from Natural and Man-Made Disasters: A comparative analysis of risk management in the EU.

Boyatzis, Richard E. (1998). Transforming qualitative information: Thematic analysis and code development. Thousand Oaks, CA: Sage.

Coningham, R., Acharya, K. P., Davis, C., Weise, K., Kunwar, R. B., & Simpson, I. (2018). Look down, not up: protecting the post-disaster subsurface heritage of the Kathmandu Valley's UNESCO World Heritage Site. In *Evolving Narratives of Hazard and Risk* (pp. 159-181). Palgrave Macmillan, Cham.

D'Ayala, Dina & Wang, Kai & Yan, Yuan & Smith, Helen & Massam, Ashleigh & Filipova, Valeriya & Pereira, Joy. (2020). Flood vulnerability and risk assessment of urban traditional buildings in a heritage district of Kuala Lumpur, Malaysia. Natural Hazards and Earth System Sciences. 20. 2221-2241. 10.5194/nhess-20-2221-2020.

Daniela, P., Giulia, G., Raffaele, P., & Antonello, C. (2023). Mental health risks for cultural heritage professionals within the framework of disaster risk reduction: An exploratory study on the emotional impact of ruins after the 2016 earthquake in central Italy. International Journal of Disaster Risk Reduction, 92, 103705.

Dekens, J. (2007) Local Knowledge for Disaster Preparedness: A Literature Review. International Centre for Integrated Mountain Development, Kathmandu.

De Paoli, Rosa & Di Miceli, Enrica & Giuliani, Francesca. (2020). Disasters and Cultural Heritage: planning for prevention, emergency management and risk reduction. IOP Conference Series Materials Science and Engineering. 10.1088/1757-899X/949/1/012084.

Durrant, L. J., Vadher, A. N., Sarač, M., Başoğlu, D., & Teller, J. (2022). Using Organigraphs to Map Disaster Risk Management Governance in the Field of Cultural Heritage. *Sustainability*, *14*(2), 1002.

Fiorentino, G., Forte, A., Pagano, E., Sabetta, F., Baggio, C., Lavorato, D., ... & Santini, S. (2018). Damage patterns in the town of Amatrice after August 24th 2016 Central Italy earthquakes. *Bulletin of Earthquake Engineering*, *16*(3), 1399-1423.

Galili, E., Benjamin, J., Eshed, V., Rosen, B., McCarthy, J., & Horwitz, L. K. (2019). A submerged 7000-year-old village and seawall demonstrate earliest known coastal defence against sea-level rise. *Plos one*, *14*(12), e0222560.

Garcia, B. M. (2019). Resilient cultural heritage: from global to national levels–the case of Bhutan. *Disaster Prevention and Management: An International Journal*.

Garcia, B. M. (2021). Integrating culture in post-crisis urban recovery: Reflections on the power of cultural heritage to deal with crisis. *International Journal of Disaster Risk Reduction*, *60*, 102277.

Granda, S., & Ferreira, T. M. (2019). Assessing vulnerability and fire risk in old urban areas: application to the historical centre of Guimarães. *Fire technology*, *55*(1), 105-127.

Groves, Robert M.; Fowler, Floyd J.; Couper, Mick P.; Lepkowski, James M.; Singer, Eleanor &Tourangeau, Roger (2004). Survey methodology. Hoboken, NJ: John Wiley & Sons.

Guba, Egon G. & Lincoln, Yvonna S. (1998). Competing paradigms in qualitative research.

Hambrecht, G., & Rockman, M. (2017). International approaches to climate change and cultural heritage. *American Antiquity*, *82*(4), 627-641.

Izumi, Takako, Rajib Shaw, Riyanti Djalante, Mikio Ishiwatari, and Takeshi Komino. "Disaster risk reduction and innovations." *Progress in Disaster Science* 2 (2019): 100033.

Jansen, H. (2010). The Logic of Qualitative Survey Research and its Position in the Field of Social Research Methods. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research*, *11*(2). https://doi.org/10.17169/fqs-11.2.1450

Jigyasu, R. (2019). Reducing disaster vulnerability through local knowledge and capacity. In *The Cultural Turn in International Aid* (pp. 192-206). Routledge.

Karataş, L., Ateş, T., Alptekin, A., Dal, M., & Yakar, M. (2023). A systematic method for post-earthquake damage assessment: Case study of the Antep Castle, Türkiye. *Advanced Engineering Science*, *3*, 62-71.

Kocaman, İ. (2023). The effect of the Kahramanmaraş earthquakes (Mw 7.7 and Mw 7.6) on historical masonry mosques and minarets. *Engineering Failure Analysis*, *149*, 107225.

Lewis, R. (2000). Sea-Level Rise and Subsidence Effects on Gulf Coast Archaeological Site Distributions. *American Antiquity, 65*(3), 525-541. doi:10.2307/2694534

Masliakova, A. (2023). DESTRUCTION AND PRESERVATION OF CULTURAL HERITAGE. *Вестник науки*, *2*(2 (59)), 130-134.

Murao, O., & Sakaba, H. (2016). Quantitative text analysis of sendai framework for disaster risk reduction 2015–2030. *Journal of Disaster Research*, *11*(3), 459-469.

Miranda, F. N., & Ferreira, T. M. (2019). A simplified approach for flood vulnerability assessment of historic sites. *Natural Hazards*, *96*(2), 713-730.

Norman K. Denzin & Yvonna S. Lincoln (Eds.), The landscape of qualitative research (pp.195-220).Thousand Oaks, CA: Sage

Omar Chong, Noraini & Kamarudin, Khairul. (2017). Issues and Challenges in Disaster Risk Management in Malaysia: From the Perspective of Agencies.

Ravankhah, M., de Wit, R., Argyriou, A. V., Chliaoutakis, A., Revez, M. J., Birkmann, J., ... & Giapitsoglou, K. (2019). Integrated assessment of natural hazards, including climate change's influences, for cultural heritage sites: The case of the historic centre of Rethymno in Greece. *International Journal of Disaster Risk Science*, *10*(3), 343-361.

Razali, A.S., & Parzi, N. (2019, December 19). "KL Tenggelam". *Berita Harian Online*. https://www.bharian.com.my/berita/nasional/2021/12/900788/kl-tenggelam Retrived on 31st January 2022.

Rosa, A., Santangelo, A., & Tondelli, S. (2021). Investigating the integration of cultural heritage disaster risk management into urban planning tools. The Ravenna case study. *Sustainability*, *13*(2), 872.

Sesana, E., Gagnon, A. S., Ciantelli, C., Cassar, J., & Hughes, J. J. (2021). Climate change impacts on cultural heritage: A literature review. *Wiley Interdisciplinary Reviews: Climate Change*, *12*(4), e710.

Sukamolson, S. (2007). Fundamentals of quantitative research. *Language Institute Chulalongkorn University*, *1*(3), 1-20.

Stanton-Geddes, Z., & Soz, S. A. (2017). Promoting disaster resilient cultural heritage.

Tozier de la Poterie, A., & Baudoin, M. A. (2015). From Yokohama to Sendai: Approaches to participation in international disaster risk reduction frameworks. *International Journal of Disaster Risk Science*, *6*(2), 128-139.

UNESCO (2007, May 23). Issues related to the state of conservation of World Heritage properties: The impact of climate change to the World Heritage properties. https://whc.unesco.org/en/documents/8900 . Retrieved on 19th November 2023.

UNESCO (2010). Managing Disaster Risks for World Heritage. Retrieved from https://whc.unesco.org/en/managing-disaster-risks/ on 17th January 2022.

UNESCO (2011, May 6). Revision of the Operational Guidelines. WHC-11/35.COM/13. https://whc.unesco.org/archive/2011/whc11-35com-13e.pdf Retrieved on 19th November 2023.

UNESCO (2021a). List of World Heritage in Danger. https://whc.unesco.org/en/danger/ Retrieved on 28th November 2023.

UNESCO (2021b). The Operational Guidelines for the Implementation of The World Heritage Convention. https://whc.unesco.org/en/guidelines/ Retrieved on 30th December 2021.

UNESCO (2021c). Updated Policy Document on climate action for World Heritage. https://whc.unesco.org/en/documents/190260 Retrieved on 23rd March 2022.

UNESCO (2019, June 29). State of conservation of the properties inscribed on the List of World Heritage in Danger. https://whc.unesco.org/en/documents/175217 Retrieved on 19th November 2023.

UNDRR (2015). Sendai Framework for Disaster Risk Reduction 2015-2030. Retrieved from https://www.undrr.org/publication/sendai-framework-disaster-risk-reduction-2015-2030

UNFCC (2022). Paris Agreement. https://unfccc.int/sites/default/files/english_paris_agreement.pdf Retrieved on 23rd March 2022.

Veltman, C. (2023, September 12). Venice May Be Put In Endanger List, Thanks To Human-Created Climate Change. *NPR*. https://www.npr.org/2023/09/12/1197139620/venice-endangered-climate-change Retrieved on 28th November 2023.

Zin, N. M., & Ismail, F. Z. (2023, July). Cultural Heritage Protection from Disaster Impacts: A Review of Global Disaster Risk Reduction Frameworks. In *IOP Conference Series: Earth and Environmental Science* (Vol. 1217, No. 1, p. 012004). IOP Publishing.