TSUNAMI EVACUATION MOTIVATION OF INDONESIAN WORKERS IN JAPAN: THE ROLE OF DISASTER MEMORIAL FACILITIES IN THE TOHOKU REGION

在日インドネシア人労働者の津波避難動機に関する研究: 東北地方の震災遺構が果たす役割

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ABSTRACT

The Great East Japan Earthquake and Tsunami of 2011 (GEJET) devastated much of the Tohoku region in north-east Japan, resulting in the deaths of approximately 22,252 people and highlighting the failure of many to evacuate in time. In response, disaster memorial facilities (DMFs) were established to preserve collective memory and promote disaster preparedness. While past research has mainly focused on the role of DMFs in memory preservation and visitor experience, their effectiveness in encouraging proactive evacuation behaviour, particularly among individuals with no prior experience of tsunamis, has not been widely studied. This study addresses this critical gap by applying the Protection Motivation Theory (PMT) framework to examine how DMFs influence the evacuation motivation of individuals with no prior experience of the 2011 GEJET disaster.

A mixed-method approach was employed, combining qualitative and quantitative research. The first stage of this study involved in-depth interviews with 21 Disaster Memorial Facility experts from the five sectors of the Penta Helix model (Academia, Government, Community, Business, and Media) to explore the objectives behind DMF establishment. The second stage consisted of a survey of 311 Indonesian workers living in the coastal area of the Tohoku region, who were chosen as representatives of Tohoku residents, especially Indonesian workers. The survey evaluated the influence of DMFs on residents' motivation to evacuate. Additionally, this study provides an overview of DMF practices in Indonesia to enhance contextual understanding while maintaining a primary empirical focus on Japan.

This study focuses on the role of DMFs in the Tohoku region, providing a novel framework for using DMFs to improve tsunami evacuation preparedness among residents, particularly Indonesian workers. It presents empirical evidence of the moderating impact of DMFs within the PMT framework as proposed by Rogers (1983) and Rogers and Prentice-Dunn (1997). Previously, the PMT framework relied on fear-based information, which can sometimes have negative effects, such as causing distress or leading to avoidance. However, introducing a new moderating variable that conveys tragedy-based and fear-arousing messages as well as emotional stories and educational information makes the new framework more insightful. This theoretical contribution improves the framework's applicability to disaster protection studies.

This doctoral thesis is divided into six chapters. Chapter 1 provides an introduction to the topic, the research questions and objectives, and the significance and novelty of the research. Chapter

2 provides a conceptual overview of DMFs and the PMT framework. Chapter 3 outlines the qualitative and quantitative methods employed in this dissertation. Chapters 4 and 5 present two empirical studies, each addressing a different aspect of the research topic. Chapter 6 concludes by presenting the limitations and implications of the research, recommendations for future research, and ethical research clearance. The subsequent sections provide a detailed account of the findings presented in Chapters 4 and 5.

In the first stage of this study, in-depth interviews were conducted with DMF experts to explore the objectives behind the establishment of DMFs. The findings reveal that these sites uniquely portray the tragedies of past disasters. DMFs particularly emphasize disaster literacy and the cultural values internalized by residents in the aftermath of disaster events, for instance, stoicism in the Tohoku region and fatalism in Indonesia. The exhibitions are enriched with emotionally powerful content, including tsunami footage, photographs of the affected areas, depictions of human casualties, and personal stories of victims who lost family members. At the same time, the DMF exhibitions also highlight survival stories, such as individuals who were saved because they were evacuated to higher ground in time. The development of DMFs has become a modern strategy for transmitting disaster literacy to future generations. These findings are significant as they help refine the focus of this research.

The second stage of the study involved a survey of 311 Indonesian workers residing in the Tohoku region. Using the PMT framework, the survey evaluated the influence of DMFs on strengthening evacuation motivation. It analysed the impact of DMFs in preventing many residents from failing to evacuate in future disasters by sharing lessons learned from past disasters. This study presents five key findings: 1) The source of information has a significant effect on threat appraisal, 2) Threat appraisal has a significant effect on evacuation motivation, 3) Threat appraisal has a significant effect on fear of death, 4) There is a significant difference between the group of respondents who engaged in disaster tourism and the group who have not engaged in disaster tourism. 5) Individuals who have previously visited disaster tourism sites tend to gain significant insights that motivate them to evacuate promptly in the event of a potential tsunami. Conversely, individuals without such experiences will be less influenced by the information they receive, potentially leading to a lack of motivation to evacuate.

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Abbreviations

2011 GEJET	2011 Great East Japan Earthquake and Tsunami
2004 IOET	2004 Indian Ocean Earthquake and Tsunami
PMT	Protection Motivation Theory
DMF	Disaster Memorial Facility

CHAPTER I

INTRODUCTION

1.1. Background and Research Question

Japan, being one of the most tsunami-prone countries worldwide, has undertaken extensive mitigation efforts over the years[1]. The Pacific coastal region between Iwate and Miyagi prefectures, commonly known as the Sanriku Area, has historically experienced the greatest impact from tsunamis. Over the past 120 years, and before the 2011 Great East Japan Earthquake and Tsunami (GEJET), this region faced three major tsunami events: the 1896 Sanriku tsunami, which claimed approximately 21,500 lives; the 1933 Sanriku tsunami, resulting in around 3,000 deaths; and the 1960 Chilean tsunami, which caused 116 fatalities[2]. Due to this repeated exposure to the tsunami disaster, the Sanriku region has become a global leader in tsunami preparedness, with comprehensive infrastructure including seawalls, bay mouth barriers, estuary floodgates, and other protective measures[3]. In addition, detailed disaster prevention plans have been developed, and regular evacuation drills and public education campaigns have been carried out to raise community awareness[4]. However, despite these efforts, the 2011 GEJET had a devastating impact on northeastern Japan, particularly the Tohoku region, leading to the deaths of 22,252 residents and the revelation of critical vulnerabilities in existing disaster response systems[5].

During the 2011 GEJET, wave heights surpassed 20 meters in most coastal regions, except for a few sheltered bays that were struck by waves over 10 meters. Remarkably, only Otanabu

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Koshimura, S., Hayashi, S., & Gokon, H. (2013). Lessons from the 2011 Tohoku Earthquake Tsunami Disaster. *J. Disaster Res.*, *8*(4), pp. 549–560. https://doi.org/https://doi.org/10.20965/jdr.2013.p0549

Satake, K. (2014). Advances in earthquake and tsunami sciences and disaster risk reduction since the 2004 Indian Ocean tsunami. *Geoscience Letters*, *1*(1), pp. 1–13. https://doi.org/10.1186/s40562-014-0015-7

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[5] Fire and Disaster Management Agency Disaster Countermeasures Headquarters (2019). p. 7. Link: https://www.fdma.go.jp/disaster/higashinihon/items/159.pdf.

in Fudai Village, Iwate Prefecture, was fully shielded from residential damage, due to a 15.5-meter-high seawall[6]. In other locations, however, the tsunami overwhelmed coastal barriers, flooding towns and residential zones. Furthermore, over 300 kilometres, of seawalls were destroyed. This catastrophic event demonstrated that, despite decades of investment in coastal protection infrastructure, these defences, were ultimately inadequate to withstand such a massive tsunami, putting the 2011 GEJET as the most catastrophic disaster in recent Japanese history, classified as a Level 5 Catastrophe (Magnitude 9.0), with highly complex consequences, especially due to the Fukushima Daiichi nuclear accident[7]. The lesson learned from the 2011 GEJET disaster revealed significant deficiencies in evacuation practices[8] and preparedness among residents, [9] underscoring the critical need for effective evacuation strategies[10]. Despite the early warning systems in place, many residents failed to evacuate in time, highlighting gaps in public understanding and response mechanisms[11].

Although approximately 500,000 residents were affected by the flooding, many were successfully evacuated to safety. However, a survey analysing, the evacuation behaviours, revealed that 48% of those who died or are missing did not evacuate[12]. The time between the earthquake and the tsunami's arrival varied by location, generally ranging from 10-minute increments to just over an hour. This window of time should have been sufficient for most residents to reach safety; had it been used effectively. Yet, the critical question remains: Why did so many residents fail to evacuate?

1.1.1. Factors Contributing to Evacuation Failure

Residents of the Sanriku region had a basic understanding of tsunamis and regularly participated in evacuation drills[13]. However, during the 2011 GEJET, many fatalities occurred

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[6] Daily Commercial News. (2011). *"Seawall that saved Japanese village from tsunami a credit to stubborn mayor"*. Construct Connect. https://canada.constructconnect.com/dcn/news/projects/2011/05/seawall-that-saved-japanese-village-from-tsunami-a-credit-to-stubborn-mayor-dcn044406w.

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[13] Oe, H., & Kawakami, S. (2021). A disaster prevention programme using virtual schemes: Recommendation of tradition populaire integrated with tendenko as an approach to immersive training. *International Journal of Disaster Risk Reduction*, vol. *57*, 102135. https://doi.org/10.1016/j.ijdrr.2021.102135, p. 2.

due to failed evacuations, which can generally be categorized into three causes: (1) individuals who attempted to evacuate but were unsuccessful, (2) those who were physically unable to evacuate in time, and (3) those who for psychological reasons, refused to evacuate.

First, among those who attempted to evacuate but failed, a major factor was their dependence on local government disaster response strategies, particularly evacuation guidance, which heavily influenced their decisions[14]. In Rikuzentakata City, for example, a *kataribe* (local storyteller) said that before the March 11th GEJET, residents regularly participated in evacuation drills[15]. However, participation began to decline because the drills involved climbing a hill, which many found burdensome. In response, the local government modified the evacuation site, designating a three-story auditorium near city hall as the new shelter location, believing it could accommodate a large number of evacuees safely. As a result, when evacuation information was issued during the actual disaster, many residents headed to this auditorium, trusting it to be a safe refuge. Tragically, the building was completely swept away by the tsunami, along with many of those who had taken shelter inside. A similar situation occurred in Kamaishi City, where residents followed their evacuation drills, but were still overtaken by the tsunami after evacuating to a designated building. In addition, many parents delayed their evacuation to pick up their children from school, hoping to escape together. Unfortunately, this well-intentioned decision often left them with very little time to reach safety before the tsunami arrived.

Second, during the 2011 GEJET, a significant number of residents were unable to evacuate in time due to physical limitations, particularly among the elderly and individuals with disabilities. Many older adults found it challenging to reach higher ground unaided, and those requiring mobility aids, such as wheelchairs, often depended on assistance that was not readily available during the emergency. A study analyzing evacuation behaviors revealed that over 60% of victims aged 60 and above either did not or could not evacuate. Factors contributing to these included difficulties in accessing evacuation sites, health-related mobility issues, and responsibilities such as caregiving for others[16].

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[14] T. Katada, T. Kinoshita, and M. Kanai. (2011). "The Influence of the Dependent on Government Response about Natural Disaster upon Preparedness for It," J. of Disaster Information Studies, No.9, pp. 114- 126. (in Japanese)

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Third, some residents chose not to evacuate due to psychological factors such as normalcy bias[17] or vague definitions of the situation[18] and general confusion about the situation. These cognitive biases led many to underestimate the danger, resulting in either a failure to evacuate or delays that prevented them from reaching high ground in time. The situation was even worsened by the way tsunami warnings were issued. Just three minutes after the earthquake, the Japan Meteorological Agency (JMA) transmitted information of wave heights of 3 meters for Iwate, 6 meters for Miyagi, and 3 meters for Fukushima, levels many believed would not overtop the seawalls. However, 25 minutes later, these predictions were revised to 6, 10, and 6 meters, and then again to over 10 meters for all three prefectures[19]. This gradual escalation created confusion and further delayed evacuations. Surveys show that although many residents heard the tsunami warnings, they had sufficient time or that the tsunami would not reach their area[20]. This misjudgement led to critical delays in evacuation. Even if the most accurate warning had been issued first, many people, especially those who had never experienced such a massive tsunami, would likely have found it hard to believe the threat. This uncertainty impaired accurate decision-making. In contrast, areas with well-organized evacuations led by schools, local authorities, or workplaces experienced no fatalities, highlighting the importance of collective and pre-planned responses. Another factor contributing to the delay was a widespread misconception in Miyagi Prefecture that the region's rias coastline would protect it from tsunamis. In reality, rias topography increases tsunami danger by amplifying wave strength[21].

This third issue, where 48% of those who died or are missing refused to evacuate, represents a significant problem that this research seeks to address. In response to this problem, one of the strategies adopted by the Japanese government is to establish disaster memorial facilities (DMF), a facility to educate the public about disaster risks and lessons learned. DMF refers to tourist attractions where disasters have occurred and that have been transformed into a place of interest, such as a museums, monuments, or memorial parks[22]. But, how can the

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[21] Data gathered during fieldwork in Rikuzentakata City, as stated by a *Kataribe* (local storyteller) in February 2024.

[22] Zhang, X.; Izumi, (2024) T. The Role of Disaster Memorial Facilities in Disaster Risk Reduction: Experiences from the Tohoku Region in Japan. Sustainability, 16, p. 3.

DMF influence the resident evacuation motivation in the future? This is why, evaluating the effectiveness of developing the DMF in influencing evacuation behaviour, is needed. This research then adopts the Protective Motivation Theory (PMT)[23] to understand more about how people could adopt protective behavior and how DMF could have an impact on this behavior. In addition, while previous PMT approaches have emphasized fear-based messaging, which can sometimes lead to adverse reactions such as emotional distress or avoidance, DMFs offer a more balanced narrative. DMF not only communicates fear-arousing, tragedy-based content but also presents miracle-based, educational messages that inspire preparedness and reflection. By optimizing the PMT framework to incorporate both positive and negative collective disaster memory elements embedded in DMFs, this study aims to expand the theory's applicability to tsunami evacuation contexts and contribute new insights into disaster risk reduction.

1.1.2. PMT Framework Enlargement

This research adopts the PMT framework to understand how individuals undertake protective actions and how DMFs may influence this behavior. While PMT has been widely applied in disaster preparedness research, particularly in the context of earthquakes and floods[24], there remains a significant gap in studies focusing specifically on evacuation behavior in response to tsunami[25].

The development of PMT[26] was grounded in earlier psychological theories that explored the impact of fear on behavioral changes. One of the earliest was the Fear Appeal Theory (FAT)[27] which posited that fear-arousing messages could motivate individuals to adopt different beliefs or behaviors. However, FAT was criticized for its simplicity, as it failed to account for how individuals cognitively process threats and assess their ability to respond. To

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address this limitation, the Parallel Response Model (PRM)[28] showed that individuals respond to fear in two parallel ways: by controlling the danger (danger control) or by managing the fear itself (fear control), with the choice depending on their perceived efficacy. Building on this, the Extended Parallel Process Model (EPPM) was also developed[29] to emphasize two key cognitive processes: perceived threat and perceived efficacy. According to EPPM, protective behavior occurs only when both threat and efficacy perceptions are high; otherwise, individuals may resort to denial or avoidance. Drawing from these foundational models, Rogers formulated PMT to offer a more structured and comprehensive explanation of protective behavior. PMT introduces two core appraisal processes, threat appraisal (perceived severity and vulnerability) and coping appraisal (response efficacy, self-efficacy, and response costs). This framework allows for a more nuanced understanding of how individuals assess risks and decide on adaptive responses. Unlike its predecessors, PMT does not rely solely on fear to motivate behavior but integrates cognitive evaluations that determine whether protective actions are taken.

In Japan, most disaster prevention education conducted before the 2011 GEJET took the form of "threatening disaster prevention education" or "knowledge-oriented disaster prevention education to inspire fear of a disaster in people[30], namely through fear-arousing communication[31]. Fear-arousing communication includes two main types of information: one that explains the dangers, and another that explains how to respond to those dangers. Its goal is to make people feel afraid of an event so they are encouraged to take action. However, people cannot be afraid all the time. When facing danger, they are often influenced by the normalcy bias or other psychological factors, which means they tend to ignore or deny threats. Because of this, disaster education that only focuses on frightening people is not enough to make them act appropriately; instead, they might see the area as dangerous and develop a negative view of the environment. Knowledge-based disaster education gives information about disasters, such as past damage, how disasters happen, what to prepare, and how to evacuate. But this approach also has issues, such as with hazard maps. A hazard map shows a possible disaster scenario based on past data and scientific knowledge. If used with this understanding, it can be very

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[31] Leventhal, H. (1970). Ibid. p. 130.

helpful. But if the map is just presented as simple information about regional dangers, people might only imagine the disaster shown and won't think about worse possibilities, sticking to their initial assumptions.

A new concept offered by DMF is "Narrative-Based Disaster Learning", or in other words, the use of stories, whether fear-based, emotion-based, or success-based, as the primary tool for conveying disaster-related messages and shaping both affective[32] and practical knowledge, thereby contributing to the development of disaster literacy. Disaster literacy is the ability of individuals to access, understand, evaluate, and effectively apply disaster-related information to make appropriate decisions that reduce risk and enable self-protection during a disaster[33]. By optimizing the PMT framework to incorporate "Narrative-Based Disaster Learning" disaster memory elements embedded in DMFs, this study aims to expand the theory's applicability to tsunami evacuation contexts and contribute new insights into disaster risk reduction.

1.2. Research Objective

In light of the preceding discussion, which led to the research question, "How can DMFs influence residents' evacuation motivation in the future?", it becomes essential to evaluate the effectiveness of DMFs in shaping evacuation behavior. This study adopts the Protection Motivation Theory (PMT) as a guiding framework to explore how individuals take protective actions and how DMFs may influence evacuation motivation. The study pursues two main objectives: to address the research question and refine the theoretical framework.

The first objective is to examine the impact of DMFs on residents. This study proposes a conceptual framework to examine how environmental information influences residents' evacuation motivation, with threat appraisal as a mediating variable and experience with DMFs as a moderating variable. Additionally, the model includes fear arousal as a related outcome that reflects the affective response to disaster information. Understanding these impacts can help determine whether DMFs positively contribute to residents' protective motivation or, conversely, lead to unintended negative effects.

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Martini, A., & Minca, C. (2021). Affective dark tourism encounters : Rikuzentakata after the 2011 Great East Japan Disaster. *Social & Cultural Geography*, *22*(1), pp. 33–57. https://doi.org/10.1080/14649365.2018.1550804

[33] Amini, R., Helsa, Y., Bachri, S., & Yosritzal, Y. (2024). Disaster Literacy and Mitigation Education: Global Trend and Future Directions for Developing Disaster Mitigation-based Science Learning Model, p. 468.

The second objective is to refine the PMT framework by integrating DMFs to better explain residents' protective behaviors. While previous PMT frameworks emphasize cognitive evaluations, such as perceived severity, vulnerability, and self-efficacy, this study aims to expand the model by incorporating DMF experiences. This refinement seeks to offer a more comprehensive framework for predicting protective behavior and evacuation motivation in disaster-prone communities. The study also aims to contribute theoretically by highlighting the role of DMFs that may influence protective behavior.

1.3. Research Significance

The significance of this study lies in both its theoretical contribution to academic discourse and its practical relevance to disaster risk reduction efforts. Theoretically, it contributes to the advancement of the Protection Motivation Theory (PMT) by extending its application to the context of disaster memorial facilities (DMFs). While PMT has been widely used in health and disaster-related behavior studies, its integration with the function of DMFs for shaping evacuation motivation remains underexplored. By analyzing how DMFs influence individuals' protective actions, the study offers a novel perspective that enriches the PMT framework.

Practically, the study provides valuable insights for the design and utilization of DMFs as part of disaster risk reduction strategies. The findings can help policymakers, disaster educators, and local authorities better understand how DMFs may serve not only as commemorative sites but also as effective communication tools that enhance evacuation preparedness.

Moreover, these two objectives within the studies are shown in Chapters 4, 5, and 6, respectively. Each chapter presents a focused analysis that contributes to the overall research aim. The contents of each chapter are introduced below.

1.4. Novelty of the Research

This study offers several novel contributions to both practice and theory. First, it introduces a suitable framework to explain how residents in tsunami-prone areas adopt protective behavior by utilizing disaster memorial facilities (DMFs) as a key variable through the concept of Narrative-Based Disaster Learning. In other words, the study highlights the use of stories, whether fear-based, miracle-based, or success-based, as a primary tool for conveying disaster-related messages and shaping both affective and practical knowledge, thereby contributing to

the development of disaster literacy. The inclusion of DMFs in this study is supported by a rigorous preliminary analysis based on expert interviews with practitioners in the DMF sector.

Second, this study proposes an extended version of the current Protection Motivation Theory (PMT) framework. The extended framework is applied to a new and relatively underexplored context, such as disaster protective behavior. It illustrates how non-fear-based messages, such as those grounded in the Disaster Memory Facilities (DMF), can effectively enhance protective motivation within the field of disaster preparedness research.

CHAPTER II

LITERATURE REVIEW

2.1. Disaster, Disaster Literacy, and Disaster Memorial Facilities (DMFs)

A disaster is something terrible that causes major physical damage, which can also cause problems for society as a whole[34]. It not only damages buildings, infrastructure, and the natural environment but also affects people's lives, livelihoods, and psychological well-being. In such cases, the impact often exceeds the capacity of local communities or governments to respond effectively, prompting requests for international assistance. For example, when the 2011 Great East Japan Earthquake and Tsunami struck, it caused not only massive damage to the coastal infrastructure but also triggered a nuclear crisis, forcing thousands to evacuate and paralyzing regional governance and services. The global community responded with humanitarian aid and technical support. In contrast, natural events like small earthquakes or typhoons that pass without causing major social or economic disruption, no fatalities, no displacement, no breakdown in public systems, are not typically classified as disasters, even if they are scientifically significant. Therefore, a natural hazard becomes a disaster when it results in serious consequences for human society, especially when the affected community is overwhelmed and unable to cope without external support.

In the aftermath of such large-scale disasters, societies often seek ways to remember, learn from, and educate future generations about these traumatic events. One such effort is the establishment of Disaster Memorial Facilities (DMF) refers to a destination where a disaster has occurred and has been transformed into an attraction site, such as a museum, monument, or memorial park[35]. These sites serve as spaces for reflection and education, offering visitors a chance to learn about the disaster's impact and responses. Key components of a DMF include the preservation of disaster-related artifacts, interactive exhibits, and guided tours, all aimed at educating visitors about the event and its consequences[36]. To convey the educational value of DMF sites, local governments often employ storytellers, typically residents who survived the

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[34] Fritz, C. E. (1961). Disaster. In R. K. Merton & R. A. Nisbet (Eds.), *Contemporary social problems* (pp. 651-694). Harcourt, Brace & World., p. 655.

[35] Zhang & Izumi, (2024). 'The Role of Disaster Memorial Facilities in Disaster Risk Reduction: Experiences from the Tohoku Region in Japan'. Sustainability, vol. 16, 8045, p. 10.

[36] Cahyanti, (2024). 'Evaluating Tsunami Memorial Museums in Indonesia and Japan as Post-Disaster Dark Tourism Sites'. International Journal of Disaster Management. Vol. 7(3), pp. 213-230.

disaster. Storytelling is considered an effective way to convey a difficult or unpleasant message, as humans are inherently storytellers (*homo narrans*). People are often more easily influenced by a compelling narrative than a strong argument[37]. In addition, storytelling is usually used to support tourist attractions[38].

The practice of storytelling is a common occurrence on DMF in Japan and Indonesia, where it is employed as a means of enhancing the visitor experience by imparting a sense of depth and narrative richness. In Japan, a specific term, *Kataribe* (語り部), is used to describe this phenomenon. It is noteworthy that *Kataribe* is not a phenomenon exclusive to the Tōhoku Region. The practice of *kataribe* is ancient in Japanese culture, and these practices are present in sites related to WWII, such as Hiroshima and Nagasaki[39] other disaster areas,[40] and heritage sites[41].

Visits to DMFs allow people to sense fear and provide a space for visitors to engage in deep and meaningful reflections on life[42], the living, death, and mortality[43]. Similarly, tourists reported feeling fear when visiting Sichuan after the 2008 Wenchuan Earthquake[44] . DMF also has a reciprocal effect on residents, as survivors' experiences inspire visitors, and survivors may experience trauma release by sharing their stories[45]. Additionally, past research has associated DMF with dark tourism[46]. Dark tourism involving places related to death and disaster potentially offers a journey of metempsychosis, ontological security, and fear[47].

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[37] Herman, Jahn, & Ryan, (2005). 'BIOLOGICAL FOUNDATIONS OF NARRATIVE'. Routledge Ltd, p. 44.

[38] Sulistia et al., (2022). 'Supporting Tourist Attractions in Bilebante Green Tourism Village Pringgarata District, Central Lombok Regency'. International Journal of Research Publication and Reviews Storytelling. Vol. 3(7), pp. 848-854.

[39] Yoneyama, S. (1999). *The Japanese high school: Silence and resistance*. Routledge. Pp. 85-111.

[40] Takano, T., & Atsumi, T. (2007). *Disaster preparedness and response in Japan: The role of civil society*. Springer, p. 15; Ikeda, S. (2013). *Community-based disaster risk reduction*. CRC Press., p. 23

[41] Osawa, M. (2007). *Social security in contemporary Japan*. Routledge., p. 55

[42] Y. Zhang, (2021). 'Unpacking visitors' experiences at dark tourism sites of natural disasters'. *Tour. Manag. Perspect.*, vol. 40(5), pp. 1–18.

[43] G. Prayag, D. M. Buda, and E. J. Jordan, (2020). 'Mortality salience and meaning in life for residents visiting dark tourism sites'. J. Sustain. Tour., vol. 29(9), pp. 1508–1528; D. Wright and R. Sharpley, (2018). 'Local community perceptions of disaster tourism: the case of L'Aquila, Italy'. Curr. Issues Tour., vol. 21(14), pp. 1569–1585.

[44] Y. Tang, (2014). 'Travel Motivation, Destination Image and Visitor Satisfaction of International Tourists After the 2008 Wenchuan Earthquake: A Structural Modelling Approach'. Asia Pacific J. Tour. Res., vol. 19 (11), pp. 1260–1277.

[45] S. Nagamatsu, Y. Fukasawa, and I. Kobayashi, (2021). 'Why Does Disaster Storytelling Matter for a Resilient Society?' *J. Disaster Res.*, vol. 16(2), pp. 127–134; B. Liu-Lastres, D. Mariska, X. Tan, and T. Ying, (2020). 'Can post-disaster tourism development improve destination livelihoods? A case study of Aceh, Indonesia'. J. Destin. Mark. Manag., vol. 18, no. December 2019, p. 100510.

[46] J. Gerster and E. Maly, (2022). 'Japan's Disaster Memorial Museums and Framing 3.11: Othering the Fukushima Daiichi nuclear disaster in cultural memory," *Contemp. Japan*, vol. 34, no. 2, pp. 187–209; A. Martini and C. Minca, (2018). "Affective dark tourism encounters: Rikuzentakata after the 2011 Great East Japan Disaster. Soc. Cult. Geogr., vol. 00, no. 00, pp. 1–25; B. J. Yan, J. Zhang, H. L. Zhang, S. J. Lu, and Y. R. Guo, (2016). 'Investigating the motivation-experience relationship in a dark tourism space: A case study of the Beichuan earthquake relics, China'. Tour. Manag., vol. 53, pp. 108–121; Y. Zhang, (2021). 'Unpacking visitors' experiences at dark tourism sites of natural disasters. *Tour. Manag. Perspect.*, vol. 40, no. May, pp. 1–18.

[47] H. D. Olsen and M. E. (2020). Korstanje, Dark Tourism and Pilgrimage. CABI, p. 102.

The 2011 GEJET prompted Japan, particularly the Tohoku region, to develop 309 DMFs as educational platforms for disaster mitigation. These sites are distributed across Aomori Prefecture (11 facilities), Iwate Prefecture (120 facilities), Miyagi Prefecture (158 facilities), and Fukushima Prefecture (42 facilities), and are accessible to foreign visitors in the Tohoku region. Meanwhile, similar DMFs can also be found in Indonesia following the 2004 Indian Ocean Earthquake and Tsunami. DMFs in Indonesia include tsunami memorial museums, monuments, parks, and mass graves. However, the number of DMFs in Indonesia is not as extensive as in Japan.

DMF is closely related to the concept of educational tourism, as highlighted by several scholars[48]. Exhibitions at DMF museums, particularly those shaped by natural disasters, stand out by enhancing empathy and evoking strong emotions, which make disaster education more impactful and memorable. These emotional experiences not only support the goal of education but also contribute to the process of memory-making for both individuals and communities. Education itself is a core function of museums, alongside conservation, research, and the presentation of cultural and historical objects[49]. Through this educational role, DMFs become powerful platforms for raising awareness, preserving disaster memory, and fostering preparedness for future events.

In this context, disaster education provided by DMFs closely aligns with the concept of disaster literacy. Disaster literacy is the ability of individuals, groups, or communities to understand, evaluate, and use disaster-related information to reduce risk, prepare, and respond effectively. Disaster literacy refers to the knowledge and skills that individuals, communities, and organizations need to understand the causes, risks, and impacts of disasters, and to use this understanding to reduce risks, prepare for emergencies, and respond effectively[50]. It includes the ability to access, evaluate, interpret, and use disaster-related information from a variety of sources. Disaster literacy is critical to building resilience because it enables people to make informed decisions before, during, and after disasters.

This concept goes beyond understanding the technical aspects of disasters; it includes awareness of the social, cultural, and psychological dimensions of risk. It includes

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[48] Amini et al., (2024). 'Disaster Literacy and Mitigation Education: Global Trend and Future Directions for Developing Disaster Mitigation-based Science Learning Model'. Migration Letters Volume: 21 (4), pp. 466-494

[49] UNESCO, (2012). 'ROLE OF MUSEUMS IN EDUCATION AND CULTURAL TOURISM DEVELOPMENT'. Policy brief. Published with the financial support of the UNESCO Moscow Office, p. 12.

[50] Amini, R., Helsa, Y., Bachri, S., & Yosritzal, Y. (2024). Disaster Literacy and Mitigation Education: Global Trend and Future Directions for Developing Disaster Mitigation-based Science Learning Model, p. 468.

understanding early warning systems, the importance of evacuation plans, and basic first aid and survival skills in the aftermath of a disaster. In addition, disaster literacy includes fostering a sense of collective responsibility for disaster risk reduction, where communities work together in preparedness efforts and share vital information during emergencies[51].

In addition to these practical aspects, educational literacy plays a crucial role in the transmission of memory about disasters, ensuring that future generations retain a vivid and comprehensive understanding of these events. Various methods, such as museums[52], disaster heritage sites (*Shinsai Ikō*) for local communities[53], and *kataribe* activities[54], serve as important components in this process. DMF[55] [56] also contributes to remembering and reflecting on these tragedies. These memorials become central to disaster education, advocacy, and awareness, serving as powerful reminders of the catastrophic loss of life that should never be repeated[57]. The transmission of memory through cultural devices, including museums, monuments, and storytelling, plays a pivotal role in preserving the collective memory of past tragedies and fostering resilience within communities. The transmission of cultural values serves to guarantee that the lessons of the past continue to inform and reinforce societies in the context of adversity.

Table 2.1 lists previous studies that have explored various aspects of DMFs, particularly in Japan and Indonesia, following the 2011 GEJET and the 2004 Aceh Tsunami. These studies emphasize how affective experiences, such as emotion, empathy, and the sublime, play a central role in disaster tourism by contributing to education, resilience, and community

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[51] Kimura, R., Hayashi, H., Kobayashi, K., Nishino, T., Urabe, K., & Inoue, S. (2017). Development of a "disaster management literacy hub" for collecting, creating, and transmitting disaster management content to increase disaster management literacy. *Journal of Disaster Research*, *12*(1), pp. 42–56. https://doi.org/10.20965/jdr.2017.p0042

[52] Gerster, J., & Maly, E. (2022). Japan's disaster memorial museums and framing 3.11: Othering the Fukushima Daiichi nuclear disaster in cultural memory. *Contemporary Japan, 34*(2), pp. 187–209.

[53] Kondo, T., Ghezelloo, Y., & Sakaguchi, N. (2024). International Journal of Disaster Risk Reduction Emerging place governance to lost places for communities : Government planning and citizen-driven placemaking in the disaster memorial parks after the 2011 Japan tsunami. *International Journal of Disaster Risk Reduction*, *114*(January), pp. 104-109. https://doi.org/10.1016/j.ijdrr.2024.104907
Sakaguchi, N. (2021). Memories and Conflicts of Disaster Victims : Why They Wish to Dismantle Disaster Remains. *J. Disaster Res.*, *16*(2), pp. 182–193. https://doi.org/https://doi.org/10.20965/jdr.2021.p0182

[54] Fulco, (2017). 'Japan-Insights *Kataribe*: A Keyword to Recovery Japan-Insights'. Japan-Insights Exploring Expert Experiences, p. 20; Nagamatsu, Fukasawa, & Kobayashi, (2021). 'Why Does Disaster Storytelling Matter for a Resilient Society?'. Journal of Disaster Research Vol.16 No.2, pp. 127-134.

[55] Martini & Buda, (2019). 'Analysing affects and emotions in tourist e-mail interviews: a case in post-disaster Tohoku, Japan'. CURRENT ISSUES IN TOURISM. Vol. 22 (19), pp. 2353-2364; Martini & Minca, (2021). 'Affective dark tourism encounters: Rikuzentakata after the 2011 Great East Japan Disaster'. SOCIAL & CULTURAL GEOGRAPHY, VOL. 22(1), pp. 33–57; Kato, (2018). 'Debating Sustainability in Tourism Development: Resilience, Traditional Knowledge and Community: A Post-disaster Perspective'. TOURISM PLANNING & DEVELOPMENT, 2018 VOL. 15 (1), pp. 55–67.

[56] Boret and Shibayama, (2017). 'The Roles of Monuments for the Dead during the Aftermath of the Great East Japan Earthquake', International Journal of Disaster Risk Reduction, Vol. 29(4), pp. 55–62.

[57] Rahman, A., Nazaruddin, M., Boret, S. P., Anjar, Y. A., Rosemary, R., Indah, R., Ridha, S., & Masturah, S. G. (2024). Memory, meaning, and monuments: An ethnographic study of tsunami memorialization in Aceh. *E3S Web of Conferences, 447*, pp. 1-5

recovery [58] . DMFs frequently serve a dual purpose: spaces for remembrance while simultaneously acting as symbolic reminders of both protection and fear. Rather than merely offering solace to those affected, contemporary commemorative structures increasingly aim to educate future generations about the dangers of natural disasters[59]. In addition to preserving memories of past events, DMFs inspire hope and promote proactive disaster preparedness[60]. Local communities and governments strive to balance the commodification of tragedy with the promotion of meaningful, transformative experiences that support survivor healing, heritage preservation, and disaster awareness.

A key element of DMFs' educational value lies in their presentation of authentic materials, such as preserved remains, photographs, and disaster-related artifacts, that reinforce the factual integrity of past events. For example, Sendai Arahama Elementary School integrates disaster prevention materials within its exhibition, demonstrating how memorials can merge remembrance with practical educational content. Studies have shown that including such authentic elements can significantly enhance visitor impact, reflecting findings from earlier research[61]. This commitment to authenticity supports a broader educational mission: to foster risk awareness, promote disaster literacy, and encourage a preparedness-oriented mindset among visitors. Thus, DMF serves not only as a historical archive but also as a vital tool for cultivating future disaster mitigation behaviors.

Despite this, there remains a critical lack of studies specifically exploring the role of DMFs in promoting protective behavior toward future disasters. This research gap underscores the urgent need for a comprehensive study. Understanding this impact is crucial, as residents are often the most vulnerable group during disasters. If DMFs can enhance residents' disaster preparedness and prompt evacuation intentions, they could serve not only as memorials but also as strategic tools for disaster literacy. Addressing this knowledge gap could inform more effective disaster education programs and policies grounded in empirical data.

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[58] Martini, A., & Sharma, N. (2022). Framing the sublime as affect in post-disaster tourism. *Annals of Tourism Research*, *97*, 103473. https://doi.org/10.1016/j.annals.2022.103473

[59] Borland, J. (2022). In Memory of Future Earthquakes: Controversial New Form and Function of a Commemorative Statue in 1920s Tokyo. J. Mater. Cult. Vol. 27 (3), p. 5.

[60] Zhang, X., & Izumi, T. (2024). The Role of Disaster Memorial Facilities in Disaster Risk Reduction: Experiences from the Tohoku Region in Japan. *Sustainability (Switzerland)*, *16*(18), p. 5. https://doi.org/10.3390/su16188045

[61] Hang, X., & Izumi, T. (2024). Ibid., p. 25.

Table 2.1. Overview of Disaster Memorial Facility Studies in the Tohoku Region and Aceh Province

Author	Title	Result
Martini & Buda (2019)[62]	Analyzing affects and emotions in tourist e-mail interviews: a case in post-disaster Tohoku, Japan	The material collected shows that the adjectives used to describe the disaster area suggest the effects and emotions felt by the people involved. These feelings are personal, but they can be compared to other similar experiences. For example, some people compare the Japanese disaster to disasters that are more familiar to them.
Lin, Kelemen & Tresidder (2018)[63]	Post-disaster tourism: building resilience through community-led approaches in the aftermath of the 2011 disasters in Japan	Transforming post-disaster visitors' experiences into positive and enduring relations with the place and its community by focusing on the beauty of nature, disaster learning, and environmental sustainability.
Martini (2019)[64]	Geographies of affect in places of death and disaster: Tohoku, Japan, after 3.11 Miracle Boats and Other Wonders: Locating Affect in the Narratives of Recovery Post-Disaster Debris	Since the original traumatic event, both floating debris and the remains that remained on the shore have been significant. This is because of the time between them disappearing and being recorded again. This significance is connected to the situations where these objects were found.
Liu-Lastres, Mariska, Tan & Ying (2020)[65]	Can post-disaster tourism development improve destination livelihoods? A case study of Aceh, Indonesia	Validated the applicability of the SLFT to a post-disaster tourism development context, but also revealed how tourism could contribute to various community assets and a resilient destination in the aftermath of a crisis.
Chie & Dewi (2020)[66]	'Dark Tourism' in a Muslim Society: Multiple Interpretations and Comments on Tsunami Tourism in Aceh, Indonesia	イスラム教の教えの中で，死は通過点であり，そこを通って死者が楽園に行くとするならば，災害がもたらすことは「ダーク」であることばかりではないと解釈できる。アチェの観光地で観光者や地元の人々がよく言う，悲劇（*musibah*）の中にある良いこと（*hikmah*）という考え方も同様である. In the teachings of Islam, death is considered a passage, and if it is through this passage that the deceased reach paradise, then

[62] Martini, A., & Buda, D. M. (2019). Analysing affects and emotions in tourist e-mail interviews: a case in post-disaster Tohoku, Japan. *Current Issues in Tourism*, *22*(19), pp. 1–12. https://doi.org/10.1080/13683500.2018.1511693

[63] Lin, Y., Kelemen, M., & Tresidder, R. (2018). Post-disaster tourism: building resilience through community-led approaches in the aftermath of the 2011 disasters in Japan. *Journal of Sustainable Tourism*, *26*(10), pp. 1766–1783. https://doi.org/10.1080/09669582.2018.1511720

[64] Martini, A. (2019). Geographies of affect in places of death and disaster: Tohoku, Japan, after 3.11. p. 207. [Thesis fully internal (DIV), University of Groningen]. University of Groningen.

[65] Liu-Lastres, B., Mariska, D., Tan, X., & Ying, T. (2020). Can post-disaster tourism development improve destination livelihoods? A case study of Aceh, Indonesia. *Journal of Destination Marketing and Management*, *18*, p. 2. https://doi.org/10.1016/j.jdmm.2020.100510

[66] Chie, S., & Dewi, C. (2020). 'Dark Tourism' in a Muslim Society: Multiple Interpretations and Comments on Tsunami Tourism in Aceh, Indonesia. 『金沢星稜大学人文学研究』, *4*(2), pp. 1–13.

		what disasters bring can be interpreted as not solely "dark." This is similar to the perspective often expressed by tourists and local people in Aceh—that even within tragedy (*musibah*), there is something good (*hikmah*) to be found.
Martini & Sharma (2022)[67]	Framing the sublime as affect in post-disaster tourism	The article highlights the ways and modalities in which the sublime-as-affect, especially when arising from situations of dark and post-disaster tourism, can become a powerful tool for transformative experiences in tourism.
Gerster, Boret & Shibayama (2021)[68]	Out of the Dark: The Challenges of Branding Post-Disaster Tourism Ten Years after the Great East Japan Earthquake	Many people working on tourism programs after disasters say that these programs are very important for teaching people about disasters. They say that this is a good reason to continue sharing the "negative" parts of their region's history, even though some people criticize them for doing so.
Rico. (2014)[69]	The limits of a 'heritage at risk' framework: The construction of post-disaster cultural heritage in Banda Aceh, Indonesia	Acehnese history is full of disasters. This means that it has a responsibility to bring the past and present together. It is also important that people continue to be aware of disasters.
Cahyanti (2024)[70]	Evaluating Tsunami Memorial Museums in Indonesia and Japan as Post-Disaster Dark Tourism Sites	Tsunami Museum and Aceh Province and Iwate Prefecture use tragic events to heighten emotions and empathy to provide an affective educational process, which can be classified as dark tourism sites. The museum has different exhibition approaches, where MTA incorporates Islamic beliefs and spiritual elements, while ITMM uses a secular and scientific approach to evoke strong emotions
Norijuki (2012)[71]	Disaster tourism: The role of tourism in a post-disaster period of the Great East Japan Earthquake	Disaster tourism is a sensitive matter, even though it potentially educational purpose, and we have started to find a way to make their programs sustainable
Kato (2018)[72]	Debating Sustainability in Tourism Development: Resilience, Traditional Knowledge and Community: A Post-disaster Perspective	Educational programs for children and school groups teach about sustainable ways of living and caring for the environment, as well as providing support for young children and families affected by the disaster.

[67] Martini, A., & Sharma, N. (2022). Framing the sublime as affect in post-disaster tourism. *Annals of Tourism Research*, *97*, pp. 1034-1073. https://doi.org/10.1016/j.annals.2022.103473

[68] Gerster, J., Boret, S., & Shibayama, A. (2021). Out of the Dark: The Challenges of Branding Post-Disaster Tourism Ten Years after the Great East Japan Earthquake. *Euro-Asia Tourism Studies Journal*, *2*(November 2021), pp. 1–27. https://doi.org/10.58345/bjov5890

[69] Rico, T. (2014). The limits of a "heritage at risk" framework: The construction of post-disaster cultural heritage in Banda Aceh, Indonesia. *Journal of Social Archaeology*, *14*(2), pp. 157–176. https://doi.org/10.1177/1469605314527192

[70] Cahyanti, M. M. (2024). Evaluating Tsunami Memorial Museums in Indonesia and Japan as Post-Disaster Dark Tourism Sites. *International Journal of Disaster Management*, *7*(3), pp. 213–230. https://doi.org/https://doi.org/10.24815/ijdm.v7i3.41401

[71] Norijuki, N. (2012). Disaster tourism: The role of tourism in post-disaster period of Great East Japan Earthquake. *International Institute of Social Studies*, p.58.

[72] Kato, K. (2018). Debating Sustainability in Tourism Development: Resilience, Traditional Knowledge and Community: A Post-disaster Perspective. *Tourism Planning and Development*, *15*(1), pp. 55–67. https://doi.org/10.1080/21568316.2017.1312508

Martini & Minca (2018)[73]	Affective dark tourism encounters: Rikuzentakata after the 2011 Great East Japan Disaster Affective dark tourism encounters: Rikuzentakata after the	It is not unusual for things that are sad or about death to be used in entertainment or education. These stereotypes often make dark tourism seem like it is not important in teaching people about the past and present. But it can help people feel better, show them how to feel sorry for others, and help people deal with difficult feelings.
Nazaruddin & Sulaiman (2013)[74]	Introduction to "TSUNAMI TOURISM": Notes from Aceh, Indonesia	The tsunami-related site in Aceh, whether it is a museum, educational park, memorial park, or monument, is very important not only for education but also for tourism development.
Mulya, Sholahuddin, & Jatmikowati, (2013)[75]	Tourism Development in Banda Aceh City (A Study of Tourism Policy Implementation Based on Aceh Qanun Number 8 of 2013 concerning Tourism)	Currently, the ship still stands firmly but is no longer functioning as a PLTD. This is due to the transfer of rights from the assets of PT. PLN is a government asset. Now, the ship is converted into a monument as well as a museum that provides education to visitors related to the origin of the ship and the cause of the tsunami
Kondo, Ghezelloo & Sakaguchi (2024)[76]	Emerging place governance to lost places for communities: Government planning and citizen-driven placemaking in the disaster memorial parks after the 2011 Japan tsunami	Our results showed that people's sense of belonging is determined by how they feel about memorial parks. We found that people's sense of belonging is affected by three things: the parks' position in their everyday lives, nostalgia, and the parks' role as symbols of reconstruction. We also found that the concept of disaster memorial parks developed by government planning is embodied by citizen-driven placemaking.
Gerster & Maly (2022)[77]	Japan's Disaster Memorial Museums and framing 3.11: Othering the Fukushima Daiichi nuclear disaster in cultural memory	Museums can also welcome more visitors. This is often part of tourism and educational programs supported by local and national governments, as well as private companies. This is especially true for 3.11 disaster memorial museums.
Boret & Shibayama (2017)[78]	The roles of monuments for the dead during the aftermath of the Great East Japan Earthquake	The third section concludes with recommendations about the future approach to monuments that we believe are necessary to allow their active contributions to processes of grief and well-being, social solidarity, and place-making, the preservation of memories, and disaster education during the immediate aftermath of disaster

[73] Martini, A., & Minca, C. (2018). Affective dark tourism encounters : Rikuzentakata after the 2011 Great East Japan Disaster A ff ective dark tourism encounters : Rikuzentakata after the. *Social & Cultural Geography*, *00*(00), pp. 1–25. https://doi.org/10.1080/14649365.2018.1550804

[74] Nazaruddin, D. A., & Sulaiman, R. (2013). Introduction to "TSUNAMI TOURISM": Notes from Aceh, Indonesia. *International Journal of Sciences*, *2*(03), pp. 71–81. Retrieved from https://www.ijsciences.com/pub/article/160%0Ahttps://doi.org/%0Ahttps://www.ijsciences.com/pub/pdf/V2-201303-16.pdf

[75] Mulya, S. M., Sholahuddin, A., & Jatmikowati, S. H. (2013). Tourism Development in Banda Aceh City, *SIASAT*, *4*(8), pp. 47–57.

[76] Kondo, T., Ghezelloo, Y., & Sakaguchi, N. (2024). International Journal of Disaster Risk Reduction Emerging place governance to lost places for communities : Government planning and citizen-driven placemaking in the disaster memorial parks after the 2011 Japan tsunami. *International Journal of Disaster Risk Reduction*, *114*, p. 3, 104907. https://doi.org/10.1016/j.ijdrr.2024.104907

[77] Gerster, J., & Maly, E. (2022). Japan's disaster memorial museums and framing 3.11: Othering the Fukushima Daiichi nuclear disaster in cultural memory. *Japan Focus: The Asia-Pacific Journal, 20*(2), pp. 1–20.

[78] Boret, S. P., & Shibayama, A. (2017). The roles of monuments for the dead during the aftermath of the Great East Japan Earthquake. *International Journal of Disaster Risk Reduction*, *29*(April 2017), pp. 55–62. https://doi.org/10.1016/j.ijdrr.2017.09.021

Zhang & Izumi (2023)[79]	The Role of Disaster Memorial Facilities in Disaster Risk Reduction: Experiences from the Tohoku Region in Japan	The findings reveal that while all three facilities contribute to DRR with the same most important role as disseminating the lessons of the GEJET, their impact on visitors' disaster awareness varies. Sendai Arahama Elementary School particularly raises awareness of disaster threats, while the Higashi-Matsushima Memorial Museums and the 3.11 Memorial Community Centre enhance visitors' disaster-related knowledge

[79] Zhang, X., & Izumi, T. (2023). The Role of Disaster Memorial Facilities in Disaster Risk Reduction: Experiences from the Tohoku Region in Japan. *Sustainability*, 16(18), p. 8045. https://doi.org/10.3390/su16188045

2.1.1. Disaster Prevention Education in Japan

In Japan, most disaster prevention education conducted before the 2011 GEJET took the form of "threatening disaster prevention education" or "knowledge-oriented disaster prevention education" to inspire fear of a disaster in people [80], through fear-arousing communication [81]. Fear-arousing communication encompasses two primary types of information: one that highlights the dangers and another that outlines how to respond to those dangers. Its goal is to make people feel afraid of an event so they are encouraged to take action. However, to prevent disaster-related fatalities, people cannot remain in a constant state of fear, as the brain naturally seeks to restore a sense of "normalcy" to avoid continuous panic[82]. When facing danger, individuals are often influenced by *normalcy bias.* For example, during large-scale disasters or accidents, even when the environment changes drastically, people may develop a self-protective mentality by thinking, "it can't be a big deal." This phenomenon, known as *normalcy bias*, refers to the tendency to ignore or deny threats to maintain psychological stability[83].

Moreover, disaster education that only focuses on frightening people is not enough to make them act properly; instead, they might see the area as dangerous and develop a negative view of their living place. Therefore, knowledge-based disaster education has been introduced, which includes information about past disasters, how disasters occur, what preparations are necessary, and how to evacuate. However, this approach also has limitations, such as the use of hazard maps[84]. A hazard map illustrates potential disaster scenarios based on past data and scientific knowledge. When used with proper understanding, it can be very effective. However, if presented merely as basic information about local hazards, people may only imagine the specific disaster shown on the map and fail to consider more severe possibilities, remaining stuck in their initial assumptions. This situation was evident in Rikuzentakata City and Kamaishi City during the 2011 Great East Japan Earthquake and Tsunami (GEJET). In these cities, people attempted to evacuate to shelters and auditoriums that were not located at a

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[80] Katada, T., & Kanai, M. (2016). The School Education to Improve the Disaster Response Capacity : A Case of " Kamaishi Miracle ." *J. Disaster Res.*, *11*(5), 845–856. https://doi.org/https://doi.org/10.20965/jdr.2016. p. 848

[81] Leventhal, H. (1970). Ibid. p. 130.

[82] Yamori, K. (2009). 再論—正常化の偏見 [Rethinking normalcy bias]. *The Japanese Journal of Experimental Social Psychology*, *48*(2), pp. 137–149.

[83] Fukuda, M. and Sekiya, N.（2005）.『平成 16 年台風 23 号豪雨 災害，新潟・福島集中豪雨における住民意識と避難 行動』。日本社会心理学会第 46 回大会発表論文集, pp. 752–753.

[84] Katada, T., & Kanai, M. (2016). Ibid., p. 849.

sufficient elevation and were ultimately washed away by the tsunami[85]. Many of them decided to evacuate to those locations because of evacuation drills previously conducted by the local government.

In the post-disaster phase of the 2011 GEJET, a new concept introduced by DMFs is "Narrative-Based Disaster Learning." This approach emphasizes the use of storytelling, whether in the form of fear-based, miracle-based, or success-based narratives, within both "threatening disaster prevention education" and "knowledge-oriented disaster education". By integrating emotionally engaging narratives with factual disaster knowledge, this method seeks to foster both affective and practical understanding. In doing so, it contributes significantly to the development of disaster literacy among individuals and communities[86]. Disaster literacy is the ability of individuals to access, understand, evaluate, and effectively apply disaster-related information to make appropriate decisions that reduce risk and enable self-protection during a disaster[87].

The process of identifying an appropriate framework to answer the research question, namely, demonstrating the impact of DMFs on protective behavior toward future disasters, led the author to explore frameworks based on fear-based messaging. Recognizing that fear-based messages do not always succeed in enhancing protective motivation toward disasters, this study proposes the integration of "Narrative-Based Disaster Learning" within DMFs. This addition is expected to contribute new insights into disaster risk reduction.

2.1.2. Risk Communication Theory

Several theories have been applied to understand how individuals respond to fear-based messages. These include Fear Appeal Theory (FAT) (Hovland, 1953); Extended Parallel Process Model (EPPM) (Witte, 1992); Dark Tourism (Foley and Lennon, 1996); Parallel Response Model (PRM) (Leventhal, 1970); and Protection Motivation Theory (PMT) (Rogers, 1975). Each of these theories will be explained in detail, along with reasons why some are not suitable and why others are appropriate for the topic of this study.

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[85] Kyodo News. (2011). "Tsunami hit more than 100 designated evacuation sites". the Wayback Machine", Japan Times, 14 April 2011, p. 1. Link: https://web.archive.org/web/20110416070149/http://search.japantimes.co.jp/cgi-bin/nn20110414a4.html

[86] Martini, A., & Minca, C. (2018). Affective dark tourism encounters : Rikuzentakata after the 2011 Great East Japan Disaster. *Social & Cultural Geography*, *22*(1), pp. 1–25. https://doi.org/10.1080/14649365.2018.1550804
Martini, A., & Minca, C. (2021). Affective dark tourism encounters : Rikuzentakata after the 2011 Great East Japan Disaster. *Social & Cultural Geography*, *22*(1), pp. 33–57. https://doi.org/10.1080/14649365.2018.1550804

[87] Amini, R., Helsa, Y., Bachri, S., & Yosritzal, Y. (2024). Disaster Literacy and Mitigation Education: Global Trend and Future Directions for Developing Disaster Mitigation-based Science Learning Model, p. 468.

2.1.2.1 Fear Arousal Appeal Theory (Hovland, 1953)

Fear Arousal Appeal Theory[88] is one of the early communication theories that focuses on how fear-inducing messages can influence a person's attitudes and behavior. FAT (Fear Appeal Theory) primarily emphasizes eliciting fear through threat communication, or threat appeal, to motivate individuals to take certain actions. These actions typically involve preventive measures aimed at reducing the risk of harm, as well as enhancing self-efficacy—the individual's belief in their ability to effectively carry out those preventive actions. For example, in a health context, preventive behaviors might include maintaining personal hygiene, undergoing regular check-ups, or avoiding risky behaviors. An example of a strong threat appeal might include statements such as: "If you ever develop an infection due to improper dental care, it can be extremely serious because these infections can spread to your eyes, heart, or joints, causing secondary infections that may lead to diseases such as arthritis, paralysis, kidney damage, or total blindness." By emphasizing threats such as pain, disease, and bodily harm, this type of messaging uses extreme fear appeals commonly found in persuasive communications via mass media like newspapers, radio, and television. The goal is to trigger strong emotional reactions that motivate the audience to conform to recommended behaviors to avoid these negative consequences. The essence of this theory is that messages containing threats or dangers can motivate individuals to change their attitudes or behaviors in order to avoid these negative consequences. Messages that arouse fear (fear appeal) function by directing the individual's attention to the danger or risk that may occur, thereby causing an emotional reaction in the form of fear. This reaction is then expected to encourage individuals to take precautions or adopt the attitude suggested in the message. In the context of persuasive communication, Fear Appeal Theory emphasizes two main elements: 1. Fear-arousing information, the message must explain the danger, risk, or threat that is real, so that it causes enough fear to trigger attention and concern. 2. Response information, the message must also provide solutions or concrete steps that individuals can take to avoid or reduce the threat. Without this information, the fear that is caused can cause anxiety or defensiveness without producing the expected behavioral changes. Fear Appeal Theory is the basis of Protective Motivation Theory, which expands on the concept by including important cognitive factors, thus providing a more complete explanation of how someone is motivated to engage in

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[88] Hovland, C. I., Janis, I. L., & Kelley, H. H. (1953). *Communication and persuasion: Psychological studies of opinion change*. Yale University Press, p. 135.

protective behavior. This is the basis for the Protective Motivation Theory[89], which was later expanded to include important cognitive factors, thus providing a more complete explanation of how a person is motivated to engage in protective behavior. Therefore, FAT is less suitable for predicting actual protective behaviors because it primarily focuses on eliciting strong emotional reactions, such as fear, to motivate compliance. The theory does not sufficiently incorporate important cognitive factors that influence whether an individual will take and maintain protective actions. These cognitive factors include perceived severity of the threat, perceived susceptibility, self-efficacy (belief in one's ability to perform the behavior), and response efficacy (belief that the recommended behavior effectively reduces the threat). Without considering these cognitive components, the theory may trigger short-term emotional responses but fails to explain how individuals process the information rationally and decide to adopt long-term protective behaviors.

2.1.2.2. Extended Parallel Process Model (EPPM) (Witte, 1992)

The Extended Parallel Process Model (EPPM)[90] talks about how fear appeals work in communication. It digs into why some fear-based messages motivate people to act, while others backfire or get ignored. The model explains how people weigh the threat and their ability to handle it, influencing their reactions; 1) Fear appeals can lead to danger control (taking protective action) or fear control (denial or avoidance); 2) The perceived threat and perceived efficacy are key to how people respond.

EPPM places more emphasis on the interaction process between fear, perceived threat, and perceived efficacy in determining responses, both danger control and fear control (See Fig. 2.1). The EPPM was designed as a framework for understanding individual responses to fear messages and how those messages motivate—or do not motivate—protective actions through the communication process. It is better suited to explaining the process of perception and reaction to specific messages than to complex real-world situations.

The Extended Parallel Process Model (EPPM) is more suitable for short-term risk communication situations and specific messages, rather than for understanding the complex

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[89] Rogers, R. W. (1975). A protection motivation theory of fear appeals and attitude change. *The Journal of Psychology, 91*(1), pp. 93–114.
[90] Witte, K. (1992). Putting the fear back into fear appeals: The extended parallel process model. *Communication Monographs, 59*(4), 329–349.

motivational processes in post-disaster contexts that involve various factors such as trust, traumatic experiences, and social influence.

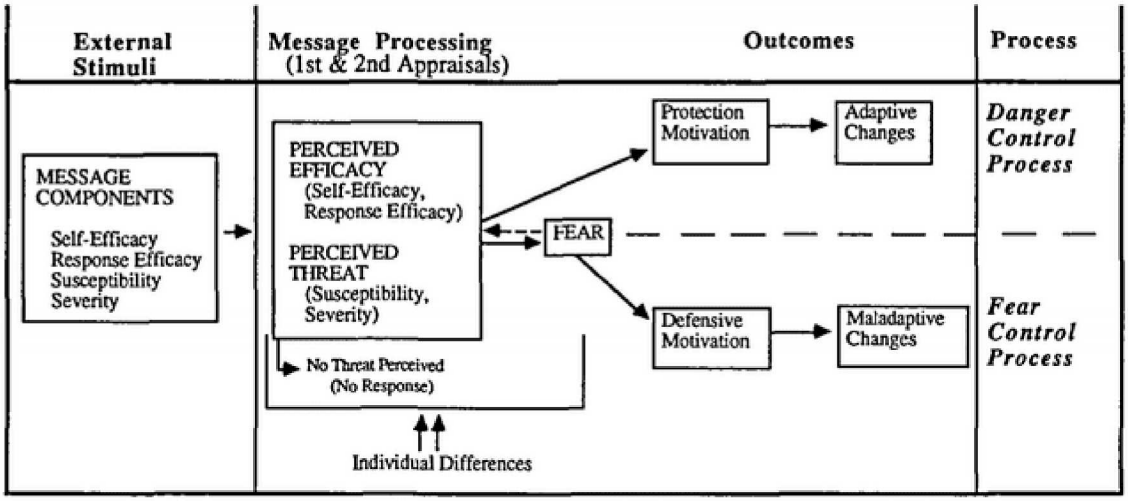

Figure 2.1. The Extended Parallel Process Model (EPPM)

Source: Witte, K. (1992: 335)[91]

Therefore, this model is not appropriate for predicting adopted protective behaviors intended to predict long-term actions toward future disasters.

2.1.2.3 Parallel Response Model (PRM) (Leventhal, 1970)

The Parallel Response Model (PRM)[92], is one of the foundational theories in health psychology that examines how individuals respond to fear-based messages. PRM laid the groundwork for subsequent models such as the Extended Parallel Process Model (EPPM) and also served as an early reference for the development of Protection Motivation Theory (PMT) by Rogers in 1975.

According to PRM, when individuals are exposed to messages that evoke fear, they may respond through one of two distinct pathways: 1) Cognitive or Problem-Focused Response (Danger Control Response). In this pathway, individuals focus on the actual threat and attempt to manage or eliminate the danger through rational problem-solving. For example, after

[91] Witte, K. (1992). Ibid, p. 335

[92] Leventhal, H. (1970). Findings and theory in the study of fear communications. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 5, pp. 119–186).

receiving information about the risk of a tsunami, a person may seek evacuation routes or develop a mitigation plan; 2) Emotional or Fear-Focused Response (Fear Control Response). Here, the individual's reaction is centered on the emotional experience of fear itself rather than the source of the danger. This can result in responses such as denial, avoidance, or minimization of the perceived risk. While PRM offers valuable insights into fear-based communication, it is less suitable for this study's focus.

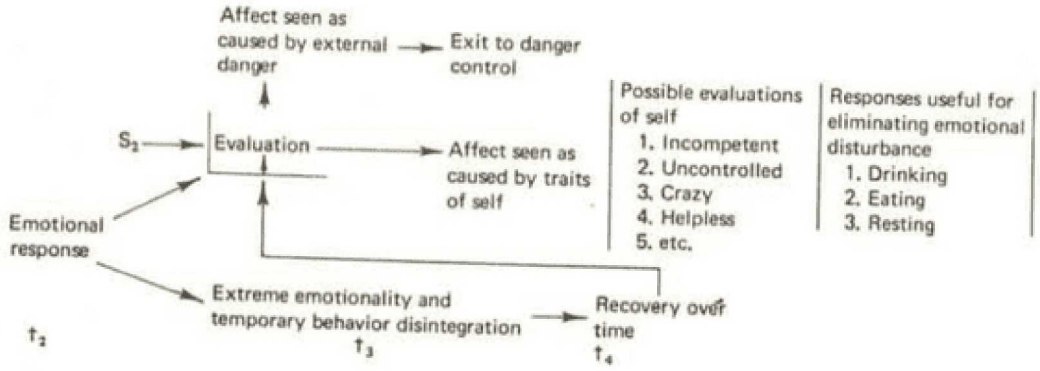

Figure 2.2. Parallel Response Model

Source: Leventhal, H. (1970: 177)[93]

The model categorizes responses into two broad types—danger control and fear control—but does not provide a nuanced explanation of the complex psychological processes involved in adopting protective behaviors. Specifically, it lacks consideration of threat and coping appraisals, such as an individual's perception of the severity of a threat or the effectiveness and feasibility of the recommended protective action. Therefore, PRM is not well-suited to predict protective motivation behavior, particularly in contexts such as post-disaster tourism, where behavioral responses are shaped not only by fear but also by prior experience, social influence, and cultural learning.

2.1.2.4. Dark tourism (Lennon and Foley, 1996)

Dark tourism is a tourism phenomenon that involves visiting sites associated with death, tragedy, or other traumatic events. These locations are often deeply connected to dark histories, and the media plays a significant role in shaping public perceptions of them. In the context of

[93] Leventhal, H. (1970). Ibid, p. 177.

dark tourism, the “fear message” often becomes a central element of attraction, as these sites evoke emotions such as fear, dread, or morbid curiosity about death and violence. For instance, visitors may be drawn to places like former concentration camps or the scenes of notorious crimes to experience the atmosphere of tragedy. In this context, the fear message conveyed at such sites can trigger perceptions of vulnerability and severity. Visitors may become more aware of human fragility and the devastating consequences of violence or disaster. However, despite the emotional resonance between dark tourism and fear messaging, this approach is not fully appropriate for research that focuses on how DMF can enhance evacuation motivation. While dark tourism encourages emotional engagement and reflection, such as memorializing victims or confronting traumatic histories, it lacks the explanatory depth needed to predict behavioral change. It does not sufficiently address how individuals assess threats, evaluate coping strategies, or develop the intention to act protectively, all of which are central to understanding protective motivation in disaster contexts. In addition, dark tourism emphasizes reflective and emotional aspects, such as commemorating victims, remembering dark history.

In contrast, the Protection Motivation Theory (PMT) provides a more comprehensive framework that is better suited for understanding the impact of DMF on protective behavior. PMT, originally developed by Rogers (1983) and later expanded by Rogers and Prentice-Dunn (1997), is more appropriate for this study because it systematically explains how individuals process information about threats and coping strategies through two key cognitive appraisals: threat appraisal and coping appraisal. These processes help predict whether individuals will adopt protective behaviors in response to perceived risks. In the context of disaster studies, the Protection Motivation Theory (PMT) offers a clear advantage over other theoretical approaches because it directly explains how individuals are motivated to take protective action in response to disaster risks.

However, despite its strengths, the PMT framework has limitations, particularly with its limited focus on non-fear-based messages that influence protective motivation. PMT was originally developed as an expansion of Hovland's (1953) Fear Arousal Theory (FAT), one of the earliest communication theories to focus on how fear-inducing messages can influence attitudes and behaviour. FAT emphasises the use of fear appeals or threat-based communication to motivate individuals to take protective action. Emotion has a strong influence on attention, modulating its selectivity as well as motivating action and behaviour.

In the context of disaster preparedness, tsunami museums and disaster memorial facilities (DMFs) in regions such as Tohoku in Japan and Aceh in Indonesia have emerged as unique platforms for fostering protective behaviours. It is valuable to explore the potential of the DMF phenomenon within the PMT framework by investigating whether the incorporation of such experiences could influence protective motivation. Unlike traditional fear-based approaches, DMFs utilise knowledge-based messages and, most importantly, aim to evoke emotion in visitors, which has a strong influence on memory as well as motivating action and behaviour[94]. To address the gap in the PMT framework, this study incorporates DMFs as a complementary variable.

2.1.2.5. Protective Motivation Theory (PMT)

Rogers first developed the Protection Motivation Theory (PMT) framework (see Fig. 2.3) to explain how individuals respond to threatening messages (fear appeals) related to health or other dangers. The original model comprised three key components: the magnitude of noxiousness (the severity of the threat), the probability of occurrence (the likelihood of the threat occurring), and the efficacy of the recommended response (the effectiveness of the protective behavior). These factors influenced cognitive mediating processes, such as appraised severity, the expectancy of exposure, and belief in the efficacy of coping responses, which collectively led to protection motivation and ultimately the intention to adopt protective behavior. In the cognitive process, threats are assessed based on appraised severity and expectancy of exposure. The effectiveness of the response is measured through belief in the efficacy of the coping response. This process produces protection motivation, which ultimately drives attitude change (intent to adopt the recommended response). However, the initial model has a weakness because it does not consider other psychological factors, such as the reward and cost of adaptive or maladaptive responses. Reward refers to the benefits gained from protective actions, while cost refers to the sacrifices or effort required to take those actions in the face of threats like natural disasters.

In 1983, Rogers refined the model by introducing more psychological factors, considering maladaptive or adaptive responses, and self-efficacy, making the framework more comprehensive (see Fig. 2.4).

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[94] Tyng, C. M., Amin, H. U., Saad, M. N. M., & Malik, A. S. (2017). The influences of emotion on learning and memory. *Frontiers in Psychology, 8*, 1454. https://doi.org/10.3389/fpsyg.2017.01454

In the sources of information section, the framework refers to two types of sources. First, environmental, which includes verbal persuasion, which is oral information from others, such as expert advice or government appeals, and observational learning, which is learning through observation, such as seeing others evacuate during a disaster.

Second, intrapersonal, which includes personality variables, such as optimism or anxiety, that can influence how individuals respond to threats, and prior experience, which is previous experience, such as having experienced a disaster, that can shape risk perceptions and influence their future actions.

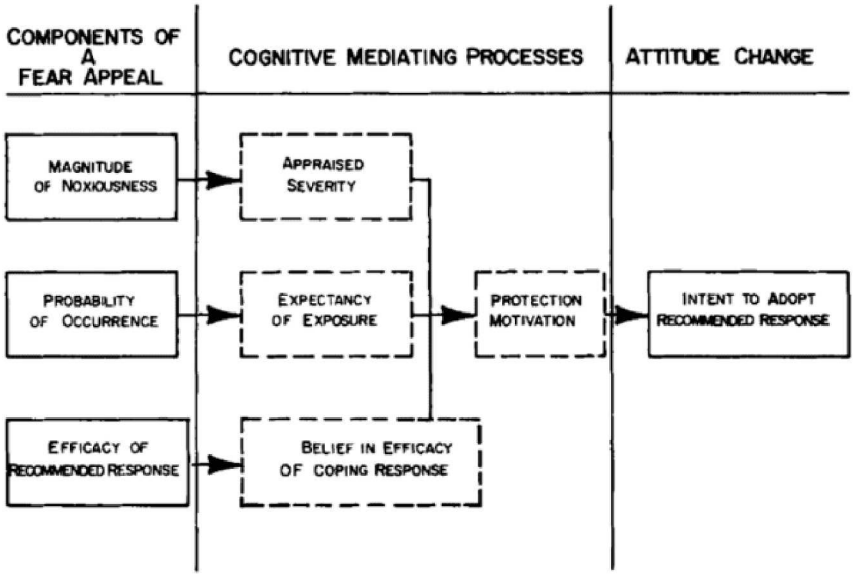

Figure 2.3. Framework of Protection Motivation Theory (1975)

Source: Rogers (1975: 93)[95]

These sources of information initiate two appraisal processes: threat appraisal and coping appraisal. The components of these appraisal processes may be viewed as the 4 cells of a 2 X 2 table. These cognitive processes appraise either the maladaptive or adaptive response(s), and the variables increasing or decreasing the probability of the occurrence of the response.

We shall consider threat appraisal first. The maladaptive response can be a behavior currently engaged in (e.g., drinking excessively) or one that could be adopted (e.g., starting to smoke). The factors increasing the probability of the maladaptive response (i.e., positive

[95] Rogers, R. W. (1975). *A protection motivation theory of fear appeals and attitude change. Journal of Psychology, 91*(1), pp. 93–114.

reinforcers) include both intrinsic rewards (e.g., bodily pleasure, satisfaction) and extrinsic rewards (e.g., social approval).

The factors decreasing the probability of the occurrence of the maladaptive response (i.e., punishers) are the severity of the threat and the expectancy of being exposed to the threat (i.e., one's vulnerability). Although severity usually refers to bodily harm, it can also involve intrapersonal threats (e.g., self-esteem) and interpersonal threats (e.g., family and work relationships). It is assumed that the appraisal of these factors, increasing and decreasing the probability of the maladaptive response, will summate algebraically to produce the final appraisal of the threat.

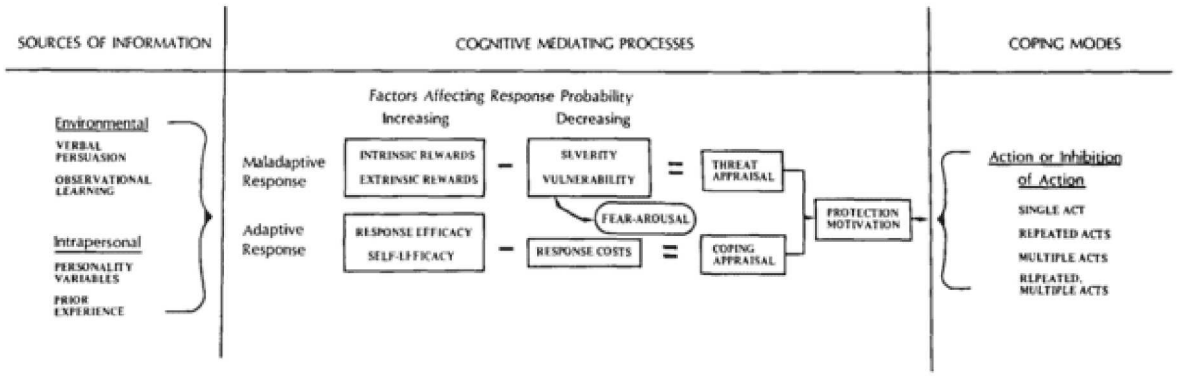

Figure 2.4. Refined Framework of Protection Motivation Theory (1983)

Source: Rogers, R. W. (1983: 168)[96]

Second, the coping appraisal process evaluates one's ability to cope with and avert the threatened danger. Beliefs that increase the probability of the adaptive response are the beliefs that the recommended coping response is effective (e.g., "stopping smoking is an effective way to avoid the dangers associated with smoking") and that one can successfully perform the coping response (e.g., "I can stop smoking"). Coping appraisal is a summation of these appraisals of response efficacy, self-efficacy, and any "costs" of adopting the recommended preventive response: inconvenience, expense, unpleasantness, difficulty, complexity, side effects, disruption of daily life, and overcoming habit strength. Self-efficacy is the major new component of the theory. According to Bandura (1977)[97]Self-efficacy expectancy is the belief

[96] Rogers, R. W. (1983). Cognitive and physiological processes in fear appeals and attitude change: A revised theory of protection motivation. In J. Cacioppo & R. Petty (Eds.), *Social psychophysiology: A sourcebook* (p. 168). New York: Guilford Press.

[97] Bandura, (1977). 'Self-efficacy: Toward a Unifying Theory of Behavioral Change'. Psychological Review. Vol. 84 (2), pp. 191 – 215.

that one is or is not capable of performing a behavior. Self-efficacy is so important that Bandura proposed that all processes of psychological change are mediated by changes in an individual's sense of self-efficacy or mastery.

In 1997, Rogers and Prentice-Dunn [98] further revised the model to be more comprehensive and simplified the visualization of relationships between variables, more clearly separating threat appraisal and coping appraisal as parallel pathways contributing to protective motivation (see Fig. 2.5). The author argues that the 1997 model is more explicit in showing that response costs can significantly reduce coping appraisal, making it more realistic in explaining why individuals are sometimes reluctant to take protective action even when the threat is high. The model also refines the coping response by distinguishing between protective and non-protective actions, recognizing that response costs can influence not only protective motivation but also the tendency to avoid or neglect protective behaviors.

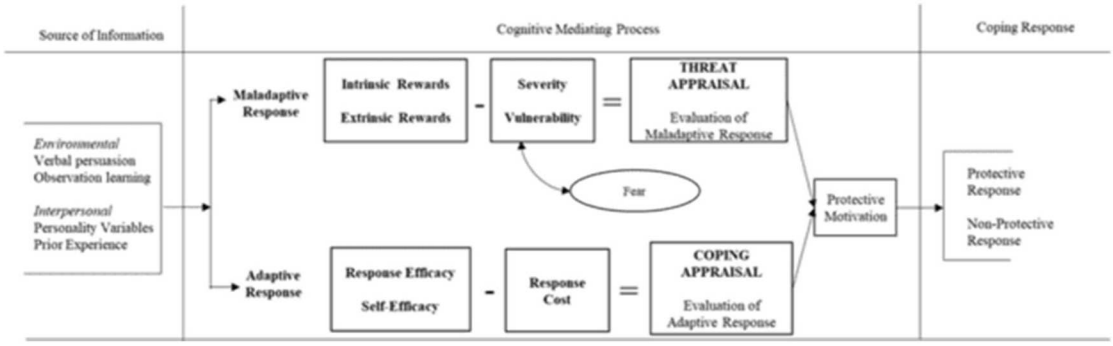

Figure. 2.5. The Structural Model of PMT by Rogers and Prentice-Dunn

Source: Rogers, R. W., & Prentice-Dunn, S. (1997: 130)[99]

In this research, the author adopted the PMT framework from Rogers & Prentice-Dunn (1997) and Rogers (1983)[100] utilizing partial variables within the framework by eliminating the interpersonal source of information and coping appraisal, and adding a new moderating variable that is experience visiting DMF (See Fig. 2.6).

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[98] Rogers, R. W., & Prentice-Dunn, S. (1997). Protection motivation theory. In D. S. Gochman (Ed.), Handbook of health behavior research 1: Personal and social determinants. Plenum Press, pp. 113–132.

[99] Rogers, R. W., & Prentice-Dunn, S. (1997). Protection motivation theory. In D. S. Gochman (Ed.), *Handbook of health behavior research I: Personal and social determinants* p. 130). New York, NY: Plenum Press.

[100] S. Rogers, R. W., & Prentice-Dunn, (1997). 'Protection Motivation Theory'. In D. S. Gochman (Ed.), Handbook of health behavior research 1: Personal and social determinants., pp. 113–132.
R. Rogers, 'Cognitive and physiological processes in fear appeals and attitude change: a revised theory of protection motivation,' Soc. Psychophysiology. A Source., no. January 1983, pp. 153–177, 1983.

Research by Kleinot and Rogers (1982) and Rogers and C. R. Mewborn (1976)[101] underscores the significance of threat and coping appraisal in shaping intentions for protective behavior. Coping appraisal, which depends on factors like self-efficacy (belief in one's capability to act), response efficacy, and response costs, is particularly irrelevant in this study, which concerns individuals lacking direct experience with tsunamis. Without such experience, respondents may struggle to assess these factors accurately.

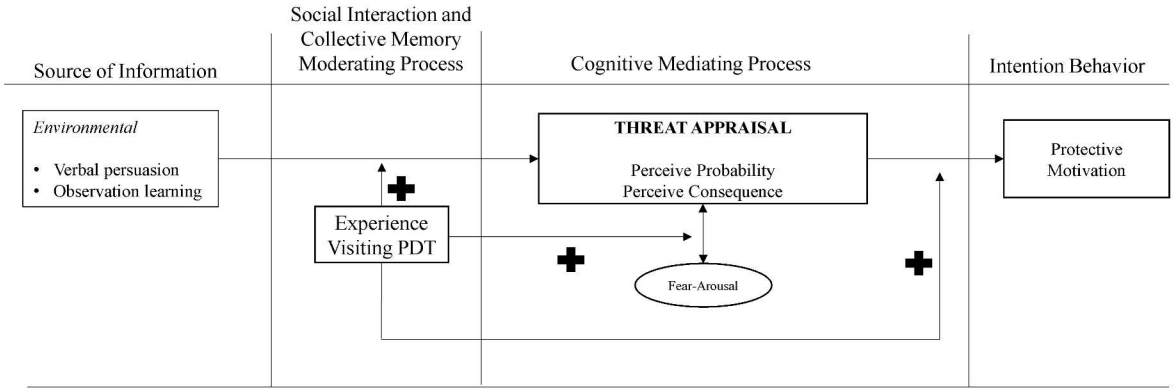

Figure. 2.6. New Framework That will be Analyzed in this Research
Source: Adapted from Rogers and Prentice-Dunn, (1997), Rogers, (1983)

Given the absence of personal experience with tsunamis among the subjects, interpersonal sources such as personality and prior experience were also excluded as irrelevant to the study's focus. Therefore, this research adopts a partial framework, starting from environmental information, emphasizing threat appraisal as a mediating variable in PMT, alongside fear arousal, to evaluate evacuation motivation. Past research posited that threat appraisal would result in the development of protective motivation[102], which, in turn, affects actual behaviors[103].

The PMT model has previously been analyzed in the context of the tourism sector and disaster (see Table 2.2). Based on Table 2.2, previous research indicates that information alone does not directly trigger evacuation intentions. Individuals first evaluate the threat (e.g.,

[101] M. C. Kleinot and R. W. Rogers, (1982). 'Identifying Effective Components of Alcohol Misuse Prevention Programs,' J. Stud. Alcohol, vol. 43, no. 7, pp. 802–811.

[102] A. Aziz, K. Umer, S. Nazish, and B. Zaidi, (2023). "Maladaptive Perception, Protection Motivation, and Health Protective Behavior: the Application of Protection Motivation Theory in Tourism Industry Amidst the Digital Revolution," pp. 11–22.

[103] J. Wang, B. Liu-Lastres, B. W. Ritchie, and D. J. Mills, (2019). "Travellers' self-protections against health risks: An application of the full Protection Motivation Theory," Ann. Tour. Res., vol. 78, no. June, p. 102743.

assessing the level of risk and potential damage) before making an evacuation decision. By positioning threat appraisal as a mediating variable, this study explores whether perceived threat strengthens or weakens the relationship between the source of information and evacuation intention. The use of intention to evacuate as the dependent variable is justified because, in many behavioral models, intention is considered the strongest predictor of actual behavior. Measuring intention is also more practical and reliable than measuring actual evacuation behavior, which is difficult to observe unless a real disaster occurs.

In addition, the author identifies a gap in PMT research, particularly in the context of disaster, where studies have primarily focused on cognitive constructs such as threat and coping appraisals. These studies tend to emphasise rational decision-making, often overlooking emotional or experiential influences, including fear arousal and lived experiences such as DMF visits. Furthermore, while many studies assess general protective behaviours (e.g. preparedness or health measures), evacuation intention, which is critical in high-risk areas, has received relatively little empirical attention.

To further enrich the framework, this study introduces the DMF visit experience as a moderating variable. This experience functions as a social and emotional moderator, potentially enhancing or diminishing the link between threat appraisal and evacuation intention. Individuals who have visited post-disaster areas tend to exhibit greater empathy, which amplifies their threat perception and strengthens their motivation to evacuate. Prior studies support this notion, showing that disaster tourism raises risk awareness and boosts preparedness through direct emotional experiences. Additionally, social interactions in post-disaster settings can foster collective perceptions and a sense of social responsibility, ultimately reinforcing evacuation motivation.

However, despite the growing recognition of DMF's role in shaping disaster literacy and preparedness, no empirical study has yet proven that disaster literacy delivered through DMF strengthens local communities' intention to evacuate in time during future disasters. This study aims to fill this research gap by examining the moderating effect of DMF experience on the relationship between threat appraisal and evacuation intention.

In addition, previous research[104] indicates that threat appraisal is the most significant predictor of protective motivation intentions compared with coping appraisal. However,

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[104] W. Wang et al., (2018). 'When destination attractiveness shifts in response to climate change: tourists' adaptation intention in Taiwan s Kenting National Park,' Curr. Issues Tour., pp. 1–26; W. Ruan, S. Kang, and H. Song, (2020). "Current Issues in Tourism Applying protection motivation theory to understand international tourists' behavioral intentions under the threat of air pollution: A case of Beijing, China,"

variables of threat appraisal (e.g., perceived probability and consequence) are poorly linked to people's motivations to engage in health protection in tourism[105]. The variable of fear arousal, elicited by threat appraisal, has also been constrained in tourism research[106]. Despite the influence of threat appraisal on fear arousal, very few studies in tourism have included this construct together and tested the effects.

2.2. Environmental Source of Information

Environmental sources of information can trigger cognitive mediation processes within the context of PMT. Past research[107] proposed that risk and preparedness information should be disseminated and made available to residents by the government. Other research[108] argued that people seek definitive information to assess the personal relevance of the risks they face. Research on improving tsunami countermeasures based on lessons from the 2011 GEJET has highlighted the importance of providing the public with specific information regarding evacuation drills. Local governments, local media, and Tohoku University launched a new program, "KAKEAGARE JAPAN" [2015]. "KAKEAGARE" means "running up to a higher place"[109].

In addition, the *Gensai* Pocket Guide is an educational tool designed to enhance disaster preparedness, especially among children (See Appendix pp. 247-257). It is a pocket-sized guide or card containing practical tips for evacuation preparation, such as carrying food supplies, a flashlight, and a whistle. The guide also includes experiences from major disasters, such as the Great East Japan Earthquake and Tsunami, and Typhoon Haiyan, making it a valuable resource for disaster risk reduction education.

The *Gensai* Pocket Guide consists of threat-based messages that evoke fear in order to enhance disaster awareness and encourage immediate protective action. Such messages include

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Curr. Issues Tour., pp. 1–15,; S. S. Alam, M. Masukujjaman, A. Omar, Z. Khan, M. Makhbul, and M. H. Ali, (2022). "Protection Motivation and Travel Intention after the COVID-19 Vaccination: Fear and Risk Perception. ; Syed Shah Alam, Mohammad Masukujjaman, nor Asiah Om," J. Qual. Assur. Hosp. Tour., pp. 1–27.

[105] S. Milne, P. Sheeran, and S. Orbell, (2000). "Prediction and Intervention in Health-Related Behaviour: A Meta-Analytic Review of Protection Motivation Theory," J. Appl. Psychol., vol. 30, no. 1, pp. 106–143.

[106] S. S. Alam, M. Masukujjaman, A. Omar, Z. Khan, M. Makhbul, and M. H. Ali, (2022). 'Protection Motivation and Travel Intention after the COVID-19 Vaccination: Fear and Risk Perception Protection Motivation and Travel Intention after the COVID-19'. J. Qual. Assur. Hosp. Tour., vol. 24, pp. 1–27.

[107] V. Basolo, L. J. Steinberg, R. J. Burby, and J. Levine, (2022). "The Effects of Confidence in Government and Information on Perceived and Actual Preparedness for Disasters," *Environ. Behav.*, vol. 41 (3), pp. 338–364.

[108] H. Brenkert-Smith, K. L. Dickinson, P. A. Champ, and N. Flores, (2013). 'Social Amplification of Wildfire Risk the Role of Social Interactions and Information Sources, Risk Anal., vol. 33, no. 5, p. 15.

[109] A. Suppasri, P. Latcharote, J. D. Bricker, and N. Leelawat, (2016). "Improvement of Tsunami Countermeasures Based on Lessons from the 2011 Great East Japan Earthquake and Tsunami — Situation After Five Years Improvement of Tsunami Countermeasures Based on Lessons from the 2011 Great East Japan Earthquake," Coast. Eng. J., vol. 58, no. January 2018, p. 30.

warnings like “Tsunami can generate destructive waves” and “Never go down the beach to watch. When you see the waves, you are TOO CLOSE TO ESCAPE from it,” clearly signaling the life-threatening risk of curiosity during disasters. The guide also urges residents to “Learn from Past Disasters in Your Area,” reminding them that such events are not hypothetical but real and recurring, thereby reinforcing the necessity of preparedness. Statements such as “東日本大震災の記” (Memory of the Great East Japan Earthquake) explicitly reference past catastrophic events that caused mass fatalities, serving as a *threatening reminder*. Similarly, the message “津波：約 40.5m／約 5.4km (Tsunami: approx. 40.5 meters high / reaching 5.4 km inland)” presents the overwhelming scale of destruction in factual terms, triggering fear through both visual and logical impact.

The typical characteristics of threat-based messages found in disaster education materials, such as the *Gensai* Pocket Guide, include the use of shocking numbers and factual details, referring to historical major disasters, to evoke emotional memory and perceived vulnerability, and use direct warnings based on natural warning signs[110].

Past research[111] suggested that information sources should be tailored to homeowners' local contexts to be more influential in shaping risk perceptions than broad-based messages. This paper adopts the definition of risk environment information. In parallel, the indicator of environmental information sources was derived from the work of past research[112] and may include content, observation, and density.

This research employs two of these sources due to the availability of information in the field: density and observation. 'Information density' describes the phenomenon of information being distributed repeatedly through various communication channels, including local

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[110] Lindell, M. K., & Perry, R. W. (2012). *The Protective Action Decision Model: Theoretical modifications and additional evidence*. Risk Analysis, 32(4), pp. 616–632.
Witte, K. (1992). Putting the fear back into fear appeals: The extended parallel process model. *Communication Monographs, 59*(4), pp. 329–349.

[111] H. Brenkert-Smith, K. L. Dickinson, P. A. Champ, and N. Flores, (2013). “Social Amplification of Wildfire Risk the Role of Social Interactions and Information Sources,” Risk Anal., vol. 33, no. 5.

[112] T. Liu and H. Jiao, (2020). “How does information affect fire risk reduction behaviors ? Mediating effects of cognitive processes and subjective knowledge How does information affect fire risk reduction and subjective knowledge,” Nat. Hazards. Springer.

government, media, personal contacts, and community groups[113]. 'Observed information' refers to information received by observing the risk reduction behaviors adopted by others[114].

2.3. Threat Appraisal and Fear Arousal

Threat appraisal measures how individuals assess the severity of a threat (such as a tsunami). If the threat is not perceived as significant or relevant, individuals may lack the motivation to act, such as failing to evacuate promptly. Conversely, if the threat is perceived as significant, it may increase the motivation to take action[115]. Threat appraisal also describes how individuals assess the potential danger posed by a given risk event[116]. Threat appraisal can be defined as a combination of the probability of a risk event occurring and the potential severity of its consequences[117].

Two indicators were used to understand threat appraisal: perceived probability and perceived consequence. 'Perceived probability' denotes an individual's subjective assessment of the likelihood of a given risk event occurring, while 'perceived severity' describes the degree of physical, psychological, and economic harm that a risk event may cause. Individuals are assumed to perceive a greater threat when exposed to a risk event with a high perceived probability or severity[118]. Past research[119] believed that such threats increase the fear of risk and death.

In this research, 'fear of fatality' refers to the emotional response individuals experience when they perceive the potential for life-threatening harm due to a disaster event[120]. It encapsulates anxiety and concern about personal safety and survival, influenced by perceived

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[113] H. Brenkert-Smith, K. L. Dickinson, P. A. Champ, and N. Flores, (2013). "Social Amplification of Wildfire Risk the Role of Social Interactions and Information Sources," Risk Anal., vol. 33(5), p. 805; S. Mccaffrey, (2004). "Thinking of Wildfire as a Natural Hazard," Soc. Nat. Resour. An Int. J., no. July 2013, pp. 37–41.

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[115] J. Wang, B. Liu-Lastres, B. W. Ritchie, and D. J. Mills, (2004). "Travellers' self-protections against health risks: An application of the full Protection Motivation Theory," Ann. Tour. Res., vol. 78, no. June, p. 102743, 2019; S. Mccaffrey, (2004). "Thinking of Wildfire as a Natural Hazard," Society and Natural Resources, 17, pp. 509–516.

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[117] S. M. McCaffrey, (2004). "Fighting Fire with Education: What is the Best Way to Reach Out to Homeowners?" J. For., vol. 102, no. 5, pp. 12–19; Y. Lee, (2011). "Understanding anti-plagiarism software adoption: An extended protection motivation theory perspective," Decis. Support Syst., vol. 50, no. 2, pp. 361–369; M. O. Lwin, B. Li, and R. P. Ang, (2012). "Stop bugging me: An examination of adolescents' protection behavior against online harassment," J. Adolesc., vol. 35, no. 1, pp. 31–41.

[118] S. Hodgkins and S. Orbell, "CAN PROTECTION MOTIVATION THEORY PREDICT BEHAVIOUR? A LONGITUDINAL TEST EXPLORING THE ROLE OF PREVIOUS,". Psychology and Health, Vol. 13, pp. 237-250.

[119] J. E. Maddux and R. W. Rogers, (1983). "Protection motivation and self-efficacy: A revised theory of fear appeals and attitude change," J. Exp. Soc. Psychol., vol. 19, no. 5, pp. 469–479.

[120] K. B. Kyes, "Using Fear to Encourage Safer Sex,". (1995). J. Psychol. Human Sex., vol. 7, no. 3, pp. 21–37; J. F. Tanner, J. B. Hunt, and D. R. Eppright, (1991). "The Protection Motivation Model: A Normative Model of Fear Appeals," J. Mark., vol. 55, no. 3, p. 36.

probability and severity. Fear of fatality is considered crucial in understanding how individuals respond to threats.

2.3. Evacuation Motivation

In this research, 'protective motivation' refers to the intention to have motivation behind evacuation during a tsunami event in the future. Based on tsunami evacuation behavior, this variable is categorized into three periods: early, mid, and late periods[121]. The early notification period may include natural phenomena such as ground shaking, usually followed by official warnings or directives to affected residents. Despite the Japan Meteorological Agency (JMA) issuing warnings during the early period (e.g., a 3-meter tsunami height warning) in the 2011 GEJET disaster, many residents failed to act appropriately due to normalcy bias or vague situation definitions[122]. Normalcy bias refers to the tendency to underestimate disaster threats, while vague definitions refer to unclear situation perceptions, both leading to inaction.

In the mid-period, some individuals begin to engage in response behaviors, serving as social cues. These cues proved instrumental in saving lives during the 2011 tsunami in Tohoku[123]. The JMA revised the warning message to a 10-meter tsunami, but many residents still failed to access it due to electrical signal disruptions and ineffective communication channels[124].

The 2011 GEJET disaster highlighted the need for improved tsunami warning procedures. In March 2013, the JMA implemented a Warning Improvement Plan, using terms like "huge" for tsunamis of 10 meters or more and "high" for those around 3 meters[125].

During the late period, the tsunami began affecting coastal areas, with warnings conveyed through natural signs such as changes in water levels and unusual sounds. At this stage, evacuation becomes challenging, underscoring the importance of early and mid-period warnings and reducing reliance on natural indicators in the final stage. The detailed definitions,

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[121] F. Makinoshima, F. Imamura, and Y. Oishi, (2020). "Tsunami evacuation processes based on human behavior in past earthquakes and tsunamis: A literature review," Prog. Disaster Sci., vol. 7, p. 100113.

[122] K. Yamori, (2009). "Revisiting the concept of normalcy bias (再論—正常化の偏見)," Japanese J. Exp. Soc. Psychol., vol. 48, no. 2, pp. 137–149; S. Tanaka, (2023). "The 2011 Great East Japan Earthquake and Tsunami: The highest casualties and largest reconstruction funds — Characteristics of major disasters and future challenges in developed countries," Japanese J. Sociol., vol. 32, no. 1, pp. 7–24.

[123] T. Katada and M. Kanai, (2016). "The School Education to Improve the Disaster Response Capacity: A Case of ' Kamaishi Miracle,'" J. Disaster Res., vol. 11, no. 5, pp. 845–856.

[124] S. Koshimura, S. Hayashi, and H. Gokon, "Lessons from the 2011 Tohoku Earthquake Tsunami Disaster," J. Disaster Res., vol. 8, no. 4, 2013, p. 551; T. Ozaki, (2012) "JMA' s Tsunami Warning for the 2011 Great Tohoku Earthquake and Tsunami Warning Improvement Plan," J. Disaster Res., vol. 7, pp. 439–445.

[125] E. Gyoba, (2014). "Differences in Subjective Estimation of Risks and Assessment for the Modified Tsunami Warning System by the Japan Meteorological Agency Among University Students Located in Damaged and Non-Damaged Prefectures Around the Period of 2011 off Pacific Coast," pp. 571–578.

items, and variables for the Protection Motivation Theory (PMT) framework used in this research are presented in Table 3.

2.4. Hypothesis Development

Past research[126] investigated the relationship between receiving information from diverse sources and the formation of perceptions regarding wildfire risk. The perceived probability of a tsunami occurring significantly correlates with receiving information from experts (local government, private companies) and non-expert sources (social interaction). Consequently, the author proposes the first hypothesis, namely that tsunami mitigation information provided by an authorized source will shape perceptions that a tsunami risk is a real possibility.

H1. The source of information (environmental) significantly affects threat appraisal.

Threat appraisal considerably influences the formation of protection motivation (intention)[127]. Furthermore, threat appraisal plays a pivotal role in determining whether tourists will adopt protective measures when visiting tourist destinations[128]. Individuals who perceive a low risk of being affected by earthquakes and tsunamis are more likely to adopt protective behaviors, such as evacuating at the appropriate time, because they understand the likelihood of such events occurring. Therefore, the author proposes the second hypothesis:

H2. Threat appraisal has a significant effect on evacuation motivation.

The study by Alam, et., al. (2022) [129] corroborates the assertion that perceived threat vulnerability and severity, as part of the threat appraisal process, significantly influence fear in the context of tourist travel behavior. The findings of the study by Zheng (2021)[130] also support

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[126] H. Brenkert-Smith, K. L. Dickinson, P. A. Champ, and N. Flores, (2013). "Social Amplification of Wildfire Risk the Role of Social Interactions and Information Sources," Risk Anal., vol. 33 (5), pp. 800 – 817.

[127] A. Aziz, K. Umer, S. Nazish, and B. Zaidi, (2023). "Maladaptive Perception, Protection Motivation, and Health Protective Behavior: The Application of Protection Motivation Theory in Tourism Industry Amidst the Digital Revolution," pp. 11–22.

[128] J. Wang, B. Liu-Lastres, B. W. Ritchie, and D. J. Mills, (2019). "Travellers' self-protections against health risks: An application of the full Protection Motivation Theory," Ann. Tour. Res., vol. 78, no. June, p. 102743.

[129] S. S. Alam, M. Masukujjaman, A. Omar, Z. Khan, M. Makhbul, and M. H. Ali, (2022). "Protection Motivation and Travel Intention after the COVID-19 Vaccination: Fear and Risk Perception Protection Motivation and Travel Intention after the COVID-19 Vaccination," J. Qual. Assur. Hosp. Tour., vol. 24, pp. 1–27.

[130] D. Zheng, Q. Luo, and B. W. Ritchie, (2021). "Afraid to travel after COVID-19? Self-protection, coping and resilience against pandemic travel fear,' Tour. Manag., vol. 83, no. April 2020, p. 104261,

this conclusion, indicating that when perceived threat severity and vulnerability are higher, the fear of fatality is greater. In light of these findings, the author proposes a third hypothesis:

H3. Threat appraisal has a significant effect on fear of fatality

The results of the survey conducted by Arce, et., al. (2017)[131] indicate that tourists have a heightened awareness of the risks associated with tsunamis. The respondents demonstrated the ability to identify potential tsunami risks and evacuate on time. Based on these findings, the author proposes the fourth hypothesis:

H4a. Experience visiting DMFs will moderate the effect of the source of information and threat appraisal

H4b. No experience visiting DMFs will not moderate the effect of the source of information and threat appraisal

H5a. Experience visiting DMFs will moderate the effect of threat appraisal and evacuation motivation

H5b. No experience visiting DMFs will not moderate the effect of threat appraisal and evacuation motivation

H6a. Experience visiting DMFs will moderate the effect of threat appraisal and fear of fatality.

H6b. No experience visiting DMFs will moderate the effect of threat appraisal and fear of fatality.

[131] R. Arce, O. Motoharu, E. Miguel, and T. Shibayama, (2017). "Risk awareness and intended tsunami evacuation behavior of international tourists in Kamakura City, Japan," Int. J. disaster risk Reduct., Vol. 23, pp. 178-192.

Table 2.2. PMT Framework on the Tourism Industry and Disaster Application

Author	Major Construct	Major Result
Wang, *et., al*, (2018)[132]	IV: Climate change perception; MV: Hypothetical shifts in destination attractiveness, threat appraisal, coping appraisal; DV: Tourists' adaptation intention	Threat appraisal and hypothetical shifts in destination attractiveness emerged as the most influential predictors of adaptation intentions.
Lu, *et., al,* (2018)[133]	IV: Efficacy-related attributes, resource-related attributes, Overcrowding risk perception; MV: Demographic, travel-specific attributes; DV: Precautionary action	In conditions of holiday travel overcrowding risk, efficacy-related attributes of precautionary actions were positively correlated
Fisher, *et., al.,* (2018)[134]	IV: Stimulus; MV: Threat appraisal, Coping appraisal; DV: Handwashing intention	The strongest predictor for handwashing intention was cost in coping appraisal.
Wang, *et., al*. (2019), [135]	IV: Threat appraisal, coping appraisal, maladaptive response; MV: protective intention; DV: protective behavior	Both threat and coping appraisals can enhance travellers' protection motivations, which in turn affect their actual behaviors.
Ruan, *et., al.* (2020[136]	IV: Threat appraisal, coping appraisal, perceived government support; DV: Protective behavior intention	Perceived government support exerted a significant and negative effect.
Alam, *et., al.* (2022)[137]	IV: Threat Appraisal, Copping Appraisal; MV: Fear; DV: Protection Motivation	As hypothesized in the tested results, fear, response efficacy, and self-efficacy are vital predictors of protection motivation.

[132] Wang, Wei-ching, Chung-hsien Lin, Wen-bor Lu, Su-hsin Lee, (2018). 'When Destination Attractiveness Shifts in Response to Climate Change: Tourists' Adaptation Intention in Taiwan Kenting National Park', Current Issues in Tourism, 22(5), pp. 1–26.

[133] Lu, Shanshan, and Jiuchang Wei, (2018). 'Public' s Perceived Overcrowding Risk and Their Adoption of Precautionary Actions: A Study of Holiday Travel in China, Journal of Risk Research, 9877, pp. 1–21.

[134] Fisher, J, Barbara A Almanza, Carl Behnke, Douglas C Nelson, and Jay Neal, (2018). 'International Journal of Hospitality Management Norovirus on Cruise Ships: Motivation for Handwashing?', 75, pp. 10–17

[135] Wang, Jie, Bingjie Liu-Lastres, Brent W. Ritchie, and Deborah J. Mills, (2019), 'Travellers' Self-Protections against Health Risks: An Application of the Full Protection Motivation Theory, Annals of Tourism Research, 78, p. 102743.

[136] Ruan, Wenjia, Sanghoon Kang, and Hakjun Song, (2020). 'Current Issues in Tourism Applying Protection Motivation Theory to Understand International Tourists' Behavioural Intentions under the Threat of Air Pollution: A Case of Beijing, China, Current Issues in Tourism, 23(16), pp. 1–15.

[137] Alam, Syed Shah, Mohammad Masukujjaman, Asiah Omar, Zafir Khan, Mohamed Makhbul, and Mohd Helmi Ali, (2022). 'Protection Motivation and Travel Intention after the COVID-19 Vaccination: Fear and Risk Perception Protection Motivation and Travel Intention after the COVID-19 Vaccination", Journal of Quality Assurance in Hospitality & Tourism, 24(2021), pp. 1–27.

Aziz, *et., al,* (2023)[138]	IV: Knowledge; MV: Threat appraisal, coping appraisal, health behavior; DV: Protection Motivation, travel/destination choice.	Protection motivation intention has no significant effect on health and choice behavior.
Alhemimah, Arej (2023)[139]	IV: Information seeking; MV: subjective norms; DV: Travel intention	COVID-19 involvement positively influences attitudes towards information seeking (Source information).
Ioannidis *et., al.* (2023)[140]	IV: Environmental impacts, place, and community attachment, economic gain, and COVID-19 risk; MV: Social Exchange Theory; DV: Support Yachting Tourism	According to PMT, residents do not change their attitude, and the balance of benefits and costs remains positive.
Babcicky & Seebauer, (2019)[141]	IV: Threat Appraisal, Coping Appraisal; DV: Protective Responses, Non-protective Responses	Threat appraisal has a consistent negative relationship with non-protective responses. For example, lower risk perceptions are associated with greater reliance on public protection, potentially reducing motivation for personal protection.
Aristyavani, (2022)[142]	IV: Threat Appraisal, Coping Appraisal; DV: Protective Responses, Non-protective Responses; MV: Combination of High Threat and Low Coping Appraisal	Coping appraisal (response efficacy and response costs) significantly influences protective responses. response efficacy is the strongest predictor of protective behaviors, especially for low-cost measures (e.g., coordination with neighbors and emergency plans). Fear has a weaker influence, with a positive association with fatalism, but otherwise shows negligible effects

[138] Aziz, Aisha, Khushbakhat Umer, Syeda Nazish, and Batool Zaidi, (2023). 'Maladaptive Perception, Protection Motivation, and Health Protective Behaviour: The Application of Protection Motivation Theory in Tourism Industry Amidst the Digital Revolution', pp. 11–22.

[139] Alhemimah, Arej, (2023). 'Journal of Destination Marketing & Management How COVID-19 Impacts Travel-Health Information Seeking and Tourists' Travel Intentions: A Protection Motivation Theory-Based Model', Journal of Destination Marketing & Management, 27, pp. 1007-1027.

[140] Ioannidis, Stelios, and Maria Doumi, (2023). 'Residents' Perception of Yachting Tourism Amid COVID-19: A PLS-SEM Approach Framed by SET, Revised SET and PMT'. Tourism, Travel, and Hospitality in a Smart and Sustainable World, Springer Proceedings in Business and Economics, pp. 81-98.

[141] Babcicky & Seebauer, (2019). 'Unpacking Protection Motivation Theory: evidence for a separate protective and non-protective route in private flood mitigation behavior'. JOURNAL OF RISK RESEARCH 2019, VOL. 22(12), pp. 1503–1521.

[142] Aristyavani, (2022). 'Persepsi Risiko dan Motivasi Memiliki Asuransi Bencana Alam: Premi Polis Asuransi Banjir / Properti untuk Warga Berisiko Banjir di Wilayah DKI Jakarta'. Jurnal Manajemen dan Usahawan Indonesia, Vol 45, (1), pp. 16-35.

P Bubeck, Botzen, & Aerts (2012)[143]	IV: Risk Perception, Perceived Probability, Perceived Consequences, Coping Appraisal, Experience with Floods, Emotions; DV: Flood Mitigation Behavior; MV: Socioeconomic Factors, Trust in Government, Coping Appraisal	Generally, other factors, such as past flood experiences, emotional responses (like fear), and beliefs about the effectiveness of mitigation measures, are found to be more reliable in explaining mitigation behavior.
Wang, *et., al*, (2019)[144]	IV: Threat Appraisal, Perceived Vulnerability, Perceived Severity, Coping Appraisal, Self-Efficacy, Response Efficacy, Perceived Costs, Perceived Rewards; DV: Protective Behaviors; MV: Intentions to Protect	Both threat appraisal and coping appraisal significantly influence travelers' intentions to take protective actions. Intentions to protect have the strongest predictive power for actual protective behaviors. Maladaptive perceptions negatively influence coping appraisal and do not directly affect intentions or behaviors. Intentions to protect mediate the relationship between threat appraisal, coping appraisal, and actual behaviors.
Babcicky & Seebauer (2017)[145]	IV: Cognitive Social Capital, Socio-demographic Variables, Previous Flood Experience, Risk Zone; DV: Risk Perception, Self-efficacy.	The study found a significant relationship between social capital and its influence on risk perception and self-efficacy. Higher levels of cognitive social capital are associated with better risk perception and self-efficacy regarding flood risks. The study also highlighted that demographic variables and past experiences with flooding play a role in shaping risk perceptions and individual confidence in risk mitigation.
Tasantab, Gajendran, & Maund, (2022)[146]	IV: Flood Experience, Coping Experience, Flood Risk Appraisal; DV: Adaptation Intention; MV: Coping Experience, Adaptation Appraisal	Strong Adaptation Appraisal: Adaptation appraisal has a strong influence on adaptation intention, accounting for approximately 67% of the variation in individual adaptation intentions. The Importance of Coping Experience: Research shows that flood-coping experience influences not only risk perception but also how individuals perceive their capacity to adapt and prevent future risk.

[143] P Bubeck, Botzen, & Aerts, (2012). 'A Review of Risk Perceptions and Other Factors that Influence Flood Mitigation Behavior'. Risk Analysis, Vol. 32, No. 9, pp. 1481-1495.

[144] Wang, Jie, Bingjie Liu-Lastres, Brent W. Ritchie, and Deborah J. Mills, (2019). 'Travellers' Self-Protections against Health Risks: An Application of the Full Protection Motivation Theory', Annals of Tourism Research, Vol. 78, pp. 1027-1043.

[145] Babcicky & Seebauer, (2017). 'The two faces of social capital in private flood mitigation: opposing effects on risk perception, self-efficacy, and coping capacity'. Journal of Risk Research, 2017 Vol. 20 (8), pp. 1017–1037.

[146] Tasantab, Gajendran, & Maund, (2022). 'Expanding protection motivation theory: The role of coping experience in flood risk adaptation intentions in informal settlements. International Journal of Disaster Risk Reduction, Vol. 76, pp. 1020-1030.

Grothmann & Reusswig, (2006)[147]	IV: Threat Appraisal, Coping Appraisal, Non-Protective Responses, Socio-economic variables; DV: Protective Responses; MV: Ownership of home, Coping Appraisal	The socio-psychological model based on PMT explains 26–45% of the variance in protective responses. This is a higher explanatory power compared to the socio-economic model, which explains only 3–35% of the variance.

[147] Grothmann & Reusswig, (2006). 'People at Risk of Flooding: Why Some Residents Take Precautionary Action While Others do not'. Natural Hazards, Vol. 38, pp. 101–120

CHAPTER III

METHODOLOGY

3.1. Research Method: Qualitative and Quantitative Approaches

This study employed a mixed-methods approach, combining both qualitative and quantitative research methods. The first stage involved in-depth interviews with DMF experts, which provided valuable insights into the primary functions of DMF and their contributions to disaster literacy. Although the primary focus of the study is on DMF in the Tohoku region of Japan, Indonesia's DMF practices in Aceh Province were briefly introduced to enrich the contextual understanding. Additionally, despite all empirical analysis and data collection being conducted in Japan, the inclusion of Indonesia's DMF practices serves to illustrate the diversity of cultural and institutional approaches to DMF. A total of 21 respondents participated in the study, representing each sector of the Penta Helix framework, academia, government, community, business, and media, from both Japan and Indonesia (see Table 3.2). The interviews were conducted in different languages, including Bahasa Indonesia and English. Consequently, the questions were translated between English and Indonesian, and all responses were translated into English using a blind translation-back-translation process by two independent, bilingual translators.

The second stage consisted of a survey conducted among a representative sample of Tohoku residents with no experience of the 2011 GEJET. The decision was made to select respondents without direct knowledge of the 2011 GEJET or any other disaster to ensure the validity of evaluating the effectiveness of DMF in enhancing evacuation motivation. This population of residents living along the coastline affected by the 2011 tsunami, but who arrived after the event, is particularly relevant to the trend of international workers who came to Japan after the 2011 tsunami. Thus, their presence reflects a broader demographic trend: Japan's ongoing population decline and labor shortages, especially in disaster-prone rural areas such as Tohoku.

According to the 2023 revision of Japan's population projections by the National Institute of Population and Social Security Research (IPSS), which included all residents living in Japan,

the country's population is expected to decline by approximately 30% by the year 2070[148]. During the same period, individuals aged 65 and older are expected to comprise approximately 40% of the total population. Although the projected total fertility rate is lower than in the 2017 estimates, the rate of population decline is expected to ease slightly due to longer life expectancies and an increase in net migration of foreign nationals. Thus, in response to these challenges, Japan has increasingly relied on foreign labor to sustain its workforce.

As of the end of October 2023, Japan's number of foreign workers reached a record high of 2,048,675, marking an increase of 225,950 workers year-on-year (12.4%) from the previous year. Among these, Vietnamese workers accounted for the largest number at 518,364 (25.3%), followed by Chinese nationals at 397,918 (19.4%) and individuals from the Philippines at 226,846 (11.1%). Notably, Indonesian workers exhibited the highest year-on-year growth rate, increasing by 56.0% from 77,889 to 121,507 workers[149]. Under Japan's "skill system," Indonesian interns participate in 1- to 3-year programs through the Industrial Training Program (ITP) and the Technical Internship Program (TIP), often combined for up to three years. Successful participants who pass a qualification exam can extend their internships to a maximum of five years. The trend of rising Indonesian worker numbers in Japan suggests that the number of Indonesian workers is expected to continue increasing in the coming years. In the Tohoku region specifically, most Indonesian workers are employed in seafood processing factories, which require them to live in coastal areas. Considering this significant increase in population of Indonesian workers and their residential proximity to high-risk zones, this study focuses on understanding the tsunami evacuation motivations of Indonesian workers in Tohoku who did not experience the 2011 Great East Japan Earthquake and Tsunami (GEJET).

This study distributed a survey among 311 Indonesian workers residing in the Tohoku coastal region, an area highly vulnerable to tsunamis. These respondents represent a population at risk, both due to their geographic location and their potential unfamiliarity with Japan's disaster history and evacuation procedures. The sample was drawn from the Facebook group "*Keluarga Tohoku*" (Tohoku Family), which had 1,398 members at the time of the study. The sample size was calculated using the Slovin formula with a 0.05 significance level. An online

[148] For details, please refer to Population Projections for Japan (2023 revision): Summary of Results available online at https://www.ipss.go.jp/pp-zenkoku/e/zenkoku_e2023/pp2023e_PressRelease.pdf (in English) and https://www.ipss.go.jp/pp-zenkoku/j/zenkoku2023/pp_zenkoku2023.asp (in Japanese)

[149] Japan Ministry of Health, Labor, "Summary of 'Employment Status of Foreign Nationals' (as of the end of October 2023). Available online at: https://www.mhlw.go.jp/english/new-info/2023.html

questionnaire was then distributed through the group to ensure broad participation and minimize missing responses.

The survey collected the respondents' demographic data, including their length of stay in Japan, region of origin, gender, prefecture of residence, previous experience of visiting DMFs, experience of natural hazards, and motivation for visiting DMFs. The study adopted a framework that categorized motivation for visiting DMFs into four main groups: physical (relaxation and health benefits), cultural (interest in different cultures and traditions), interpersonal (social interactions and escape from routine), and prestige (self-esteem and self-discovery). The researcher also utilized a crosstabulation analysis to examine the relationship between earthquake experience, DMF visits, and future evacuation motivation.

This study measured reflective constructs with a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The measurement items were based on existing research frameworks and were pre-tested, with items reworded, deleted, and added as necessary, to ensure content validity. The survey was translated between English and Indonesian using a blind translation-back-translation process by two independent bilingual translators. A linguist reviewed both versions to ensure accuracy and contextual relevance.

The scale items for the source of information construct were adapted from previous research[150]. The threat appraisal scale items,[151] fear of fatality items[152], and evacuation motivation items were adapted from past research[153]. Detailed information on the operational table of protection motivation theory (PMT) in this research is shown in Table 4.

The researcher conducted the data analysis using IBM AMOS 28 and SPSS 23 software, and structural equation modelling (SEM) was employed to test the hypotheses. The study

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[150] H. Brenkert-Smith, K. L. Dickinson, P. A. Champ, and N. Flores, (2013). "Social Amplification of Wildfire Risk the Role of Social Interactions and Information Sources," Risk Anal., vol. 33(5), pp. 1-23; M. M. Wood, D. S. Mileti, M. Kano, M. M. Kelley, R. Regan, and L. B. Bourque, (2012). "Communicating Actionable Risk for Terrorism and Other Hazards," Risk Anal., vol. 32(4), pp. 1-15.; R. Lion, R. M. Meertens, and I. Bot, (2002). "Priorities in Information Desire about Unknown Risks," vol. 22(4), pp. 765-776.

[151] I. Aristyavani, (2022). "Persepsi Risiko dan Motivasi Memiliki Asuransi Bencana Alam: Premi Polis Asuransi Banjir / Properti untuk Warga Berisiko Banjir di Wilayah DKI Jakarta," J. Manaj. dan Usahaw. Indones., vol. 45, no. 1, pp. 16–35; P. Babcicky and S. Seebauer, (2019). "Unpacking Protection Motivation Theory: evidence for a separate protective and non-protective route in private flood mitigation behavior," J. Risk Res., vol. 22, no. 12, pp. 1503–1521; C. Richert, K. Erdlenbruch, and C. Figuières, (2017). "The determinants of households' flood mitigation decisions in France - on the possibility of feedback effects from past investments," vol. 131, pp. 342–352.

[152] P. Babcicky and S. Seebauer, (2019). "Unpacking Protection Motivation Theory: evidence for a separate protective and non-protective route in private flood mitigation behavior," J. Risk Res., vol. 22, no. 12, pp. 1503–1521; C. Richert, K. Erdlenbruch, and C. Figuières, (2017). "The determinants of households' flood mitigation decisions in France - on the possibility of feedback effects from past investments," vol. 131, pp. 342–352.

[153] F. Makinoshima, F. Imamura, and Y. Oishi, (2020). "Tsunami evacuation processes based on human behavior in past earthquakes and tsunamis: A literature review," Prog. Disaster Sci., vol. 7, pp. 1001-1013.

utilized covariance-based SEM (CB-SEM) in AMOS, which is suitable for confirming existing theoretical frameworks. SPSS was used for the demographic analysis, descriptive statistics, and cross-tabulation. Validity and reliability tests were also conducted using SPSS. In addition, a multi-group analysis (MGA) was conducted to identify significant differences between groups with and without DMF visit experience, and further validate the study's findings.

3.2. Study Sites in Japan and Indonesia

The Tohoku region of Japan was the primary study site for this research. However, additional insights from Aceh Province, Indonesia, were also incorporated to enrich the analysis (see Figure 3.1). In Tohoku, the 3.11 *Densho* Road comprises a network of DMFs that function as platforms for various initiatives and projects related to disaster preparedness and education, aiming to convey the lessons learned from the 2011 GEJET.

Many disaster sites and exhibition facilities serve as resources for understanding the details of the disaster. These facilities may hold historical or academic significance, conveying facts about the disaster and the lessons learned from the event. By recognizing these facilities as "disaster memorials," the Disaster Memorial Network Council aims to establish a network by creating maps and guideposts (see Figure 3.2). DMF facilities contribute to the public's understanding of disaster prevention and preparedness, enabling them to grasp the terrifying nature of disasters. DMFs can be divided into three categories: Category 1 focuses on disaster-related content, Category 2 includes facilities from Category 1 but adds features such as easy access, including public transport and parking, and Category 3 builds upon the previous categories by enhancing visitors' understanding through guides or storytelling activities (Table 3.1).

Table 3.1. Category Definitions for DMFs in the Tohoku Region

Category	Explanation
Category 1	Facilities to which one or more of the following criteria are applicable. • Establishments designed for understanding the lessons learned from the disaster. • Establishments that contribute to understanding disaster prevention and readiness. • Establishments aimed at grasping the terrifying nature of disasters and the powerful aspects of nature. • Establishments possessing historical or academic significance related to disasters. • Other facilities that convey the facts of the disaster and the lessons drawn from it.
Category 2	Category 2 includes facilities from Category 1 that are easily accessible to the public, such as those with convenient access to public transportation or a paid or free parking lot in the vicinity.
Category 3	Includes facilities from Category 2 that particularly consider visitors' understanding, such as providing tour guides or storytelling activities.

Source: 3.11 *Densho* Road Website (retrieved: March 2024)

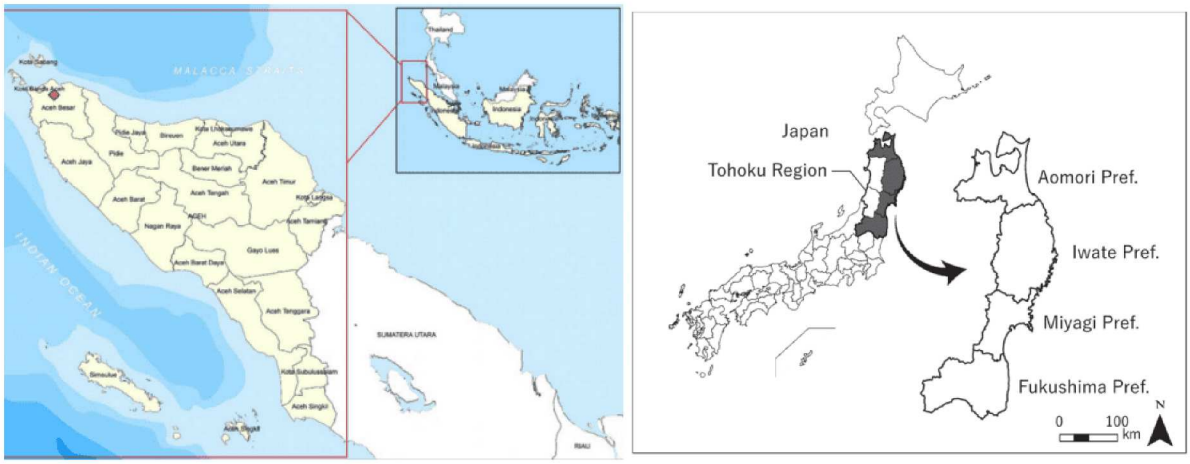

Figure 3.1. Map of Aceh Province, Indonesia (left) and Tohoku Region, Japan (right)
Source: Batubara, *et., al.* (2022)[154] and Nishisaka (2022)[155]

Figure 3.2. 3.11 DMF in Iwate and Miyagi Prefectures (Source: www.311densho.or.jp)[156]

[154] F. M. Nur, A. S. Batubara, N. Fadli, S. Rizal, M. N. Siti-Azizah & Z. A.Muchlisin (2022) Diversity, distribution, and conservation status of Betta fish in Aceh waters, Indonesia, The European Zoological Journal, 89:1, 135-144, DOI:10.1080/24750263.2022.2029587, p. 137.
[155] R Nishisaka. (2022). Evaluating the Accessibility of Networks in Earthquake Memorial Facilities for the Great East Japan Earthquake IOP Conf.: Earth Environ. Sci. 1092 012020.
[156] 3.11 Densho Road Program (2019), for details, please refer to Population Projections for Japan (2023 revision): Summary of Results available online at https://www.311densho.or.jp/en/denshoroad/index.html

This study focuses on two areas in Tohoku, the Iwate and Miyagi Prefectures in Japan, as they fall under Category 3 of the 3.11 *Densho* Road classification. According to the 3.11 *Densho* Road website, there are 47 such locations.

The author selected the visited locations based on specific criteria, such as those most frequently visited by tourists, those with the highest educational value, or those that represent the distinctive characteristics of the category. A total of 9 (nine) DMFs were visited by the author in Tohoku, such as the Iwate Tsunami Memorial Museum, Ishinomaki NEWSée, Sendai 3/11 Memorial Community Center, Otsuchi Cultural Community Center *"Oshacchi"*, Kamaishi Memorial Park, Kadonowaki School Ruins, Monument *Yuriage*, and Ruins of Kesennuma City Memorial Museum. Additionally, five DMFs in Aceh, Indonesia, were visited: the Aceh Tsunami Memorial Museum, Museum PLTD *Apung*, Boat on the Roof, the mass grave of tsunami victims, and the "*Nusa*" Tourism Village. Out of the 20 interview respondents, 11 (eleven) were from Tohoku and 9 (nine) were from Aceh. Field visits and interviews were conducted at DMFs in Japan and Indonesia between February 2024 and February 2025. Table 3.2 shows the detailed distribution of respondents, including one expert representative from each role in the Penta helix model.

3.3. Research Framework

This study employed a mixed-methods approach, as illustrated in Figure 3.3. This research framework integrates qualitative and quantitative methods to comprehensively analyze the role of DMF in strengthening protective motivation toward disasters. The research process is divided into three main steps:

Step 1: Literature Review and Preliminary Analysis

The first step of this research process was to conduct a comprehensive literature review to gather information on DMFs. The review focused on studies that examine DMFs related to two major events: the 2011 Great East Japan Earthquake and the 2004 Indian Ocean Earthquake Disaster. In this phase, the author analyzed past research on DMFs and identified gaps in existing research that have yet to be addressed, thereby forming the foundation for this study. The outcome of this step defines the research gap, which was then explored through fieldwork and interviews at the selected study sites.

Step 2: Qualitative Evaluation of DMFs in Japan with additional information from Indonesia

In the second step, the researcher employed a qualitative method using the Pentahelix model to evaluate the function and purpose of DMF in Japan, with additional information from Indonesia. The Penta helix model involves collaborating with DMF experts from five key stakeholders: the Government, who are responsible for disaster policies and regulations; Academia, who provide scientific insights and educational resources; the Business sector, which contributes to tourism development and management; the Community, that represents local perspectives and experiences; and the Media, who disseminate information and raise public awareness. The evaluation aims to assess how these museums contribute to enhancing disaster literacy, preserving collective memory, and promoting preparedness behaviors. The results from this phase served as the qualitative foundation for the subsequent quantitative analysis.

Step 3: Quantitative Analysis to Examine the Impact of the DMF on Protective Motivation Theory (PMT)

In the third step, the Protective Motivation Theory (PMT) framework was applied and tested through a quantitative method using Structural Equation Modelling (SEM) with the AMOS software. This stage aimed to measure the impact of DMF on evacuation motivational behavior by introducing the DMF variable as a moderating effect in the PMT model. A multi-group analysis was then conducted to compare two groups: the first group being individuals with disaster tourism experience, and the second group being individuals without disaster tourism experience. This multigroup analysis (MGA) aimed to identify the effect of DMF in reinforcing the effects of source information, threat appraisal, fear, and evacuation motivation. The final goal is to derive several novel insights that can contribute to both practical applications and theory.

Overall, this study first introduces a suitable framework to explain how residents in tsunami-prone areas adopt protective behavior by utilizing disaster memorial facilities (DMFs) as a key variable through the concept of Narrative-Based Disaster Learning. In other words, the study highlights the use of stories, including fear-based, miracle-based, or success stories, as a primary tool for conveying disaster-related messages and shaping both affective and practical knowledge, thereby contributing to the development of disaster literacy. The inclusion of DMFs in this study is supported by a rigorous preliminary analysis based on expert interviews with practitioners in DMF.

Second, this study proposes an extended version of the current Protection Motivation Theory (PMT) framework. The extended framework was applied to a new and relatively underexplored context, such as disaster protective behavior. It illustrates how non-fear-based messages, such as those grounded in the Disaster Memory Framework, can effectively enhance protective motivation within the field of disaster preparedness research.

Table 3.2. Respondents for the Qualitative, Comparative Study between Japan and Indonesia

Country	Role	Facility/Institution	Position	Informant	Reason
Japan	Academician	Iwate Tsunami Memorial Museum	Manager	Informant 1	Gain expert insights on disaster education and tourism.
	Community		On-site tour guide	Informant 2	To learn how guides convey disaster history to visitors and explore their personal experiences with tourists.
	Community		On-site tour guide	Informant 3	
	Business	Rikuzentakata City	Private Tour Guide	Informant 4	
Indonesia	Academician	Aceh Tsunami Memorial Museum	Museum Director	Informant 5	Gain expert insights on disaster education and tourism.
	Government	Regional Tourism Ministry	Head of Business Development Division	Informant 6	To understand tourism policies and strategies.
	Community	Association of Tour Guides Indonesia	Vice chairman	Informant 7	To learn how guides convey disaster history to visitors and explore their personal experiences with tourists.
	Community	Aceh Tsunami Memorial Museum	On-site tour guide	Informant 8	
Japan	Community	Iwate Tsunami Memorial Museum	On-site tour guide	Informant 9	
Indonesia	Community	Baiturrahim Mosque in Ulee Lheue	Mosque guardian	Informant 10	To understand the mosque's role as a disaster memorial site.
Japan	Media	Ishinomaki NEWSée	Journalist	Informant 11	To explore how the media covers disaster tourism and memorials.
	Community	Sendai 3/11 Memorial Community Center	On-site tour guide	Informant 12	To gain insights into how the center educates visitors.
	Business	Otsuchi Cultural Community Center "Oshacchi"	Private Tour Guide	Informant 13	To understand the role of private tours in cultural remembrance.
		Kamaishi Memorial Park			
	Academician	Kadonowaki School Ruins	Museum Director	Informant 14	To learn about the site's educational and memorial functions.
		Monument Yuriage,	Researcher	Informant 15	
	Government	Ruins of Kesennuma City Memorial Museum	City worker	Informant 16	To understand the government's role in disaster memorial preservation.
Indonesia	Community	Museum PLTD *Apung*	On-site tour guide	Informant 17	To explore its symbolic role in tsunami remembrance.
		Boot on the Roof		Informant 18	
		Mass grave tsunami victim		Informant 19	To understand the site's role in commemorating victims
	Business	Village Tourism "Nusa"	Business owner	Informant 20	To examine how local businesses contribute to disaster tourism.
	Media	Aceh Woman Journalist	Journalist	Informant 21	To explore how the media covers disaster tourism and memorials.
Total			**21 Respondents**		

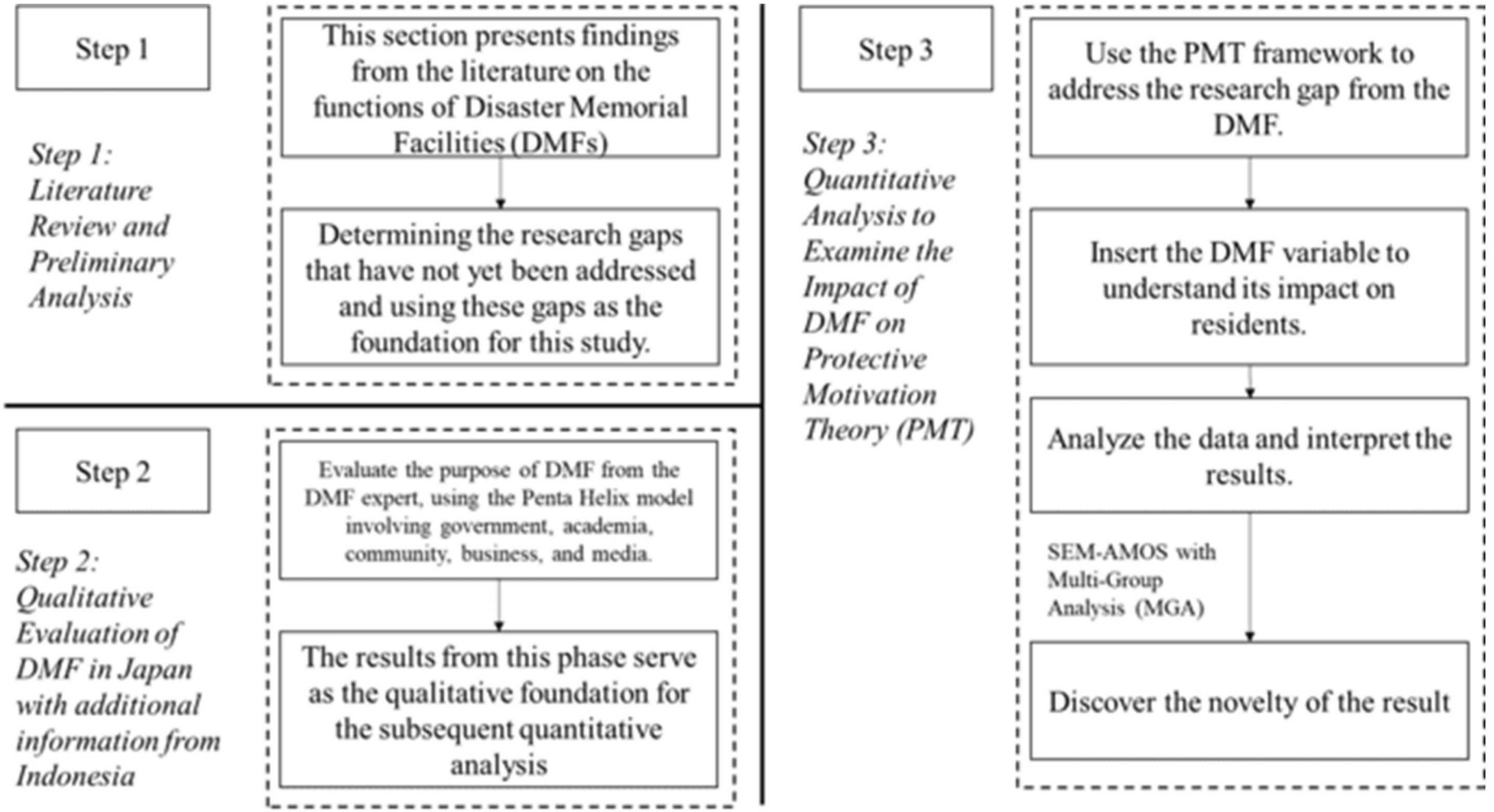

Figure 3.3. Research Framework

Table. 3.3. Protection Motivation Theory (PMT) Application in this Research

Antecedent	Variable	Definition	Items	Source
Sources of Information (environmental) (X1)	Information density	Information sources that provide information specifically tailored to the local context.	SI1. I often get information about earthquake and tsunami disaster mitigation from companies.	157
			S12. I often get tsunami emergency instructions from the local government.	
			SI3. I often seek information about the risks or consequences of the tsunami from local people.	
			How much do you know that anyone (Japanese / International people), not including yourself, who has:	
	Information Observed	Observation of others engaged in the process of preparation.	SI4. Having emergency plans when a tsunami comes (emergency evacuation routes, shelters).	
			SI5. Prepare emergency equipment to deal with an upcoming tsunami (Flashlights, Thermal blankets, warm clothing, non-perishable food, a first-aid kit, etc.).	
Threat Appraisal (Z1)	Perceived Vulnerability	Perceptions regarding the potential or possibility that respondents will be affected by the dangers of earthquakes and tsunamis.	**What is the chance that a major earthquake and tsunami will...?**	158
			TA1. History from the past.	
			TA2. Due to the current residence area.	
			TA3. Frequent earthquakes happened.	
	Perceived Severity	Perceptions regarding the dangers of earthquakes and tsunamis.	**How do you assess the seriousness of the consequences of the reference tsunami for your society?**	
			TA4. Roads/infrastructure will be badly damaged.	
			TA5. Your house/building will be destroyed or badly damaged.	
			TA6. Many fatalities will occur.	
			TA7. The social disruption occurred.	
Fear Arousal (Z2)	Caused by a disaster	Fear of fatality	FF1. I feel afraid of the risk of tsunamis in my region area.	159
			FF2. I feel afraid that the risk of tsunamis will devastate your residence.	
			FF3. I feel afraid I'll be too late to avoid the tsunami if I don't get to high ground quickly after the earthquake.	
	Early Period	Ground shaking	EM1. I want to evacuate to high ground early, as soon as possible after the earthquake occurs.	

[157] J. Wang, B. Liu-Lastres, B. W. Ritchie, and D. J. Mills, (2019). "Travellers' self-protections against health risks: An application of the full Protection Motivation Theory," Ann. Tour. Res., vol. 78 (6), p. 102743; W. Wang et al., (2018). "When destination attractiveness shifts in response to climate change tourists' adaptation intention in Taiwan Kenting National Park," Curr. Issues Tour., pp. 1–26; V. Basolo, L. J. Steinberg, R. J. Burby, and J. Levine, (2009). "The Effects of Confidence in Government and Information on Perceived and Actual Preparedness for Disasters," Environ. Behav., vol. 41, no. 3, pp. 338–364.

[158] I. Aristyavani, (2022). "Persepsi Risiko dan Motivasi Memiliki Asuransi Bencana Alam: Premi Polis Asuransi Banjir / Properti untuk Warga Berisiko Banjir di Wilayah DKI Jakarta," J. Manaj. dan Usahaw. Indones., vol. 45, no. 1, pp. 16–35; P. Babcicky and S. Seebauer, (2019). "Unpacking Protection Motivation Theory: evidence for a separate protective and non-protective route in private flood mitigation behavior," J. Risk Res., vol. 22, no. 12, pp. 1503–1521; C. Richert, K. Erdlenbruch, and C. Figuières, (2017). "The determinants of households' flood mitigation decisions in France - on the possibility of feedback effects from past investments," vol. 131, pp. 342–352.

[159] P. Babcicky and S. Seebauer, (2019). "Unpacking Protection Motivation Theory: evidence for a separate protective and non-protective route in private flood mitigation behavior," J. Risk Res., vol. 22, no. 12, pp. 1503–1521; C. Richert, K. Erdlenbruch, and C. Figuières, (2017). "The determinants of households' flood mitigation decisions in France - on the possibility of feedback effects from past investments," vol. 131, pp. 342–352.

Evacuation Motivation (Y) The level of a person's motivation to take action to avoid the danger of a tsunami.	Mid. Period	Additional update warning	EM2. I want to evacuate in the middle of the period, but I will wait for other people to evacuate before following.	160
	Late Period	Sea surface change	EM3. I want to evacuate when I see the sea level rising and hear big waves and roaring sounds.	

[160] F. Makinoshima, F. Imamura, and Y. Oishi, (2020). "Tsunami evacuation processes based on human behaviour in past earthquakes and tsunamis: A literature review," Prog. Disaster Sci., vol. 7, p. 100113.

CHAPTER IV

THE PURPOSE OF DISASTER MEMORIAL FACILITIES (DMFS) FROM AN EXPERT PERSPECTIVE

Chapter 4 presents the findings from the expert study on Disaster Memorial Facilities (DMF) in Japan and includes additional insights from Indonesia to enrich the discussion. The primary aim of this chapter is to explore the underlying objectives behind the establishment of DMFs. In the initial phase of this research, in-depth interviews were conducted with DMF experts to investigate the motivations and purposes associated with these facilities.

Although the overall focus of this study is centered on DMF practices in the Tohoku region of Japan, this chapter also incorporates a complementary case study from Indonesia, specifically from Aceh Province. The inclusion of the Indonesian case is intended to broaden the understanding of DMFs by highlighting diverse cultural and institutional perspectives.

Moreover, despite all empirical data and detailed analyses being conducted in Japan, the Indonesian example serves to contextualize the topic further and emphasize the global relevance of DMFs in post-disaster recovery and memory-making. A total of 21 respondents participated in this study, representing the five sectors of the Penta Helix framework, including academia, government, community, business, and media, from both Japan and Indonesia.

4.1. The Megathrust Earthquake and Tsunami in the Tohoku Region of Japan

Japan is situated within the Pacific Ring of Fire, making it vulnerable to a range of natural hazards, including earthquakes and tsunamis[161]. The country's high likelihood of experiencing natural disasters is due to the intense geological processes in the region from the convergence of multiple tectonic plates. One of the principal challenges facing Japan is the recurring risk of similar disasters in the future[162]. There is a possibility that the same tragedy will be repeated if the next generation lacks the requisite survival skills to cope with a potential tsunami. Table 4.1 illustrates the number of reported earthquakes and tsunami events in the Tohoku Region of Japan and Aceh Province of Indonesia from 1961 to 2011.

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[161] Gerster & Maly, (2022). 'Japan's Disaster Memorial Museums and Framing 3.11: Othering the Fukushima Daiichi nuclear disaster in cultural memory'. CONTEMPORARY JAPAN 2022, VOL. 34(2), pp. 187–209.

[162] Tanioka, Ruff, & Satake, (1997). 'What controls the lateral variation of large earthquake occurrence along the Japan Trench?'. The Island Arc, Vol. 6, pp. 261-266.

Table 4.1. History of Earthquakes and Tsunamis in the Tohoku Region of Japan and Aceh Province in Indonesia

Place	Date	Disaster Name	Earthquake Scale	Number of Victims
Tohoku Region	Jul 13, 869	869 Jogan	M 8,3	1,000
	Dec 2, 1611	1611 Keicho Oshu	M 8,1	3,500
	Jun 15, 1896	1896 Meiji Sanriku	M 8,2	22,000
	Mar 3, 1933	1933 Showa Sanriku	M 8,1	3,000
	May 22, 1960	1960 Chilean	Mw 9,5	142
	Mar 11, 2011	Great East Japan	Mw 9,0	22,252
Aceh Province	1907	Earthquake and tsunami	Mw 7.6	400
	2004	Indian Ocean	Mw 9.1	160,000

Source: Iwate Tsunami Memorial Museum, taken by the Author (2024)

Indonesia, also located in the Ring of Fire, has experienced a major earthquake that triggered a tsunami in Aceh Province. However, in the case of Aceh, large tsunamis tend to occur at longer intervals compared to the Tohoku region. Aceh experienced a major tsunami in 1907, followed by another in 2004, with an interval of 97 years[163]. In contrast, the Tohoku region experiences a higher frequency of tsunamis, with time intervals between major tsunamis being 51 (Great East Japan and the 1960 Chilean Tsunamis) and 78 years (Great East Japan and the 1933 Showa Sanriku Tsunamis)[164] (Table 4.1).

Alexander (2018)[165] considers the 2004 Indian Ocean Earthquake and Tsunami (IOET) and the 2011 Great East Japan Earthquake and Tsunami (GEJET) as examples of M5 or Level 5 Catastrophes, with overwhelmingly complex consequences.

4.1.1. The 2011 Great East Japan Earthquake and Tsunami

In Japan, the 2011 GEJET, with a magnitude of 9.0, occurred at 14:46 Japan Standard Time on 11 March 2011. Soon afterward, a giant tsunami struck the Pacific coast of eastern Japan, causing severe damage[166]. The official death toll reached 19,689 people, with 2,563 people missing[167]. The earthquake and tsunami also triggered a nuclear disaster at the

[163] Kongko, Karima, Tiwi, & Sudiana, (2018). 'Description of the 1907 Aceh tsunami: impact (height, inundation and the travel time) on Cities of Banda Aceh, Meulaboh and Gunung Sitoli, Indonesia'. Journal of Physics: Conference Series, pp. 1-7. Indriati Retno Palupi et al 2023 J. Phys.: Conf. Ser. 2498 012021, p. 7.

[164] Hashima & Sato, (2017). 'A megathrust earthquake cycle model for Northeast Japan: bridging the mismatch between geological uplift and geodetic subsidence'. Earth, Planets and Space, vol. 69 (23), pp. 1-10.

[165] Alexander, (2018). 'A magnitude scale for cascading disasters'. International Journal of Disaster Risk Reduction, vol. 30, pp. 180–185.

[166] Itaba. (2018). Earth, Planets and Space. Vol 70, no. 124 https://doi.org/10.1186/s40623-018-0894-5, p. 3.

[167] Fire and Disaster Management Agency Disaster Response Headquarters reports Regarding the 2011 Tohoku Pacific Ocean Earthquake (Great East Japan Earthquake) on Friday, March 8, 2019, 8:00 AM can be accessed at https://www.fdma.go.jp/disaster/higashinihon/items/159.pdf (Japanese).

Fukushima Daiichi nuclear power plant in Fukushima Prefecture. The disaster had profound consequences for Japan and the rest of the world.

Furthermore, the Tohoku Region, particularly the Sanriku Area (situated within the boundaries of Iwate and Miyagi Prefecture) in Japan, had previously been regarded as "the most advanced area in the world for tsunami countermeasures" before the occurrence of the 2011 GEJET. A variety of disaster prevention facilities have been developed, including seawalls, bay entrance seawalls, estuary floodgates, and other infrastructure. The region has also applied substantial tsunami disaster prevention strategies, accompanied by the regular implementation of evacuation drills and disaster prevention education[168].

However, an analysis of the 2011 GEJET disaster reveals that the 'hard' disaster prevention measures were ineffective in preventing the loss of nearly 22,252 lives in the Tohoku Region[169]. Nevertheless, it is challenging to ensure the safety of coastal populations and to rely exclusively on structural mitigation measures when facing a Level 2 tsunami [170]. The Japanese Coastal Engineering Community posits that a level 2 tsunami has a recurrence period of once every hundreds or thousands of years, with a tsunami wave height exceeding 10 meters, potentially reaching 20-30 meters. Previous research has confirmed that the 2011 GEJET tsunami was of level 2 severity, as the waves reached a height of 30 meters in some areas[171]. Thus, evacuation is the most effective method of saving lives in a disaster of this nature, particularly in vulnerable households.

Remarkably, almost all the 2,900 elementary and junior high school students managed to survive this disaster due to timely evacuation[172]. The media attributed this extraordinary outcome not to mere chance but to a disaster preparedness program initiated in 2005[173]. One of the extensively taught aspects of this program was the concept of "tsunami-*tendenko*," which emphasized the crucial rule of action: "*Flee to higher ground for your safety, without waiting*

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[168] Tanaka, (2023). 'The 2011 Great East Japan Earthquake and Tsunami: The highest casualties and largest reconstruction funds — Characteristics of major disasters and future challenges in developed countries. Japanese Journal of Sociology, Vol. 32 (1), pp. 7-24.

[169] Fire and Disaster Management Agency Disaster Prevention Headquarters (2019), can be accessed at this link: https://www.fdma.go.jp/disaster/higashinihon/items/159.pdf (In Japanese)

[170] Takabatake, Shibayama, Esteban, Ishii, & Hamano, (2017). 'Simulated tsunami evacuation behavior of local residents and visitors in Kamakura, Japan'. International Journal of Disaster Risk Reduction, vol, 23, pp. 1–14.

[171] Martini & Buda, (2019). 'Analysing affects and emotions in tourist e-mail interviews: a case in post-disaster Tohoku, Japan'. CURRENT ISSUES IN TOURISM, Vol. 22 (19), pp. 1-12.

[172] Kodama, (2015). 'Tsunami-*tendenko* and morality in disasters. Journal of Medical Ethics, May 2015, Vol. 41 (5), pp. 361-363.

[173] UNDRR, "Sendai Framework for Disaster Risk Reduction 2015-2030." Sendai, 2015. https://www.unisdr.org/files/43291_sendaiframeworkfordrren.pdf.

for others or even your own family when a tsunami strikes." The term "*tendenko*" is a regional expression meaning "separate and escape"[174]. The effective evacuation of the Iwate Kamaishi school students led to the widespread dissemination of the story of the "Kamaishi Miracle," which acknowledged and commended the tsunami-*tendenko* approach[175]. The success story of a family that adopted tsunami-*tendenko,* compared to the other evacuation concepts, was also exhibited in the Iwate Tsunami Memorial Museum[176].

4.1.2. The 2004 Indian Ocean Earthquake and Tsunami

The largest earthquake and tsunami in Indonesia's history occurred on 26 December 2004, when a magnitude 9.1–9.3 earthquake struck off Sumatra's northwest coast, triggering the 2004 Indian Ocean Earthquake and Tsunami – IOET[177]. The tsunami caused extensive devastation to coastlines around the Indian Ocean, including those of Aceh, North Sumatra, and other countries in South Asia and East Africa[178]. In Aceh, Indonesia, many people were unfamiliar with the term "tsunami," which led them to remain in the coastal area and not immediately evacuate after the megathrust earthquake occurred. In some areas, such as Banda Aceh, Pidie, and Sabang, residents even ran toward the sea to collect stranded fish as the water receded. Moments later, the ocean surged back at speeds comparable to a Boeing aircraft's maximum velocity (750–900 km/h), leaving them no chance to escape. The height of the tsunami that struck the province varied, reaching 15 meters at Lhoknga Beach, Aceh Besar, and up to 34.5 meters at Ulee Lheue Beach. The waves pushed 5 to 8 kilometers inland, resulting in 236,116 deaths, with nearly 74,000 people reported missing[179].

However, the situation was different for the residents of Simeulue Island, located only 60 to 70 km from the earthquake's epicenter, compared to Banda Aceh's distance of 250 to 260 km. Although Simeulue Island is close to the epicenter of the earthquake, only seven people died (mostly babies and older adults who could not run away), 22 people were seriously hurt, and 106 people had minor injuries because of the earthquake[180]. The island's residents were

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[174] (Kodama, 2015), ibid, p. 361

[175] Katada & Kanai, (2016). 'The School Education to Improve the Disaster Response Capacity: A Case of "Kamaishi Miracle"'. Journal of Disaster Research Vol.11 No.5, pp. 845-856.

[176] Personal observation of Iwate Tsunami Memorial Museum in February 2024.

[177] Satake, (2014). 'Advances in earthquake and tsunami sciences and disaster risk reduction since the 2004 Indian Ocean tsunami'. Geoscience Letters, Vol. 1 (15)., pp. 1-13.

[178] Fehr et al., (2004). op. cit., p. 50

[179] Dinamika, Ibrahim, (2006). 'Tsunami Aceh getarkan dunia'. Harian Serambi Indonesia: Banda Aceh., p. 56.

[180] Kelman, Spence, Palmer, Petal, & Saito, (2008). op. cit., p. 111.

able to evacuate to higher ground immediately after the big earthquake due to the local wisdom passed down through generations by their ancestors. This traditional knowledge, known as *Smong*, is conveyed in the Simeulue language with the phrase, "*Mali linon, fesong smong*" (If there is an earthquake, it will be followed by a tsunami).

Following the devastating earthquake that struck Aceh Province in 1907, the *Smong* story has become an integral part of the daily lives of people on Simeulue Island, shared through various social interactions[181]. The transmission of this narrative across generations ensured that the *Simeuluean* population knew what actions to take during the 2004 Indian Ocean tsunami.

Past research has found that *Smong,* as Indigenous knowledge, has been effectively utilized nowadays for disaster risk education and preparedness, especially in Simeulue Island[182]. The *Smong* story was transmitted around the Simeuleu islanders through various traditional means, including *'Buai-buai*' (a traditional song), a poem (*Nandong*), and daily conversations within families or communities[183] as well as *Nafi-nafi* (Simeuluean traditional storytelling about past events)[184]. *Nafi-nafi* would be shared with children after they finished reciting the Quran. These narratives would focus on *Simeuluean* ancestors or important historical events[185]. Unfortunately, this local wisdom cannot be adopted in other parts of Aceh, such as the capital city of Aceh province, as they use a different local language from the *Simeuluean.*

Natural disasters typically disrupt social structures and cause physical damage and loss of life. They have a profound impact on societies, prompting them to adopt new behavioral norms and strategies to cope with the aftermath. Natural disasters repeat and are likely to accelerate and become even bigger than before[186]. Past researchers have categorized disasters according to specific phenomena. For example, natural forces include floods, hurricanes, tsunamis, and earthquakes, and man-made events include terrorism, ethnic conflict, war,

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[181] Rahman, Sakurai, & Munadi, (2018). 'The analysis of the development of the *Smong* story on the 1907 and 2004 Indian Ocean tsunamis in strengthening the Simeulue island community's resilience'. International Journal of Disaster Risk Reduction 29 (2018), pp. 13–23.

[182] Shaw, Uy, & Baumwoll, (2008). 'THE VALUE OF INDIGENOUS KNOWLEDGE FOR DISASTER RISK REDUCTION: A Unique Assessment Tool for by'. Published Master Thesis from Webster University, Vienna, p. 14

[183] Gadeng, Maryani, & Rohmat, (2018). 'The Value of Local Wisdom *Smong* in Tsunami Disaster Mitigation in Simeulue Regency, Aceh Province'. 1st UPI International Geography Seminar, pp. 1-6.

[184] Alfi Rahman, Aiko Sakurai, and Khairul Munadi, (2018). 'The Analysis of the Development of the *Smong* Story on the 1907 and 2004 Indian Ocean Tsunamis in Strengthening the Simeulue Island Community's Resilience', International Journal of Disaster Risk Reduction, pp. 13–23.

[185] *Quran* (also spelled Koran) is the holy book of Islam.

[186] Oliver-Smith, (1996). 'Anthropological Research on Hazards and Disasters'. Annual Review of Anthropology, Vol. 25, pp. 303-328.

genocide, economic breakdown, and technological failure[187]. However, natural disasters are often more readily forgotten than man-made disasters (heuristic bias)[188]. Many people have limited opportunities to reflect on these events[189]. Nevertheless, according to Silberberg[190], tourism represents an alternative strategy for conserving past events and protecting them from memory degradation. Disaster Memorial Facilities (DMF) enable people to respect the power of nature, draw valuable lessons, and preserve the memory of traumatic natural disasters, which many would prefer to forget, through tourism.

4.2. The Development of Disaster Memorial Facilities (DMF) after Disasters Occurred

After the occurrence of natural disasters, Japan and Indonesia built memorial sites to help people reflect on what happened. These sites display lessons from past disasters and teach the public about resilience and how to prepare for future ones[191]. Disaster memorial facilities also offer visitors a chance to learn and understand more deeply, especially for those who have never experienced a disaster themselves[192]. Unlike human sources, whose recollections may change over time, museums remain stable and serve as lasting spaces to preserve and share history[193].

Previous research has suggested that DMFs are important sites for those studying dark tourism[194]. Visiting sites where negative events have occurred and are associated with tragedy and loss of life is related to the theory of dark tourism[195]. The concept of dark tourism theory

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[187] Rodríguez, et., al. (2018). 'Handbook of Disaster Research'. 2nd Edition. Springer., p. 57.

[188] Affect heuristic bias refers to the mental shortcut where people make decisions based on their emotions or feelings rather than a rational analysis of the information at hand.

[189] Loewenstein, Hsee, Weber, & Welch, (2001), 'Risk as Feelings'. Psychological Bulletin, Vol. 127 (2), pp. 267–286.

[190] Silberberg, (1995). 'Cultural tourism and business opportunities for museums and heritage sites.'. Tourism Management. Vol. 16 (5), pp. 361-365.

[191] Meutia, Rosyidie, Zulkaidi, & Maryati, (2021). 'DINAMIKA PENGANGGURAN TERDIDIK: TANTANGAN MENUJU BONUS DEMOGRAFI DI INDONESIA'. Journal of Economic and Economic Education Vol.3 (2), pp. 124 – 136; Gerster et al., (2021). 'Out of the Dark: The Challenges of Branding Post-Disaster Tourism Ten Years after the Great East Japan Earthquake'. EATSJ - Euro-Asia Tourism Studies Journal, Vol. 2, p. 1-27.

[192] Biran & Buda, (2018). 'Unravelling Fear of Death Motives in Dark Tourism'. P. R. Stone et al. (eds.), The Palgrave Handbook of Dark Tourism Studies, pp. 515-532.

[193] Julia Gerster and Elizabeth Maly, (2022). 'Japan's Disaster Memorial Museums and Framing 3.11: Othering the Fukushima Daiichi Nuclear Disaster in Cultural Memory', Contemporary Japan, 34.2, pp. 187–209.

[194] Hanafiah et al., (2021). 'Exploring Aceh Tsunami Museum Visitors' Motivation, Experience, and Emotional Reaction'. The Museum Journal 2021, Vol. 64 (4), pp. 613–631.

[195] Biran, Liu, Li, & Eichhorn (2014). 'Consuming post-disaster destinations: The case of Sichuan, China'. Annals of Tourism Research, Vol. 47, pp. 1–17; Ridzuan, Hannis, and others. (2019). 'THE POTENTIALS OF DARK TOURISM IN BANDA ACEH, INDONESIA'. 4th International Conference on Rebuilding Place, pp. 700-707; Martini and Minca. (2021). 'Affective Dark Tourism Encounters: Rikuzentakata after the 2011 Great East Japan', Social & Cultural Geography, 22.1, 33–57; Y. Zhang. (2021), 'Unpacking Visitors' Experiences at Dark Tourism Sites of Natural Disasters'. Tourism Management Perspectives, Vol. 40, pp. 1–18; Y. Zhang, A. Coghlan, and K. Knox. (2018). 'Understanding the Depersonalization Process in Post-Disaster Sites', Tourism Recreation Research, 43 (4), pp. 497–510.

was first introduced by Lennon and Foley[196] about a museum dedicated to a man-made disaster as a case study. Over time, this theory has been built upon by other researchers[197].

The concept of dark tourism in Japan was initially introduced by a Japanese researcher, Omori[198], in a brief essay published in the *Tourism Research Journal of the Japanese Association for Tourism Research*. Shinjiro questioned the appropriateness of using dark tourism in the context of DMF in Japan. In response, Ide[199] defended that the English word "dark" does not have the strong negative nuance that the Japanese word "dark" implies. In addition, the healing effect of international solidarity (sharing grief) is also a great help to disaster victims. Moreover, Ide asserted that it is the responsibility of tourism researchers to educate the public and residents to correct the negative image associated with dark tourism. Avoiding the term would be a missed opportunity for researchers to reshape their societal perception. Tarlow[200] also defines dark tourism as visiting locations where significant tragedies or deaths of historical importance have taken place and which still influence our lives. However, the discussion of DMF concerning dark tourism is beyond the scope of this research.

Developing DMFs has facilitated the recovery process for individuals, enhanced community resilience, and cultivated positive experiences[201]. This powerful tool enables countries to provide disaster education while empowering locals to share their experiences and educate other residents[202]. The retelling of the history and preservation of debris from the tsunami disaster in a DMF were undertaken for several reasons, including guilt reduction, as a

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[196] Foley & Lennon, (1996). 'JFK and dark tourism: A fascination with assassination'. International Journal of Heritage Studies, Vol. 2 (4), pp. 198-211.

[197] Biran, Poria, and Oren. (2011). 'Sought Experiences at (Dark) Heritage Sites', Annals of Tourism Research, Vol. 38(3), p. 820; Podoshen, et., al., (2018). 'Dark Tourism, Abjection, and Blood: A Festival Context', Tourism Management, Vol. 64, pp. 346–56; Wight and Lennon, (2004). 'Towards an Understanding of Visitor Perceptions of "Dark" Sites. The Case of the Imperial War Museum of the North, Journal of Hospitality & Tourism Research, 2(2), pp. 105–22; Walby and Piché, (2011). 'Punishment & Society Penal History Museums the Polysemy Penal History Museums', Punishment & Society, vol. 13(4), pp. 451–472; Strange and Kempa, (2003). 'Shades of Dark Tourism: Alcatraz and Robben Island', Annals of Tourism Research, 30 (2), pp. 386–405; Romano, Werblow, and Williams. (2022). 'Evolving Conceptualizations of Peace Education in Hiroshima, Japan', Vol. 10 (2), pp. 1–24.

[198] Omori, (2012). 'A Proposal for 'Reconstruction Tourism' or 'Every Time We Pray' - Regarding the appropriateness of using the term 'Dark Tourism'. The Japan Association for Tourism Research's Tourism Research Journal. Vol. 24 (1), p. 35.

[199] Ide. (2012). ダークツーリズム」という名称を使う必要性. Retrieved at: https://researchmap.jp/blogs/blog_entries/view/77623/7d8a5f3497d1bca5d7cbcf6fc150ee28?frame_id=504692 (Japanese) on February 2025.

[200] Tarlow, (2005). 'Dark tourism the appealing 'dark' side of tourism and more'. In the book of 'Niche Tourism: Contemporary issues, trends, and Cases, ed. Novelli. Elsevier Butterworth-Heinemann., pp. 47-58.

[201] Biran, et., al., (2014). 'Consuming Post-Disaster Destinations: The Case of Sichuan, China', Annals of Tourism Research, Vol. 47, pp. 1–17; Prayag, Buda, and Jordan, (2020). 'Mortality Salience and Meaning in Life for Residents Visiting Dark Tourism Sites', Journal of Sustainable Tourism, Vol 29 (9), pp.1508–1528.

[202] Bowman & Pezzullo, (2010).' What's so 'Dark' about 'Dark Tourism': Death, Tours, and Performance Michael'. Tourist Studies, vol. 9(3), pp. 187–202.

form of respect for the victims, and for potential economic benefits[203]. Content and exhibitions in DMFs typically focus on presenting educational materials, honoring the victims, and raising awareness about natural disasters. Additionally, the tour guides in DMFs are recognized as contributors to the development of 'historical empathy'[204].

DMFs are a new phenomenon that has emerged in Indonesia and Japan after megathrust earthquakes and tsunamis have affected these countries. Past research has argued that this type of attraction is dedicated to commemorating the devastation left by the tsunami. However, this chapter will focus on gaining a deeper understanding of the exhibitions displayed in DMF sites in Tohoku and Aceh. The Tohoku region has developed 306 DMF sites, including memorial museums, parks, monuments, learning centers, community centers, aquariums, and castles, under the initiative called 3.11 *Densho* Road. Meanwhile, in Aceh, Indonesia, DMFs have not been developed as extensively as in Japan. The DMFs in Aceh consist mainly of memorial museums, monuments, mosques, and mass graves. Since local customs in Aceh require that deceased bodies be buried in the soil, after the disaster, all bodies were collected and buried together in large mass graves. Today, victims' families can visit these sites to pray for their loved ones. As a result, these mass graves have also become sites of commemoration for the victims, attracting many tourists who come to express their empathy and offer prayers.

4.3. Evaluating Tsunami Memorial Museums as Disaster Memorial Facilities

The author conducted a fieldwork study of tsunami memorial museums in Indonesia and Japan to gain a deeper understanding of the exhibitions displayed in DMF sites. Museum Tsunami Aceh (MTA) in Indonesia and Iwate Tsunami Memorial Museum (ITMM) in Japan are the most prominent examples of successful establishments of significant sites following the 2011 Great East Japan Earthquake (GEJET) and the 2004 Indian Ocean Earthquake and Tsunami (IOET). The establishment of tsunami memorial museums is a relatively new phenomenon in Asia that combines the functions of commemoration and disaster risk reduction (DRR)[205]. Indonesia and Japan are the only countries that have created such museums on this scale.

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[203] Petrevska, Krakover, & Collins-kreiner, (2017). 'Evaluation of an Urban Tourism Destination'. Tourism Geographies, vol. 15 (2), pp. 233-249.

[204] Tucker, (2016). 'Empathy and tourism: Limits and possibilities.' Annals of Tourism Research, vol. 57, pp. 31–43.

[205] Zhang & Izumi, (2024). 'The Role of Disaster Memorial Facilities in Disaster Risk Reduction: Experiences from the Tohoku Region in Japan'. Sustainability, vol. 16 (8), pp. 1-27.

The first exhibition at the ITMM is called Tracing History (歴史をひもとく). As visitors enter the first zone, the main lighting is dimmed, and only modest sources of light are used. Zone 1, Tracing History, focuses on the following information:

> "*The history of the earthquake and tsunami that hit Iwate and how people living along the coast prepared for tsunamis (Informant 1)".*

The first zone of the ITMM explored the tsunami disaster from both a historical and scientific perspective. The museum aims to review the information, methods, and social practices that have evolved over centuries. This zone also seeks to consider new ways of living in harmony with nature despite the dangers associated with living in coastal areas of the Tohoku region.

Meanwhile, in the MTA, the first exhibition is called Tsunami Alley (*Lorong Tsunami*). This alley aims to recreate the atmosphere of the time of the tsunami. The museum sets the frame for visitors in this exhibition to be silent and feel the fear of the tsunami. The alley also played various sound effects, including the roar of water, crying, and Islamic prayers, such as *Lailahaillallah,* which 'means nothing deserves to be worshipped except God Almighty.'

The next exhibition at ITMM is called Zone 2, "Learning the facts" (事実を知る), and the respondents' explanation of Zone 2 is as follows:

> *"(This section) introduces the strength and terror of tsunamis through videos of the tsunami, photographs of the affected areas and victims, and the voices of the victims" (Informant 2).*

In Zone 2, visitors can observe the power of GEJET 2011, demonstrated through the displayed artifacts, photographic documentation of the affected sites, first-hand accounts, and memories of those who experienced the tragedy. One of the items damaged by the disaster is a fire engine in Tanohata Village (see figure in the appendix, p.134), which is made of high-quality metals, illustrating the destructive power of the disaster. The damaged part of the *Kesen Ohashi* Bridge is also on display. The bridge section was swept away by the tsunami and split into two parts (see figure in the appendix, p.134). These exhibitions effectively illustrate the

profound impact of the tsunami disaster[206]. Zone 2 of the ITMM also shows a short film, which is repeated and lasts approximately seven minutes. The short film presents a video of the 2011 GEJET disaster, incorporating scientific data, images, and footage of the earthquake and tsunami.

The next exhibition at the MTA was the Memorial Hall (*Ruang Kenangan*). After walking through the 30-meter-long Tsunami Alley, visitors enter the Memorial Hall. This room has 26 monitors to symbolize the date when the tsunami hit Aceh. Each monitor displays images and photos of the victims and the sites affected by the tsunami. The visitors are made to feel as if they are in the middle of the ocean when they enter the room, symbolized by glass walls that represent the seabed, monitors as rocks in the water, and the dim lights on the roof of the room symbolizes light from above the surface of the water entering the seabed (informant 5).

One of the monitors in the Memorial Hall showed the image of the *Baiturrahman* Mosque (see figure in the appendix, p.135), which stood firm even though the surrounding area was destroyed. This mosque is one of the miracle stories told by many national and international mass media (Informant 6). The tsunami came and destroyed surrounding buildings, but the tsunami water only passed along the side of the mosque without even entering the mosque courtyard (informant 7). Eyewitnesses reported that all individuals who had taken shelter in the mosque were unaffected by the tsunami and survived (informant 8).

A mosque (*Masjid*) is a place of worship for Muslims. The word "mosque" comes from the Arabic word *masjid* (مَسْجِد, which means "place of prostration"). Mosques are not only used for prayers but also serve as centers for religious, social, and educational activities within the Muslim community. Three mosques have become popular DMFs in Aceh because they survived the tsunami while the surrounding buildings were destroyed. These mosques include Masjid Raya Baiturrahman in Banda Aceh, Masjid Baiturahim in Ulee Lheuee, and *Masjid* Rahmatullah in Lampuuk. These mosques have become symbols of the strength and resilience of the Acehnese people in the face of disaster.

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[206] Halabi, S. El, Hayashi, M., Jasper, J., Kamio, A., Al-hamati, A. A. S., Sumabe, A. K., & Yingchao, W. (2022). TOHOKU STUDY TOUR REPORT, (November), p. 5. Retrieved from https://www.icu.ac.jp/en/news/images/20230202GroupReport_TohokuStudyTour.pdf

Mosques hold significant value in post-tsunami Aceh[207]. One resident mentioned, "*Look at Ulee Lheue Mosque… it remained standing during the tsunami, while the nearby buildings were destroyed*" (Informant 8). Many residents cited both practical and spiritual reasons for seeking refuge in mosques during emergencies. One resident explained, "*I'm not sure if the building is strong enough. It may collapse if it is God's will, but I will go to the mosque first, along with others. We can recite the Quran there*" (Informant 17). Another resident shared, "*God knows everything, and those inside the mosque may be spared, as many mosques survived the disaster*" (Informant 18).

The next exhibition at ITMM was called Zone 3: Learning Lessons" (教訓を学ぶ).,

The respondents' explanation of Zone 3 is as follows:

> *"(This zone) shows visitors how to protect their lives and the efforts they can take to save the lives of others based on the actions taken during the Great East Japan Earthquake and Tsunami (Informant 4)."*

Information on saving lives, protecting lives, evacuating to live, and building a future was also displayed in this zone. The best lesson for the next generation in Japan to escape a disaster such as a tsunami is to start with tsunami *tendenko* (津波てんでんこ) (Informant 2).

The concept of "tsunami *tendenko*" encourages a swift evacuation to higher ground without waiting for others, even one's family members[208]. In the local Japanese dialect, "*tendenko*" signifies an "every person for themselves" approach (Informant 2). This principle emphasizes that rapid evacuation to higher ground, without concern for others, is the only way to escape the catastrophic effects of a devastating wave[209]. This concept is shown in the ITMM due to the lessons learned from GEJET 2011, where the main reason for the high death toll was the failure of residents to evacuate (Informant 4).

Meanwhile, the third exhibition at the MTA is the prayer chamber (*Ruang Sumur Doa*). The Prayer Chamber is a 30-metre-high, dimly lit cylindrical room with around 2,000 names

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[207] Mccaughey, Mundir, Daly, Mahdi, & Patt, (2017). 'Trust and distrust of tsunami vertical evacuation buildings: Extending protection motivation theory to examine choices under the social influence'. International Journal of Disaster Risk Reduction, vol. 24 (4), pp. 462–473.
[208] Kodama, S. (2015). Tsunami-tendenko and morality in disasters. *J. Med. Ethics*, *41*(5), pp. 361–363. https://doi.org/10.1136/medethics-2012-100813

[209] Yamori, (2012). "Revisiting the Concept of 'Tsunami *Tendenko*'. Journal of Japanese Natural Disaster Science 31 (1), pp: 35-46. Accessed 3 July, 2025. http://www.jsnds.org/contents/shizen_saigai_back_number/ssk_31_1_35.pdf.

of tsunami victims written on each wall. This room is philosophized as a mass grave of the tsunami victims, and visitors who enter this room are encouraged to pray for the victims according to their respective religions and beliefs (Informant 6). This room also depicts man's relationship with God (*Hablumminallah*), symbolized by the calligraphy of ﷲ (*Allah*) printed on the chimney, with the light pointing upwards, and verses from the Al-Qur'an. These motifs remind the visitors that all human beings will return to their Creator (God Almighty) (Informant 7).

Finally, the last zone of ITMM is called Zone 4, "Reconstruction Together" (復興を共に進める), where the respondent's explanation of Zone 4 is as follows:

> *"It shows how the disaster area has been reconstructed due to the support from the Japanese government and other countries (Informant 1)."*

This zone shows the appreciation for the tremendous support to Japan from within and outside Japan after the 2011 Great East Japan Earthquake and Tsunami occurred (Informant 2). The display in Zone 4 implies the collaborative effort and determination of a community to move forward and rebuild after a tsunami disaster (Informant 3). It signifies that, rather than being deterred by the tsunami's destruction, those affected are committed to working together to recover, rehabilitate, and rebuild their lives and environment, demonstrating a spirit of resilience, cooperation, and a common goal to rebuild after a devastating event.

The final exhibition at MTA is the Space of Confusion, which leads to the Bridge of Hope (*Jembatan Harapan*). The philosophy of these two exhibitions shows the confusion and despair of the people of Aceh when they were struck by the tsunami in 2004, which included confusion about finding missing relatives and about the loss of property and objects (Informant 8). After that, visitors move on to the natural light that symbolizes the hope of the people of Aceh (Informant 7). In the Bridge of Hope exhibition, visitors enter a studio set up like a cinema with big screens to watch short films of about 10 minutes, which display sensitive content like the victim's bodies (Informant 6). The documentary begins by explaining that the 2004 IOET happened because of the Indo-Australian and Eurasian tectonic plates shifting. The event is recorded by several international institutions as the deadliest tsunami in history[210].

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[210] Nazaruddin, D. A., & Sulaiman, R. (2013). Introduction to "TSUNAMI TOURISM": Notes from Aceh, Indonesia. *International Journal of Sciences*, *2*(03), pp. 71–81. Retrieved from https://www.ijsciences.com/pub/article/160%0Ahttps://doi.org/%0Ahttps://www.ijsciences.com/pub/pdf/V2-201303-16.pdf

It is estimated that around 167,000 people died because of the 2004 tsunami in Aceh. This high number of casualties is because at the time, most of Aceh's residents were unaware that a tsunami could occur following a strong earthquake (Informant 6). As a result, many people did not evacuate the area immediately and instead stayed on the coast, collecting fish from the beach as the water receded (Informant 7). However, this generation could learn from how the people of *Siemeulue* Island dealt with the 2004 IOET tsunami. Although this island is closer to the epicenter and thousands of houses were destroyed, only seven deaths were recorded there (Informant 8). One reason why *Siemeulue* islanders were spared from the 2004 IOET tsunami is that its residents retained local wisdom about the 1907 tsunami (Informant 6). The local wisdom disseminated among the people of Simeulue Island is called *Smong*. *Smong* is shared through *manafi-nafi* (folklore), *mananga-nanga* (child lullaby), and *nandong* (humming), which are introduced to all ranges of life[211]. If the ITMM has 'tsunami *tendenko*', the MTA has '*smong*' as local wisdom for disaster preparedness.

4.3.1. Summary of Evaluating Tsunami Memorial Museums as DMFs

Both the ITMM and MTA tsunami memorial museums are associated with death, suffering, disaster, and tragic events, presenting threat-based messages in the first zone of the museum. However, the exhibitions also provided meaningful, knowledge-based information as visitors progress through the museum. The tragic events are related to the high death toll caused by technological failure[212], the normalcy bias[213] in Japan, and the lack of tsunami education and warning systems in Indonesia (Informant 7). These factors have also been identified as the primary reasons for establishing the tsunami memorial museum.[214]. Therefore, technology alone is not enough, as public awareness and preparedness must also be enhanced to ensure a more responsive reaction to early disaster warnings. There is also a need to integrate local knowledge and scientific insights into disaster mitigation strategies. This information is presented in the exhibitions, which offer a rich blend of scientific explanations and historical accounts detailing the causes, impacts, and lessons from previous earthquakes and tsunamis.

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[211] A. N. Gadeng, E. Maryani, and D. Rohmat, (2018). 'The Value of Local Wisdom *Smong* in Tsunami Disaster Mitigation in Simeulue Regency, Aceh Province', IOP Conference Series: Earth and Environmental Science, vol. 145 (1), p. 3.

[212] Koshimura, Hayashi, & Gokon, (2013). 'Lessons from the 2011 Tohoku Earthquake Tsunami Disaster'. Journal of Disaster Research Vol.8 (4) pp. 549-560.; Ozaki, (2012). 'JMA's Tsunami Warning for the 2011 Great Tohoku Earthquake and Tsunami Warning Improvement Plan'. Journal of Disaster Research Vol.7, pp. 439-445.

[213] Tanaka, (2023), 'The 2011 Great East Japan Earthquake and Tsunami: The Highest Casualties and Largest Reconstruction Funds — Characteristics of Major Disasters and Future Challenges in Developed Countries', Japanese Journal of Sociology, vol. 32 (1), pp. 7–24.

[214] Gerster, Boret, and Shibayama, (2021). 'Out of the Dark: The Challenges of Branding Post-Disaster Tourism Ten Years after the Great East Japan Earthquake', Euro-Asia Tourism Studies Journal, vol. 2, pp. 1–27.

Furthermore, the MTA highlights a strong narrative of devotion and faith, conveyed through the religious teachings in the displays. A notable example is the so-called Miracle Mosque, which remained standing despite the destruction of the surrounding buildings. The author also visited this mosque to investigate why it withstood the disaster. The mosque's caretaker explained that scientists from Malaysia, specializing in engineering, had conducted tests on its structure. Their findings concluded that, from a scientific perspective, it was difficult to logically explain how such a building could withstand high-speed tsunami waves (Informant 10). Thus, in addition to promoting disaster awareness, the Tsunami Museum in Aceh also encourages visitors to strengthen their faith in God. The underlying message is that in times of disaster, preparedness alone is not enough; faith in God is also essential for survival.

On the other hand, the narrative presented by the Tsunami Museum in Iwate promotes disaster awareness. It highlights extensive government initiatives and achievements in Sendai and Tohoku, as said by the *Kataribe* (Informant 9). These exhibits publicly showcase the government's numerous achievements, particularly the "Operation Comb" strategy, a major initiative to clear and reopen roads across the Tohoku region, starting from the railway lines. The government executed this operation swiftly and widely publicized it, emphasizing their efficiency and leadership rather than focusing on the lessons learned from the disaster.

Nevertheless, both narratives, when viewed positively, offer valuable insights. The Aceh Museum highlights the importance of faith for its predominantly Muslim population, while the Japanese approach demonstrates effective leadership in disaster response. As a developed country frequently affected by natural disasters, Japan continues to learn and improve its disaster management strategies for the welfare of its people.

However, education is one of the main activities of a museum, along with conservation, research, and display of museum objects[215]. Therefore, the disaster education provided aims to improve the visitors' disaster literacy. Disaster literacy is the ability of individuals, groups, or communities to understand, evaluate, and use disaster-related information to reduce risk, prepare, and respond effectively[216].

Both the MTA and ITMM offered similar educational programs, where the exhibition begins with the story of the earthquake and tsunami. The story of the tragedy is told, followed by a scientific explanation of why the disaster can occur. The main educational message in the

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[215] UNESCO, (2012), op. cit., p. 19.

[216] Amini, Helsa, Bachri, & Yosritzal, (2024). 'Disaster Literacy and Mitigation Education: Global Trend and Future Directions for Developing Disaster Mitigation-based Science Learning Model'. Migration Letters Volume: 21 (4), pp. 466-494.

memorial museum is what lessons can be learned from the disaster. The lesson is divided into two parts: first, people can die because of a failed evacuation; second, people can be saved because they evacuated in time, according to local wisdom.

This chapter revealed the similarities and differences between MTA and ITMM. Both museums attract visitors by depicting the tragic events of the tsunamis (the 2004 IOET or the 2011 GEJET) while emphasizing local wisdom, the MTA emphasizes '*Smong*' and the ITMM focuses on 'tsunami *tendenko*' as tools for disaster education and risk reduction. Both museums promote emotional narration through storytelling, using survivors' experiences, audio-visual materials, and personal artifacts to create emotional engagement that strengthens disaster literacy and increases the potential for preparedness and mitigation to leave a lasting impression.

However, there are differences in their approach. The MTA incorporates Islamic beliefs and spiritual elements such as prayers and the symbolism of the *Baiturrahman* Mosque, combining spirituality with memorialization to evoke strong emotional responses. In contrast, the ITMM takes a secular and scientific approach, requiring additional spaces such as *Takatamatsubara* Park for activities such as paying respects to the victims. The ITMM also uses *kataribe* (storytellers), often survivors, to share their personal experiences, while the MTA relies more on exhibits and multimedia storytelling, as survivor-led tours are less common.

4.4. Monuments, Disaster Ruin Museums, Community Centers, and Mass Graves as DMFs

In addition to the Tsunami Memorial Museum, which the author considers to have comprehensive information and a well-developed infrastructure, there are other types of DMFs with their own unique stories to tell. One of these other types of DMFs is the *Ishinomaki NEWSée* facility established by the *Ishinomaki* Newspaper Company, a local media company in *Ishinomaki*. The *Ishinomaki* Newspaper Company had been operating for 99 years before the 3.11 disaster and continued to provide information to the public despite its office being destroyed by the tsunami. From a media perspective, the Ishinomaki NEWSée museum's primary objective is to document and educate the public about the vital role of journalism in disaster situations, particularly how the media adapts to deliver accurate information even under emergency conditions (Informant 11). The museum also serves as a historical archive that presents the events of 3.11 through media documentation, including handwritten newspapers that were created after the tsunami. False information can worsen conditions after

a disaster. Therefore, the media is responsible for ensuring that the information disseminated is accurate and reliable (Informant 12).

In contrast, although the 2004 Indian Ocean tsunami also resulted in massive loss and trauma to Aceh, the local media played a limited role in documenting, preserving, and communicating the disaster's lessons in a sustained and educational way. Unlike in Ishinomaki, where the local media actively contributed to documenting the disaster and raising public awareness, such media-driven initiatives are largely absent in Banda Aceh. As one informant noted, "*There is a ceremonial event once a year. For example, every 26 December, a tsunami commemoration event is held. After praying, we would do dhikr*[217] *together and then listen to a sermon. But the question is how this can be integrated into the education curriculum. It seems like Banda Aceh still doesn't have anything like that.*" (Informant 21). This observation highlights the tendency in Aceh to approach remembrance spiritually and symbolically, rather than as a sustained educational strategy. Although annual rituals serve an important role in honoring those lost, they are not always accompanied by mechanisms for knowledge transmission, disaster preparedness, or critical reflection. The absence of localized disaster education within formal curricula, combined with the lack of specific regulations such as a regional *Kanun* [218] for disaster risk reduction, it indicates a missed opportunity to institutionalize memory as a tool for future safety and resilience.

Other examples of DMFs are the Sendai 3/11 Memorial Community Center and the Otsuchi Cultural Community Center "Oshacchi". Each center was created for the community to come together after the disaster. However, there appears to be a difference in function between the Sendai 3/11 Memorial Community Center and the Otsuchi Cultural Community Center. The Otsuchi Cultural Community Center became active after the 3.11 disaster, bringing together people from different generations. It provides a space for events, meetings, and activities such as sewing, which naturally encourage people to talk about the disaster. Many residents find it easier to talk during familiar activities than in formal therapy sessions provided by the government. Talking is healing, but coming to terms with such a huge loss is still overwhelming (Informant 13). This group has been running for over 10 years, providing

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[217] *Dhikr* (also spelled *zikir* or *zikr*) is an Islamic devotional practice that involves the repetition of phrases or names of God, often silently or aloud, as a form of spiritual remembrance and mindfulness of Allah. Schimmel, A. (1975). *Mystical Dimensions of Islam*. Chapel Hill: University of North Carolina Press, p. 171.

[218] Kanun is a regional regulation specific to the province of Aceh in Indonesia, grounded in Islamic law (*sharia*). Fitri, R. (2020). The implementation of Islamic Qanun law in the modern Aceh society. Conference: 1st Raden Intan International Conference on Muslim Societies and Social Sciences (RIICMuSSS 2019), p. 196

support through shared activities. Some sell their handicrafts, while others engage in simple pastimes such as playing games to socialize.

Meanwhile, the Sendai 3/11 Memorial Community Center serves as a place to display pictures and videos of survivors. The center has a large whiteboard where visitors can leave their comments. Hanabuchi-san is a *kataribe* who is always present at the center, welcoming visitors with her stories. As a volunteer, she is responsible for helping injured survivors and older adults right after the disaster occurred. She believes that her survival was not only lucky, but there was some purpose behind it. The trauma she experienced was so deep that she was unable to go to the beach for 10 years after the disaster (Informant 12). However, she decided to carry on and honor those who lost their lives by staying alive. When she was offered the opportunity to become a *Kataribe,* she realized that returning to the community and sharing stories could help minimize the guilt she felt for surviving the disaster (Informant 12). This explanation shows that the role of the community in supporting survivors, who are burdened with trauma and grief, is more crucial than any other form of support.

Another example is with Kamaishi City. The city used to conduct disaster prevention drills regularly. However, due to a decline in community members participating in these drills, the local government changed the evacuation site from a hill to an emergency building to boost participation. However, instead of evacuating to the correct hill when a real tsunami occurred, many people used the emergency building, which then eliminated the essence of the disaster drill. Now, people commemorate those who died in the drill area at the Kamaishi Memorial Park (Informant 13). In addition, there is also a high wall that shows how high the tsunami reached in that area (See Figure in Appendix, p. 135). The wall shows visitors that the emergency building was not high enough compared to the tsunami's height.

Disaster memorials are also a form of DMF. Their purpose is to remind us of the dead and preserve collective memory through an active social effort (Informant 15). For example, at the Yuriage Memorial monument, parents who do not want others to forget their children who died in the disaster express their grief through the monument. Some memorials even include workshops for children to help them process their emotions by creating drawings of their homes before and after the tsunami, with some specifically honoring the spirits of the deceased (Informant 15). They help families and communities remember loved ones and provide a place for communal mourning and sharing.

Jizo (地蔵), a Buddhist memorial statue, is important in Japanese society and is often associated with the grieving process as it is believed to be a guardian deity for children. Many people who have lost loved ones visit these memorials and leave small tokens or messages to show their respect. These memorials are often maintained by the local community, not just religious groups, and have become part of the wider cultural tradition. However, despite their intended permanence, some memorials, such as the *Yuriage* memorial, have been moved three times (Informant 15). Overall, memorials promote remembrance, socialization, and the transmission of memories, ensuring that the events of the disaster are not forgotten by society (Informant 18).

Besides memorial monuments that aim to honor the victims of disasters, both countries also have similar post-disaster sites, where disaster ruins are preserved, such as the *Kadonowaki* Elementary School in *Ishinomaki* City and the ruins at the *Kesennuma* City Memorial Museum, which was previously a high school. In Indonesia, there is also the large PLTD *Apung* ship, which was swept away by the tsunami into the city. The ship weighs 2,600 tons, measures 63 meters in length, and spans 1,900 square meters. It was dragged approximately 3 to 5 kilometers from its original location at *Ulee Lheue* Port, Banda Aceh, to *Punge* Blang Cut Village, Banda Aceh, as well as the "Boat on the Roof," a ship that was stranded on a house and left in place with compensation provided by the government to ensure its preservation.

These types of sites help maintain the collective memory of the disasters that occurred. At *Kadonowaki* Elementary School, visitors can learn about the disasters that struck the city, including the earthquake, tsunami, and massive fire caused by a kerosene heater. The black waterline on the building marks the tsunami's height at 1.8 meters above floor level. Meanwhile, the *Kadonowak*i Ruin Museum serves as an example of a successful evacuation site, as all evacuees managed to survive. The evacuation was possible because the school was connected to a nearby hill, providing an escape route. However, a 1.5-meter gap between the school building and the hill made it difficult for some people to cross. Younger individuals could jump across, while others struggled. Therefore, they placed non-slip boards and blankets over the gap to allow people to cross safely (Informant 14).

Moreover, in *Ishinomaki* City, there is also another ruined school with a more tragic story, namely the Okawa Elementary School. After the earthquake, the teachers took too long to decide on evacuation, debating whether to stay in the building or move to higher ground (Informant 14). Instead of climbing the hill behind the school, they decided to cross the river,

which was a fatal mistake. Before they could reach safety, the tsunami arrived, claiming the lives of 70 children. Both the stories of failed and successful evacuations must be preserved to allow people to see the remains of the schools and learn from their history.

Meanwhile, the story about the Boat on the Roof involves the evacuation process that saved people from this village from the tsunami, leading them to this boat (See Figure in Appendix, p. 136). While many residents were trapped in their houses on the second floor, suddenly, a neighbor shouted, "*Come out… come out… the ship is coming.*" As there was a small terrace, like a balcony, on the second floor (Informant 18), they opened the door and said, "*Alhamdulillah, the aid ship has arrived.*" This ship was washed away by the tsunami. However, people believed God sent them this ship to save them. Then, people get on the ship one by one.

The boat on the roof gives us an important lesson. Before the tsunami, people lived their normal lives. In just a moment, everything was gone. It reminds us that we cannot take anything with us when we die, except our prayers and good deeds. God will not ask how much wealth we had or how many children, but whether we prayed and remembered Him. It is fine to work and seek wealth, but worship is what we will bring with us after death. This world is only temporary, but the afterlife is certain (Informant 18).

4.3.5. Summary of Monuments, Disaster Ruin Museums, Community Centers, and Mass Graves as DMFs

Other than museums, sites such as disaster ruins museums serve as powerful platforms for preserving collective memory. By allowing visitors to physically encounter the spaces where the disaster unfolded, these sites evoke emotional proximity, foster empathy, and promote disaster literacy. Meanwhile, monuments, community centers, and mass grave sites provide support for individuals and communal healing, while also serving to commemorate the souls of the victims.

In Japan, sites like the *Ishinomaki NEWSée* Museum highlight the media's critical role in providing accurate information during crises. At the same time, community centers such as the Sendai 3/11 Memorial and *Otsuchi "Oshacchi"* offer survivors spaces for shared activities, aiding their emotional recovery. The *Kamaishi* Memorial Park and preserved ruins like *Kadonowaki* Elementary School commemorate both successful and failed evacuations, offering valuable lessons on disaster preparedness. Similarly, in Indonesia, the PLTD *Apung* Museum and Boat on the Roof symbolize the tsunami's devastating power and the survivors' resilience. The Boat on the Roof carries a spiritual message, as villagers believed it was

divinely sent to save them, encouraging visitors to reflect on the impermanence of life. Meanwhile, mass graves and community-based sites like the "Nusa" Tourism Village honor victims and promote disaster awareness. Together, these sites transform tragedy into educational experiences, fostering remembrance, resilience, and preparedness for future disasters.

4.4. DMFs as a Tool for Disaster Literacy

The idea of establishing DMFs in Japan and Indonesia did not emerge suddenly. Historically, transmitting information and knowledge as a warning for future generations has always been a practice conducted by our ancestors. For example, in *Ōtsuchi* City, the author found two monuments commemorating the 1933 Showa Sanriku Tsunami and the 1896 Meiji Sanriku Tsunami (see appendix, pp. 213–214).

The *Kataribe* in Outsuchi said, "*We have had this monument like this throughout the coastline, and not many people knew. They don't pay attention to it. It's also sad that we can't read this, because it's old Japanese (a monument of the 1896 Meiji Sanriku Tsunami). The characters are very different from the ones we use now. We don't use that kanji anymore. But the message is*:

"*After the earthquake, watch out for a tsunami.*"
"If a tsunami is coming, evacuate to the higher ground."
"Don't build houses in the lower dangerous zones."

The message has been repeated over the years, but without *kataribe*, and education, the tragedy might be repeated (Informant 13).

The *Kataribe* play a critical role in explaining the warnings inscribed on the monuments, especially since not many people can read them. They help maintain the transmission of disaster literacy among local communities who have lived in earthquake- and tsunami-prone areas for generations. In addition to monuments, people in the Tohoku region have also recorded detailed information about past earthquakes. For example, the author found historical archives at the Iwate Tsunami Memorial Museum, shown in Picture 4.6. The archive provides detailed information, including the exact time of the earthquake and tsunami, the magnitude, and the disaster's impacts, such as casualties and other damages (detailed explanations are found in Appendix 211).

However, based on the author's findings, the transmission of disaster literacy by the ancestors in Aceh Province differs from that in the Tohoku region. Around 100 to 1,000 years ago, Aceh Province was the first region where an Islamic state was established under the Samudra Pasai Kingdom. This historical background explains why Aceh remains a special region on the island of Sumatra, Indonesia. As a Special Region, Aceh has its own regulations, which local authorities can establish without having to follow the national laws of the Republic of Indonesia entirely. These regulations are based on Islamic law. For example, in Aceh, punishments such as public caning are enforced for crimes like consuming alcohol. This regulation is not applied in other parts of Indonesia, only in Aceh. Additionally, only *Sharia* banks are allowed to operate in Aceh, meaning conventional banks do not exist in the region.

Based on this brief historical background, the archives discovered by the author revealed that the ancestors in Aceh used *Jawi* (Malay written in Arabic script) to record information. However, not all members of the current generation can read it; only those who have studied in Islamic boarding schools (*pesantren*) or have specifically learned the language.

The warnings left by ancestors in Aceh Province often appear to be based on superstition. For example, a manuscript states that if an earthquake occurs during Duha time in the month of *Dzulqa'dah*, a great disaster will follow, bringing powerful seawater and causing many deaths. Both *Dzulqa'dah* and Duha are terms commonly used in Islam. Interestingly, the earthquake on 26 December 2004 coincided with the 14th of *Dzulqa'dah* 1425 in the Islamic (Hijri) calendar, making this manuscript particularly intriguing for researchers in manuscript and historical studies (see appendix, pp. 214–220).

These manuscripts can be found in several locations, including the Ali Hasjmy Museum and Library and the PEDIR Historical Museum. According to experts in Islamic cultural history at the PEDIR Museum, 100 years ago, many elders relied on these manuscripts because their communities were in earthquake-prone areas. When an earthquake occurred, they would refer to the manuscript to determine the Islamic month and prayer time in which the event took place. The manuscript records six Islamic prayer times as time markers: *Subuh* (dawn, before sunrise), *Duha* (morning, before noon), *Zuhur* (midday), *Asar* (afternoon), *Maghrib* (evening, after sunset), and *Isya* (night). This practice reflects how local communities integrated religious timekeeping with disaster awareness.

In conclusion, each generation has its own way of transmitting disaster literacy to future generations, as they understand that disasters such as earthquakes and tsunamis can recur over

time. The transmission of disaster literacy helps future generations to be better prepared and more aware of potential risks. The author also argues that the large-scale development of DMFs in the Tohoku Region and Aceh Province serves as a modern way for this generation to pass on disaster literacy to the next.

4.4. Summary of Chapter 4

This chapter explored the objectives behind the development of Disaster Memorial Facilities (DMF) from the perspective of various experts. This study applied the Penta Helix Model, which involves five key stakeholder groups as respondents, and found that each group holds a distinct perspective on the core functions of DMFs. This chapter also identified the overarching purpose behind the establishment of DMFs.

The author argues that Disaster Memorial Facilities (DMF) focuses on disaster education by explaining the risks of delayed evacuation, the differences between evacuating to a high building and evacuating to higher ground, such as a hill, and the overall importance of timely evacuation. Such facilities also incorporate emotional stories, impactful pictures, and preserved disaster ruins to enhance the visitors' learning experience.

This study's findings also highlighted a new approach adopted by the DMF: "Narrative-Based Disaster Learning." This instructional method is designed to motivate learners and support them in practicing disaster-related skills through narrative scenarios[219]. DMFs emphasize the use of storytelling, which may be fear-based, miracle-based, or success-based, into "threat-based disaster prevention education" and "knowledge-oriented disaster education."

The DMFs' integration of emotionally engaging narratives with factual disaster knowledge and use of visual and emotional elements to stimulate the visitors' affective feelings helps embed disaster awareness more deeply in people's memory[220]. This method enhances the effectiveness of disaster education by making it more relatable, memorable, and actionable for diverse audiences.

Most DMFs that are designated as monuments serve as memorials to past tragedies, commemorating those who lost their lives. Meanwhile, museums typically focus more on

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[219] Mangione, G. R., Capuano, N., Orciuoli, F., & Ritrovato, P. (2013). *Disaster education: A narrative-based approach to support learning motivation and students' engagement. Je-LKS: Journal of E-Learning and Knowledge Society*, *9*(2), p. 132.
[220] Kim, Y., Van Lancker Sidtis, D., & Sidtis, J. J. (2021). Emotional nuance enhances verbatim retention of written materials. *Frontiers in Psychology, 12*, p. 8. https://doi.org/10.3389/fpsyg.2021.519729

educating future generations. The author also argues that, in addition to reminding future generations of the recurring nature of large-scale disasters, DMFs also share important values for coping with such crises. The author further argues that this transmission of information goes beyond disaster literacy and includes the value of stoicism (in Tohoku). Stoicism is a philosophy that originated in ancient Greece and emphasizes mental resilience, emotional control, and acceptance of what cannot be changed. It teaches that happiness and inner peace can be achieved by focusing on what is within one's control while calmly accepting what is beyond one's control, such as natural disasters.

In contrast, the author argues that DMF in Aceh focuses less on disaster literacy and more on the value of fatalism. Fatalism is the belief that all events in life are predetermined and beyond human control, governed by destiny, supernatural forces, or the laws of nature. In this context, it reinforces the concept of the oneness of God. This result also supports the findings of an Indonesian scholar who conducted research into the disaster in Aceh. They found that in the context of Banda Aceh, religion and its values act as a form of social capital, fostering mutual trust, cooperation, and a sense of collective identity among community members. These values encourage solidarity, mutual aid, and emotional resilience in the face of disaster. Such religious teachings also promote *ikhlas* (sincerity), *sabar* (patience), and *tawakkal* (trust in God), thereby strengthening community coping mechanisms[221].

The DMF framework based on the Penta Helix Model is shown in Table 4.5. Table 4.5 illustrates the roles of various elements in Japan and Indonesia, reflecting each country's different approaches. In Japan, the government focuses on memorialization and educating the younger generation about disasters, using disaster sites as ongoing learning spaces. Meanwhile, in Indonesia, the emphasis is on deeper learning regarding the impact of disasters, with a focus on religious values, emotional connections, and preserving history through museums and historical studies.

Moreover, academia in Japan stresses the importance of preparedness through education, training, and practice, alongside the preservation of collective memory through memorial sites. In contrast, in Indonesia, the focus is on educating the younger generation about

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[221] Aksa, F. I., Utaya, S., Bachri, S., & Handoyo, B. (2020). The role of knowledge and fatalism. Journal of Disaster Risk Studies, Vol 12(10), pp. 1-6. https://doi.org/10.4102/jamba.v12i1.954; Kasim, F. M., Nurdin, A., & Rizwan, M. (2021). Agama, modal sosial dan ketahanan masyarakat dalam menghadapi bencana di Kota Banda Aceh. *Jurnal Antropologi: Isu-Isu Sosial Budaya, 23*(1), pp. 66–73. https://doi.org/10.25077/jantro.v23.n1.p66-73.2021

the remnants of disasters, hoping these stories will continue to be preserved through historical studies and museums. The business and industry sectors in Japan also strive to balance tourism and education, ensuring that disaster narratives are conveyed meaningfully. In Indonesia, community-based tourist villages have been developed to provide authentic disaster experiences, to strengthen the local economy, and preserve the region's culture and environment.

Communities in Japan play a crucial role in preserving disaster memories through *Kataribe* (storytellers) and DMFs. They help ensure that the lessons learned from disasters are not forgotten. Meanwhile, in Indonesia, the emphasis is on strengthening faith and spiritual awareness through DMF and reminding people to focus on religious values. The goals of DMFs in both countries include education and learning about disasters, historical preservation, strengthening the community's disaster preparedness, developing the local economy, and reinforcing cultural and spiritual values. Japan focuses more on memorialization and preparedness, while Indonesia places greater emphasis on religious education and community development.

Based on the findings of this chapter, the author continues the research by analyzing the residents' responses and focusing solely on DMFs in Japan. The study attempts to measure the indirect impact of DMF on evacuation motivation using Rogers' PMT theory. The respondents are people who live in the Tohoku Region coastline area and did not experience the 2011 disaster. This study explores the effectiveness of DMFs in Japan in providing disaster literacy, especially for residents who did not experience the disaster firsthand. The findings may contribute new evidence by providing empirical data on whether DMF sites can strengthen evacuation motivation in the event of a large earthquake, followed by an early evacuation order from the government.

Table 4.5. DMF Framework Based on the Penta Helix Model

Role	Japan	Indonesia
Government	Aims for DMFs to become places that people worldwide associate with memorial museums for the Great East Japan Earthquake. In these sites, people continually visit to learn about the disaster, especially young generations seeking to understand its impact.	Sees DMFs as a tourist attraction and powerful educational experience that first creates fear of the disaster, then reinforces faith in the power of God and the belief that one day we will all return to God. This perspective reflects how the tsunami deepened the religiosity of the Acehnese people, and through these stories, the government aims to emotionally connect with the younger generation today.
Academics	DMFs provide examples of the importance of preparedness in addition to providing education, training, and sharing practices that enable people, especially students, to understand where to evacuate to safer areas. Meanwhile, memorial sites serve as reminders of those who have passed away, preserving collective memory as an active process. They are dedicated to the lives lost in the tsunami. Such monuments honor individual victims while also commemorating a collective loss.	Aim to educate the younger generation by informing them about the traces left by the tsunami, with the hope that these stories do not fade into mere folklore. Continuous historical studies, such as those conducted by tsunami museums, ensure that the personal accounts of survivors are collected and preserved to ensure that this history is never forgotten.
Business /Industry	They believe that with enough public awareness, DMFs can have a positive impact and benefit their visitors. However, although a tsunami memorial will become a tourism site, and the number of visitors is important, it is also essential to present the narrative thoughtfully. There is a natural concern about maintaining respect and avoiding discomfort for visitors, which is understandable. However, if significant aspects of the disaster are hidden, there is little opportunity for meaningful learning. Therefore, a balance must be maintained between the visitors' comfort and education.	A tourist village functions as a community-based tourism destination that offers an authentic experience of the tsunami, highlights the region's potential, strengthens the community's economy, and preserves its culture and the environment.
Community	*Kataribe* and post-disaster tourism ensure that the memory of the disaster is preserved. As humans, our memories naturally fade over time, but it is crucial to prevent that from happening. Years have passed, and it has become clear that we cannot simply live as if nothing had happened. It is essential to safeguard this shared memory, as it is a lesson passed down from our ancestors. The most meaningful contribution *Kataribe* can make is to continue sharing	Post-disaster tourism helps remind people to focus on their faith, pray, and not get too caught up in worldly things. It teaches that worship and remembering God are the most important things in life.

	this story, ensuring that future generations, including their grandchildren, inherit a world where these lessons remain alive.	
Media / Press	Providing accurate information was essential for helping people make informed decisions. In disaster situations, rumors can spread easily, so the dissemination of accurate information is crucial to prevent misinformation. The media also has a responsibility to disseminate positive information to share hope. The media's coverage of the post-disaster tourism site serves as a testament to the disaster, illustrating how the media adapted to such circumstances.	The Indonesian media focuses on learning from the past so we can be ready for the future. When a disaster happens, we learn from it and do our best to make sure it does not happen again. However, being prepared does not only come from having faith. Even if people are faithful and religious, they still need to take mitigation actions and be prepared to save themselves.

CHAPTER V

THE MODERATING ROLE OF DISASTER MEMORIAL FACILITIES (DMF) ON THE PROTECTION MOTIVATION THEORY (PMT)

5.1. Enhancing Evacuation Motivation through Disaster Memorial Facilities (DMF)

Chapter 4 summarises the expert study of DMF in Japan and provides additional information from Indonesia. It shows that the purpose of developing DMF depends on the narrative that is being conveyed. The author argues that Japan is more prepared to position its DMF to memorialize victims and transmit disaster literacy. Five perspectives from various sectors in the Tohoku region try to share an understanding that DMF in the Tohoku Region serves to preserve collective memory, educate future generations, and promote disaster preparedness while honoring those who were lost. This is conveyed through messages that instil fear and provide lessons, while also touching the emotional side so that the memories remain vivid and can serve as a lasting guide for facing future tsunamis.

Therefore, Chapter 5 will explore this further by focusing specifically on DMF in the Tohoku region and offering a new contribution by providing empirical evidence on whether DMF can strengthen individual disaster preparedness.

The lessons learned from the 3.11 disaster revealed significant deficiencies in evacuation practices and preparedness among residents[222], underscoring the critical need for effective evacuation strategies[223]. Despite the early warning systems in place, many residents failed to evacuate in time, highlighting gaps in public understanding and response mechanisms[224]. Several years after the disaster and this tragic event, local governments decided to establish DMF under the name *3.11 Densho Road* to conduct various initiatives and projects related to disaster prevention. These efforts aim to ensure that the lessons of the 2011 GEJET are not forgotten, fostering a culture of preparedness and awareness for future generations[225]. However, past research reveals a significant gap: there is still limited empirical evidence demonstrating how visiting the DMF influences residents' evacuation behaviour. Especially, in

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[222] Koshimura et al., (2013); op., cit., p. 565; Ohsumi, Dohi, and Hazarika, (2019). 'Damage Related to the 2011 Tohoku Earthquake in and Around Kamaishi City – Beyond the Tsunami Disaster –', J. Disaster Res., vol. 14 (9), pp. 1185-1200.
[223] Mccaughey et al., (2017). op., cit., p. 463
[224] Maly & Suppasri, (2020). op., cit., p. 174
[225] For more detail, 3.11 *Densho* Road website could be found online in this link: https://www.311densho.or.jp/en/denshoroad/index.html

terms of responding to early warnings from the Japan Meteorological Agency (JMA) by evacuating to higher ground after a major earthquake to avoid a tsunami.

Therefore, this chapter takes a quantitative research approach, focusing on residents who currently live in coastal areas that were previously affected by the tsunami. This study then focuses on international newcomers in Tohoku, a small yet significant population. This focus aligns with the growing number of foreign workers in coastal areas, as Japan's ongoing depopulation has made many of these regions dependent on international labour to sustain local industries[226]. The selection of international workers aligns with the purposive sampling technique employed in this study, which requires respondents to meet two key criteria: (1) the respondent must reside in a coastal area, and (2) the respondent must have no prior experience of the 2011 GEJET or any other major disaster. This study further narrows its focus to Indonesian workers, who have shown the most significant growth in numbers over the three years leading up to 2025[227]. Many of these Indonesian workers are employed in the seafood processing industry in the Tohoku region, which requires them to live near the coast, placing them at increased risk in the event of future tsunami disasters[228].

This chapter emphasises the use of DMF as a moderating variable with a 'narrative-based approach', combining 'fear-based disaster prevention education' and 'knowledge-oriented disaster education'. Additionally, Chapter 4 states that DMF employs emotionally engaging narratives, utilising authentic disaster-ruined buildings as museums. This approach aims to encourage remembrance of past tragedies. It makes a significant contribution to the development of disaster literacy, defined as an individual's ability to access, understand, evaluate, and apply disaster-related information effectively to make informed decisions, reduce risk, and support self-protection during a disaster. Evaluating the effectiveness of the interventions of DMF in influencing evacuation behaviour remains crucial.

Evaluating the effectiveness of DMF in influencing evacuation behaviour remains crucial. To understand how such interventions might motivate individuals to take protective

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[226] Takizawa, Y., & Sato, H. (2021). Cohort-Based Analysis of Foreign Residents' Growth in Japan. *Applied Sciences, 13*(4), 2298. https://doi.org/10.3390/app13042298

[227] Japan Ministry of Health, Labor (2023). "Summary of 'Employment Status of Foreign Nationals' (as of the end of October 2023)," . Link: https://www.mhlw.go.jp/stf/newpage_37084.html.

[228] Asahi Shimbun. (2021, January 9). *Tsunami-hit area struggles to find foreign workers in pandemic*. The Asahi Shimbun. https://www.asahi.com/ajw/articles/14134925?utm_source=chatgpt.com

action, this study then adopts the Protective Motivation Theory (PMT) as a conceptual framework.

The use of fear-based messaging to influence protective behaviour was first introduced by the Fear Arousal Appeal Theory, one of the earliest communication theories to emphasise the role of fear-inducing messages in shaping attitudes and behaviours.[229]. This theory primarily focuses on using threat-based appeals to elicit fear and drive behavioural change. Building upon this foundation, PMT extends the theory by incorporating key cognitive components, offering a more comprehensive understanding of how individuals are motivated to engage in protective actions. Unlike earlier models, PMT introduces two critical cognitive processes, threat appraisal and coping appraisal, which systematically explain how individuals assess the severity of a threat, their vulnerability, the efficacy of the recommended response, and their ability to carry it out. PMT is particularly appropriate for this study, as it not only accounts for the emotional impact of fear-inducing narratives but also integrates psychological and cognitive dimensions. This makes it a suitable framework to examine how DMF, through emotionally engaging, fear-based messages and knowledge-rich narratives, can influence evacuation motivation and disaster preparedness behaviour. Although the PMT framework demonstrates its strengths, it also has limitations, particularly in its lack of emphasis on non-fear-based factors influencing protective motivation. Incorporating the role of DMF as a complementary variable can address this gap.

The Protection Motivation Theory (PMT) provides a useful framework for understanding evacuation motivation. PMT posits that individuals assess threats based on their perceived severity and vulnerability, influencing their motivation to engage in protective behaviors[230] . The PMT framework, initially formulated by Rogers[231] , was refined in 1983[232] and has been applied in various contexts to understand how threat perceptions affect preventive

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[229] Hovland, C. I., Janis, I. L., & Kelley, H. H. (1953). *Communication and persuasion: Psychological studies of opinion change*. Yale University Press, p. 135.
[230] R. W. Rogers, (1975). op., cit., p. 95
[231] Rogers (1975)., ibid. p. 176.
[232] Maddux & Rogers, (1983); Bubeck, Botzen, Laudan, Aerts, Jeroen, & Thieken, Annegret, (2018); Tasantab et al., (2022); Thieken, Kreibich, Müller, & Merz, (2007); Lindell, Arlikatti, & Huang, (2019)

actions, including disaster preparedness and evacuation[233] . However, there is a dearth of studies focusing on tsunamis[234].

To address this research gap, this study explores the application of the PMT framework in understanding the evacuation motivation of residents living in tsunami-vulnerable areas, particularly those lacking direct experience with the 2011 GEJET disaster. This stage consisted of a survey conducted among a representative sample of Tohoku residents with no experience of the 2011 GEJET. The decision was made to select respondents without direct knowledge of the 2011 GEJET or any other disaster to ensure the validity of evaluating the effectiveness of DMF in enhancing evacuation motivation. This population, residents living along the coastline affected by the 2011 tsunami but who arrived after the event, is particularly relevant to international workers who came to Japan after 2011. Their presence reflects a broader demographic trend: Japan's ongoing population decline and labour shortages, especially in disaster-prone rural areas such as Tohoku.

According to the 2023 revision of Japan's population projections by the National Institute of Population and Social Security Research (IPSS), the country's population is expected to decline by approximately 30% by the year 2070. In the same period, individuals aged 65 and older are anticipated to constitute around 40% of the total population. Although the projected total fertility rate is lower than in the 2017 estimates, the rate of population decline is expected to ease slightly. This is attributed to longer life expectancy and an increase in net migration of foreign nationals. The forecast includes all residents living in Japan[235]. In response to these challenges, Japan has increasingly relied on foreign labour to sustain its workforce.

Japan's number of foreign workers reached a record high of 2,048,675, marking an increase of 225,950 workers year-on-year (12.4%) from the previous year. Among these, Vietnam accounted for the largest number at 518,364 (25.3%), followed by China at 397,918 (19.4%) and the Philippines at 226,846 (11.1%). Notably, Indonesian workers exhibited the highest year-on-year growth rate, increasing by 56.0% from 77,889 to 121,507 workers[236].

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[233] Mulilis & Lippa, (1990). 'Behavioral Change in Earthquake Preparedness Due to Negative Threat Appeals: A Test of Protection Motivation Theory'. Journal of Applied Social Psychology, vol. 20 (8), pp. 619-638.

[234] Mccaughey, et., al., op., cit. p. 463; Lindell et., al. op., cit. p. 334.

[235] For details, please refer to Population Projections for Japan (2023 revision): Summary of Results available online at https://www.ipss.go.jp/pp-zenkoku/e/zenkoku_e2023/pp2023e_PressRelease.pdf (in English) and https://www.ipss.go.jp/pp-zenkoku/j/zenkoku2023/pp_zenkoku2023.asp (in Japanese)

[236] Japan Ministry of Health, Labor, "Summary of 'Employment Status of Foreign Nationals' (as of the end of October 2023). Available online at: https://www.mhlw.go.jp/english/new-info/2023.html

Under Japan's "skill system," Indonesian interns participate in 1- to 3-year programs through the Industrial Training Program (ITP) and the Technical Internship Program (TIP), often combined for up to three years. Successful participants who pass a qualification exam can extend their internships to five years. Indonesia has recorded the highest year-on-year growth rate among foreign workers in Japan, indicating that the number of Indonesian workers is expected to continue rising in the coming years. In the Tohoku region specifically, the majority of Indonesian workers are employed in seafood processing factories, which require them to live in coastal areas. Considering this significant increase and their residential proximity to high-risk zones, this study focuses on understanding the tsunami evacuation motivation of Indonesian workers in Tohoku who did not experience the 2011 Great East Japan Earthquake and Tsunami (GEJET).

To explore this, a survey was conducted among 311 Indonesian workers residing in the Tohoku coastal region, an area highly vulnerable to tsunamis. These respondents represent a population at risk, both due to their geographic location and their potential lack of familiarity with Japan's disaster history and evacuation procedures. The sample was drawn from the Facebook group "*Keluarga Tohoku*" (Tohoku Family), which had 1,398 members at the time. The sample size was calculated using the Slovin formula with a 0.05 significance level. An online questionnaire was then distributed through the group to ensure broad participation and minimize missing responses.

The number of foreign workers in Japan has reached a record high of 2,048,675, marking an increase of 225,950 workers year-on-year (12.4%) from the previous year. Among these, Vietnam accounts for the largest number at 518,364 (25.3%), followed by China with 397,918 (19.4%) and the Philippines with 226,846 (11.1%). Notably, Indonesian workers exhibited the highest year-on-year growth rate, increasing by 56.0% from 77,889 to 121,507 workers[237]. Under Japan's "skill system," Indonesian interns participate in 1- to 3-year programs through the Industrial Training Program (ITP) and the Technical Internship Program (TIP), often combined for up to three years. Successful participants who pass a qualification exam can extend their internship to five years (Organization of Technical Intern Trainee / OTIT, 2017). Given the significant increase in Indonesian workers in Japan, this research focuses on

[237] Ministry of Health Labour and Welfare, (2023). '「外国人雇用状況」の届出状況まとめ【本文】（令和５年 10 月末時点）'. Link: https://www.mhlw.go.jp/stf/newpage_37084.html, pp. 3-10.

understanding their evacuation motivation, particularly those without direct experience of the 2011 GEJET disaster, to enhance disaster preparedness strategies and ensure their safety.

To explore this, a survey was conducted among 311 Indonesian workers residing in the Tohoku coastal region, an area highly vulnerable to tsunamis. These respondents represent a population at risk, both due to their geographic location and their potential lack of familiarity with Japan's disaster history and evacuation procedures. The sample was drawn from the Facebook group "*Keluarga Tohoku*" (Tohoku Family), which had 1,398 members at the time. The sample size was calculated using the Slovin formula with a 0.05 significance level. An online questionnaire was then distributed through the group to ensure broad participation and minimize missing responses.

5.2. Theoretical Contribution

As a theoretical contribution, this research emphasizes the role of the threat appraisal factor as a mediator variable and introduces a novel element: the experience of visiting as a moderating variable. By employing multigroup analysis, the study compares two groups, those with and without DMF visiting experience, to provide deeper insights into the role of DMFs.

Protection Motivation Theory (PMT) is a psychological approach that examines the process of changing human behavior by driving protective behavior in response to threat appraisal, fear, and coping appraisal after receiving information (see Figure 5.1). In this study, the author adopted the new PMT framework from Rogers and Prentice-Dunn (1997) and Rogers (1983), utilizing partial variables within the framework by eliminating the interpersonal source of information and coping appraisal (See Fig. 5.2).

Research by Kleinot and Rogers (1982) [238] and Rogers and Mewborn (1976) [239] underscores the significance of threat and coping appraisal in shaping intentions for protective behaviour. Coping appraisal, which depends on factors like self-efficacy (belief in one's capability to act), response efficacy, and response costs, is particularly irrelevant in this study, which concerns individuals lacking direct experience with tsunamis. Without such experience, respondents may struggle to assess these factors accurately. Given the absence of personal experience with tsunamis among the subjects, interpersonal sources such as personality and

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[238] Kleinot & Rogers, (1982). 'Identifying Effective Components of Alcohol Misuse Prevention Programs'. Journal of Studies on Alcohol, Vol. 43 (7)., pp. 802-811.

[239] Rogers & Mewborn, (1976). 'Fear Appeals and Attitude Change: Effects of a Threat's Noxiousness, Probability of Occurrence, and the Efficacy of Coping Responses'. Journal of Personality and Social Psychology Vol. 34 (1), pp. 54-61.

prior experience were also excluded as irrelevant to the study's focus. Therefore, this research adopts a partial framework, starting from environmental information, emphasizing threat appraisal as a mediating variable in PMT, alongside fear arousal, to evaluate evacuation motivation.

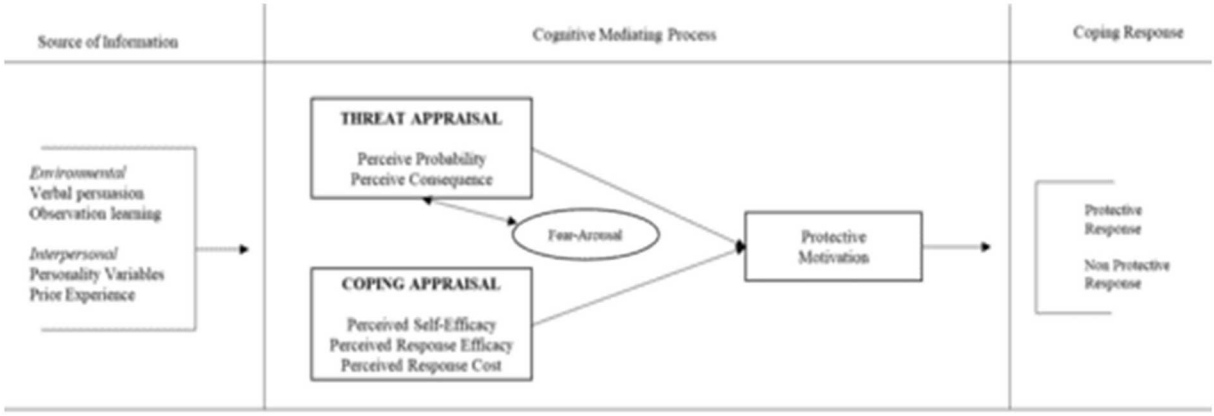

Figure. 5.1. The Structural Model According to the PMT

Source: Adapted from Rogers and Prentice-Dunn, (1997), Rogers, (1983)

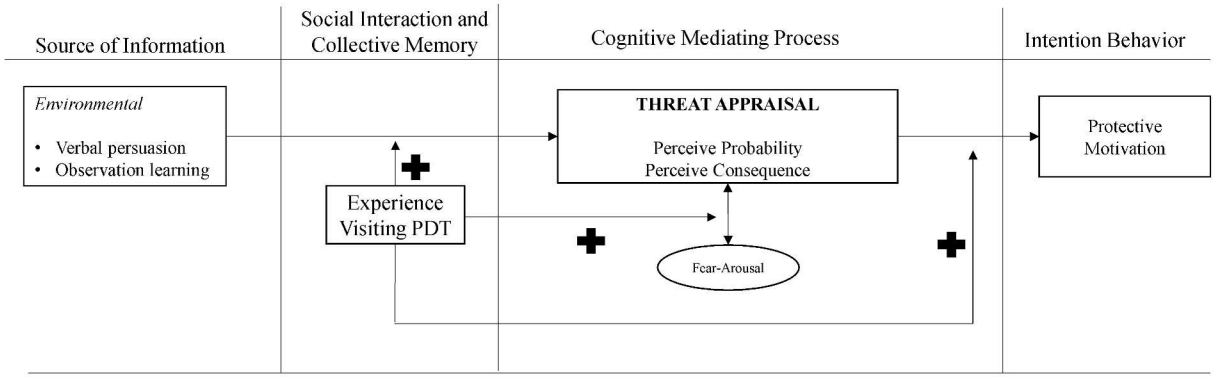

Figure. 5.2. New Structural Model That will be Analyzed in this Chapter

Source: Adapted from Rogers and Prentice-Dunn (1997), Rogers (1983)

5.3. Result

5.3.1. Characteristics of Respondents

The socioeconomic and demographic analysis (see Table 5.1) revealed that most participants were male (66.2%). Most respondents had resided in the Tohoku Region for 1–3 years (59.5%), with the majority originating from Java Island (64.6%). Additionally, a

significant proportion of respondents lived in Miyagi Prefecture (42.4%), specifically in Sendai City. Regarding the DMF visitation experience, 50.5% of respondents reported having visited a DMF, while 49.5% indicated no prior experience. Regarding natural hazard exposure, 67.2% of respondents had experienced a natural hazard such as an earthquake, whereas 32.8% had not.

Table 5.1. Respondent profile (n = 311)

Indicator	Demographics	Freq.	(%)
Length of Stay in the Tohoku Region	1 – 3 years	185	59.5
	4 – 6 years	34	10.9
	7 – 9 years	71	22.8
	More than 10 years	21	6.8
Region of Origin	Bali and Nusa Tenggara	29	9
	Java	201	64.6
	Kalimantan	13	4.2
	Sulawesi	24	7.7
	Sumatra	45	14.5
Gender	Male	206	66.2
	Female	105	33.8
Prefecture of Origin	Aomori	44	14.1
	Fukushima	15	4.8
	Iwate	120	38.6
	Miyagi	132	42.4
Experience Visiting DMF	Yes	157	50.5
	Not yet	154	49.5
Experience of Natural Hazards	Yes	209	67.2
	Not Yet	102	32.8
Motivation to Visit DMF (n=157)	Escaping from daily routines	56	35.67
	Learning about history	17	10.83
	Spending time with friends or family	49	31.21
	Visiting destinations never visited before	35	22.29

Furthermore, additional questions for respondents who had visited a DMF revealed that the highest motivation for visitation was physical motivation (35.67%), followed by social motivation (31.21%), with cultural motivation being the lowest (10.83%). These findings suggest that the initial reasons for visiting DMFs are not primarily educational. Demographic analysis further indicates that DMF visitation does not always correlate with higher disaster awareness, as motivations such as physical (escaping from daily routines) and social (spending time with friends or family) factors often predominate.

When comparing the impact of earthquake experience and DMF visitation on evacuation motivation (see Table 5.2), the data indicated that individuals who had visited a

DMF were likelier to choose the early (70 respondents) and middle stages (83 respondents) of evacuation than those who had not. While the earthquake experience also demonstrated a tendency toward mid. evacuation (112 respondents) stages, it represents a passive and uncontrollable factor.

Table 5.2. Crosstabulation Analysis

Demographic Respondents		**Evacuation Process (Period)**			**Total**
		Early	**Mid.**	**Late**	
Earthquake Experience	Not yet	33	47	22	102
	Yes	11	111	87	209
Experience Visiting DMF	Not yet	50	76	28	154
	Yes	70	83	4	157

In contrast, DMF visitation is a structured and replicable educational intervention. This distinction underscores the potential of DMF visitation to influence disaster awareness and preparedness actively.

Given these findings, the study focuses on the role of DMF visitation by conducting a Multi-Group Analysis (MGA) to compare two groups: Group A, comprising individuals who had visited a DMF, and Group B, comprising those who had not. This analysis aims to provide actionable insights into how DMF visitation can strengthen the connection between disaster awareness and evacuation behaviour, thereby enhancing future disaster preparedness efforts.

5.3.2. Measurement Model Evaluation

The constructs' internal reliability (consistency) and convergent and discriminant validity were evaluated using the measurement model (see Table 5.3). As shown in Table 5.3, all variables have significance values less than 0.05, indicating that the measurement instrument, namely the questionnaire, is capable of effectively capturing the influence of each variable. This suggests that the constructs used in the study demonstrate adequate internal reliability, as well as convergent and discriminant validity, thus confirming the appropriateness of the measurement model. Furthermore, since all items can be considered valid, there is no need to eliminate any statements. Therefore, all items included in the questionnaire can be retained for use in subsequent analyses.

The analysis of Cronbach's Alpha supports the instrument's reliability based on established criteria[240]. As shown in Table 5.4, the Cronbach's Alpha values for Source of Information (SI), Threat Appraisal (TA), Fear of Fatality (FF), and Evacuation Motivation (EM) were 0.812 (excellent reliability), 0.707 (high reliability), 0.582 (moderate reliability), and 0.777 (high reliability), respectively.

Table 5.3. Result of Validity and Reliability Statistics Test

Construct	Item	Cronbach' Alpha	Pearson Correlation	p-value
Source of Information	X11	0.812	0.789	0.000
	X12		0.622	0.000
	X13		0.514	0.000
	X14		0.902	0.000
	X15		0.910	0.000
Threat Appraisal	Z11	0.707	0.539	0.000
	Z12		0.641	0.000
	Z13		0.657	0.000
	Z14		0.638	0.000
	Z15		0.604	0.000
	Z16		0.569	0.000
	Z17		0.568	0.000
Fear of Fatality	Z21	0.582	0.866	0.000
	Z22		0.833	0.000
	Z23		0.498	0.000
Evacuation Motivation	Y11	0.777	0.652	0.000
	Y12		0.924	0.000
	Y13		0.904	0.000

Table 5.4. Interval of Cronbach's Alpha Reliability

Interval of Cronbach's Alpha (α)	**Reliability Criteria**
$0.90 \leq \alpha \leq 1$	Excellent reliability
$0.70 \leq \alpha < 0.90$	High reliability
$0.50 \leq \alpha < 0.70$	Moderate reliability
$\alpha < 0.50$	Low reliability

The moderate reliability for Fear of Fatality ($\alpha = 0.582$) highlights the challenges of measuring subjective constructs in disaster research, as this variable is shaped by personal perceptions, cultural influences, and prior experiences, which can result in inconsistent responses. These findings confirm that the instrument used in this study is both reliable and valid for measuring the variables of interest. The interpretation of reliability levels—categorized as low (<0.6), moderate (0.6–0.7), high (0.7–0.8), and excellent (>0.8)—follows

[240] P.R. Hinton, I. McMurray, and C. Brownlow, (2014). SPSS explained; Second edition Routledge, New York, p. 386.

commonly accepted benchmarks in social science research. These categories help researchers assess the consistency of respondents' answers across items measuring the same construct.

The moderate reliability for Fear of Fatality (α = 0.582) highlights the challenges of measuring subjective constructs in disaster research, as this variable is shaped by personal perceptions, cultural influences, and prior experiences, which can result in inconsistent responses. Nevertheless, the overall reliability levels are acceptable for exploratory research, and these findings confirm that the instrument used in this study is both reliable and valid for measuring the variables of interest.

5.3.3. Goodness of Fit and Instrument Test

Hair *et al*[241] state that achieving four to five goodness-of-fit indices within the required thresholds is sufficient for evaluating a model's suitability. The results of the AMOS analysis (see Table 5) indicate that the CMIN/DF (2.210 < 3) and RMSEA (0.044 < 0.08) values fall within acceptable ranges, suggesting a good model fit.

Table 5.5. Results of CFA and Structural Model with Standards.

Fit Indicates	Result	Cut-off
Cmin/df	2.210	<3
RMSEA	0.044	<0.080
CFI	0.925	>0.900
TLI	0.900	≥ 0.90
GFI	0.888	>0.900
IFI	0.926	>0.900

Furthermore, the CFI (0.925 > 0.90) and TLI (0.900 ≥ 0.90) values indicate a good fit, while the GFI (0.888 < 0.90) was classified as a marginal fit. As five out of six indices demonstrate a good fit, it can be concluded that the model used in this study is appropriate. The appropriateness of the model in this study also reflects the inclusion of a moderating variable—experience visiting DMF sites—which is theoretically sound and empirically justified. The addition of this moderating variable is reasonable, as it helps to explain how prior exposure to post-disaster environments may influence the strength or direction of the relationships between key constructs. Moreover, the model meets the goodness-of-fit criteria, further supporting that this conceptual framework is valid and suitable for examining the research objectives.

[241] Hair, Ringle, & Sarstedt, (2022) . 'Multivariate Data Analysis'. Pearson Prentice Hall., p. 758.

5.3.4. Structural Modelling

The hypotheses were tested using IBM AMOS version 28, evaluating the direct effects and multigroup analysis (MGA) between two groups: those with experience of visiting DMF sites (Group A) and those without (Group B) (Table 5.6).

Hypothesis 1 posits that the source of information significantly affects threat appraisal. The results indicate a path coefficient value of 0.368 with a probability of 0.000 (0.000 < 0.05), suggesting a significant effect of the source of information on threat appraisal. Therefore, Hypothesis 1 is supported.

Table 5.6. SEM Model Result with Multigroup Analysis (MGA)

Variable Paths	Estimates	Degree of Experience	
		EVDT	NEVDT
SI → TA	0.368***	0.334**	**0.353**
TA → EM	0.216**	0.372**	**-0.049**
TA → FF	0.470**	0.532***	**0.249**
SI←SI1	0.746***	0.710***	**0.771**
SI←SI2	0.310***	0.255**	0.321***
SI←SI3	0.317***	0.368***	0.223**
SI←SI4	0.921***	0.912***	0.924***
SI←SI5	1.030***	1.040***	1.023***
TA←TA1	0.356***	0.443***	**0.184**
TA←TA2	0.546***	0.479***	**0.442**
TA←TA3	0.555***	0.450***	0.668**
TA←TA4	0.618***	0.519***	**0.811**
TA←TA5	0.445***	0.503***	0.366**
TA←TA6	0.472***	0.358**	**0.558**
TA←TA7	0.413***	0.423***	**0.339**
FF←FF1	0.837***	0.807***	**0.749**
FF←FF2	0.907***	0.862***	1.069*
FF←FF3	**-0.023**	0.254**	-0.319*
EM←EM1	0.374***	0.193**	**0.463**
EM←EM2	1.003***	1.025**	1.021*
EM←EM3	0.854***	0.817***	0.850*
**p<0.05; ***p<0.01; standardized path coefficient and correlation; EVDT (Experience Visiting Disaster Tourism; NEVDT (No Experience Visiting Disaster Tourism); SI (Source of Information); TA (Threat Appraisal); EM (Evacuation Motivation); FF (Fear of Fatality)			

Hypothesis 2 posits that threat appraisal significantly affects evacuation motivation. The results indicate a path coefficient value of 0.216 with a probability of 0.004 (0.004 < 0.05), confirming a significant effect of threat appraisal on evacuation motivation. Thus, Hypothesis 2 is supported.

Hypothesis 3 posits that threat appraisal significantly affects fear of fatality. The results indicate a path coefficient value of 0.470 with a probability of 0.004 (0.000 < 0.05), supporting the significant effect of threat appraisal on fear of fatality. Hence, Hypothesis 3 is supported.

Hypothesis 4a posits that the source of information significantly affects the threat appraisal of respondents who visited DMF sites (Group A). The results indicate a path coefficient value of 0.334 with a probability of 0.004 (0.005 < 0.05), confirming a significant effect of the source of information on threat appraisal among those with experience of visiting DMF sites. Therefore, Hypothesis 4 is supported.

Hypothesis 4b posits that the source of information has no significant effect on the threat appraisal of respondents who did not visit DMF sites (Group B). The results indicate a path coefficient value of 0.353 with a probability of 0.078 (0.078 > 0.05), indicating a non-significant effect of the source of information on threat appraisal for respondents with no experience visiting DMF sites. Thus, Hypothesis 4a is supported.

Hypothesis 5a posited that threat appraisal significantly affected the evacuation motivation of respondents who visited DMF sites (Group A). The results indicate a path coefficient value of 0.372 with a probability of 0.040 (0.040 < 0.05), confirming a significant effect of threat appraisal on evacuation motivation among respondents with experience of visiting DMF sites. Therefore, Hypothesis 5 is supported.

Hypothesis 5b posits that threat appraisal does not significantly affect the evacuation motivation of respondents without the experience of visiting DMF sites (Group B). The results indicate a path coefficient value of -0.049 with a probability of 0.613 (0.613 > 0.05), indicating a non-significant effect of threat appraisal on evacuation motivation for respondents without such an experience. Therefore, Hypothesis 5a is supported.

Hypothesis 6a posits that threat appraisal significantly affects the fear of fatality among respondents who visited DMF sites (Group A). The results indicate a path coefficient value of 0.532, with a probability of 0.000 (0.000 < 0.05), suggesting a significant effect of threat appraisal on fear of fatality among those with experience of visiting DMF sites. Therefore, Hypothesis 6 is supported.

Hypothesis 6b posits that threat appraisal has no significant effect on fear of fatalities among respondents who did not visit DMF sites (Group B). The results indicate a path coefficient value of 0.249 with a probability of 0.129 (0.129 > 0.05), indicating a non-significant effect of threat appraisal on fear of fatality for respondents without experience visiting DMF sites. Therefore, Hypothesis 6a is supported.

In conclusion, the experience of visiting a DMF site significantly affects the relationships between SI and TA, TA and FF, and TA and EM in Group A. However, no significant relationships were found in Group B, suggesting that the experience level affected the groups differently.

5.4. Discussion

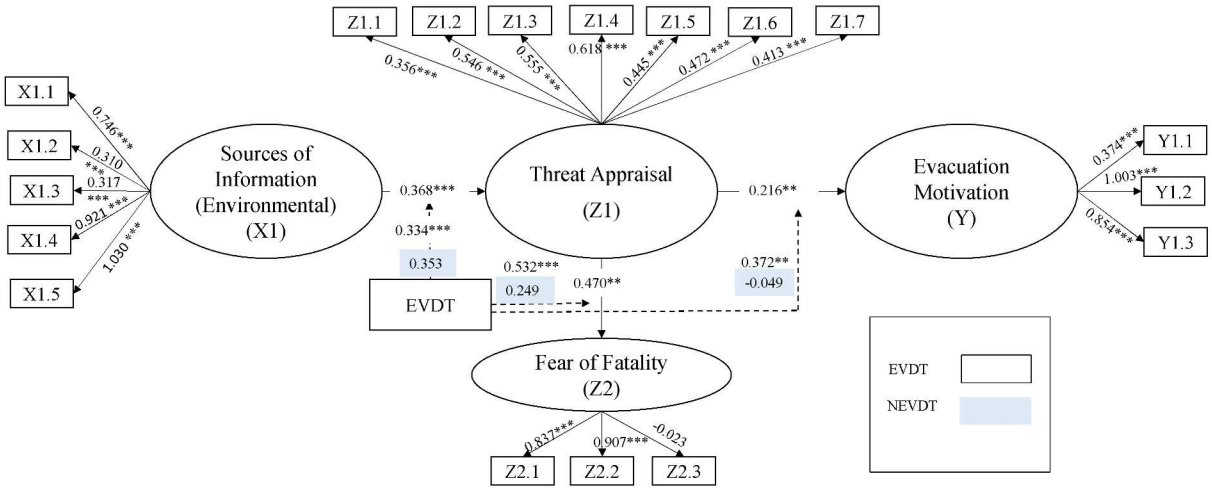

Figure 5.3. Structural Model of PMT with Disaster Memorial Facilities Visitation as a Moderating Variable

5.4.1. Source of Information and Threat Appraisal

The sources of information, including environmental factors such as verbal persuasion and observational learning, initiate the threat appraisal process[242]. The results also show that the respondents' experience level in Group A leads them to perceive information about tsunami risks as more relevant and has a stronger impact on the threat perceived. The results of the study support the past research that argued the provision of risk information significantly impacts threat appraisal, particularly among those with higher levels of education [243].

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[242] Rogers, (1975) 'A Protection Motivation Theory of Fear Appeals and Attitude Change', The Journal of Psychology, vol. 91 (1), pp. 93–114; Maddux and Rogers, (1983). 'Protection Motivation and Self-Efficacy: A Revised Theory of Fear Appeals and Attitude Change', Journal of Experimental Social Psychology, vol. 19 (5), pp. 469–79.

[243] Liu & Jiao, (2020). 'How does information affect fire risk reduction behaviors? Mediating effects of cognitive processes and subjective knowledge How does information affect fire risk reduction and subjective knowledge'. Natural Hazards. Springer.

For example, the exhibition shown at the *Kadonowaki* Elementary School ruin presents risk information for observational learning, which can enhance the perceived threat of disasters. *"The exhibition includes displays of debris devastated by the tsunami, serving as a stark reminder of the immense power of the waves that struck the city"* (Informant 14). This exhibition effectively conveys the severity and destructive force of the tsunami. Such visual and physical evidence, particularly when presented in an authentic setting like the *Kadonowaki* School ruin, can heighten visitors' perception of the threat posed by future disasters. It allows them not only to understand the danger intellectually but also to emotionally grasp the intensity of the threat, which is essential for increasing their risk awareness and perception.

In addition, the "*Unosumai Tomosu*" memorial in Kamaishi City's Memorial Park marks the location of a former emergency evacuation building destroyed by the tsunami (see figure in Appendix p. 150). This powerful reminder of the risks contributes significantly to threat assessment by illustrating the devastating consequences of natural hazards. The site also uses *Kataribe* to convey clear lessons about what worked and what failed during the disaster (Informant 13). A monument listing the names of those who were swept away after evacuating to the designated 'safe' building serves as a reminder of the real and present danger posed by tsunami events. A nearby wall displaying the actual height of the tsunami further emphasises the magnitude of the threat. Together, these features raise visitors' awareness of the risks posed by tsunamis, challenging assumptions about safety and encouraging more serious consideration of evacuation planning and personal preparedness. The site highlights a significant shortcoming in official disaster drills where residents were erroneously directed to an unsafe location (Informant 13), emphasising the urgent necessity of accurate threat assessment and adaptive evacuation strategies.

In contrast, the respondents' experience level in Group B does not influence their perception of tsunami risk. These studies examine the past research that argued that increases in knowledge and information correlate weakly with precautionary behaviour in certain contexts[244].

Additionally, Table 5.6 shows that SI5 has the strongest impact on environmental sources of information. The SI5 statement, "prepare emergency equipment to deal with an upcoming tsunami (flashlights, thermal blankets, warm clothing, non-perishable food, a first-

[244] Miceli, Sotgiu, & Settanni, (2008). 'Disaster preparedness and perception of flood risk: A study in an alpine valley in Italy'. Journal of Environmental Psychology, vol. 28, pp. 164–173.

aid kit, etc.)", provides vital information to residents of vulnerable areas regarding the potential occurrence of a disaster. Respondents' acceptance of this information is stronger when they observe others engaged in preparation, such as local government disaster drills, rather than relying on other sources of information.

Besides DMFs giving important information about disaster risks, people in the community also play a key role in helping others understand and feel the threat of disasters. A powerful example of this is the story of the "*Kamaishi* Miracle", where a group of schoolchildren evacuated without a teacher. This was possible because the school had been proactive in disaster preparedness. As these students, especially those in junior high and younger, began evacuating, residents observed their actions and followed them (Informant 13). This collective movement toward higher ground prompted the wider community to evacuate as well. As a result, many lives were saved. When members of a community visibly respond to a perceived threat, their actions can raise threat awareness in others, reinforcing the urgency and seriousness of the situation.

However, for Group B, even when respondents observe others preparing emergency equipment or seeking assistance from disaster mitigation agencies, the lack of tangible evidence of disaster consequences, as seen at many DMFs, may prevent them from fully understanding the risks posed by natural disasters[245].

5.4.2. Threat Appraisal to Fear

Past research has argued that the effective subcomponent of threat appraisal relates to fears or concerns about flooding, emphasising the influence of emotions on flood-risk behaviour[246]. The results of this study also support this argument. Perceiving the severity and vulnerability of danger often triggers an emotional state of fear. The findings of this study suggest that individuals who are aware that they reside in a tsunami-prone region with frequent earthquakes are more likely to experience heightened fear. These results support Rogers' theory that threat appraisal significantly contributes to fear. However, this study shows that Group A exhibits a strong and significant correlation between threat appraisal and fear arousal. The

[245] Boret & Shibayama, (2017)., op., cit., p. 56; Rahman, et., al., (2023). 'Memory, Meaning, and Monuments: An Ethnographic Study of Tsunami Memorialization in Aceh', E3S Web of Conferences, 447, pp. 1–5.

[246] Zaalberg, R., Midden, C., Meijnders, A., & Mccalley, T. (2009). Prevention , Adaptation , and Threat Denial : Flooding Experiences in the Netherlands. *Risk Analysis*, *29*(12), 1759–1778. https://doi.org/10.1111/j.1539-6924.2009.01316.x

findings also confirm that threat appraisal mediates the relationship between environmental information and fear arousal.

This study suggests that environmental information (e.g., verbal persuasion and observational learning) does not directly elicit fear responses. Instead, people first evaluate how serious and personally relevant the threat is, and this evaluation then leads to feelings of fear. Therefore, threat appraisal acts as an intermediate step that explains how environmental information results in fear arousal.

The tragic story of Okawa Elementary School is a powerful example of how tragic information can generate threat appraisal and evoke a strong sense of fear. "*Okawa Elementary School is remembered for its tragic story, as all the students who stayed in the school perished... teachers took too long to decide on evacuation... they decided to cross the river, which turned out to be a fatal mistake... the tsunami arrived and took the lives of 70 children.*" (Informant 14). In this sense, exhibits that emphasize the fatal consequences of delayed evacuation, like the Okawa Elementary School case, serve not only as educational tools but also as emotional triggers that internalize the sense of fear through threat. Therefore, Group A, which visited the DMF and was exposed to tragic and frightening stories as well as external information, is more likely to develop a strong understanding of disaster threats, which in turn leads to an increased feeling of fear. The experience of visiting DMF sites appears to amplify fear responses[247], thereby intensifying the effect of threat appraisal on emotional fear.

Regarding fear arousal, FF2 showed the most pronounced effect. The FF2 scale measures fear of potential tsunamis, with one item stating, "I feel afraid that the risk of tsunamis will devastate my residence." Previous studies have demonstrated that threats to housing during natural disasters can trigger increased fear[248].

Moreover, Group B exhibited a weak and non-significant effect on fear arousal, and threat appraisal could not mediate the relationship between environmental information and fear arousal. Past research also supports this finding, showing that threat appraisal has no consistent association with protection motivation, and even the fear component only influences immediate

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[247] Olsen & Korstanje, (2020); Biran and Buda, (2018). 'Unravelling Fear of Death Motives in Dark Tourism', The Palgrave Handbook of Dark Tourism Studies, pp. 515–32.

[248] P Bubeck. Botzen, and Aerts, (2012). 'A Review of Risk Perceptions and Other Factors that Influence Flood Mitigation Behavior', Risk Analysis, Vol. 32, No. 9, pp. 1481-1495; Lindell and Perry, (2011). 'The Protective Action Decision Model: Theoretical Modifications and Additional Evidence'. Risk Analysis, pp. 1-17.; Kellens, Terpstra, and De Maeyer, (2013). 'Perception and Communication of Flood Risks: A Systematic Review of Empirical Research', vol. 33 (1), pp. 24-49.

emergency planning, not long-term protective behavior[249]. In simpler terms, perceiving a threat did not lead to significantly stronger fear-based actions among respondents in Group B.

As the author mentioned earlier in Chapter 2, disaster education in Japan typically still adopts fear-based messages, where moderate fear can stimulate proactive behaviors that reduce risk, such as seeking information, rehearsing evacuation routes, or complying with disaster preparedness recommendations. However, this study shows that after the 2011 GEJET disaster, disaster evacuation messages seem to no longer focus on arousing fear. Although past research also supports the idea that fear does not necessarily lead to evacuation motivation, Group A still exhibited a sense of fear, confirming that the exhibitions at the DMF partially continue to evoke fear.

5.4.3. Threat Appraisal to Evacuation Motivation

This study indicates that the effect of threat appraisal on evacuation motivation is both positive and significant for the total sample as well as for Group A. These findings support previous research suggesting that when individuals perceive a high level of threat, both in terms of the likelihood of a disaster occurring (perceived probability) and the severity of its potential consequences (perceived severity), they are more motivated to take protective actions, such as purchasing insurance[250].

Protective responses to disasters (evacuation) do not immediately occur upon receiving verbal information or early warnings. "*When the earthquake happened in the morning, we didn't know anything big would happen. When the earthquake hit, the house and the glass collections were all broken because we felt the earthquake going up and down. After that, we cleaned the house. It was only when we were cleaning the house that we heard people running. People were running from locations that were badly hit by the tsunami. we also just realized. Why? More and more people were running. They said, "Don't think about wealth. Now, get out of the house. Oh, the sea water is rising. The sea water is rising". We imagine that the distance from the sea to the house is far. It's impossible. But more and more people were shouting water... water... My parents at the time said, maybe this wave could reach the city. At that time, my family and I packed our bags, just the way we wanted. Locked the door, got in the car. Get in the car, run towards the most crowded people running.*" (Informant 5).

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[249] Babcicky, P., & Seebauer, S. (2019). Unpacking Protection Motivation Theory: Evidence for a separate protective and non-protective route in private flood mitigation behavior. *Journal of Risk Research, 22*(12), pp. 1503–1521.

[250] Aristyavani, (2022). 'Persepsi Risiko dan Motivasi Memiliki Asuransi Bencana Alam : Premi Polis Asuransi Banjir / Properti untuk Warga Berisiko Banjir di Wilayah DKI Jakarta'. Jurnal Manajemen dan Usahawan Indonesia. Vol 45 (1), pp.16-35

Protective responses to disasters (e.g., evacuation) do not typically occur immediately upon receiving verbal information about the disaster. Instead, many people take action after they perceive a threat, either by recognising the probability of a serious event occurring, understanding the consequences, and realising that their safety is at risk, or by observing the panicked behaviour of others. In the case of the informant, their family did not initially recognise the danger, even though the earthquake had already occurred. Instead, the focus was on the restoration of the house from the damage. This phenomenon is known as the normalcy bias, which refers to the tendency to perceive ongoing events as normal and to postpone critical actions in spite of evident indications that such action is required[251]. However, people were mostly motivated to act protectively after seeing others do the same, which made them want to copy that behaviour.

Additionally, the study shows a clear distinction exists between Groups A and B, with Group B displaying a negative yet insignificant effect of threat appraisal on evacuation motivation. Group B exhibited a weak negative impact of threat appraisal on evacuation motivation, which aligns with past research findings suggesting that flood mitigation efforts often fail to establish a positive correlation with expected behaviour[252]. In this context, a negative impact refers to situations in which an increase in perceived threats results in a decrease in protective motivation.

The findings of this study are in line with the conditions of residents in Tohoku before the 2011 GEJET. Despite regular disaster drills being conducted in the Tohoku region before the 2011 GEJET, many casualties occurred because the majority of people failed to evacuate. **"***Kamaishi City used to hold disaster prevention drills regularly, but the number of community members participating in these drills gradually decreased because walking uphill during the drill was tiring. As a result, the local government changed the evacuation site to increase participation. Instead of evacuating to the correct hill, they used a community building, which caused the drills to lose their true purpose. Later, people came to commemorate those who died in the area originally designated for evacuation drills at the Memorial Centre*." (Informant 13). These drills were also conducted along almost the entire coastline of Tohoku.

On the other hand, although disaster drills were routinely held in the Tohoku region before the 2011 GEJET, a large number of fatalities still occurred, as many individuals chose

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[251] For more details on normalcy bias and strategies to overcome it in disaster situations, please click the following link: https://bosai-lab.com/disaster-prevention-guide/normalcy-bias/?utm_source=chatgpt.com.

[252] Bubeck et al., (2012). op., cit., p. 1482

not to evacuate. "*Iwate is very famous for tsunamis. I wonder why so many people living near the sea—adults, teachers, even intelligent people—didn't escape to higher ground? That's why more people died in Miyagi. They didn't believe the tsunami would reach their homes. More than half of the victims were from Miyagi. This was a very costly lesson, and they regret it deeply*." (Informant 4). However, the more information that was provided and the more residents understood the threat of a tsunami, paradoxically, the lower their motivation to evacuate became. In this study, Group B showed these results because they did not have the opportunity to visit the DMF. Visiting these facilities provides a clearer and more emotionally impactful understanding of the threat, which could otherwise increase evacuation motivation.

Previous research highlights that raising risk awareness alone is insufficient to ensure the transition to integrated risk management[253]. Overemphasis on risk awareness may even result in non-protective responses, such as fatalism, denial, or avoidance. These results align with the findings of past research that extreme threat appraisals can provoke psychological defence mechanisms, such as ignoring or minimizing risk, ultimately reducing evacuation motivation[254].

Furthermore, among the variables analyzed, TA4 had the strongest influence on threat appraisal. The TA4 item, "How do you assess the seriousness of the consequences of the reference tsunami for your society? Roads/infrastructure will be badly damaged," was highly rated. Respondents perceived the potential destruction of infrastructure essential for community survival, such as access to emergency aid, recovery resources, and basic utilities, as significantly heightening their threat perception. People often perceive the destruction of infrastructure, such as buildings, as a sign of imminent danger. "*After the first earthquake occurred, I saw several buildings that had collapsed. But I went back to my house to clean up and grab some other things—my cell phone, wallet—because when we evacuated the first time, we didn't bring them. Then, just as we were all about to leave again, we were standing out front talking, because many people had already gathered, and the second earthquake hit. Our sister came running from one of the local coffee shops shouting, 'Run… run, everyone… the sea water is rising!"* (Informant 6). This informant had already developed an intention to protect themselves and seek safety, which was later reinforced by external motivation from others in the community. This suggests that the strongest influence on threat appraisal came from visible

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[253] Babcicky & Seebauer, (2019)., op., cit., p. 1510.

[254] Maddux and Rogers, (1983). "Protection motivation and self-efficacy: A revised theory of fear appeals and attitude change," J. Exp. Soc. Psychol., vol. 19, no. 5, pp. 469–479.

physical destruction and social cues. Notably, the TA4 item, *"How do you assess the seriousness of the consequences of the reference tsunami for your society? Roads/infrastructure will be badly damaged"*, received a high rating, indicating that perceived damage to infrastructure played a key role in shaping people's perception of threat seriousness.

In conclusion, the perception of infrastructure vulnerability and the social influence of others' evacuation behavior increase the likelihood of evacuation. These findings are consistent with disaster behavior studies, which emphasize the role of risk perception and social influence in shaping individuals' responses[255].

In the context of evacuation motivation, EM2 emerged as the most impactful factor. The statement, "I want to evacuate in the middle of the period; I will wait for others to evacuate, then I will follow," highlights the influence of behavioral herd and social dynamics in disaster decision-making[256]. External factors, including social cues and environmental conditions, strongly impact the likelihood of individuals engaging in herding behavior during emergency evacuations. People tend to follow others' actions, especially when visibility or information is limited, which can shape collective decision-making in crises.

Surveys of past disasters indicate that social cues, such as evacuation calls from family or neighbours[257], or observing others evacuate[258], are key triggers for action within informal communication networks. Surveys from the past 2004 IOET and the 2011 GEJET disaster indicate that social cues, such as evacuation calls from family or neighbours, or simply observing others evacuate, serve as critical triggers for action to evacuate. Many survivors reported taking action only after seeing their neighbours run toward higher ground upon hearing that the sea water was rising.

Phrases such as "*Run… run, everyone… the sea water is rising!" or "Don't think about wealth. Now, get out of the house"*, and *oh, the sea water is rising. The sea water is rising!"* (Informants 5, 6) were commonly recalled by survivors. One example includes a group of schoolchildren who evacuated on their own without a teacher, which was possible because the

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[255] Albris, Lauta, & Raju, (2020). 'Disaster Knowledge Gaps: Exploring the Interface Between Science and Policy for Disaster Risk Reduction in Europe'. Int J Disaster Risk Sci, vol. 11, pp. 1–12.

[256] Ni, M., Xia, L., Li, C., Wei, Y., Deng, F., Liu, Z., Qin, M., & Pan, S. (2024). Herd behavior influence on decision-making during evacuation process: An empirical analysis from building evacuation experiments. *Current Psychology, 43*(33390–33405). https://doi.org/10.1007/s12144-024-06806-8

[257] Lindell., et., al. (2015). 'Households' Immediate Responses to the 2009 American Samoa Earthquake and Tsunami', International Journal of Disaster Risk Reduction, vol. 12, pp. 328–40; Okumura, Harada, and Kawata, (2010). 'Field Survey of Evacuation Behavior in the 29 September 2009 American Samoa Tsunami Disaster', Vol. 66 (1). pp. 3–7; Makinoshima, Imamura, and Oishi, 'Tsunami Evacuation Processes Based on Human Behaviour in Past Earthquakes and Tsunamis: A Literature Review', Progress in Disaster Science, 7, p. 100113.

[258] Clave, et., al. (2008). 'Ethnic Groups' Response to the 26 December 2004 Earthquake and Tsunami in Aceh, Indonesia', Nat Hazards, vol. 47, pp. 17–38.

school had proactively conducted disaster prevention education. As the students, particularly those in junior high school and younger, began to evacuate, the surrounding community followed, resulting in many lives being saved (Informants 13). Therefore, one person's awareness and decision to run and save themselves can inspire others to do the same, ultimately saving many lives.

Additionally, many respondents with a residence duration of 1–3 years were likely participants in the Industrial Training Program (ITP) or Technical Internship Program (TIP), who had recently arrived in Japan. Without direct experience of the 2011 GEJET disaster, they relied on secondary sources, such as training and guidelines, which limited their understanding of disaster risks and reduced the urgency to act. DMF in 2011 GEJET-affected areas addressed this gap by allowing individuals to learn through firsthand stories, experiences, and visualizations of the disaster, with interactions with local guides further reinforcing awareness and the importance of evacuation.

5.4.4. The Role of DMF Sites in Moderating Relationships Between Variables

In the context of the PMT framework, as it pertains to disaster protective motivation, DMF sites can serve as significant moderating factors, strengthening relationships between variables such as the source of information and threat appraisal, threat appraisal and fear arousal, and threat appraisal and evacuation motivation.

The DMF provides evidence from Group A that strengthens the role of the threat appraisal variable in mediating the effect of environmental information on both evacuation motivation and fear arousal.

First, the DMF plays a role in enhancing the role of threat appraisal in mediating the effect of environmental information and evacuation motivation. Information delivered at the DMF, whether through storytelling by tour guides, survivor testimonies, is often perceived by visitors as credible and emotionally impactful. These firsthand experiences at disaster sites evoke strong emotional reactions, particularly empathy and fear, which deeply affect how individuals appraise future threats[259].

On the other hand, places that provide authentic physical evidence of the tsunami, such as those in the Tohoku region of Japan, including the *Kadonowaki* Elementary School Ruins,

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[259] Fulco, (2017)., op., cit., p. 9.

Koyo High School Ruins in *Kesennuma* City, and Sendai Arahama Elementary School, as well as sites in Aceh Province like the Boat on the Roof and the PLTD *Apung* Museum, offer powerful, tangible reminders of the disaster. This aligns closely with the mission of these memorial sites, *"The facility aims to keep the memory of the disaster alive, which in Japanese is called Densho (伝承). It also seeks to pass on the lessons of the disaster to future generations so they do not experience a similar tragedy. The goal is to minimize future loss of life by raising awareness about disaster preparedness.",* (Informant 14). In this way, these facilities not only serve as sites of remembrance but also function as platforms for risk communication, transforming emotional and cognitive experiences into long-term protective behaviors.

As a result, visitors are more likely to assess the severity and probability of future disasters as high after visiting DMF, which enhances the impact of environmental information and subsequently increases their motivation to evacuate in similar situations.

Second, the DMF also reinforces the role of threat appraisal in mediating the influence of environmental information on fear arousal. Visiting sites directly associated with loss of life, such as tsunami memorial museums or locations where devastating impacts occurred, makes the perceived threat more immediate, concrete, and emotionally impactful. These sites provide a visceral, immersive experience that goes beyond abstract warnings. When visitors imagine themselves or their loved ones in similar situations, the threat becomes personalized, triggering a stronger emotional reaction, particularly fear[260]. This process enhances threat appraisal, as individuals begin to evaluate both the severity of the potential disaster and their vulnerability more seriously.

Sometimes, the feeling of fear is intentionally created by the museum itself. "*Also, lots of people come to the museum but don't go in. Because they are scared and have experienced bad things in the past. We want to make people afraid of this tsunami. This tsunami is not just a tourist destination; it's a place that teaches us about God. First, we are afraid of the tsunami, and then we realise that God is powerful and that we will one day return to him. This idea is explained in the Prayer Zone*" (Informant 6). In this way, fear is redefined, not as something to be avoided, but as a necessary emotional experience that leads to both practical preparedness

[260] Zaalberg et al., (2009). 'Prevention, Adaptation, and Threat Denial: Flooding Experiences in the Netherlands.' Risk Analysis, Vol. 29 (12), pp. 1759-1778.

and spiritual readiness. Fear is not always a negative emotion; rather, when appropriately framed, it can serve as a powerful tool for reflection, learning, and spiritual awakening.

Therefore, in this study, DMFs are shown to strengthen the role of the threat appraisal variable in mediating the effect of environmental information on fear arousal. By providing emotionally charged, real-world experiences, through visual evidence, survivor testimonies, and symbolic spaces like prayer zones, DMFs make the threat more tangible and immediate, thereby constructively intensifying fear arousal.

Theoretically, this study challenges the argument that interventions focused solely on increasing threat perception are ineffective without incorporating coping appraisal: "*Raising threat perception alone is insufficient to prompt protective action without coping appraisal.*"[261]

Findings from Disaster Memorial Facilities (DMF) show that when visitors emotionally connect with the tragic events being presented, they become more aware of how serious a disaster can be. This emotional experience helps people better understand the dangers around them, making them more likely to pay attention to disaster-related information and take protective actions, like evacuating, if a real threat occurs.

The utilisation of DMFs as a substitute for coping appraisal is a viable option. DMFs can serve as a substitute for coping appraisal, especially for individuals who have never experienced a disaster firsthand and therefore lack a clear understanding of what such an event involves. Coping appraisal typically involves evaluating one's ability to respond effectively to a threat, often based on experience or perceived control. However, for those without direct disaster experience, this evaluation can be weak or even absent.

In this context, DMFs offer a valuable alternative by presenting emotionally powerful narratives and visual reminders of past disasters. These facilities allow visitors to access collective memory, shared stories, images, and experiences from real victims and survivors. By emotionally engaging visitors and helping them visualize the seriousness of disaster situations, DMFs help bridge the gap created by the lack of personal experience. As a result, individuals feel more motivated to adopt protective behaviors, including evacuation, because the emotional and social learning they gain from the DMF experience strengthens their threat awareness and encourages proactive decision-making.

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[261] Rogers, R. W. (1975). A protection motivation theory of fear appeals and attitude change. *Journal of Psychology, 91*(1), pp. 93–114.

CHAPTER VI

OVERALL DISCUSSION, THEORETICAL CONTRIBUTION, IMPLICATIONS, LIMITATIONS, AND FURTHER RESEARCH

6.1. Overall Discussion

The 2011 Great East Japan Earthquake and Tsunami (GEJET) severely affected northeastern Japan, particularly the Tohoku region, resulting in the deaths of 22,252 residents. In addition, a magnitude Mw 9.1–9.3 earthquake struck off Sumatra's northwest coast, triggering the 2004 Indian Ocean Earthquake and Tsunami (IOET). The tsunami caused extensive devastation to coastlines around the Indian Ocean in Indonesia (Aceh and North Sumatra) and other countries in South Asia and East Africa, resulting in over 200,000 fatalities. These disasters exposed significant deficiencies in evacuation practices and preparedness among residents, underscoring the critical need for effective evacuation strategies. Despite the early warning systems in place, many residents failed to evacuate in time, highlighting gaps in public understanding and response mechanisms. The situation in Aceh Province was even worse, as there was no early warning system in place, and many residents ran toward the sea to catch fish as the seawater receded before the tsunami struck.

In response to these challenges, both the Tohoku region and Aceh Province have developed disaster memorial facilities (DMFs), such as memorial museums, parks, monuments, learning centers, community centers, aquariums, and castles, under the initiative called 3.11 *Densho* Road in the Tohoku region, and a museum, a monument, a park, and mass graves under the name of tsunami tourism in Aceh province. A disaster memorial facility is a tourist destination where a disaster has occurred and the site has been transformed into an attraction, such as a museum, monument, or memorial park[262]. These sites preserve the memory of past disasters and serve as educational tools for raising awareness of disasters. However, how can DMFs influence evacuation motivation among residents in the future? It is therefore necessary to evaluate the effectiveness of developing DMFs in influencing evacuation behaviour.

This research then adopts the PMT framework to understand more about how people could adopt protective behavior and how DMF could have an impact on this behavior. In

[262] Zhang, X.; Izumi, T. (2024), ibid, p. 3.

addition, while previous PMT approaches have emphasized fear-based messaging, which can sometimes lead to adverse reactions such as emotional distress or avoidance, DMFs offer a more balanced narrative. DMF not only communicates fear-arousing, tragedy-based content but also presents miracle-based, educational messages that inspire preparedness and reflection. By optimizing the PMT framework to incorporate both positive and negative collective disaster memory elements embedded in DMFs, this study aims to expand the theory's applicability to tsunami evacuation contexts and contribute new insights into disaster risk reduction.

This study employed a mixed-methods approach, combining both qualitative and quantitative research methods. The first stage involved in-depth interviews with DMF experts, which provided valuable insights into the primary functions of (DMFs) and their contributions to disaster literacy. While the main focus of the study is on DMF in the Tohoku region of Japan, Indonesia's DMF practices in Aceh Province are briefly introduced to enrich the contextual understanding. Although all empirical analysis and data collection were conducted in Japan, the inclusion of Indonesia serves to illustrate the diversity of cultural and institutional approaches to DMF. In total, 21 respondents participated in the study, representing each sector of the Penta Helix framework: academia, government, community, business, and media, from both Japan and Indonesia. The interviews were conducted in different languages, such as Bahasa Indonesia and English, so the question and interview result was translated between English and Indonesian, and all responses were translated into English using a blind back-translation process by two independent bilingual translators.

Based on the DMFs experts in the Tohoku region and Aceh Province, the findings reveal that the DMF in Japan emphasizes disaster literacy by highlighting the risks associated with delayed evacuation, the distinctions between evacuating to a high building and evacuating to higher ground, such as a hill, and the paramount importance of timely evacuation. On the other hand, most of the monuments in the Tohoku region play the role of memorial statues in remembrance of past tragedies and the victims who lost their lives, while museums and other sites focus more on future generations. Furthermore, the primary purpose of the DMF in Japan is not only to convey these stories to future generations as a reminder of the recurring nature of large-scale disasters but also to impart important values for coping with such crises. The author further argues that this transmission goes beyond disaster literacy and includes the value of stoicism. Stoicism is a philosophy that originated in ancient Greece and emphasizes mental resilience, emotional control, and acceptance of what cannot be changed. It teaches that

happiness and inner peace can be achieved by focusing on what is within one's control while calmly accepting what is beyond one's control, such as natural disasters.

In contrast, the author argues that DMF in Aceh Province, Indonesia, focuses less on disaster literacy and more on the value of fatalism. Fatalism is the belief that all events in life are predetermined and beyond human control, and governed by destiny, supernatural forces, or the laws of nature. In this context, it reinforces the concept of the oneness of God. Furthermore, based on the findings of Chapter 4, the author continues the research by using residents as respondents and focusing solely on DMF in Japan.

The second stage consisted of a survey conducted among a representative sample of Tohoku residents with no experience of the 2011 GEJET. The decision was made to select respondents without direct knowledge of the 2011 GEJET or any other disaster to ensure the validity of evaluating the effectiveness of DMF in enhancing evacuation motivation. This population, residents living along the coastline affected by the 2011 tsunami but who arrived after the event, in particular consist of international workers who came to Japan after 2011. Their presence reflects a broader demographic trend: Japan's ongoing population decline and labor shortages, especially in disaster-prone rural areas such as Tohoku. In response to these challenges, Japan has increasingly relied on foreign labour to sustain its workforce.

This quantitative study presents five key findings: 1) The source of information has a significant effect on threat appraisal, 2) Threat appraisal has a significant effect on evacuation motivation, 3) Threat appraisal has a significant effect on fear of death, 4) There is a significant difference between the group of respondents who have visited disaster tourism sites and the group who have not visited disaster tourism sites. 5) Individuals who have previously visited disaster memorial facilities (Group A) tend to gain significant insights that motivate them to evacuate promptly in the event of a potential tsunami. Conversely, individuals without such experience (Group B) will be less influenced by the information they receive, potentially leading to a lack of motivation to evacuate. Furthermore, threat appraisal effectively mediates the relationship between environmental information and both evacuation motivation and fear arousal in Group A. Meanwhile, the DMF experience serves as a moderating factor that strengthens each of these effects within the same group.

6.2. Theoretical Contribution to PMT Framework

As a researcher, the results of this study do not truly create something entirely new. Rather, the author argues that research findings are formulated. All knowledge already exists in the universe, including that which has been organized and formulated by previous researchers. Therefore, this study can be seen as the author successfully discovering a formula for motivating individuals to adopt protective behavior. The author has formulated that the environmental sources of information provided by trusted institutions, such as academicians and the government, can serve as key variables in delivering disaster-related information. However, when it comes to influencing protective behavior, information alone is insufficient.

It can be analogized that even if the government regularly conducts disaster drills, this does not necessarily have a significant impact on an individual's motivation to engage in protective behavior. According to the study's findings, there are important variables that bridge the gap between information and protective behavior, namely threat appraisal, which refers to an individual's assessment of the severity of and personal vulnerability to a potential threat. When people perceive a disaster as highly dangerous and believe they are personally at risk, they are more likely to take protective actions. Additionally, the framework reveals another significant variable: the influence of external factors derived from the collective memory of the social community, which is then manifested in the form of disaster memorial facilities (DMFs). This framework is empirically proven to influence protective motivation, specifically by encouraging timely evacuation when receiving evacuation notifications from relevant agencies, such as the JMA (Japan Meteorological Agency) in Japan.

In this research, the author attempts to formulate a new framework from the previous framework of Roger (1983)[263] and Rogers and Prentice-Dunn (1997)[264] (see Fig. 6.1 and Fig. 6.2), by utilizing partial variables within the framework, eliminating the interpersonal source of information and coping appraisal, and adding a new moderating variable that is the experience of visiting a DMF.

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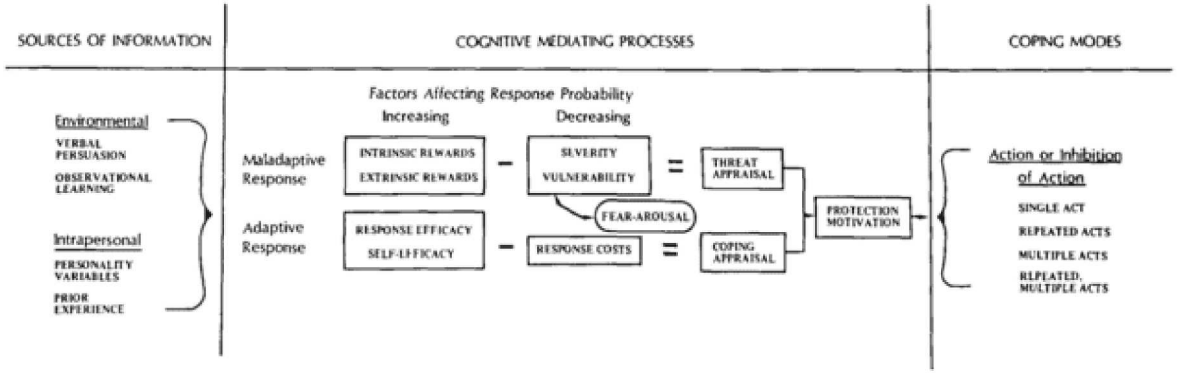
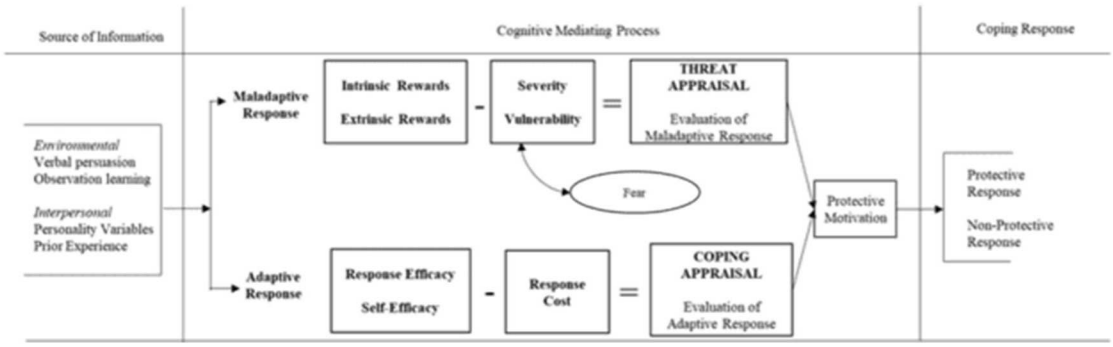
[263] Rogers, R. (1983). Op. Cit, pp. 153–77.

[264] R. W. Rogers and S. Prentice-Dunn, (1997). Op. Cit. 113–132.



Source: Rogers, R. W. (1983: 168)[265]

Figure 6.1. Refined Framework of Protection Motivation Theory (1983)



Source: Rogers, R. W., & Prentice-Dunn, S. (1997: 130)[266]

Figure. 6.2. The Structural Model of PMT by Rogers and Prentice-Dunn (1997)

The exclusion of intrapersonal information and coping appraisal in this study is based on practical considerations. Intrapersonal information, which includes prior experience, is deemed less relevant because the respondents have not personally experienced the 2011 disaster, making it impractical to measure its influence. Meanwhile, coping appraisal, which focuses on self-assessment of efficacy, is also excluded. Since the respondents lack direct experience with a major tsunami, they may find it difficult to accurately evaluate their ability to cope with such

[265] Rogers, R. W. (1983). Cognitive and physiological processes in fear appeals and attitude change: A revised theory of protection motivation. In J. Cacioppo & R. Petty (Eds.), *Social psychophysiology: A sourcebook* (p. 168). New York: Guilford Press.

[266] Rogers, R. W., & Prentice-Dunn, S. (1997). Protection motivation theory. In D. S. Gochman (Ed.), *Handbook of health behavior research I: Personal and social determinants* p. 130). New York, NY: Plenum Press.

an event. This lack of experience could lead to unreliable or inconsistent self-efficacy assessments, prompting the author to exclude coping appraisal from the model.

The inclusion of the experience of visiting a DMF as a moderating variable is based on its potential to enhance disaster literacy and emotional engagement. DMF sites are specifically designed to help visitors comprehend the impact of past disasters by providing firsthand exposure to the aftermath. Through immersive experiences, such as storytelling by *kataribe* (survivors or local guides) and viewing disaster artifacts, visitors can gain a deeper understanding of the event's severity. This exposure is intended to increase emotional connection by allowing visitors to vividly imagine the hardship and losses experienced during the 2011 GEJET disaster. Consequently, this emotional and cognitive engagement is expected to strengthen protective motivation, as the risks become more tangible and the urgency for preparedness more compelling.

Therefore, the framework needs further revision to incorporate the social and emotional dimensions of DMF visitation experiences, which are not adequately captured in the previous models. While earlier frameworks primarily emphasize self-assessment factors such as threat and coping appraisals, the new framework overlooks the influence of shared social experiences and emotional engagement on evacuation motivation. Furthermore, the results provide empirical evidence that DMF can enhance the effect of each variable. The findings of this study offer several important insights into the factors influencing evacuation motivation in the face of a potential tsunami (See Fig. 6.3).

First, the study reveals that sources of information play a crucial role in shaping threat appraisal. This indicates that the credibility and delivery of disaster-related information, such as warnings from government agencies or educational campaigns, significantly influence how individuals perceive the severity and vulnerability of the threat.

Second, threat appraisal is shown to have a direct and significant impact on evacuation motivation, and suggests that individuals who perceive a higher level of danger and personal risk are more likely to take protective actions, such as evacuating promptly.

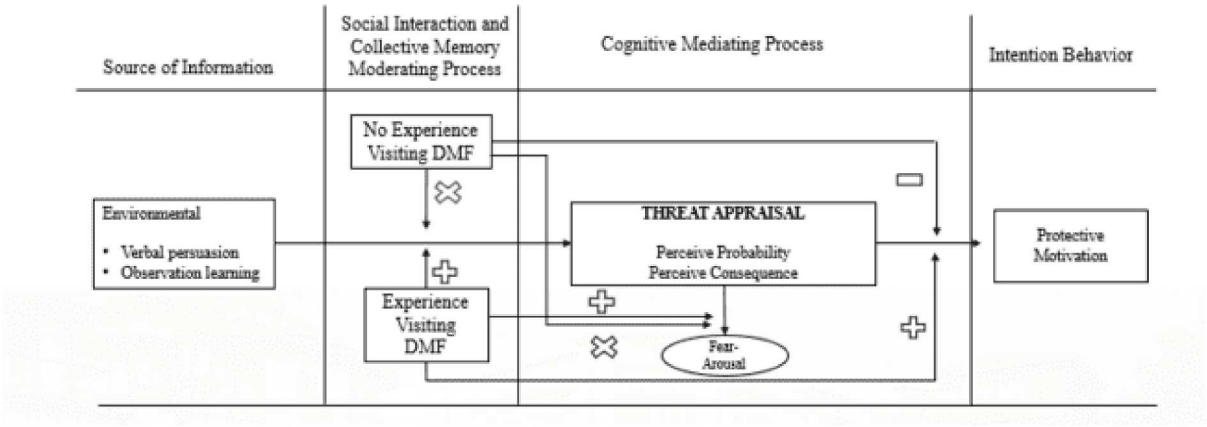


Figure. 6.3. New Framework Model Based on the Result of this Study

Source: Adapted from Rogers and Prentice-Dunn (1997), Rogers (1983), Author (2025)

Third, the study highlights the relationship between threat appraisal and the fear of death, and demonstrates that the more individuals perceive a disaster as life-threatening, the stronger their fear of death becomes. This emotional response further reinforces their motivation to evacuate.

Fourth, the study from a multigroup analysis identifies a notable difference between individuals who have visited DMF sites and those who have not. Respondents with DMF experience display higher levels of protective motivation, indicating that firsthand exposure to disaster-affected areas strengthens their disaster literacy and emotional connection, making the risks feel more tangible. Furthermore, threat appraisal effectively mediates the relationship between environmental information and both evacuation motivation and fear arousal in Group A. Meanwhile, the DMF experience serves as a moderating factor that strengthens each of these effects within the same group.

Finally, the study finds that individuals who have previously visited DMF sites tend to gain valuable insights that enhance their motivation to evacuate promptly during a potential tsunami. In contrast, those without DMF experiences are less influenced by the information they receive, making them more prone to non-protective behaviors or delayed evacuation responses. These findings underscore the importance of experiential learning through disaster tourism as an effective method for enhancing disaster literacy and protective motivation.

This finding helps explain why many residents in the Tohoku region still lack the motivation to protect themselves, even though the government had already provided information and warnings about tsunami risks before the 2011 disaster. A similar situation is seen in this study among Indonesian workers who moved to the region after the 2011 GEJET. Since they never visited any DMF sites, they also show lower levels of protective motivation (Group B).

On the other hand, respondents who have the opportunity to visit DMF sites scattered across the Tohoku region, which are specifically designed to increase disaster literacy by providing insights into the 2011 disaster, have higher motivation to adopt protective behaviours. This gives them an advantage over pre-2011 Tohoku residents who neither experienced the disaster nor benefited from the transmission of disaster knowledge from their ancestors.

The author argues that each generation in the Tohoku region has made efforts to pass down disaster narratives from before 2011. The Tohoku region's ancestors documented their experiences in books and built monuments to preserve the memory of past disasters. However, this method has become less effective over time due to language shifts, making the narratives harder for younger generations to understand. In contrast, the post-2011 generation has developed its approach to transmitting disaster literacy to future generations through DMF. DMFs can be seen as a modern method used by today's generation to transmit the memory of past tragedies in a way that is emotionally impactful and more likely to influence future generations to adopt protective behaviors, such as evacuating promptly after early warning systems are activated.

Thus, it can be concluded that a DMF is an effective tool for influencing residents without firsthand experience of the 2011 disaster, but who live in vulnerable areas. It enhances their protective motivation, making them more likely to evacuate when they perceive early warning signs of a tsunami, such as strong earthquakes or official evacuation advisories.

6.3. Research Implications

Based on these findings, this research recommends that local governments in tsunami-prone areas integrate structured visits to DMFs as part of school disaster education programs. The educational modules developed could include locally tailored tsunami information, observational learning from survivors' efforts, perceptions of earthquake and tsunami risks, awareness of potential personal impacts, and the importance of timely evacuation after a major

earthquake to reduce the risk of fatalities. Additionally, as the Indonesian workforce grows, the need for disaster preparedness education and training becomes more urgent. Tailored training for Indonesian workers should also incorporate DMFs.

6.4. Limitation and Further Research

The limitations of this research include the potential for self-selection bias, as differences in pre-existing awareness and dispositions may exist between visitors and non-visitors to DMF sites. This highlights the need for future longitudinal research to provide a more comprehensive understanding of protective motivation. A potential future research design could include a follow-up survey with the same participants one year later to assess changes in evacuation motivation, which could also be conducted as a longitudinal study. In addition, considering the influence of different types of DMF visits (e.g. guided vs. independent visits) and regional factors could add depth to future studies.

Furthermore, as this study partially adopts the PMT framework without incorporating coping appraisal, future research should consider including coping appraisal, which may have a stronger influence on evacuation motivation, particularly in regions with limited exposure to disaster education.

Future research should also explore the effects of different types of DMF visits, examine the influence of regional characteristics and cultural backgrounds, and assess the impact of temporal factors (e.g., time elapsed since the DMF experience). Additional inquiries could investigate the specific types of DMF experiences respondents encountered, perform a comparative analysis of differences by residential area (high vs. low tsunami risk), and offer a more nuanced understanding of protective motivation.

Moreover, due to the low-reliability coefficient for the Fear of Fatality scale ($\alpha = 0.582$), future studies should refine the survey items, include more specific questions, and conduct pre-testing to improve reliability.

6.5. Ethical Clearance Statement

In this study, informed consent was obtained from all participants after they were briefed on the research's objectives, procedures, potential risks, and benefits. Although no formal approval from an official ethics review board was obtained, the study adhered to ethical standards under the supervision and guidance of the Chairperson of the Indonesian Tohoku Family Association, thereby ensuring that the research was conducted responsibly and respectfully while safeguarding participants' confidentiality and anonymity.

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Appendix

Appendix 1. Disaster Memorial Facilities Exhibition Pictures

Figure. Damaged Fire Truck by Tsunami Disaster in Iwate Tsunami Museum, Source: Author (2024)

Figure. Kesen Ohashi Bridge Part Damaged by Tsunami Disaster, Iwate Tsunami Museum, Source: Author (2024).

Figure. Baiturrahman Mosque in Aceh Survived the Tsunami, Source: Author (2025).

Figure**.** A picture of the monument to the name that was swept away on the emergency building, and the wall to show the height of the tsunami that struck this area

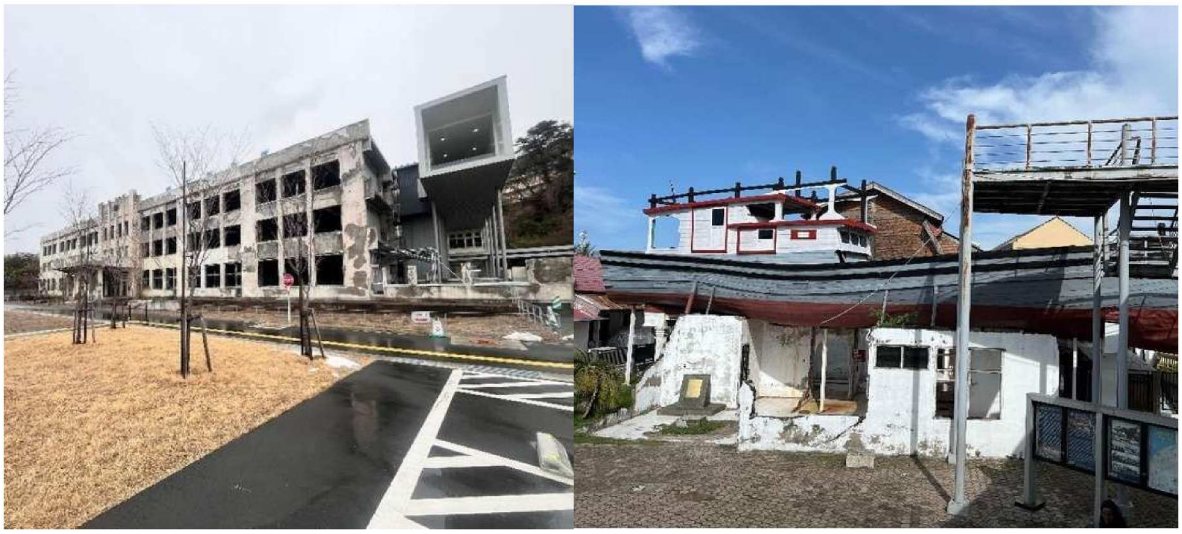

Figure. Picture of Disaster Ruin that has been preserved at Kadonowaki Elementary School in Japan, and “Boat on the Roof” in Indonesia.

Appendix 2 (a): Kataribe of Konno Fumiaki Rikuzentakata City

***KATARIBE* / TOUR GUIDE INTERVIEW**
RIKUZENTAKATA CITY, IWATE
By Konno Fumiaki, February 22, 2024

1. **What do you know about this building? It is the last standing building, and it was still there while the other building was gone.**

Yuichi Yonezawa owned the Yonezawa Shokai Building, which was left standing after the tsunami hit Rikuzentakata City. This building is a shop that sells small things like a plastic cup, etc. The chimney height is 15 meters. And the water level of the tsunami touches the top of the building about 15,2 meters. Mr Konno tried to climb out of the building and measure the height of the building to understand the height of the tsunami, 15,175 feet above the ground. The ground is 2 meters above sea level. So, in terms of the sea level height of the tsunami is 17,2 meters. This is an urban area, the centre of the city.

2. **What is your feeling when you tell the story about the 3.11 earthquake and tsunami? And what is your motivation to tell this story to people?**

When I tell my stories, I tell them as they were when I survived the tsunami just before March 11. I don't want people to do this, but if they can listen to my story and imagine what it was like, they can understand the height of the tsunami or the horror of the disaster a little bit. When I tell my story, I always remember my father, mother, and younger brother clearly. When I talk to everyone at the storytelling club, I can remember not only the time of their deaths but also all the happy memories I had before that time. I'm grateful for the moment I remember them, so the joy of remembering them is greater than the sadness, and that's why I'm talking like this.

3. **How was the condition of this city before and after the disaster?**

Let's see the image of the town. This is the town before the tsunami. He tells the surrounding image of Rikuzentakata station.

When they heard the tsunami coming, because of the tremendous earthquake shaking, he took his parent to the nearby auditorium structure near the city hall. Everybody thought the tsunami would be 3 meters high. As it was broadcast by the Japan Meteorological Agency. 3 meters initially and then change to 6 meters. Although in fact here it was 17,2 meters. So, he miscalculated, everybody miscalculated in the escape. It makes a huge difference. He taught his parent would be safe in the three-story auditorium near the city hall, for various events like music, concerts, and return to his building to tidy up the store. In case a tsunami comes, he saves, because he thinks the building is very high. In fact, it wasn't. he nearly died. Because he just hanging on the top of the chimney, the water came. He thought he going to die, and he took a video of the tsunami with his phone. He recorded and everybody knows what happened to him. So unfortunately, his parent and brother are dead.

4. **Can you tell me more about the JMA Broadcast message to the people as a tsunami warning?**

The broadcast said a tsunami was coming, it will be 6 meters in Miyagi, 3 meters in Iwate. The sea wall at that time was 5.5 meters above the sea level. So, we are safe. So, people didn't escape immediately, they waited and see. 10 – 15 minutes later, the agency changed the forecast into 6 meters in Iwate and Miyagi to 10 meters in sea level. We are astonished, it's very high from our recent memories. But still, the sea wall is 5.5 meters, so thought we are safe, but it's completely wrong. It's not only because of the earthquake and massive tsunami, but wrong information given to people is very… very… decisive.

The government, scientific, must make sure the information is correct when giving information because it's about life and death. And this lesson is not being learned. Has not been learned properly. In my opinion. They don't talk about it, I don't know maybe because of they are shamed. They talk about another thing. Skipping the main point. The government didn't say sorry. And if they accept and say sorry, it might be a legal problem.

5. **How many people were dead and/or missing in this city?**

Rikuzentakata, 1.800 people and more, we don't know how many people subsequently, by the consequence of the tsunami, because there are so many elderly people. They die after the tsunami because of natural causes, cold hospice, not good heating, ventilation, one of the hospitals here, overnight, 16 elderly people die. These are not mentioned publicly. It's not known. Direct or indirect cause.

6. **How long is the duration after an earthquake happens to a tsunami? and how you survive?**

40 minutes before the tsunami came. We have enough time to escape if we get the right information. Myself included, when I heard 3 meters, no rush no problem never reached my house. So, leave my computer on the table and many things. I just went for a while and I came back. I escape to the hill. When I was on the hill, the city was submerged by the huge wave. I lost everything. I don't wear the best clothes outside.

7. **Do you think this is the first tsunami that has happened in this area?**

The number is very comparable to 1969 in the Sanriku area, mainly Iwate. Iwate is very famous for tsunamis.

I wonder why many people living near the sea, adults, teachers, and intelligent people they didn't escape into the higher ground? That's why the larger people die in Miyagi. They don't believe the tsunami will reach their house. More than half from Miyagi. This is very high cost to learn, they are regretting a lot.

8. **What is the lesson learned that you want to share?**

I want to say the point that natural disasters we cannot blame because it's nature. We blame ourselves because we are not ready. Not giving the right information. Not being prepared. 10 years previously, the top scientist in Miyagi said a 10-meter tsunami would hit in the future. The warning is a 10-meter tsunami. At least 10 meters high.

But they keep using the emergency centre just 3 meters above the ground. The emergency centre is a shelter. Many people came here when the disaster happened. Many people die there because it's designated as a place to shelter in emergency times.

Now, this city planning wants to leave this place alone because in the future when a tsunami comes about 15 meters height, it will be safe. This area does not have permission to be lived in. Not safe.

The recent forecast shows that even here, it is still dangerous. You have to have a very flexible mind. Nothing is given. You have to think and decide.

9. **Did the Tohoku people have a special culture? Does the ceremony have purpose to prevent the disaster from coming back?**

Yes. They pray as Buddhists or Shinto to celebrate something, or pray for disaster prevention. Any festival starts with prayer, it's habitual. There is not so much religious belief, but a kind or tradition.

Free conversation. question comes from the *Kataribe*: do you know the difference between Buddhist and Muslim?

I lived in Cairo over 20 years ago. Travel for a Japanese visitor. A larger tourist company private. Larger number of Japanese. Every Christmas or New Year's we welcome 100 more groups of Japanese. I visited Jerusalem, the golden mosque, in the summer time, I studied in Jerusalem University in English. I saw all 3 religions. You have to make a difference between religion and philosophy, and people. Do they behave as the religion teaches you? No! Muslim people are different. Different between Buddhism and monotheism. Buddhism doesn't have an almighty God. Budha or Shaka is one of the people who reach that one. Individual living creatures have the possibility of becoming Buddha. No such thing as one heaven or hell. Possibilities of having a million paradises. This is different from monistic; Almighty God decides many things whether you are good or bad.

So, doesn't mean you are God, but in reality, this thing or Buda is just as God like. Religious philosophy can be as good as anything as long as people practice. So, what people practice and religion is different. Pluralism vs monotheism.

We are treating anything as God, like ancient Rome, ancient Greece, how people did it at that time. And surprisingly, we are the people who doing it in the century of 21. In a very post-modern, incredible information.

Most of the countries are dominated by 3 religions: Christianity for Europe, Islam in the Middle East, and Judaism with a small number. US Christian. Rest of it what?

Japan is still practicing just like ancient Egypt, Rome, and Greece, in a modernized, and still valid, way. Because of the million Shinto temple and practice ceremonies, festival must be something that valid must be part of tradition.

We are religious but not part of a religion in a way of Judaism or monotheistic, although we behave quite often like this people. Buda is not God but a threat like God.

Every new year, I go to a local Shinto shrine. It was important not because I believe in the deep meaning of Shinto, I don't know what their teaching is. But still a kind of gasoline with an upper.

More for United, very important, very rare to have a meeting like that. Traditionally, the local and big family in town contribute to the Buddhist temple and Shinto shrine. They have more connection with the priest or monk because their grandparent continues to contribute to the temple and shrine.

Family gathering to maintain. It's very important to keep the culture, it's not an absolute belief but it helps. More natural pragmatism. Good for everyone to be here, pray to something. It's not forced to do anything. You are free to come. Buddhism, for our long tradition, is very important to deal with the temple because we have family members who have died in the past and keep the cemetery right.

When are you going when you die? You go to the cemetery; you want to keep it in a Buddhist temple. Where do you go? Your ashes will be buried in the temple.

10. What is the story of Takata Matsubara Tsunami Reconstruction Memorial Park, which is known for "Miracle Pine" or "Kiseki no Ippon Matsu"?

Miracle Pine is in Rikuzentakata. But we are ambivalent about this, of course, we see it's a miracle, see one tree surviving after the terrible disaster. But at the same time, a part of the tree about 70.000 we lost everything here unless here. We lost the symbol of our town and our home. Every town has its landmark or symbol.

***kataribe,* ask me: what is your city symbol? I answered Bromo Mountain.**

If the Bromo mountain disappears, you will lose part of the town. For us, it's a pine tree and the sea. Every time I go back home from Egypt, London, or any country out of Japan, I go to the beach and feel like I am home; when you lose it, what u feel?

The pine tree survives, but it's not enough, 70.000 pine trees that we need. And to keep this artificial tree, there was no discussion, the mayor decided by himself and took credit for it, we dislike it.

Ambivalent, it could be the shrine of the tsunami.

Crowdfunding to do it, an artificial tree. But better to build a house. Not everyone is happy. This is reality.

11. Do you have any story about the miracle pine tree?

The branches of the pine tree are only the top of it, because the surrounding tree is higher than it. So, he wants to get high and high to get the sun.

Again, it prevents water heating him directly, survive. The root is not deep, less than 1.5 meters.

Idea why it's not a miracle, it survives by the condition. It's not a miracle. The mayor decided to keep it.

But the people are not particular because the cost is high. In the end, get enough contribution of the publicity, then it's not harmful. Good to people coming to see.

12. What is the building that is still there near the Miracle Pine tree?

1971 building something funny from Europe. Young people visiting alone and having experience, the tourism becomes popular, you can travel freely. But then become unpopular anymore. This structure helps this district survive.

13. What is your main Motivation being *kataribe*?

I think that many things can be learned. Very few are being learned. Continue to be learned, it's a pity. We talk about miracles; it's not a lesson. We have to learn another important thing. About forecast. We are not prepared. The fact that the emergency shelter is as low as 3 meters.

According to scientific simulation, the city is not responsible, they follow the simulation. Iwate prefecture study simulation.

People are very quiet. Because they are embarrassed to blame the mayor and city officials. We are one way together, the mayor didn't decide himself, collectively.

When you blame city officials, you have to blame yourself and you didn't criticize why you chose that policy.

But that's not giving you good learning.

14. Is there any good place to know the lessons learned other than from the *Kataribe*?

People are overwhelmed about the tsunami, not thinking logically, very important flow, better than another tsunami museum. Some parts are very good. Especially university research introduction, history, and data about the tsunami.

Major flow is the room called lesson. Big propaganda displays of the part of government in Sendai, Tohoku area, which publicly displays the numerous achievements by the officer as an "operation comb".

Major strategic road, to open the road from the middle of the Tohoku region, start from the line of the train line. They clear it very fast and publicize it, glorifies it. Not the lesson.

The self-defence, firefighter, move quickly, help many people. But this is when we discard the important thing I mentioned. Embarrassing, very few people realize. We lost thousands of people, publicizing what you did good is not a priority, this is normal, you should not glorify yourself. Tsunami storytelling becomes tourism, the number of tourists coming is more important. We don't want to embarrass people. Reasonable, but the fact is that if you hide an important thing, we can't learn anything.

I visited many museums, an art museum, a disaster, could I say?

The lesson is not properly learned.

The meteorological agency gave the wrong number. Chronologically mention in the museum, 3 meters, 10 meters. Based on the research, this information cannot change the behaviour of inhabitants to escape. Completely wrong.

15. If you said so, then any other Museum is good to visit to get the lesson learned from this disaster?

The Yuriage Tsunami Recovery Memorial Museum (津波復興祈念資料館 閖上の記憶) is located in Yuriage District, Natori City, Miyagi Prefecture, Japan. It was established to commemorate and educate people about the 2011 Great East Japan Earthquake and Tsunami, as well as to raise awareness about disaster preparedness.

16. About the phenomenon that many people refuse to do in time evacuation, what do you think the reason behind this behaviour?

We had traditional mythology that tsunamis would not come into the town. They think naturally, in Iwate prefecture, that many coastal tsunamis come from small inlets, which make water swell very fast, that's traditionally Iwate famous with tsunami.

In other hand, Ishinomaki city downtown, we don't have an inlet. Like sun beaches. They believe wrongly, tsunamis come from Iwate because the Rias coast, zig zag, Ria in Spanish is 'in depth', Rio is river, Ria feminine inlet. Rio is masculine, straight. Rias is plural. The Iwate coast is called a rias coast. People in Miyagi believe that only Iwate has big tsunamis. Miyagi

people think it's not dangerous because historically it hasn't happened for 100 years, also. Coastline inhabited an excess population of Sendai, a newcomer. They may leave in 10 years. Past 50 years, no tsunami, nothing happened.

Appendix 2 (b): Mio Kamitani san Kataribe from Kamaishi and Otsuchi city

PRIVATE KATARIBE / TOUR GUIDE INTERVIEW (BUSINESS)
KAMAISHI AND OTSUCHI CITY
Kamitani, 24 February 2024

1. **Why in this city, do a lot of people hesitate to evacuate?**

A lot of work, especially for old people, to run up the hill. Also, they imagine the condition of the emergency centre will be crowded, they don't want to be in that environment. On the other hand, some people trust a 6,5m seawall, we have time to evacuate, or the thinking that a tsunami will not come to the town. Information bad; 1st warning thought broadcasting system estimated 3 meters, so people knew the seawall is 6,5m, it's higher than 3 meters, so the seawall will protect us. Bad announcement. Change how they announce after 3.11 that I could give the credit for that, at least they try.

2. **Do you know the improvement from the government after this false information?**

Now, the National government does not mention the height of tsunami unless they are sure of the real height of it. Now they say "big wave" is estimated or "super big wave" is estimated. So, when people hear big wave they don't know how high so it kind of scares them, but then I think what the warning is supposed to do. Warning is supposed to warn people, so they want to evacuate. But before, when 3.11 happened, the warning broadcasting gave assurance to people that they did not have to evacuate.
At least it's a change.

3. **Are you a survivor of the disaster? What is your role in this disaster process?**

I was not in Tohoku when the tsunami happened. But I was a member of a Non-Governmental Organization (NGO) and sent here as a rescue worker and met my husband who originally came from here.

4. **What is your motivation to become *Kataribe*?**

Kataribe is a little bit different angel, I could give a broader view of 3.11. Most *kataribe* told based on their experience of what she/he went through. Through kataribe they teach what is worked and what is not worked, see wall and triangle show how hight the tsunami was.
This location shows the failure of government about the drill disaster that direct people to this place, unfortunately it's not a safe place.

5. **What do you think about residents toward this disaster?**

Many residents are not accepting the disaster at first. They are in an Angry situation. But it depends on the person I think, some people find peace in it, some people don't, in a way. Find a way to move on, some people are stuck, especially people who have lost a lot of family members. So older people are hard for them to look forward to it.

6. **Is there any special culture of Tohoku people that can find peace after this big disaster?**

Culture of Japan, especially in Tohoku, because they face a lot of disasters, and the winter here is really strong, I found out that the people here just accept the nature as something they can't control. What will happen, happens. They live with that. Some people said they don't blame the disaster because it's just what nature did to them,
So, then this people gear the anger to the local government after a disaster, how poorly financial problems are handled, instead of being mad at nature. A lot of people are mad toward the local

government or even the national government for how they handled the situation. Some people have to move from their land. After all, their old land is prohibited for rebuilding the houses because they so close to the ocean, so when those policies start to be implemented, they start to get mad at the government.

7. Do you know why they mad? it's good for their safety?

Because it's the land they grow up in and taken away from them. Instead of being mad at nature, the policy is something man-made, it's easier to give the anger toward that. Anger expresses itself, and a lot comes out to the government. In life, it's natural to feel anger. The land is their heritage from their ancestor.

8. Then back to this question, why do people in this city not want to evacuate?

So difficult to leave them at home when your grandparents are in the house, that's why many victims die in a family like 4-5 people because they stay at home together. Now we tell the older people from younger kid training to evacuate, if its difficult, for example I tell my mother-in-law to evacuate, but my son said OKAY we need to go grandma, she more like agree to go because they don't want be apart with the grandchild, so we teach a young kid to evacuate no matter what. When the small kids evacuate, more likely the grandparent generation will follow. Another problem is, even before 3.11, we have a high number of older generations in this area, now with a much higher population, it will get more difficult to go up higher; that challenge, we didn't figure out what to do even for Japan.

Especially when 3.11 happened its rare case, because it's happened in the weekday during the daytime, kids are school, my generation are work, and older generation in the home, or the kids that still too young to go to school yet, and since this is very traditional area usually 3 generation live under 1 (one) roof. Usually grandparents look after the grandchild, while the parent is at work, before the grandchild is old enough to go to school. So those generations are too young to evacuate on their own, and the older generation is also in a vulnerable situation, when it comes to evacuation. So, we assumed that so many people want to evacuate but couldn't think about holding hands of the younger kids and going uphill, then they just went home, and stayed in the 2nd floor, visited the neighbourhood house which is higher but a lot of them washed away.

9. How much weight of the tsunami that came to this city?

The highest tsunami is in Otsuchi city, 20m, while in Kamaishi city is about 12m. In Outsuchi city, the coastline is very zigzag here, go to the Kesennuma, where the tsunami is getting bad, because it's a coastline. The Fukushima coastline is gentler than the waves coming in more slowly in the area. Iwate is the worst hit. Because of the geographical. Enter the narrow it's squishes and increase the height. We can't see the ocean in the Pacific, and when it comes, it's too late for him to evacuate. The scenery is much different from Rikuzentakata. The downtown is close to the ocean because it is a coastline area, a coastline area is where the sea and the mountain are located closely, so the flat area is the nearest to the sea. The water travels 10km from the sea through the river, so many areas near the river is flooded.

10. Why does the government intend to build an Otscuhi community center instead of other memorial facilities? What is the function of this building?

People from different generations gather here, the community here is very strong. Anyway, this community center is not used constantly before. But after 3.11 it became active. Now so many things, an event, a group of ladies that get together, sewing, a lot of people want to talk about that disaster. Is such an emotional talk, but then they find it difficult when the professionals come, difficult to start the opening, especially with someone they didn't know, and what happened to them is so big. They find out a lot of people love to sew, and they do it together

and start to talk about that in a natural way rather than therapy. It's getting difficult to talk with somebody that you don't have a relationship. And your timing is narrow, 1,5 hours. But when they come here every day for the purpose of flouring, or sewing, even sometimes it comes out, sometimes it doesn't, but it's something more natural way. To release each other. You don't need to talk to each other, but when you want to talk you can. Talking is healing. Because it's too big to process. They don't even really know where to begin. You lose your family member, house, job, everything, where do you start? Now that the group has been continued for over 10 years. Sometimes they sell and show their work. Different groups are doing the different crafts. Like the man playing the gambling, but for 1 yen, just come together.

11. What is the story of the tsunami when it hit this city?

After the earthquake, many people here are depending on cars for transportation, so they try to drive cars up the hill to evacuate, and there is traffic congestion in the road, and they fail to evacuate. So, imagine there are people who don't want to evacuate and also people who want to evacuate but they can't. At that time, it is winter, also the paving is usually slippery, and for 3 months for that kind of situation, from December to march, then many old people won't let out the kid by them self because too slippery, its hasn't become our habit, put on jacket and go. They tried to evacuate, we had enough time, but since they didn't see the change in the water, and were freezing outside, forgetting their jacket, mobile phone, and they came back to their home to bring the stuff, but then the tsunami came. Going down to take stuff.

12. How was the story after 3.11 disaster?

Now the reconstruction itself, adding a 7.5m sea wall, controls the water into the river. And the city decided that the area so near to the sea is prohibited to rebuild the house. 4 meters ground up level of soil. Elevated ground.

13. Why did the residence refuse to follow the reconstruction?

Sentimental value of land. It's very important to protect the land as a heritage from ancestors, because every generation to the next lives here and they have to protect it, but they can't. It feels ashamed. The government purchases the land, and gives the land somewhere in the Otsuchi, but still it can't switch to other land even though the amount of the land is covered.
There are some people who moved out from the city because of the policy, there are some people who have no negotiation, after the city plan is fixed, the government just give the money and they have to sign in, and some people issued the government to the court of destroy the right of them.

14. What kind of activity could cheer up this community again and accept the situation after the disaster?

The traditional dance is also helping people, where before 3.11 the interest was going down, but after 3.11 they realised that being in a group is important. Especially when we are in the shelter, at least people know each other. They will be able to each other. Most of the group lost their equipment, but most of them got donations and rebuilt their stuff. And I hear many people say that when they do the dancing, they lose the focus on disaster, they just focus on what they love to do, and help them. It's difficult not to think about disaster, after disaster.
After a disaster, people cry, you have to think of a billion things. Your family, house, job, life, you don't know what. It really helps them to dance for a couple of minutes and not think about disaster. Most groups do once a month.
As a rescue worker, we need something that helps us not to think about disaster, and it's hard, also it's draining the energy, energy-consuming, it's really difficult to have positivity. But dancing just to be in that moment and help them emotionally cover up.

15. Can you describe how the dead body was managed?

Cremation is the law of Japan, we went up sending the body to a neighbouring city, but still cremated. Temporary buried, and dig up to cremate. By law we must cremate.

16. Can you describe more what happened to this city after a disaster?

City hall killed the mayor. 139 people work in the government office. Otsuchi city became famous because 39 government workers lost, including the mayor. Rikuzentakata City lost the building. But in here, 70% of the top person is swept away. That was a big issue, none being able to make a decision. They elect a new mayor in August 2011. 5 months running without a mayor. Here is the epicentre of chaos.

17. Along with this important story, why are there no 3.11 memorial facilities that have been built in this city?

Unfortunately, the memorial place related to 3.11 is destroyed by the government to avoid local people remembering the disaster because the position is really at the heart of the city. So, the government doesn't want to make people see the ruin building every day and remember the disaster.

18. Is there any complaint from the residents during the reconstruction in this city?

The soil elevation is also harming the nature. Even the seawall construction is causing complaints by the fishermen because the construction starts deep in the sea, affecting the ocean environment.

19. If no monument is built related to the 3.11 tsunami, is there any monument related to the tsunami? How do people warn the next generation?

We have a monument after the Meiji tsunami and the Showa tsunami. We have had this monument like this throughout the coastline, and not many people knew. They really don't pay attention to what this is. Irony that we can't really read this, because it's old Japanese. The letter is very different from now. We don't use that kanji anymore. But the message is:
"After the earthquake, watch out for a tsunami"
"If a tsunami is coming, evacuate to the higher ground"
"Don't build houses at the lower dangerous zone"
They repeat so many over the years, but without *kataribe*, and education, the tragedy might be repeated.

20. What another place has a story related to the 3.11 disaster?

Next: We go to an evacuation place in the hill. There is a light on in the hill that is brought from a group of people who are doing *kataribe* in the Kobe to commemorate the people who die. It's a light of hope.

Picture Light of Hope

Facilities are necessary, but *kataribe* is losing their business nowadays. In the local younger generation, there is still a need for the *kataribe*. The teacher in Outsuchi is struggling telling the story to the student because they only have a picture and a video here.
Next, go to the attraction where there was a boat up the house. But again, it's only left the picture, with a barcode that when you scanned it, you could see the 3D picture of this boat.

Picture of Ship in the House that Destroyed

Before this attraction was destroyed, people lived in this area and were arguing. Where most women want to keep it, but most men didn't want it. Fisherman is very old and patriarchal, so man is winning. Again, if they keep it, they will see it on a daily basis. It's too close to the living area. I don't want to see this every day, especially people who lose their family, but for educational purposes it is needed.

21. Do you have another intangible heritage from the 3.11 disaster?

Miracle of Kamaishi:

A group of schoolchildren evacuated without a teacher, because this school was proactive in disaster prevention, and because students evacuated, especially junior high and younger, followed the community, which also prompted the community. They go to the hill to evacuate. And because of it, many of them survived.
There is also another group that went to a building that they thought was an emergency centre. This building was used as a disaster drill, as a place to go to evacuate. But because it is not high enough, many people were not there. So, they have positive and negative memories of Kamaishi City.
Kamaishi City used to make disaster prevention drills regularly, but since the community that joins this drill is getting smaller, because walking up hill in the drill is tiring, then the local government thinks to increase the participation, which changes the evacuation place. Instead of evacuating to the right hill, they use the community building, then they lose the essence of the disaster drill. Then, people commemorate in the Memorial Centre of those people die in the drill area.

Picture of Unosumai Tomosu in Memorial Park the Place of Former Emergency Building

Picture of the monument to the name that was swept away on the emergency building and the wall to show the height of the tsunami that struck this area.

Appendix 2 (c): Mr Seietsu Sato Kesennuma city

KATARIBE / TOUR GUIDE INTERVIEW
KESENNUMA CITY
Mr Seietsu Sato, former head firefighter, February, 2024

1. **How do you feel about the 3.11 disaster?**

"I hate the Great East Japan Earthquake that swept away my loved one (wife), beloved family, and colleagues, just like leaves, but I also learned the importance of fully accepting this truth and taking strong steps toward new goals and objectives with a positive mindset and heart."

2. **How high was the tsunami that hit in this city? And how does it affect**?

20-meter hit. Over 20.000 were lost in this disaster. I will not forget my feeling for those lost people and my lost wife.

3. **What is your motivation to become *Kataribe*?**

I will continue my Kataribe as long as I live. I learned the importance of these things at the Great East Japan earthquake, about the leadership in a disaster situation. What is important in a leader? Leader should not waver, don't waver from what, leaders should have an unwavering determination, to protect live, first protecting their own live, then lives of family members, and organizations and the community, also please be someone who can adapt to changing circumstances, don't be complacent, adapt to the changing environment, and think of the next steps.

4. **What is the Lesson Learned that you want to share?**

Lesson learned in the reconstruction time, in 2013, in Kesennuma City accepted volunteers from Baylor University, Texas, USA. At that time, everybody was smiling with their teeth; after the earthquake, it took me 2 years to smile and laugh. I couldn't do this at the time of disaster. So, what is the important thing to meet these people through this program, that's compassion. What is compassion? Compassion is, for example, when a grandma tries to climb up the stairs, it's not enough just to worry about her, and what might happen to her, but having compassion is to hold her hand and help her to climb the stairs. Having compassion is to put your thoughts into action. This program connects people's hearts with hearts; people can help other people. I am so grateful.

Lesson learned: Protect your own life, even if you are a couple, siblings, parent, child, or friend, even when they are holding hands, they got separated in front of their eyes and left separately, the word self-help. But that kanji hidden between self-help, what do you think it is? It's the kanji life. Once you have safe, help those around you. Strengthen new ways to prevent disasters and the ways to live. Memories are forgotten, but records remain, as a proof of my experience I will write a book.

5. **What is your story from 3.11 disaster?**

The very sad part was when my colleague found his wife's dead body, "I'm going to come to you soon, wait for me, and his son whispered he couldn't bear to lose the dad as well, then I took my senses, I though im not the only one in deep sadness, so many people lost their loved ones, 20.000 people died in this disaster, and everyone suffered about their lost."

Appendix 2 (d): Storytelling Bus by Shun Ito Kesennuma City

KATARIBE / TOUR GUIDE INTERVIEW
MINAMI SANRIKU HOTEL BUS TOUR
Shun Ito and Kazuma Goto, February, 2024

1. **Can you describe the 3.11 disaster?**

It makes the disaster seem like a dream, it was a beautiful and gentle surprise. Yet the fact is that all the houses, people, things and our heart were carried away by the massive earthquake and the terrifying coal-black tsunami.

2. **What is the attraction that can relate to the disaster?**

We are now taking you to Togura Junior High School. You can see the Moai statue on your right. During the Chilean tsunami in 1960, 41 people died here, this region has a long history of earthquakes and tsunamis. Therefore, *Kataribe* exists to not let the disaster fade away. We are only human, so our memories fade. But we want to prevent that. Many years passed, and I realized more and more that we must not live as if nothing happened. It seems as if nothing happened. If we don't see it or know it.

The reconstruction has progressed, and there are few traces of the disaster now. The 1st stop used to be Togura Elementary School, but there is nothing here now. The building was white and beautiful. Its gymnasium was magnificent as well; it had only just been rebuilt, and the work was completed on March 1, 2011. The tsunami destroyed the gymnasium before the first graduation was held in the month. All the students were survived, they experienced the earthquake on March 9, which led the teachers to decide to evacuate the next time. And they even carried out a drill on March 10. That's why everyone ran and survived. Otherwise, they would have escaped to the rooftop. Maybe they still would have survived, but the teachers thought beyond that. They wondered how they would protect the students if they became isolated. They chose the high ground after considering all factors.

Next: Takano Hall

It's a high building, the rooftop is the height of the tsunami, 327 people survived here plus 2 dogs. One of the staff had experienced the Chilean tsunami, ran to the rooftop and checked the see, the water receded. In the Chilean earthquake in 1960, the sea receded and People rushed to collect the exposed fish, and the tsunami carried them away. Our memories are fade away. We don't want the stories to be distorted. We want them to be shared accurately. We want to tell you about the disaster, but even more. To protect your lives and live on.

Next: Shizugawa City

There is a building of city hall, 50 people on the rooftop, 43 were carried away. The building is 12 meters tall, but it was swallowed by the tsunami. You might think you save there, but it's not. We must not forget them. It's a heart-breaking place.

If we forget this, our memory of the lives they wanted to live will fade away. That must not happen. We hope a disaster never happens to any of you. Please survive, stay alive. I sincerely hope you remember that. I feel that strongly, especially here.
By praying for this town, I feel as though those missing will come back soon. As you place your hands together, you feel their warmth. This is obvious, but you wouldn't feel that just by looking at them. But on that day, there were no warm hands. There was only a cold hand. When you look for your family, if you can't find them at the shelters and around, you go to a morgue, even if your family isn't there, you would see someone else you know. I want all of you to protect that warmth. You can do it, once you have seen these places. I used to live right there, where half of the sea wall is gone. There was an apartment building there, but it's gone now. The tsunami reached its rooftop as well, it taught us some lessons. Some survived on the rooftop, it was an evacuation building. 48 families lived there and nobody died, because it was at the seaside. If they lived further away, they would have thought that they were safe.

3. **How could all of them survive?**

We have tsunami *tendenko*, it means you should "run alone towards high ground when the tsunami hits" even if separated from your family, that is to save your own life first. It's important not to misunderstand this. It sounds selfish, but it's not; trust each other in the family and survive when separated. That's a lesson from our ancestors.
But remember, tsunamis tendenko teach us to always run. Run higher than before. We must learn from the past and be as ready as possible. So, please survive, keep living and then regain a normal life.
There are three steps I learned from a professor at Mie University. Protect your own life first. And then protect those you love.
Sharing of your experience here will bring more people to this town. Disaster-affected places are not dangerous now. They are places to learn important lessons.

Storytelling Bus by Kazuma Goto - Minami Sanriku Hotel Kanyo

Togura Junior High School, renovate it as the current community centre. That also shows the time off that shows when Tohoku Electric shut off the power supply. The tsunami height is 22 meters. Unbelievable, there were 3 types of people;

1. Followed instruction and evacuated to the 2nd floor
2. Some who had never seen a tsunami went over there to watch the ocean, they saw the sea bed as the water receded. This is happened 15 minutes after the earthquake.
3. They sat in their cars with the heaters on

The first wave struck about 30 minutes after earthquake, the people watching realized they had to run so they fled up the hill and survived. Those on the 2nd floor also survived. But the ones in their warm cars some of them were even sleeping, they didn't notice the tsunami came and were being carried by the tsunami. So many victims were found in their cars.
It's hard to imagine the immense tragedy that happened here.

1. **What do you feel about this disaster? And why do you want to become Kataribe?**

The *kataribe* told his own experience when the earthquake happened. I hate the Great East Japan Earthquake that swept away my loved one (wife), beloved family, and colleagues, just

like leaves, but I also learned the importance of fully accepting this truth and taking strong steps toward new goals and objectives with a positive mindset and heart.

2. **Is there any disaster prevention that is taught to residents who live in the vulnerable area?**

In Japan we talk about "disaster prevention". But before we have to remember that some disasters cannot be prevented. Talk with your family in advance about what to do in a disaster. When a disaster does occur, a single wrong step can make the difference between life and death. So, we must learn from the past, its not possible to understand how strong the tsunami was from TV or magazine. Looking at this ocean, how many of you can imagine that it would rise this high?

3. **Did you get early warning notification?**

When the meteorological agency issued a flash bulletin, Mr. Takeshi Miura and his team would immediately broadcast it over the disaster warning system. A 24-year-old woman named Miki Endo made the actual announcement. But the height of the first wave was much greater than the 6 meters predicted by the agency. The sea wall was completely ineffective. The tsunami was so massive that it smashed and swallowed houses. The tsunami was so massive that it smashed and swallowed houses. With nowhere to flee, the staff looked for a stable and tall building, the rooftop of that building was the only place they could evacuate to.

Looking outside as Mr Miura directed the broadcast, he realized it was too late and told Miki to run upstairs, then he took over the announcements. A male voice could be heard about 5 times and then it ceased with a zapping noise. That was probably when the tsunami hit. There were 9 survivors, 1 miraculous, one other person was carried by the tsunami, but managed to drift to another building and he was rescued. Total 10 survivors. 43 people died in the office building. 33 office staff and 10 visitors.

4. **What kind of lesson learned do you want to share?**

Try to remember the year of the earthquake. We thought that money and things would make us happy. But it wasn't true. The earthquake and tsunami taught us; the disaster showed that all of us alive today are connected in some way. The disaster had the power to show us what we could not see. I don't know how many years I can keep telling this story. But as an old man, all I can do is keep telling this story so that the world will be worth living in for my grandchildren.

Appendix 2 (e): FUKUSHIMA Karin Taira and Shuzo

KATARIBE / TOUR GUIDE INTERVIEW
FUKUSHIMA
Karin Taira and Shuzo, 21 February, 2024

1. **What will we do in the Fukushima Dainichi Power Plant?**

We are arriving at the power plant, we will go to the meeting room, then we will hear a presentation about the power plant, and follow the procedure.
In the meeting room, we will hear about the explanation about:

1. What happened at that time, a hydrogen explosion.
2. Debris cleaning
3. Water treatment, purification

2. **What will get from the Exclusive zone in this company?**

At a very first time in the bus tour to go to TEPCO, Karin san showed the people the place that is still shut down. Since March 2011, people left their houses, and until March 2024, people have not come back yet. This city is located near TEPCO, less than 30km away. The government divided the zone into three zones; the red zone, which is also called the difficult to return, the yellow zone as restricted residence, and the green zone as evacuation order cancellation preparation. The evacuation orders were expanded from a 3 km radius on March 11th to 20km the next day, the 20km radius was fully shut down by the gates on April 22nd, 2011. The area was divided into three zones depending on the radiation level on April 1st, 2012. From the green zone, the government started decontamination. All green and yellow zones are now open. People are now starting to come back. Namie town, about 2.000 people were returned. Government is still working for decontamination until the red zone is reopened. When the bus is across the Namie town, the second kataribe person, whose name is Shuzo san, said that the tsunami reached until here. Shuzo san continued the story in “exclusive zone”, when the earthquake happened, he said that Japan has a manual emergency book that is very thick, unfortunately, it was completely useless. Because he said the disaster is beyond our imagination. At that time, we had to think how we should do right now, every time, every hour, every day. We are really afraid of the progress of the nuclear accident. We have a total of 10 reactors in 10km away from each other, Dainichi 4 has Daiichi 6, we are really afraid of the theory of nuclear extinction. We have a nuclear building explosion by Hydrogen. But the nuclear situation is critical.

3. **What Happened when the tsunami hit this place?**

The defence member and the police officer join together.
I called my wife; we are ready to evacuate from Fukushima by the next early morning at 4 am. The number of 160.000 counted in 1 year after the accident, but the real evacuee is around 500.000. The situation was really serious. Two of my primary school friends work at the power plant and became 2 of Fukushima 15. 69 people ready to die, I respect them and thank them for their job. My brother works for a construction company, and many workers work at the power plant to clean up the debris. My brother said that he didn’t have a safety suit, but it's their mission. I think many unknown heroes work there. My brother couldn’t tell the story to the public because it's out of the law, it's secret. Highly contaminated soil promises 2045 to be a year that somewhere, mission impossible. This time we will go to the soil decontaminated storage. The mountain area is impossible to clean up. Around in the area here, the top soil is exchange. When we enter the exclusive zone, the radiation reached 12 mSv.

One tourist said, " I saw a documentary of Chernobyl, and being curious of Fukushima, indeed I have not yet visited Chernobyl, but I could conclude that Fukushima and Chernobyl are different.
Shuzo san continues his narrative on the exclusive zone, he shared that" One of my friends live here, and he lost his father, wife, second daughter, in the tsunami. His house is very near the coastline.
The victim got compensation from the government; however, their own house is still owned by the private house owner. Compensation given by the demolishing house to the contaminated.
Zhuo san "We cross a meeting room for the villagers, 30-40 people house, where the villagers meet here right after the earthquake happened, evacuated to the meeting house, but the tsunami reached here. But all was saved, they were lucky. Mr. Kimura's father didn't come here and walk to the hill, show that, and tell us that you think you're important, don't obey the rule.
Because of the evacuation order issue in a 3km radius, for the power plant, at the night of March 11, Mr Kimura had to evacuate, 40 km away here in the rice paddy, he searched for his daughter for 6 years and finally, found the daughter around here. So, it's trauma for Mr. Kimura, now he is telling his experience to the visitor. Tell them how much we consume a lot of energy. He tells us to rethink the way for our life.

4. Where are you from? do you know about dark tourism in your country?

A German student said that she visited the Auschwitz-Birkenau before and now went to Fukushima.
She said, "I went there by the school, not by choice, and she told it's not dark tourism, I cried. It's horrible. Don't go there to have fun. I didn't take a picture there. I just took a picture in the entrance. The sign also stated in the entrance, "everyone gets what they deserve". The nazi said that Jews are deserve to die, and even the Germany people doesn't understand the meaning behind. Fukushima is not a dark tourism because people come here not to see the death.

5. What happened after live in the evacuation shelter?

Shuzo san "I was born in Fudaka town", 50km away from Fukushima, my father was the chairman for the town, the main family is from here. The Fukushima disaster destroyed the community and family. My father, eldest brother, youngest brother, 3 generations of life in 1 house. Evacuation divided into age. My father, 80 years old. Go to evacuation alone. And my brother evacuated alone and continued their new life in another area. It's common to live in 1 house with many generations inside. The disaster evacuation divided the family and community, and it's too bad.
Leaving the homeland and village is hard, they need a reason to leave.
There is a building of Futaba hospital, 250 people can't walk, evacuation by buses. 14 March 100 left alone without a doctor, the next day they laid the patient down on the usual bus floor and travelled 100km far, that was too hard. *Masugu desune*!
41 patients die because of hard evacuation. And 2 patients in the other hospital, the Canada hospital. Biggest victim in Fukushima. In a power plant, only 2 people drowned in the tsunami.

6. What happaend when after the nuclear accident happened?

When the nuclear accident occurred, we needed as much as possible. To check the contamination of the evacuees, otherwise they couldn't return to their relative home, the evacuation center. We just have a little gigametre. That was the problem because the patient had difficulty traveling and moving to another hospital. One who checks the body contamination and passes will get the certificate issued by the government. Shuzo san family is a samurai family, although you see the revitalization centre. After leaving the exclusive zone, we have to check the body surface, the shoe bottom, and the tire. You are less than 100

milliseconds, it's safe. If it's reached until 300.000 you need to submit your shoes here and are not allowed to bring back.

Appendix 2 (f): Hanabuchi, SENDAI

KATARIBE / TOUR GUIDE INTERVIEW

SENDAI 3.11 MEMORIAL COMMUNITY CENTER

Mr. Hanabuchi, 22 February, 2024

Female 1 00:00

The tsunami came here.

I 00:03

How many meters?

Woman 1 00:08

So, make this here at this height and at the same height as the enclosed height. So, if you go under here, you will come back to the mouth of the water from the tunnel, so this is without a tunnel. So, when you come now, you go over like this. Our house is close like this. Decide.

00:30

Huh? (Noise)

00:50

You saw this tsunami evacuation tower from the bus, right? Yes, that's right, when you go, you return over there. This area here. People can no longer live here. Yes. People are not allowed to build houses and live here, so people who live here, even on this side of the road. Most of them are now relocating to this side of the highway.

01:34

As you can clearly see in the 3D map below, the area around this point was flooded by the tsunami. The area where the color of the propulsion zone is white is through this tunnel, and this area was also flooded by the tsunami. Yes. Yes. Yes. The seawall here is 7002 meters high, and the seawall is 6 meters high, and they are saying that the three stages of the highway will come this way now. Those who enter. Tokyo and... (noise)

02:20

Because of the Sadayama Canal, the tsunami that came from here once fell here, so it was a little weaker coming this way. The height and strength of the tsunami weakened a little, so it was able to hold up, and then it came here, you know. If the Sadayama Canal had not been here, if the tsunami had continued to come in at the same rate, it might have broken through here. Then, there are cases where it would not be possible to do more this way. Yeah. So, this Sadayama Canal will play a very important role in this project. This is a man-made canal that Masamune Date had built, right? Yes. And if you come all the way this way, it continues to the mouth of the Abukuma River, and if you go all the way this way, it continues to the mouth of the Kitakamigawa River.

I 03:32

This is new, eh, Arai is new.

Woman 1 03:37

Arai station is new. And, well, it is located here, here at the International Center, but from here, all the way up the mountain, it is Yagiyama Animal Park, which is the highest subway station in Japan in terms of elevation.

04:07

The Tozai Line was still under construction at the time of the earthquake, but the tunnel had already been dug, completed, and was already connected to Sendai. Therefore, if the line had collapsed and tsunami water had come from here, the tsunami water would have reached Sendai Station.

04:43

This is the center of the city, but the Hirose River runs through here, so if you take the subway under the Hirose River, you have to dig dozens of meters to go underground. So, the river would have to go down here. So, only here, while crossing this river, does the subway go above ground, but only for this part. Then, from here, you go underground into the subway and climb up the mountain. This is the Kokusai Center Station, on this side. If you go to the other side, you will see the campus of Tohoku University. I think we went around like this on the way here. The Agricultural Operation Center, yes. I thought that the plum blossoms had already started to bloom here. In spring, there are butterflies, rose gardens, and wisteria trellises here.

I 06:10

Fuji?

Woman 1 06:11

Fuji (wisteria), wisteria flower.

I 06:14

Oto flowers.

Woman 1 06:15

So here is a little hill, and the shade of it is a swamp. Swans and other birds sometimes come there. Before the earthquake, there used to be a greenhouse around here. But the greenhouse was damaged by the earthquake, so it is not in operation even now. Various fruit orchards were built and a fruit park was established... (Noise)

07:00

The bridge area is a place that has collapsed and is quite a bit painted over (noise).

07:28

These monuments were built in each of the five villages that were lost, one at a time, to tell what kind of place they used to be before the earthquake and what kind of place they used to be. They were built as monuments to preserve the history for future generations, and also as memorials to the victims of the earthquake and the repose of their souls. In the case of Arahama, this monument was built at the Sadayama Canal, a little further from the Arahama Elementary School.

08:10

I have been to the one after this foundation. This is by all means to the sea.

08:23

This is a bus stop with this feature, that Nakano Elementary School, which is located in the direction of Sendai Port, is located in the direction of Sendai Port. This is the first one, so it may not be the first one, but it is here, at Komurohama. Now here is the bus, get off here, like this. (?) That singer (?). So you think that he went here by crossing the bridge of the (?), right? Yes, I think so. And this Sendai Port is located further this way. So this elementary school was located there, and this side of the elementary school is the sea, and the river runs here. So the river flows here. So the tsunami that created the river and the tsunami that came from this side of the river made this tsunami. The monument that you just saw was created here.

09:51

There was a small mountain called Hiyoriyama, which at 6 meters was the lowest mountain in Japan. It was the lowest mountain in Japan at 6 meters. However, the tsunami had cut it down both above and to the side, making it only 3 meters high. So it became a small mountain like a small hill in the park, but it is recognized as the lowest mountain in Japan, so it is the lowest mountain in Japan.

10:40

This is the mountain called Hiyoriyama, which I just mentioned, and this place was built in the image of the mountain called Hiyoriyama after the elementary school we just met, and this became a little higher up, and this, well, this just came out, and there is a big mountain across from the Arahama Elementary School, right? Evacuation. This can evacuate about 5,300 people. Evacuation.

11:14

This is an elementary school called Higashi Shiromaru Elementary School and another elementary school. There are three elementary schools in the coastal area that were affected by the disaster. The community plaza that was built on the site of the elementary school was used as a place to grow killifish, which are unique to this area. It's in the nature. And they are still being cultivated and living here even once.

11:50

Also, after we left, the land was turned into orchards like this, and if you go a little further south, there is a hot spring where you can take a day trip, and if you go a little further north toward Sendai Port, you can have a hot spring like this (?). And if you go a little bit to the north toward Sendai Port, you can see (?) and (?) and (?). If you go a little further north toward Sendai Port, you can see the hot springs (?) and (?) being built and utilized.

12:30

This is the Sadayama Canal, a former canal, where people in Arahama used to hold a ceremony called "Lantern Floating Ceremony" to honor their ancestors during the Obon Festival. The lantern floating ceremony was suspended for a time, but it was revived about 3 or 4 years ago, and is now held at night. On March 11, this year again, we will hold an event where we put flower seeds in balloons and let them fly. So we gather together to see our old friends and also to pray for our ancestors. We always hold this ceremony on March 11 every year. Nowadays, live concerts and mini-live performances are being held in various ways, and gradually we are

trying to make the lost land come back to us, somehow. So, we are trying to make it like this, so that people will come back. So that we can harvest the various fruits over there all the year round. We will do this while doing this and that.

14:24

So, the disaster prevention forest was planted in this way, and it has been gradually growing, and now it is about 10 years old, and it is growing, so it is being cared for in this way, and so on. So they are growing, and they are taking care of the chi in this way, and so on. So now they are growing up, and they are being cared for in this way, and this is done with the help of volunteers. The second Sunday of every month is also the day of the month. When you walk from Arahama Elementary School, which one is on the left, everyone gathers there to talk, and we also serve pizza and other dishes. And, if you look to the left, there is a small building called the seaside library, where there is an old man who is an amateur photographer. There is also a small building in the seaside library, where an old man usually lives, and there is a place where photographers can talk with visitors about personal matters, about the local area, and so on. I was just wondering if I forgot to introduce you there, and if you went to the ocean, if I did that.

16:09

I see. I'm off today. I'm sorry. I'm sorry. Being in a cold place (noise)

Woman 2 17:41

I think that this will probably continue until the person passes away. While providing consultation on health issues and such, we look at the district from the perspective that not only the person in question, but also the people around him or her may have similar issues, and confirm the health issues of the district as we go about our activities. I think it gave us an opportunity to strengthen our awareness of the essential activities of health centers, which we call "district activities".

Female 3 18:17

...There must be many people in the community who can connect us, right? We can't see them, so we can't see their day-to-day lives. So, it is very important to have contact with people in the community, whether they are neighborhood association presidents, welfare committee members, welfare commissioners, the main members of the social welfare council, senior scholars, school teachers, or anyone else. I think it is very important to know how many people you can meet in the community who are really involved in your daily life.

Women 4 18:51

For me, at my age, it would be about not getting sick. Even if you have a disease, how you spend your time in a familiar place, chatting and laughing with your good friends may have a great impact on your health, and you may need to focus on your lifestyle and other things to prevent further deterioration. It may be necessary to improve the environment, or it may be necessary to change the person's lifestyle.

Female 5 19:53

Because we can't see the goal, we wonder what we are doing, (laughs) and so on. I wonder who we are. (Laughs.) I gradually became unsure. (laughs) I hate everything.

20:08

I would like to solve the problems of the world. You have to know what is happening on the ground. If you don't know how the local people live and what they value in their daily lives, and what they value in their daily lives, you will end up saying things that are out of line with what you normally say. What is important is to be "on-the-spot," "local," and "resident-centered. I think that is the only way to achieve this. I believe that the degree to which we can work in close proximity to the local residents is also important for young children. I often say, "Let's get out into the community.

Women 6 21:48

It's that one thing all together. That alarm of their own cell phone goes off, right? And then the alarm went off, and then the shaking started. And then the shaking started, and I thought, "This is no ordinary shaking. There were several designated evacuation centers in the ward, but the number of public health nurses was far fewer than the number of designated evacuation centers, so they were put in government vehicles and driven to evacuation centers with necessary items from the coastal areas first.

Women7 22:24

I was in charge of collecting information from the public health nurses who had gone to the evacuation centers, and I remained at the center to prepare forms, collect hygiene materials and other necessary items, gather them, and prepare them....

Women 8 22:40

...We go round and round, and look around once, twice, three times, and there are a lot of people with this kind of problem. I take their blood pressure, and I talk to them about whether they are taking their medications and whether they were able to escape with them...

Women 9 23:00

Whenever there was a tremor, the electricity in the gymnasium would sway, and we would start to scream, thinking that it might fall on us. And with the children in the gymnasium, they were also very unstable.

Women 10 23:33

The younger one was still in the third grade of elementary school. We always told them that their mother would not come back when there was a movie like this, so they understood that their mother would not come back.

Women 11 23:49

On the day of the earthquake, my child was still a little small, so I really had to go across the street or something, but, well, I couldn't get in touch with any information. And just when I was feeling really troubled, I happened to get in touch with my husband, and I asked him to tell my husband, and I stayed here.

Women 12 24:13

The younger one is in the first grade of junior high school. The younger child was in the second grade of elementary school. When I told them that no one would be able to come back home, I asked them if I could take the child in and take care of her for a few days.

Women 13 24:36

The first step was to go to Higashi High School. I was sorry to hear that the family members who heard that Higashi High School had been hit hard by the tsunami ran around a bit, worrying about what had happened since they had lost contact with the school. I was worried about the family and wondered what had happened.

Women 14 25:11

The damage at the evacuation centers was completely different depending on the location and the area. We have seen the terrible situation of evacuees whose houses were swept away. Also, in the area in front of the station, the JR line was stopped, so there were many people who had difficulty returning home. In some evacuation centers, there were 3,000 people in one evacuation center, and they had to evacuate in a very small space....

Women 15 25:50

Every day was a new situation that I had never encountered before, and I was lost in each decision, wondering where to connect and how to solve this or that.

Women 16 26:05

I heard that one part of a house had collapsed and that people were not injured, but were still anxious about the first tremor. We were continuously monitoring people's mental health to see if it was deteriorating...

Women 17 26:21

Gradually, the families in the evacuation centers were informed that their missing family members were no longer missing and that their safety had been found. And you want to cry, don't you? But, they haven't found them yet. Because the families are there, they are very considerate. There were people who covered their heads with a futon and cried like sobs, and there were also people who had had terrible experiences and wanted to talk about them all the time because they could not settle their feelings unless they told someone about them. I felt as if I had experienced the same thing myself...

Women 18 27:05

When I finally finished work at 1:00 am and was ready to go back to the shelter, it was snowing outside, and my child was very small and unstable, so I had no choice but to go home. I had to return home late at night, soaking wet from the snow. I remember that I had to wash my hair with water because there was no hot water.

Women 18 27:41

What really saved me was the support of the supportive public health nurses who were able to be dispatched. Everyone listened to me very carefully.

Women 19 27:55

On the spot. I can't say anything. However, if I was asked what I was doing about the hurt feelings I had been told, I would come back to the workplace and share them with the staff. I would come back to the office and share with the staff. I would talk about it, but it can't be helped, can it? I would also ask around the staff if what I had done was all right or not, and confirm that it was all right...

Women20 28:35

The people I work with in Wakabayashi are all going through the same thing, aren't they? I was not alone, but everyone had the same experience at each shelter, so I think it was good that I told them about what happened to me until late at night, and how I loved them. I think it was a good thing that I told them about what had happened and how I loved them.

Women 21 29:16

In order to rebuild their lives after leaving the evacuation shelters, there were many cases where people who had been living together were asked to separate from their younger family members at the same time they moved into temporary housing,

Women 22 29:37

There are also differences of opinion among family members about what to do in the future, and this has become a psychological burden for some...

Women 23 29:51

It is the people who have difficulty or are unable to make an SOS that make the problem more complicated and severe, so we need to help those who have no voice, such as those who have been shut in for 10 years, or those who have a mental disorder and go to the hospital, but do not have a certificate or medical subsidy, and have been paying everything on their own. We need to support people who are not able to talk about it. We often talked about that. Yes.

Women 23 30:38

If there are households that are not taken into consideration by the community, they may be excluded from the community application, and they may not be connected. If there are households that are not taken into consideration by the community, they may be excluded from the community application, and those who are not connected to the community will be, well, isolated. For example, we should provide them with enough information so that they will not be left out....

Women 24 31:16

I wanted to save the lives of those who survived the tsunami and the earthquake, and I worked to protect the lives of those who survived the disaster, but the most vulnerable people are those with mental disabilities, and some of the people I was involved with, well, some of the people I supported died unfortunately, I was involved with a few of the people I supported who died tragically, so I guess that's where I was unable to protect them. I think the strongest point is that I could not protect them.

Women 25 32:00

I felt that there were things I could have done better, things I should have done better, and things I should have done better as a public health nurse. I also wonder if I should have made better judgments as a public health nurse. I feel that there is a part of me that still has some emotional pain, or something like that.

Women 26 32:40

Some people say, "How long are we going to keep calling it support for disaster victims? However, people who lost their homes or houses in the earthquake, and those who suffered damage in that way at the time, are the ones who are still living in the same way as those who were not affected by the disaster. I think it is wrong to look at them as people who are living

normal lives, just like those of us who were not affected by the earthquake, Some people may fall down again. So, I think this is probably (noise)

Women 27 33:57

I have done this kind of work until now, you know. Firefighters had to go to the site of the disaster even though they themselves were affected by the disaster and had to leave their families behind. If we turned off the sewage system, the taps would overflow and the sewage would overflow, so we had to turn them manually and managed to keep them running....

SENDAI 2.WAV

I 00:37

Are family members allowed?

Woman 1 00:38

My family is fine. Yes, they are fine. (Noise) So, since I was working at a nursing home, I could not escape alone from there, so I stayed behind to evacuate the old people, so I was on the second floor of the facility as well as the Arahama Elementary School, all under tsunami water for one night, and the next day, that evening, a helicopter arrived.

I 00:37

I see. Is everything okay with all the students and teachers? Arahama Elementary School.

Woman 1 01:37

I am very nostalgic for the town where we used to live, and it is difficult for me to leave it. That is why I am living in Wakabayashi Ward, and I really do not want to go to another area, so I am staying here.

I 02:07

I understand.

Woman 1 02:09

Even as close as possible, I haven't been able to get to the beach for about 10 years. Hmmm. I can finally go there, right? Yes, I can. We are going to go to Arahama Elementary School. Yes, I think I can go. I'm going. I'm going. Later. Yes. Where did you start today?

I 02:27

Yamaguchi.

Woman 1 02:27

Yamaguchi? Sensei lives in Yamaguchi.

I 02:37

Ah, yes. I'm going to Fukushima today. I went. Sendai today, Iwate tomorrow.

Woman 1 02:44

Oh, is that so?

I 02:47

All I study. But a little Japanese.

Woman 1 02:58

But can I talk to you a little bit like this?

I 03:02

Yes, you can.

Woman 1 03:03

Hey, he said I'd be relieved too. I can't do it at all. Anyway. Yes. I am an old person, so I didn't study English much in our time, because I didn't need it. Now I wish I had done it.

03:27

This is also a public health nurse. When we were in temporary housing or evacuation shelters at the time of the earthquake, she visited everyone and provided mental care and listened to women's problems. This was not so well known to others, and we were not allowed to go there. We also presented the fact that public health nurses do this kind of work, and that they are there for you in this way. I had a little time to prepare for the next exhibition, so I did this (?) for a month. Do it now. Wait a minute (noise).

05:46

There were more than 800 houses here, but, by the way, only the Arahama Elementary School remains. This is not in black and white, but in color, and here is a little bit of the color, but it is very black in color. The next day, the highway coming out this way was shuffled by the tsunami, so the area is in a sludgy state.

06:46

This is the direction of the ocean. So, this is the highway, so even if this tsunami comes from this direction, the tsunami is taken from this side when it reaches this area, so this is the direction of the sea, but this is not the sea yet, but rice fields in this area. But this is not the ocean yet. And this building is here. So, in this picture, this area is a highway, and here, all the houses of 800 households in Arahama and all the pine trees are being swept away as rubble, and all the cars are being swallowed up.

06:47

In the "Mere Old Man", the ceiling of the 7th floor of a place called "Meditech" in the middle of the town fell down, and the evacuation shelter was like this. So, in this way (?), we can't say that we were lucky to be saved at first. So, at the beginning, we could not say that we were lucky to have survived. We could not say that we were happy that we were the only ones who survived, because some of our neighbors might have lost their lives. So, even among friends, they would signal to each other with their eyes like this. As the days go by, however, we start to hear about the death of each of the deceased. Then we wonder if it is okay for us to live on our own. As the days go by, we start to feel guilty about being alive. So, I was not usually at the evacuation center, because I went there and went to work from there. So, the people at the shelter thought I had been gone for more than a month, and when they told me that I had been there for more than a month, I told them that yes, I was still alive. So we were always there to help. So, we are not always saying that we were saved, or that we were saved, but that we were given life, and we have to live for those who have passed away. So, you know.

09:37

We have been able to recover thanks to the support we have received, not only from Japan but from people overseas as well. We must repay them for their kindness. We have to live for the sake of those who have passed away, and we have to repay everyone, but we cannot repay them individually. That is why, when I was offered this opportunity, I initially turned it down. Oh, when I was put in a situation where I could not refuse, I thought, oh, I see. I thought that telling people about it would be one way of repaying the favor. And also, I knew that I should not have been looking down forever. Everyone believed in me. So I thought I should show that I am getting better and returning to a normal life, even though I am just an old woman. I believe that what I saw with my own eyes is the real thing. I didn't see the tsunami either. I was guiding the residents, so I saw the right-angled wall that was built after the tsunami. I still have a fear of water, and I am still traumatized by it. I can't take a bath comfortably, and when I go to the bathroom, I always feel like going to the toilet, So, if there are people who come here and just fall asleep and go home, there are also people who receive the same support and still have these feelings in their hearts. By talking with them in various ways, some of them are able to ease their feelings and change their minds. Now that they have found a place to live, they are able to recover. I can see that they have recovered and want to recover, but as I said, they have not recovered yet. So now it is a question of psychological recovery. I see that now. As I helped him more and more, I realized how young he was. When I was working, I was absorbed in my work, but now that I have quit my job, I have to think about the future, and my mentality is gradually deteriorating.

12:39

Yes. So, some people from overseas request us to do this, and some of them are watching us, but we are still not sure where they are going to be. You never know what will happen in the event of a natural disaster. There are many disasters such as floods, wildfires, and so on, not only earthquakes and tsunamis. How can we protect our lives at such times? That's why. Anyway, what we always want to say is that you can never escape with that thing, so don't carry it. Just protect your life. Anyway, no matter what anyone says, if you just run away and protect your life, you will be able to return to your normal life even if you lose everything or nothing at all. If I lost my house, the clothes I wore in the morning, my bag, and everything else, the only things I own are two ballpoint pens in my lab coat and my cell phone, which I hurriedly took out of the doctor's office. However, thanks to the support I received from everyone, I have been able to return to a normal life. If I could escape as quickly as possible and have my life protected, I would be fine. I thought it would be good for me to stay here.

14:26

So now, here, after being seen like this, I went to the Arahama Elementary School, and at the Arahama Elementary School, and also, if it is that, you know, the staff. If you are lucky, the principal of Arahama Elementary School at that time is there, and he is working there, so you can ask him if he is there. If there is no group in the room, please ask the principal if he or she is there, and if possible, ask him or her if he or she would like to talk to you. I always tell them, "I'm sorry, doctor, I'm sorry. I always tell them, "I'm sorry, Sensei, but please listen to what I have to say. Then you can hear directly from the teacher about what was going on at the school at that time.

I 15:32

There is a schedule.

Female 1 15:57

43 minutes. Now 40 minutes, you haven't gotten it yet. And after you see Arahama Elementary School, you can come back here and have a look at the interview, well, this is the one that I really feel, you know, until 4:00, so you can see Arahama Elementary School at a warmer time.

Appendix 2 (g): Hazuki, Iwate Tsunami Museum.

KATARIBE / TOUR GUIDE INTERVIEW
SENDAI 3.11 MEMORIAL COMMUNITY CENTER

Hazuki, 27 February, 2024

Q: What is Zone 1, and what does it cover?
A: Zone 1 is "Tracing History." In this zone, we look back at the history and scientific viewpoint of earthquakes and tsunamis. This exhibit shows that earthquakes and tsunamis are recurring events. Tsunamis are not only caused by earthquakes but also by landslides or meteor impacts. Tsunamis triggered by earthquakes usually happen at the bottom of the ocean. The mechanism of earthquakes and tsunamis occurs because there are two types of plates: the oceanic plate and the continental plate. The ocean plate is heavier than the continental plate, so the ocean plate usually moves in one direction while the continental plate is pushed by the ocean plate. Sometimes, they meet and strike, which is why earthquakes and tsunamis happen.

Q: What is the difference between normal waves and tsunami waves?
A: Normal waves are usually caused by the power of wind, and only the surface of the water moves. In contrast, a tsunami moves all the water. This is the power of a tsunami. If the tsunami is only 30 cm high, a person might only fall down. However, if the tsunami reaches 2 meters, it can completely destroy a house. The speed of a tsunami is like jet speed—up to 800 km/h—so a 10-meter tsunami can travel as fast as an Olympic sprinter. That's why it's crucial to evacuate to higher ground when you're not an Olympic runner. Unless you are an Olympic runner.

Q: What is the history of tsunamis in the Sanriku area?
A: The history of tsunamis in the Sanriku area dates back over 1,000 years. The black areas on this map show where the tsunami came. This is a sample taken in Yamada Town, Iwate Prefecture. The machine used to collect samples from the soil revealed ocean coral, showing that a tsunami occurred there 1,000 years ago. From the soil layers, you can see parts of the ocean that were brought into the soil. The color of the soil is different in each layer. The white lines come from the sea. Tsunami soil has two types: lighter soil compared to the other layers, and the rocks are larger than the others.

Q: What is the Jogan earthquake and tsunami?
A: The Jogan earthquake and tsunami occurred 1,000 years ago. This sample might have been brought in by the tsunami that happened at that time. Lighter soil indicates new soil. This is the oldest record humans have of a tsunami. It's possible that there have been other earthquakes and tsunamis that are not recorded by humans. The map also shows earthquakes from around the world within the last 30 days. The circle indicates the date of the earthquake. This screen is connected to the internet and updates in real-time. The blue indicates small magnitude earthquakes, while pink/red shows large magnitudes, such as those around 9 on the Richter scale.

Q: What does Zone 2 focus on?
A: Zone 2 focuses on the "3.11 Disaster." In this zone, you can look back through pictures, videos, and testimonies. This will show items washed away by the tsunami of March 11, 2011. It also includes a monitor displaying before-and-after conditions. For example, this is Ofunato City, and this is Rikuzentakata, where the tsunami washed everything away and changed daily

life. The station sign from Outsuchi Station City was twisted in a spiral shape, looking like a tornado. This is a sign of the Sanriku Rail train, which used to be silver but became rusty after the tsunami. Many children or students are familiar with these items, like the harmonica and trumpet, which came from Kamaishi City, Unosomai Elementary School. The school buildings were washed away, but everyone had evacuated on time, so no one died.

Q: What does the testimony of tsunami victims show?
A: The testimony of victims highlights the scale of the disaster. The victims' ages are shown in a chart, with about 64% of the victims being over 60 years old. The primary cause of death for 90% of the victims was drowning. Other injuries were caused by building collapses due to the large shaking and the destruction of buildings, where people were buried.

Q: What is the magnitude of the 3.11 earthquake?
A: The earthquake had a magnitude of 9.0 MW, making it the largest earthquake in the world since 1990. Similar earthquakes include the 2004 Sumatra earthquake (9.1) and the 1960 Chile earthquake (9.5 MW). However, there are no memorial museums related to this disaster in Chile. The most affected prefecture in Japan was Iwate, which saw half of the victims. Fires were caused during the winter, as kerosene heaters ignited after the tsunami washed away oil, which spread and caught fire.

Q: What challenges did firefighters face during the disaster?
A: Firefighters and fire trucks couldn’t communicate because their electronic devices were down due to the tsunami. They were also caught in the tsunami. In some areas, the fire continued for days. For example, in Yamada City, it took 3 days to extinguish the fire. Some areas remained flooded because the soil had sunk, trapping water. The tsunami hit multiple times, with some land sinking due to the earthquake, which led to water being trapped in those areas.

Q: What is Zone 3 about?
A: The next exhibition, Zone 3, is called "Learning Lessons" (教訓を学ぶ). This zone introduces how to protect one's own life and efforts to save the lives of others based on actions taken during the Great East Japan Earthquake and Tsunami. This section teaches visitors the lessons learned from the disaster.

Q: What is Zone 4 about?
A: Zone 4 is titled "Reconstruction Together" (復興を共に進める). This zone shows how the reconstruction of the disaster-affected areas is progressing, with support from both Japan and overseas. It emphasizes the collaborative efforts to rebuild the communities affected by the disaster.

Appendix 2 (h): Newsee

MEDIA INTERVIEW
Ishinomaki NEWSée, Miyagi
Reporter of the newspaper, 28 February, 2024

Q: Can you tell us about the Ishinomaki Newspaper Company during the 3.11 disaster?
A: The Ishinomaki Newspaper Company, which was just 1 km away from the sea, was greatly affected by the tsunami. The building was washed away, and as a result, they couldn't produce the newspaper anymore. During the disaster, people relied heavily on information, and without it, they felt uncertain about what was happening and what the future held. In response, the reporters began writing the newspaper by hand. You can see the handwritten papers in the shelter where they were placed at that time. The Ishinomaki Newspaper had been in operation for 99 years by 3.11, making it especially important to deliver accurate information to the people, as the community trusted the newspaper.

Q: What was the state of the seawall and the river during the disaster?
A: From the reporter's perspective, there was a seawall along the ocean. The river in Ishinomaki was artificially created by a samurai clan, but at that time, there was no seawall in place to protect the area. Over the years, after many large-scale disasters, the seawall was finally built. However, after the 3.11 tsunami, the seawall no longer existed because the tsunami completely washed it away.

Q: Can you describe what happened during the earthquake on 3.11?
A: On Friday, 3.11, at 2:36 pm, an earthquake struck while a meeting was scheduled at the company for 3:00 pm. The earthquake was stronger than any she had ever felt, and everything in the office fell over. There was no electricity, and they couldn't get any information from the TV. All the reporters spread out to gather information. After the earthquake, the speakers, which were typically used for music, were repurposed to broadcast evacuation warnings, announcing that a 7-meter tsunami was approaching. Before 3.11, there had been many smaller earthquakes, and tsunami warnings had been issued frequently, so many people thought it was just another false alarm.

Q: What did the reporter experience when the tsunami arrived?
A: The reporter went to find a good vantage point to watch the tsunami. She saw the tsunami coming, but she didn't have the proper equipment to capture it. The tsunami was enormous, and she realized it was too large to photograph. Fires started to spread due to oil from the kerosene heaters, and the city was covered by flames caused by the tsunami's destruction. The combined effects of the water and fire completely destroyed the city. Even the firefighters couldn't put out the fires.

Q: What were the communication challenges faced by the reporters?
A: After the tsunami, the reporter rushed to the city hall. The radio attempted to communicate, and it was announced that Ishinomaki was on fire. Many people listened to NHK, Japan's national broadcasting network, to receive critical information, but they struggled to spread it effectively. They tried using GPS to understand what was happening, but it was difficult to get accurate information. It was crucial to provide correct information so that people could make informed decisions. The reporter's boss knew this and came to the city hall at that time. In such

a situation, it was easy for rumors to spread, and he believed that the correct information was essential to prevent misinformation.

Q: How did the community respond to the spread of information?
A: Rumors can cause confusion and spread only negative information, especially in completely destroyed areas. However, positive information also became important. News about the bodies being found on the streets was necessary, but equally important were the efforts to provide positive news, such as reports of survivors. For example, the results of the entrance exam were announced, and one student who had passed was happy, which was shared as a piece of positive news.

Q: How were the evacuees coping with the disaster?
A: The emergency shelters were within walking distance from the city center, but there was no information coming from other areas. Around 5,000 people survived in a middle school shelter. Because it was so cold, many evacuees had to sleep in their cars, as there was no time to bring jackets. In addition to the official shelters, people also took refuge in hotels, supermarkets, pachinko parlors, and even temples and shrines. While these were not official shelters, they became places of refuge for people looking for safety. Those who had relatives had to search in many places.

Q: What did the reporter experience in the aftermath of the disaster?
A: The reporter also took photos of the situation near the city hall. The streets were blocked by debris, and without a seawall, ships were swept away, with parts of ships even found in buildings. A volunteer center opened on March 15 at the Ishinomaki University Center. Many volunteers came to help the affected areas, and local people were facing immense damage, feeling helpless. In Japan, municipalities are responsible for the majority of disaster response efforts, but due to the scale of the damage, they could not manage everything alone. They had community radio stations to distribute information.

Q: What role did the elderly play in the disaster response?
A: The Tohoku region has a high number of elderly people, and they required additional care during the disaster. Special shelters for the elderly were set up, but in the beginning, it was impossible to manage them properly. Many of the shelters, such as schools, were overcrowded, and the teachers who were in charge of these places were not trained for disaster management, which caused them to be overwhelmed by the number of people.

Q: How did the situation improve by March 16?
A: On March 16, positive information was spread to cheer up the city. The whole country supported Ishinomaki, and more information was found. The flow of information reversed, with the newspaper providing information and the people also contributing by sharing what they knew, especially regarding missing family members. Half of the people in Ishinomaki were still missing. One young man shared his story of evacuating to a rooftop. As the tsunami took his house away, he thought he was going to die, but a fishing boat appeared, and he managed to return. This was a big piece of news for the newspaper.

Q: How did the Ishinomaki Newspaper Company continue after the disaster?
A: Without electricity, the reporters couldn't work normally. But once the electricity was restored, people were overjoyed. The company was able to print newspapers again, but they used blank paper at first. They printed around 300 copies and distributed them. Eventually, the company resumed printing regular newspapers. The headline of the newspaper was "Ganbatte

Ishinomaki!" ("Go for it, Ishinomaki!"). Although many houses were destroyed and delivery wasn't possible, the company sold the newspapers directly to the people. They used colorful printing and printed on both sides of the paper to conserve resources.

Q: What kind of information did the newspaper focus on after the disaster?
A: The newspaper focused on providing essential information, such as where to find food and the locations of shelters. They also sought to deliver information that survivors needed, including updates on missing family members. The newspaper was distributed within walking distance of the company. The American Washington Museum has a collection that tells the story of the disaster, demonstrating how the media adapted in such situations. Copies of the newspaper are also on display at the Yokohama Museum, and a digital version is archived.

Appendix 2 (i): Maly, Sebastian Researcher Tohoku University

ACADEMICIAN INTERVIEW
Researcher at Tohoku University
Liz Maly, Sebastian Boret, Julia 27 February, 2024

Interview with Liz Maly (Geography Researcher related to 3.11 Disaster)

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1. **How was the history of Tsunami in this Region?**

The region has experienced several major tsunamis, including those in 1869 and 1933, which affected Tohoku similarly to the 2011 disaster. The seismic activity here, due to four tectonic plates, explains the frequent earthquakes and their predictions.

2. **How was the traditional story about the earthquake in Japan?**

In history, do you know about the "catfish" legend? Long ago, people believed that earthquakes were caused by a giant catfish underground, which would cause the earth to shake by waving its tail. They tried to stop the shaking to prevent earthquakes. While this is no longer used as a method for predicting earthquakes, it shows that people in the past tried to understand the phenomenon, which we now recognize as being caused by different factors.

3. **What did you research about?**

In terms of geography and housing recovery. For me, the 3.11 disaster was a massive and complex event, impacting various aspects such as earthquakes, tsunamis, fires, and nuclear accidents. It affected a vast area, resulting in 20,000 deaths and creating a large number of evacuees. Even today, around 30,000 people are still living in evacuation centers, largely due to the nuclear disaster rather than the tsunami, and the recovery process is ongoing.

4. **What is the Issue of this Region?**

One of Japan's major challenges is its aging population and depopulation in rural areas. This issue existed before 2011 but has accelerated in the affected regions. Geographically, the tsunami-affected areas include the Rias coast, which resembles Scandinavia with narrow valleys meeting the sea. These areas consist of small fishing villages with limited land space compared to the vast ocean, and the geography is very flat. There are no highlands along the coastline to evacuate to.

5. **In Sendai, what story about 3.11 Disaster?**

In 2011, there were successful evacuation stories, such as in Arahama, Sendai, where many people evacuated to schools and were safe. There were also other instances where education, training, and practice helped people evacuate to safer areas, especially students. However, there were tragic cases where students died at school due to late evacuations.

6. **Can you tell me the condition of recovery after disaster?**

Regarding housing, Japan has a well-established policy and legal framework for providing housing after evacuation, including temporary and permanent housing. Temporary housing is no longer as visible, but many people are still waiting for permanent homes. The government has supported the development of permanent housing using local products and improved designs, as seen in Fukushima, where they have used local materials to build more affordable and livable environments.

In terms of recovery, one of the biggest factors shaping recovery planning and implementation is the reshaping of towns after the disaster, focusing on disaster mitigation. Before 2011, the dominant thought was that building a large wall would protect against a big tsunami. The calculations were made based on anticipated tsunami sizes, and walls were built accordingly. However, the 2011 tsunami was much larger than expected. While Japan is excellent at

engineering strong walls for smaller, regular tsunamis, for a large-scale disaster like the 2011 event, other strategies are needed. In addition to physical infrastructure, it is important to consider where to build towns and where to evacuate.
The idea of relocation emerged as part of the recovery project. Relocation is not new; after the large tsunamis in 1869 and 1933, the strategy was to move towns away from the sea to higher ground. Some areas were completely relocated, while others moved only parts of their population. In the 2011 disaster, areas that had relocated to higher ground were generally safer, but some people chose to return to risky areas due to the appeal of scenic views and available land. The strategy now is to avoid risky areas for residential development and to build homes on higher ground, either by cutting into mountains or piling up land.
For example, in Rikuzentakata, the land was raised by piling up soil to create safer living areas. The government provided infrastructure, and people could either buy or rent land to rebuild their homes or move into public housing. Some recovery strategies focus on large-scale housing infrastructure, changing the landscape and community dynamics. Fishing communities, in particular, had to move away from the sea.
The issue of indirect death also needs attention. While most deaths occurred due to the earthquake or drowning in the tsunami, some people survived but later died due to the conditions in evacuation shelters, including suicides and health complications, particularly in nursing homes. In Fukushima, more people died indirectly than directly from the disaster.
Housing recovery focuses not only on rebuilding infrastructure but also on supporting the livelihoods of affected communities, including economic and social aspects.
Regarding evacuation, the decision on where to evacuate is complex. Some areas were evacuated based on scale, and many people evacuated multiple times. For example, in Niigata, the government welcomed evacuees and allowed them to move to other regions like Kobe or Okinawa. The government paid for the preparation of land, and people with damaged homes could sell their land and receive compensation, or they could rent housing in the designated areas.

Disaster Memorials

Respondent: Sebastian Boret (Anthropology researcher related with 3.11 disaster).

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1. **What is a disaster memorial? What is your first thought when you visit one?**

A disaster memorial often reminds us of the absence of those who have passed. Some people see it as representing the present era for the victims. For example, monumental sites like clocks capture the moment of disaster. The purpose of memorials is to preserve collective memory, which is an active process. It's not a natural occurrence; it's a societal effort. Arahama, for instance, preserved its school and turned it into a memorial. The school's evacuation plan was changed just weeks before the disaster, leading to the saving of many lives.
Memorials can be visited by individuals or large groups, and the act of joining hands can symbolize a connection to the deceased. While it's not a religious act like prayer, it is a way to show respect and connect with the memory of those lost.

2. **Why is a memorial monument built?**

In Tohoku, there are many memorials, each representing something different. The special ones are "irehi" (memorials for the spirits of the deceased). In Sendai, many people moved to new houses without considering the risks of the sea, and this led to devastation during the 2011 disaster. Memorial monuments also help families and communities preserve the memory of those lost. Parents, for example, may not want others to forget their children who passed away in the disaster.
Memorials often provide a place for the community to gather, share stories, and express grief. Some memorials even include workshops for children, helping them process their emotions by creating drawings of their homes before and after the tsunami.

Jisow, a Buddhist memorial statue, is significant in Japanese society, often linked to the grief process. Many people who lost loved ones visit these memorials, offering small tokens or messages to show their respect. These memorials are often maintained by the local community, not just religious groups, and have become part of the broader cultural tradition.

In addition to memorializing the dead, these sites promote long-term disaster memory education, contributing to social reconstruction and helping to bridge the gap between recovery and the return to normal life. Even though memorials are meant to last forever, many have been moved, as in the case of the Yuriage memorial, which has been relocated multiple times.

Memorials also help visitors engage with the process of remembrance, socializing and transmitting memories. They serve as a reminder not only for the families of the deceased but for society as a whole, ensuring that the events of the disaster are not forgotten.

Julia (Anthropolgy Researcher related to 3.11 Disaster)

Q: Is disaster tourism considered dark tourism?

A: Yes, you shouldn't try to prove that disaster tourism is not dark tourism because it is clearly a form of dark tourism. Visiting dark places—regardless of whether the visitor is interested or excited about the tragic background—doesn't really matter. As long as it involves visiting places where negative events have occurred, it qualifies as dark tourism.

Q: Are public disaster memorial facilities neutral and objective?

A: Many public disaster memorial facilities are run by the prefecture and city governments. The people in charge believe they need to remain objective and cannot take a stance or engage in discussions about controversial topics like nuclear power or seawalls. They are not allowed to be political. However, **katariba** and the local people are not entirely objective. They frame and phrase events based on their own perspectives because they cannot explain everything. Not everyone's experience is included in these facilities. Some may emphasize the importance of family, saying that "everyone is important," which reflects the values embedded in their storytelling.

Q: How does Rikuzentakata's disaster narrative connect to Shinto beliefs?

A: When you visit Rikuzentakata, they always emphasize "living with nature." I believe this idea is connected to **Shinto**. The interesting thing is that public facilities are run by the state, and in Japan, the state and religion must be kept separate. They claim it is not religious, but the values they promote are inherently religious. This presents a challenge for Japanese people because when asked about religion, they may say they are not religious, yet they frequently visit temples and shrines to pray. Of course, this is part of tradition, but many people still insist that it is not religious.

Q: What kind of memorials can be found in Tohoku, as you ever visited?

A: If you visit Ishinomaki and go to the Recovery Park, you will find many different memorials. One of them, located inside the park, is a memorial statue dedicated to those who lost their lives in the tsunami. Although public parks are not supposed to have religious elements, there is a shrine remnant in the park, which is inherently religious.

Q: Is there a memorial dedicated to foreign victims of the tsunami?

A: Yes, one of the interesting memorials in the park is dedicated to an American girl who died in the tsunami—the Taylor Anderson Foundation. Chiba-san, who will guide us, is part of this foundation and is actually a Christian. Some of her actions reflect her religious beliefs, which is interesting because the Taylor Anderson memorial closely resembles a gravestone, with her face engraved on it.

Q: How do different cultural perspectives on memorialization appear in the park?

A: Nearby, there is another memorial—a simple one created by grieving parents who lost their children at Okawa Elementary School. It consists of only three empty chairs, symbolizing the

lost students. This design is deeply Japanese, as it aims to commemorate all the students while still highlighting one specific student in the centre. These two memorials—one dedicated to an individual and the other to a collective loss—reflect two different cultural perspectives standing side by side.

Appendix 2 (j): Ishinomaki School Memorial Museum

DIRECTOR INTERVIEW
Kadonowaki Elementary Ruin School Ruin
Richard, 27 February, 2024

Q&A on the 2011 Tsunami and Memorialization in Ishinomaki

Q: How did the 2011 tsunami affect Ishinomaki's population?

A: Ishinomaki experienced a population decline of 130,000 as many residents moved away after the disaster. It was the most heavily damaged city compared to others in Iwate Prefecture.

Q: Why was Ishinomaki so vulnerable to the tsunami?

A: Ishinomaki was surrounded by the Pacific Ocean and had two major rivers running through it. Ishinomaki is indeed surrounded by the Pacific Ocean and has two major rivers, the Kitakami River and the Old Kitakami River. During the 2011 tsunami, these rivers worsened the disaster's impact because they acted as pathways for the incoming water to flow further inland. The powerful tsunami waves easily traveled up the rivers, causing severe flooding in the city center, making Ishinomaki one of the hardest-hit areas. These strong water connections made the city more susceptible to tsunamis. The two rivers acted as weak points because when the tsunami arrived, water easily flooded the area and reached the city center, causing severe destruction.

Q: How high was the tsunami in Ishinomaki?

A: The tsunami surged significantly above the highest tide level, causing widespread destruction. In some areas, the tsunami height was recorded at approximately 7 meters, though it varied depending on the location.

Q: What happened to Kadonowaki Elementary School during the tsunami?

A: Kadonowaki Elementary School was not only damaged by the tsunami but also destroyed by fire. The fire started from a kerosene heater, and the debris pushed by the tsunami spread the flames to the school building.

Q: What remains of the Kadonowaki Elementary School building today?

A: The main building still exists, but the wing buildings have been dismantled. Visitors can see burnt debris in the school as evidence of the fire.

Q: What is the main purpose of preserving Kadonowaki Elementary School?

A: The facility aims to keep the memory of the disaster alive, which in Japanese is called Densho (伝承). It also seeks to pass on the lessons of the disaster to future generations so they do not experience a similar tragedy. The goal is to minimize future loss of life by raising awareness about disaster preparedness.

Q: Was there opposition to preserving the school as a memorial?

A: Yes, there was public debate about whether the school should be preserved or demolished. Many residents wanted it to be completely removed, but the city decided to turn it into a memorial site, despite opposition. Over time, some people have come to appreciate the importance of keeping the school standing.

Q: What does the Kadonowaki Elementary reveal about the tsunami?

A: Inside the gymnasium, there is a photograph showing how the tsunami covered the floor with mud. However, some parts of the walls were not covered in mud, indicating that the tsunami did not reach the ceiling of the first floor. The gym floor remains original and was simply cleaned after the disaster.

Q: How high did the tsunami reach inside the school?

A: The black waterline on the building marks the tsunami's height at 1.8 meters above the floor level.

Q: What damage did the tsunami and fire cause to the school?

A: The first floor was damaged by both the tsunami and fire, while the second floor was only damaged by fire. Every classroom shows visible signs of damage, but for safety reasons, visitors cannot enter and can only view the classrooms from outside.

Q: Did the school manage to hold its graduation ceremony in 2011?

A: The graduation ceremony was originally planned for March, but it had to be cancelled due to the disaster. However, the sixth-grade students were still able to receive their graduation certificates from the principal. And it makes them happy

Q: What discussions are there about the seawall in Ishinomaki?

A: Ishinomaki has built a large seawall, but it has been controversial. Some residents argue that the money spent on the seawall could have been used for economic or social programs instead. Additionally, there is concern that the seawall might not be effective in protecting the city from future tsunamis. Because look at the town of Taro in Iwate that had a large seawall before the 2011 disaster, but it was instantly destroyed by the tsunami. The collapsed wall became debris that was pushed inland, causing even more destruction. This has led to concerns that seawalls cannot guarantee complete protection against tsunamis. However, since no one can predict the future, the government still sees seawalls as part of a preventive strategy.

Q: How did people evacuate from Kadonowaki Elementary School during the tsunami?

A: The school was connected to a nearby **hill**, which provided an escape route. However, there was a **1.5-meter gap** between the school building and the hill, making it difficult for some people to cross. Younger individuals were able to **jump**, but others struggled. To help, they placed **non-slip boards and blankets** over the gap to allow people to cross safely.

Q: How about the evacuation behaviour?

A: Yes, two days before the tsunami, there was a pre-quake that triggered a tsunami warning, but no tsunami occurred. This led some people to believe that evacuation was unnecessary, which may have contributed to delays in evacuating on March 11. The lesson learned is that every tsunami warning should be taken seriously, as you only have one life.

Q: What is the significance of the 'Ganbaro Ishinomaki' sign?

A: The **'Ganbaro Ishinomaki'** sign became a **symbol of resilience** after the disaster. It was originally created by locals and later adopted as an **icon of hope and recovery** in Ishinomaki.

Q: What do the exhibits at the memorial site include?

A: The exhibits display various aspects of the disaster, including:

- Photographs of Evacuation Shelters: Visitors can see photographs of the evacuation shelters used during the disaster. This provides a vivid representation of the conditions and challenges faced by evacuees.
- Section Expressing Gratitude for Global Assistance: The exhibition includes a section expressing gratitude to people from around the world who provided assistance, including volunteers. This highlights the global solidarity that emerged after the disaster.
- Third Floor: Poetry Reflection and Empathy: On the third floor, visitors will find a collection of Japanese poems reflecting the personal experiences of disaster victims. This section is designed to encourage visitors to reflect on their own emotions and develop empathy for survivors. Through poetry, visitors are invited to feel the depth of the disaster experience and understand its psychological impact.
- Display of Temporary Housing: The site also features displays of non-permanent housing that was once constructed in the aftermath of the disaster. This gives insight into the immediate living conditions of those displaced.

- Exhibition of Tsunami Debris: The exhibition includes displays of debris devastated by the tsunami, serving as a stark reminder of the immense power of the waves that struck the city. This helps to illustrate the sheer force of the tsunami.

Q: Who funded the construction of the memorial site?
A: The memorial was funded by the city, the prefectural government, and the national government. The park surrounding the site was specifically developed by the city.
Q: How does the Okawa Elementary School memorial compare to Kadonowaki Elementary School?
A: Okawa Elementary School is remembered for its tragic story, as all the students who stayed in the school perished. After the earthquake, teachers took too long to decide on evacuation, debating whether to stay in the building or move to higher ground. Instead of climbing the hill behind the school, they decided to cross the river, which turned out to be a fatal mistake. Before they could reach safety, the tsunami arrived and took the lives of 70 children.
Q: Was there controversy surrounding the Okawa Elementary School tragedy?
A: Yes, the city government attempted to cover up the poor evacuation decision to avoid blame and protect those involved. The story is deeply tragic and painful, but it provides an important lesson on the dangers of hesitation during disasters.
Q: How is Okawa Elementary School memorialized today?
A: The site has been preserved as a memorial ruin, allowing people to see the remains of the school and learn from its history. However, the memorial is often described as depressing, with fewer exhibits compared to other sites.

Appendix 2 (k): Government Kesennuma

GOVERNMENT
Kesennuma Elementary Ruin School Ruin
Katsumi Sato, February, 2024

Q1: Can you introduce yourself briefly? Where are you from and what is your current job?
A1: I was born and raised in Kesennuma. At the time of the earthquake, I was working at Kesennuma City Hall. I witnessed the tsunami from the parking lot of the city hall. Later, I was put in charge of removing debris and eventually became the director of the Ruins of the Great East Japan Earthquake Kesennuma City Memorial Museum.
Q2: What kind of place is the Ruins of the Great East Japan Earthquake Kesennuma City Memorial Museum?
A2: The museum preserves the old school building of Kesennuma Koyo High School, which was damaged by the tsunami. Instead of recreating the inside of the school building, we have preserved it as it was after the tsunami. Visitors first watch a 13-minute clip of the tsunami before entering the building, and at the end, they watch a 3-minute clip featuring the thoughts of three people who experienced the earthquake.
Q3: What challenges did you face in launching the memorial museum?
A3: Initially, there was opposition to keeping a large ship, the 18th Kyotoku Maru, as a memorial. Around 70% of the residents were against it. Eventually, it was decided to use the Kesennuma Koyo High School building for the museum because all the students there managed to evacuate safely, while 60 people nearby lost their lives.
Q4: Why was there so much opposition to using the Kyotoku Maru ship as the memorial?
A4: The ship was swept 700 meters inland by the tsunami, and it likely crashed through houses. Although it could represent the terror of natural disasters, it was emotionally charged, and the community opposed it. The final decision was made by the residents, with the majority against it.
Q5: Why do you continue working persistently despite the difficulties?
A5: After the earthquake, I became deeply committed to making sure the lessons learned from that experience are not forgotten. I believe it is important to teach people the necessity of taking safe actions in times of disaster, as many lives could be saved with better knowledge of disaster prevention.
Q6: What was it like to remove debris after the tsunami? Was it shocking?
A6: It was deeply shocking. When everything is swept away—your house, photos, your life's belongings—you realize that you must move forward by cleaning up. We were taught by survivors of the Great Hanshin-Awaji Earthquake how to properly handle debris, and we made sure to treat items like photos and mortuary tablets with care.
Q7: How did you feel when you found the bodies of your own friends and family members?
A7: It was a heartbreaking experience to find the bodies of my friends and family members. It was not just about cleaning debris but also about treating everything with care and respect. Life is precious, and it is important to pass on that message to others.
Q8: What is your vision for the future of the memorial museum and the city of Kesennuma?
A8: I hope that the Ruins of the Great East Japan Earthquake Kesennuma City Memorial Museum becomes a place that people from all over the world think of when they think of

memorial museums for the Great East Japan Earthquake. I want it to be a place where people always come to learn about the disaster.

Q9: Do you think the reconstruction of Kesennuma is complete?

A9: Reconstruction varies for each individual. While there have been significant developments like the construction of bridges and the opening of the Sanriku Expressway, I believe the true start of recovery is different for each person. Full recovery is ongoing, and it is important to recognize that the process is personal.

Q10: What can people abroad do to help with the recovery, especially during the pandemic?

A10: People can share their experiences and stories, like how the earthquake affected them, and encourage others to visit the memorial museum. Young people must learn about the disaster. Sharing stories through platforms like Zoom can help spread awareness.

Q11: What is your message to young people interested in the disaster and recovery?

A11: I'm glad that young people, even from abroad, are interested in learning about the disaster. It's important that they spread the message of the disaster's lessons and help teach others about the importance of being prepared for natural disasters.

Appendix 2 (l): Forum Group Discussion Aceh

FORUM GROUP DISCUSSION
ACADEMICIAN OF ACEH TSUNAMI MEMORIAL MUSEUM, LEADER OF ASSOCIATION FROM TOUR GUIDE INDONESIA IN ACEH, GOVERNMENT OF TOURISM
FEBRUARY 27, 2025

Ladies and gentlemen, I would like to know the story of your involvement during the tsunami. Did you also experience it at the time of the disaster?
Answer 1 (Academician) Mr. Putra
In 2004, I happened to be a witness. I was still living in my parents' official residence in the Jambotape area. When the earthquake happened in the morning, we didn't know anything big would happen. When the earthquake hit, the house and the glass collections were all broken. Because we felt the earthquake going up and down. After that, we cleaned the house. It was only when we were cleaning the house that we heard people running. People were running from locations that were badly hit by the tsunami. we also just realized. Why? More and more people were running. They said "Don't think about wealth. Now also get out of the house. Oh, the sea water is rising. The sea water is rising". We imagine that the distance from the sea to the house is far. It's impossible. But more and more people were shouting water... water... .... My parents at the time said, maybe this wave could reach the city. At that time, my family and I packed our bags, just the way we wanted. Locked the door, got in the car. Get in the car, run towards the most crowded people running where.
Which way did it go?
Answer 1. (Academician) Mr. Putra
The direction to Brawi. It was indeed from the sea, he was a little far from the sea. At that time, we ran with the crowd. So when we ran, we took a car. Well, because of the lack of public knowledge, we got stuck at Junction 4 Jambu Tape. Junction 4 Jambu Tape is where there is now an intersection 5 of the BSI Bank Syariah Indonesia monument. There, why did we get stuck there? Because many people don't understand. We are from the sea area running to the high area. Meanwhile, people from Brawi want to go to the sea area. Then from that intersection they want to run here, from this intersection they want to run there. That's it. We couldn't move anymore. Suddenly we felt that the water had started to move. In that area the water was already running. From the car we saw the water coming. So we immediately took the initiative, got out of the car. There, at that intersection, at that time there was still a police station. Now it's BRIMOP. So, we ran there, up to the third floor there. Not long after we went up, the water immediately got higher and higher. We still don't know what this phenomenon is because the water might be, oh it's already high. After half an hour, the water had started to recede, then we realized there was a disaster behind. There were dead bodies. After the water receded, we saw dead bodies lying around.
We returned home and the house was indeed filled with piles of garbage and wood. Only then did we realize that the disaster that had just happened was called a tsunami. Maybe for those of you who know, I saw that it was really gloomy. We didn't stay at home that night because it was like that. There was no electricity and no basic food. So we looked for a safe place and our families gathered there. That's what I felt on December 26, 2004.
That means it's enough to be able to record memory, yes sir at that time? How old was he at that time?
Yes, I was in my 20s at the time. I also saw the conditions, I didn't explore much on that day, because we still didn't understand, but the next day we started looking for family, then we

explored everywhere. We can't even access it. Because I also have a lot of family, I'm looking for grandparents, aunts.

Are they all safe?

Answer 1. (Academician) Mr. Putra

No, I didn't. Not found until now.

Answer 2 (Academician) Mrs. Intan

I was 16 years old when the Tsunami happened, and I was far away. So it wasn't a tsunami, it was just an earthquake. Fortunately, people said that there was no loss of property, but most of the family were in the place where the Tsunami occurred.

Answer 3 (Academician) Ms. Mila

I am... I am also a living witness to the tsunami. I did not experience it first-hand. But I felt the situation that morning myself. It was very sad.

So that morning we were all in front of the house, and... We were one of the less severe areas, but my house was destroyed by the tsunami. There we tried to run at the time of the earthquake, because there were shouts of "run, the sea is rising". They didn't shout tsunami, they shouted rising seas, and we ran.

What makes me regret it is that I left my parents and I was carrying my 3-month-old child, I was 25 years old at the time. And I ran, but I didn't know where I was going.

And we ran to Jambo tape, where the conditions were already bad. The water was already flowing. And I had a collision, we fell down. And we got up by ourselves, no one helped us there. We were thinking about ourselves. And we immediately ran. After that we decided to just run to... Away from the beach. We ran to one of the mountains, we were there from 10 am to 4 pm. There I saw a reuk truck going up with some victims who had no hands, no legs. There I just realized my parents, I left them.

So that's what broke my heart. There I was thrashing around, I was calmed down by the police. The policeman said, "You can't go down from the Matai Mountains, because it's not conducive down there."

After that, I was already unconscious, half-conscious. It was because I was screaming. I imagined, maybe my parents were like that. Covered in blood. In the afternoon, I was allowed to go down. We went down, all the same, with my husband and my son, and we walked from Stui Street and saw the devastation on Stui Street, covered in bodies that were unrecognizable because they were covered in mud.

We walked, we kept walking until near my house, I saw my parents' motorcycle that was still standing upright, with the Brand vespa at that time and the Vespa was green, but the color was gone, it was smeared with mud and I thought did my parents have time to run like me or did they not have time?

Because the vespa motorcycle was still there and I wondered if my parents had died.

After that someone shouted, my family or neighbors shouted that my parents were in the office in front of my house.

I couldn't reach directly to go up into the building. I had to wait until the evening before I could see my parents. We couldn't get in through the door, we had to reach through the windows until we broke the glass, and only then could we get inside. Because the pile was almost half of the second floor.

After that we went up, I grabbed my parents, there I was hugging my parents.

I immediately promised that I would never leave my parents again, because of the tremendous pressure I felt.

But thank God we gathered, maybe my cousin who was missing and my grandmother who was missing, we gathered but we couldn't occupy the house anymore because the house was destroyed because the house was semi-permanent.

We returned to the Ketapang area, close to Mata'i as well. Alhamdulillah, we reunited. One thing that makes me proud is that I still meet my parents, and at the tsunami museum I can share my experience, so I can share a little bit of what I feel in my heart with the visitors at the museum. So they have never experienced a tsunami, hopefully not, but with me telling the story they were a little bit carried away.

Answer 4 (Academician) Mr. Abdul

Assalamualaikum Warahmatullahi Wabarakatuh. Waalaikumsalam. For me, at the time of the tsunami, my position was, we were on leave, I was studying at the same time at the STPDN school, but I was on leave. But my position was in Lhoksumawe.

On Sunday morning, in Lhoksumawe, it felt like an earthquake, an earthquake with high strength. So at 8am that morning, I was sleeping, suddenly my parents woke me up, earthquake, earthquake. Because the earthquake was strong, we were told to go outside again. So I was told to go out, get out of the house, and I saw that the road was swaying outside.

It was very strong, different from normal earthquakes, with a magnitude of up to 8.1 Richter. So that's why we were asked to get out, for fear of collapsing buildings.

After coming out, there were two earthquakes. Then it stopped once, entered the house. But there was another earthquake, and I left the house again. In Lhoksumawe, the earthquake was only felt. The tsunami water did not reach Lhoksumawe. But only in the Puso area, Lhoksumawe.

Because Lhoksumawe is not close to the Indian Ocean sea.

After that I found out that the Lhoksumawe to Banda Aceh crossing was also closed. You can't go there. Because there are also many families in Banda Aceh. They are stuck there. So we were not allowed to go to Banda Aceh first, because the condition of Banda Aceh was bad.

Answer 5 (Community leader) Mrs. Eva

I did not experience the tsunami, because my house was far from the city center. Because the tsunami was centered around the city of Aceh with the coastal areas. So because my house was far away, I did not understand the tsunami.

However, the night before the tsunami, I slept rather slowly, and that night I had to study hard for my thesis exam.

Around 1 or 2pm, suddenly the atmosphere became very quiet. The atmosphere was quiet, coincidentally there was an empty garden next to my house.

The sound of the wind was soothing. Suddenly there was a long dog howl. So because I'm a scared person, people say... If there's a dog howl, it means a Kuntilanak demon is approaching...

The next morning it was discovered that a tsunami had occurred...

Actually, nature also has signs before a disaster occurs. But we are not educated.

Then the next morning, because I had slept late, I also woke up late. When I took a shower, there was a sudden earthquake, 8.9 on the Likert scale.

I still have a headache from not getting enough sleep.

But it got bigger and bigger. I was knocked on the bathroom door and asked to come out. I just realized that there was an earthquake.

After that, we left the house. Actually, we couldn't get out. Because the walls were already shaking. It's not the lights anymore, the walls are already swaying badly. Even cars can get out of the garage by themselves, without being controlled.

Finally we got out, we asked "what's going on? "Because our house is far from the beach, we didn't understand.

Many of the people who managed to escape were covered in mud, injured and said "the sea is rising"!

We thought, sea water rising? It's not raining, it's not flooding.

What sea water? After that, because our house is far away, we just went out... My house happened to be near the stadium. After walking out, I saw dead bodies near the Ketapang rivers.

Then we thought, where did the corpse come from? Not long after the incident, the electricity went out. Phones also went out, communication was also unusable. So it was very panicky.
Then we are still thinking about, coincidentally at that time, there was a BRI bank anniversary event so at the time of the earthquake they were all disbanded, the event did not happen.
Because my aunt's house was far away, it turned out that they went back to her house, and it turned out ... After the tsunami, when we were gathered together, talking, I found out that my aunt, her husband, and their four children were missing, not found.
And no one saw them at the time. But for my own family, my immediate family was not affected by the tsunami, thank God. Because we don't know about tsunamis. So when I was guiding guests, I was asked by my guests, what about Eva, did experience a tsunami? How do you understand tsunamis? Actually, I didn't witness it directly, I only felt the earthquake.

But the question is, was there any warning at the time of the big earthquake?

Answer (All)

There has been no warning from BMKG. Nothing at all.

Answer 7 (Academician) Mrs. Intan

Even we, the people of Aceh, because we have not experienced it, based on the stories of people on the coast, when we see the sea receding, it is actually a sign of disaster.
We didn't understand it was a sign of disaster after the earthquake. So we don't understand to run to the hill. There is no education yet.

Answer 8 (Community Leader) Mrs. Eva

Even my neighbors on Sundays, because they are used to going to Ulee Lhueue beach on weekends for swimming, bathing, and therapy.
So when there is a low tide, the fish come out.
Many residents there took the fish instead of running, because they understood what would happen... They didn't know there would be big water.
Only then did some residents feel something strange, and they thought to run, but behind them a wave of water had come. But thankfully he survived. So, the people of Aceh did not understand at all.

Answer 9 (Academician) Mrs. Mila

Some shouted "Ieu Beuna!" but we didn't understand either. It means the water is rising.

After the Tsunami, what policies did the government implement for people living around the coast?

Answer 10 (Academician) Mr. Putra

Now, with the presence of support from foreign aid, including in the past, there was already someone coordinating, called BRR. BRR was the one who made a big program for the rehabilitation and reconstruction of Aceh. This includes mitigation. The mitigation program, which was actually also after the tsunami, was one of the work units in the government called BPBD, the Regional Disaster Management Agency. Because of the Aceh tsunami, every region has a BPBD throughout Indonesia. Well, that's where the government's efforts to provide education to the community, mitigation to the community, especially areas that are prone to disasters. Well, their main tasks and functions are more to educate, mitigate, where if a disaster occurs they have to do anything. If the sea water recedes, what should they do? And actually the regions have also been given the authority to regulate the distance between houses and the beach, especially in disaster areas, it has been regulated. That is the condition, although there are still many settlements near the sea.

Why? Because sailors, huh? Fisherman?

Answer 11 (Academician) Mr. Putra

Because the majority of livelihoods are nelasayan. In terms of income, it is also because house prices in urban areas or the mountains are expensive, compared to coastal areas. Maybe they can afford to buy land, buy houses in coastal areas.

Is there a policy that the land is slightly raised? Is there an effort to raise the land of those who live on the coast?

Answer 12 (Academician) Mr. Putra

In terms of regional policy, we don't. We are not doing what Rikuzentakata has done. Because I have visited that city. There, the land from the mountain was taken. We are not like that, but ... the efforts made by the government include embankments for coastal protection and also increasing mangroves. There is also a government program to promote tsunami drills. You can run to the fourth floor of the tsunami museum.

Answer (Leader Association) Mrs. Eva

In addition, in every disaster-prone area, an escape building is established. So people understand if a disaster comes they have to go to the escape building. In addition, there is an "evacuation way" signboard with striking colors such as red, orange, green. That is, directions for everyone.

As a resident of Aceh, whose house is far from the coast, I don't understand the situation in certain areas so I don't know where to run. But with the evacuation way markers, it makes it easier.

What is the purpose of the tsunami museum?

Answer (Academician) Mrs. Mila

The tsunami museum has an extraordinary function. Because school children in 2012, April, there was an earthquake in the tsunami museum, and there was a potential tsunami. Because the warning system was already running.

It was only in 2012 that we were able to deliver a warning system for evacuation during a major earthquake. Because of the disaster mitigation training, during the earthquake, many school children ran to the tsunami museum on the 4th floor. So we went out of the tallest building, but the school children ran to the tsunami museum. They said that the warning system had sounded, so we had to go up to the 4th floor.

We went down in the afternoon. And this tsunami museum also functions as an escape building too.

How many meters did the tsunami reach the city?

Answer.

In terms of total height, it can be as tall as a coconut tree.

Answer (Academician) Mrs. Mila

If the water level is 30 meters, it is measured from the puddle in the house, when the wave came, it left a puddle at the factory in the village, so when it was measured it was 30 meters.

But if the water level from the sea to land is what we know that moved the ship from the sea to the residential area as far as 25 meters.

How many meters high is this building (tsunami museum) sir? What is the reason sir, why does the escape have to go to the building?

Answer (Academician) Mr. Putra

It is up to 30 meters high.

Actually, the construction of this tsunami museum was the idea of BRR at the time. The Rehabilitation and Reconstruction Agency, not only as a reminder of the dark history, but also as an evacuation site.

With some existing philosophies. So the basis for the construction of this building was made a competition. And the most interesting philosophy was won by Mr. Ridwan Kamil. He won the competition to design this tsunami museum. Therefore, in every size there is a philosophy, including the height of the museum, the shape is made to facilitate evacuation, which is circular upwards.

Is there a story like that, sir, when there was a tsunami and they had evacuated to the building and some survived or some did not survive so that it ended up inspiring?

Answer (Academician) Mr. Putra
We don't really understand, but what I feel from my story is that people don't understand about tsunamis.
What about those who evacuate to the mosque, sir?
Answer (Academician) Mr. Putra
At that moment they ran to see people running in that direction. Not on the basis of knowledge, just on instinct.
But there are also those who don't understand. From Berawi, they ran towards the sea. But there are also those who have other interests. For example, in Japan, if there is an earthquake or tsunami, mothers do not pick up their children from school. The child is already the responsibility of the school. But in Aceh, some still want to see their parents. And one of the victims from my family, my grandfather was like that. During the earthquake, my grandfather picked us up. If the sea had risen behind him, he would have run away. God willing, he was safe. But he wanted to see his wife. So we didn't know. This at that time was probably instinct. Running away from the sea is just an instinct,
After 2004, sir, what initiatives did the museum take so that these things would not happen again, so that if there is an earthquake, a tsunami, don't go there?
Answer (Academician) Mr. Putra
We have a lot of development after the tsunami and we feel that at this time the people of Aceh have begun to be ready and alert, especially the road routes near the sea, the size of the road is no longer small. Always made bigger. So that evacuation can be easier.
In the past, the road near the beach was only big enough for one car, one motorcycle. After that, it was crowded with people who didn't know where to go.
But now, the lane is already large in size and enough for 4 cars. That's the one adjacent to the sea.
That's the government's efforts now, especially in the infrastructure. That is what is also being pursued. For us, the museum continues to educate. For education in the museum, we hope that whoever enters the museum will understand what a tsunami is like, and know what to do in the event of a tsunami.
How do you provide education like what? If I compare it to the Iwate museum in Japan, they made the Tendenko Tsunami. Is there an educational method that is specifically summarized from this museum?
Answer (Academician) Mr. Putra
From this museum, we introduce the effects of the disaster itself. First of all, maybe the children by seeing the ruins of the buildings, seeing how bad the condition was after the tsunami, they can already imagine.
The disaster that happened in Aceh. We also created a virtual one, so that children and visitors in general are able to imagine.
Today's tsunami museum will be digital, because our target is children. If we say adults, maybe they already know what to do. But children are our main target. The tsunami has been 20 years, which means that children aged 20 years and under did not experience it directly.
That's what we are educating now, our target. School children are the reason we make digital so that they want to watch, want to see what the effect is like, a tsunami or waves as high as what. They understand first. So then they want to find out more. Because if we look at the stories from the people of Aceh in the past, the sea receded, where did people go? To get fish, to get closer to the sea. Because they see the fish in the ocean. Now we want them to understand the basic knowledge first, but for deeper knowledge, we have tried, and there is also cooperation with JICA, from Japan, they also really hope that it becomes one of the local content and becomes the school curriculum. Even become the school curriculum. That's their effort. But for adults I think, all Indonesians already know.

We asked junior high school students at that time. Does anyone know about Tsunami? Flood he said. Tsunami is a flood.

Answer (Academician) Mr. Abdul

Besides that we also make activities, socialization. Smong Box program.

So the Smog Box program is a learning program at the Museum. So we work with schools, inviting school students to learn at the museum. We also provide the room. So we invite each school to learn at the museum. We invite resource persons who understand about the tsunami to tell about the tsunami in Aceh.

Question

What is the Box content of the Smong Box program?

Answer (Academician) Mrs. Mila

We invite school children because most people keep tsunami-affected objects like your feet, or whatever. So instead of keeping them at home, it's better to give them to the tsunami museum, through that box. So we delivered the boxes one by one to each school, and we invited them to the tsunami museum. So the children keep the items, or their parents, or grandmothers. They give their personal belongings that were affected by the disaster and give them to the museum, which will become an additional collection in the tsunami museum.

Answer (Academician) Mr. Putra

The mission is actually to add to the collection. So Smongbox is actually from the community to the tsunami museum, not just from the museum to other communities. We are reciprocal.

At present, the tsunami museum in Aceh has mostly replicas, whereas during our comparative study at the Iwate Tsunami memorial museum, we saw that the majority of the collections were original.

Because we find it difficult to get the original one. Many residents also do not want to let go because of memories.

The object has a connection to them, for example a gift from their parents and it turns out that their parents died in the tsunami, so they want to keep the object.

Answer (Academician) Mrs. Mila

We actually adopted the method from Simeuleu Island. Why can the people of Simeuleu Island provide mitigation to the community? Why can't we?

So we created our own mitigation that was different from the people on the island.

We in Banda Aceh are different, we use Museum, while they use Smong.

Do you feel that this museum is the most effective way to educate children?

Answer (Academician) Mr. Putra

We haven't done in-depth education yet, but to give an understanding of how the waves are, what the effects are, we feel that this is enough.

Answer (Academician) Mrs. Mila

Another one that we need to teach more aggressively is about mindset.

The mindset here is that when an earthquake occurs, people must think of children first, pick up children, pick up parents, well that's what we have to change.

I learned from the 2004 tsunami. When the tsunami happened again in 2012, I immediately went home to see my parents and my family, why should I go home? My parents knew the answer, so why would I go home? If there was a tsunami I would be lost on the road. Before I even reached home in the Blang Padang area, I would have been lost if a wave came. So we have to change that mindset, we can't go home but we have to stay on the path like we are in the correct evacuation site.

But it's amazing in Japan, because the children even if they are left at home, they just pull their parents to save themselves, even though the parents don't understand much.

That's actually what happened in Banda Aceh. I want it to be like that. It is precisely the children who will attract parents to save themselves.

That's why the tsunami museum also plays a role in educating teachers too.
How long was the time between the earthquake and the tsunami?
Answer (Academician) Mr. Putra
40 minutes to the city.
But those who live near the sea, the waves come faster.
Answer (Academician) Mr. Abdul
If they didn't fish, many would have survived. There is still plenty of time to run.
Answer (Academician) Mrs. Mila
Actually, if they have learned their lesson, they don't fish, there is still a chance. I don't think there would have been so many casualties.
Welcome Mr. Is. Earlier you told us about your direct experience. Do you have direct experience of the 2004 tsunami?
Government (Disbudpar) Mr. Is
Bismillahirrahmanirrahim. On that Sunday, in the morning, I happened to be working as an engine operator at the Mbata power plant. I was on the afternoon shift. So that morning I was still at home, at the shop to be precise. We lived in the shop, and at the time of the first earthquake I was still upstairs and then we ran downstairs because we sold children's bicycles so I couldn't go out to the front, there were a lot of bicycle wheels, bicycle tires that we had hanging down so we couldn't run to the front, we ran to the back of the shop which was fenced with bricks along the back of the shop and thank God where we were standing the fence didn't fall down, the others all fell down. There were three of us there, me, my wife and my cousin. Even though the place where we stood the tallest fence was about 2 meters high, it didn't fall. And we survived there, and then after the earthquake subsided, the first earthquake, we looked around for equipment, took the motorcycle, wanted to see our parents, and also one other shop in Darussalam.
On the way we saw several buildings that had collapsed, for example, the regional PLN office, Laprik collapsed. So I live in Lingke in the direction of Ke kuncut, in Lingke in the direction of Dussalam. We traveled to Berawi to see the office, there were several buildings that collapsed. Then we wanted to see Pantai Perak (shopping center), at that time it also collapsed.
But because we remembered the other shop in Darussalam, we turned around to see the computer rental business that we have in Darussalam. And on the way we stopped at the shop, because we wanted to pass the shop, where we live, a bicycle repair shop. Then the second earthquake happened.
We were cleaning up, taking other equipment, cellphones, wallets, because when we went the first time we didn't bring them, because we thought it would be afternoon. So we took all our wallets to see the second shop in the direction of Darusalam. And after we were all about to leave, we were talking at the front, because there were already many people gathered, and the second earthquake happened, and our sister ran from one of the local coffee shops with a shout, "run... run all... the sea water is rising!".
And we saw that there was water gushing down the drain. We climbed into the dump truck. A car carrying sand. My wife took the car. I rode a motorcycle. Indeed, we already saw many people running away at that time. The question is that we are not used to it. The Brimob with their weapons ran away. Why did the Brimob run with their weapons? Why are they running with weapons? It was still the conflict period. I thought it was still normal. Then I saw a male Kijang minibus. The women in the back stood up. We were still thinking, "ah, this is probably taking people to the hospital". Because the direction was towards the city. Of course the hospital is in the direction of the city. Maybe someone was crushed by concrete or something and they took them to the hospital. Still not aware of the rising sea water.
Seeing that my wife couldn't get on, she was wearing a skirt, four months pregnant. So we took the initiative to get on the truck and pull her up. There were about 9 people in the truck, 4 boys

and 5 adult men. In a sand truck. And the car went for a while, then stopped. I thought, there are more people wanting to get on. Apparently, the driver saw that the water in front was already dark. The tsunami water was already rising. Apparently, the driver saw that the water in front was already dark. Then the driver ran away. Because we didn't see him running, we stayed in the truck. Until the water hit the truck that we had brought from the side of the road to the middle of the sidewalk. The truck was lifted up and hit another car. So our car became heavier. Had there been no other cars attached, it could have been carried away by the water and overturned. But thank God, maybe Allah willed us to be alive.
We were on the water until 11:00 PM. And seeing that it had calmed down a bit, we went down. Wanted to go up to the store because we wanted to evacuate, not in the middle of the water anymore. Walking with my wife to the store, we were on the way to the store that we wanted to go up. The people above the shop immediately stopped, stopped, don't go up again. It's already crowded here. Then the ladder was moved. With difficulty, fear, we climbed back into the car. At 1:30 PM we got out of the car. We could already evacuate. We moved from Lingke to Lampineng, to a relative's house. In the afternoon we returned to the location where we lived. We evacuated, some children were hit by zinc sheets and died. We took them to the Hajj Dormitory. Then there was a woman, still young, a girl. She was already dying from the tsunami water. We lifted her up, we put her on a chair so she was no longer lying on the road. And it was difficult at that time. We can't help people much. We had to think about ourselves. And it all passed until we were able to return to where we are today, Insha Allah.
The water did not rise just once, as there were several waves.

So it's like being pulled into the sea?

Answer (Government) Mr. Is

Not at the beginning, the water hit all the buildings. Why many buildings collapsed is because the initial wave of water in the estuary carried coconut trunks, or trees, or other materials so that when the second wave came with heavy materials and hit the walls, the walls were destroyed as well.
And we saw that there were several people who saved themselves because they were stuck on the Acacia tree that was planted in the middle of the road.
At first they could still breathe here. But when we looked again, they had already drowned. We, thank God, did not enter the water. So at that time, we took some of the women's headscarves, we covered them with the women's headscarves so that the water did not enter the car. Then the women's salaries, we saw Indomie, we saw instant noodles, we saw mineral water, we took it all to stock the truck. Because we understand how long it will be in this condition. Around 10 AM, three men wanted to go down, they asked permission from me because I was the oldest at that time, there I said, pity the friends here who are women who don't understand. Because they were together, so they didn't go down, they stayed until noon and Alhamdulillah everyone was safe. The children are also safe.

I heard earlier that the museum itself focuses on education, mitigation. From the government, what is the purpose of building a museum? Why not focus on building infrastructure? Why not focus on the trainings that might be more important, sir. Because it's related to life, why should it be the museum, why should it be tourism, sir?

Answer (Government) Mr. Is

Actually, this museum is more about education, and reminder. We have to give a reminder to our children and grandchildren in the future. If we don't have artifacts that we can leave behind that they can learn about disaster mitigation, maybe once a strong earthquake occurs in the next few tens or hundreds of years the children will understand that it can potentially cause a tsunami. During the earthquake on December 26, 2004, most Acehnese people saw that the sea water was dry, so they took fish instead of running away.

People in Banda Aceh, especially Aceh Besar and Aceh Jaya, up to West Aceh, once they see the sea water receding, there are fish lying in the sea which is usually quite deep, even these Acehnese people go down there to pick up the fish that are lying because the water is receding. Whereas in Simeuleu, there is the Smomg culture, there is education from the community, the parents to their grandchildren, once a big earthquake occurs, they understand that they must run to the mountains. We in Banda Aceh do not understand to run to the mountains. Because there is no education. So this tsunami museum was built to provide early warning and also education to our children and grandchildren in the future about what a tsunami is, and what to do when a big earthquake occurs. Where should we run. Maybe that can save our children and grandchildren in the future.

Smong is effective, using more traditional means like what the people of Simeuleu already do? They use Nandong, Manafi-nafi. Why not the traditional way? Why should we use technology, why should we use virtual , why not the traditional way that has been proven to be effective, suitable with the culture here?

Answer (Government) Mr. Is

Now it's gen Z. It's already 4.0. We've even entered 5.0. So now teenagers no longer like to hear ancient poetry, no longer impressed by ancient sciences. They prefer what is currently trending. However, there are some Acehnese singers who have also done or made verses about this tsunami so that it will also give them an impression of what a tsunami is.

And the government is making various efforts to save its people.

The government also continues to conduct Smong activities during tsunami commemorations every year. The Aceh Tsunami Museum also socializes Smong to students, early childhood. So as a provision of what a tsunami is, it doesn't stop at poetry, it doesn't stop traditionally, we also want to convey to the world what a tsunami really is. If for example there was no tsunami in Aceh, in 2004, maybe the world would understand what a tsunami is.

But because it happened in Aceh, it has educated the entire world community about big earthquakes and about if there is indeed an earthquake of that magnitude, the potential for a tsunami exists. So the tsunami museum will also be able to provide education not only for the people of Aceh, but also for the world community. From Aceh to the world. Not only from the world to the Aceh

Answer (Academician) Mr. Putra

Indonesia, the Ministry of Tourism at this time also wants to develop what is called Dark Tourism. Dark Tourism is learning from history, dark history becomes tourism. Why should it be tourism? Because what is really interesting at this time is from tourism. If it becomes an object of historical sites only, we are like seeing today the condition of the community looking at the collection in the tsunami Museum. If we look at the behavior of visitors, if there is one collection, they only pass by, read and pass by. But if it is virtual, if there is a video, they understand more. That's why we want to digitize it. As I said earlier, who do we target for education? Children's age. The age of children now, right. They prefer digital. Because for education, if it's with poems or books of all kinds, maybe they don't understand too quickly anymore. But with pictures, videos, they can go deeper and they can practice immediately.

Answer (Community Leader) Mrs. Eva

So if it's traditionally, maybe now we also face the obstacle that children nowadays don't speak Acehnese. So look at a coffee shop or anywhere, the kids are using Indonesian or Slank languages.

It's different when I was in elementary school, 20 years ago, there was a local content lesson in school, Aceh language. We continued to learn Aceh language from grade 1 to grade 6. But today the Aceh language lesson no longer exists. That lesson is no longer a local content.

So let's say if in their family they don't use Aceh as a medium language, they automatically don't speak Aceh, right? Because my own child only learned Acehnese after he went to a

boarding school where his friends happened to come from outside Banda Aceh Because if Banda Aceh itself, yes, we speak Indonesian, we don't speak Acehnese But if from outside Banda Aceh, Aceh Besar, Aceh Jaya, they do use their daily language Acehnese.
So, if we use traditional methods through poetry, do they understand what we say to them? No, they don't. So the message won't get through. Because they don't understand. That's probably one of the difficulties we also have using traditional methods.

Answer (Government) Mr. Is

The tsunami museum also provides a lot of education to its visitors. For example, visitors can directly experience the sound of tsunami water. When they enter the first tunnel below, with the creation of maybe almost like 4D, we enter, there is a roar of Laillahaillah. Then there is also a splash of water that we feel, there is water that hits our body with a rumbling sound like water, sea waves. That educates people about, like this, what it looks like when a tsunami comes. Then after they enter the room, there is a room with a screen (Memorial Hall).
The education room is downstairs. There they also see photos after experiencing how the tsunami water came, they see how the impact after the tsunami water and also they enter the prayer well and there are many precise names of tsunami victims. And maybe that gives a feel of how the tsunami has increased the religiosity of the Acehnese that we will return to God someday.
Also, many people come and don't dare to enter there. Because of fear, because of trauma. That's actually the message that we want to convey "Be afraid of this tsunami".
This tsunami is not just a tourist destination but indeed an education that makes us first we are afraid of the tsunami and then we are convinced by the power of God that one day we will return to God, which is conveyed from the Prayer Well Zone.
And some of the collections displayed here also provide a space that has water waves, which we pass through the water waves, so we can feel maybe how people were in the water when the tsunami came.
There were some friends who were also drenched by the tsunami water and thank God, some survived and some were infected with lungs due to the dirty sea water at that time so they did not live long.
One of my friends in my room, Fina, was drunk by the tsunami water. Alhamdulillah, she is healthy until now. She is also one of the survivors. And there are some people who might have had a positive impact from the tsunami itself. I used to be a little bit harsh. Because I was a survivor, I've become better. Already understand.

The tsunami showed something sad. How can the government here or the tsunami maintain empathy for the people? How can you maintain your empathy for the good cause?

Answer (Academician) Mr. Putra

That is why at that time Mr. Ridwan Kamil won. Actually there is opposition, because this is sadness. Why are we reminded of sadness or what?
He created a room that became the most sacred philosophy in the tsunami museum. The prayer well. That's the important point. The prayer well is not just to commemorate the names of the victims, but we are asked to pray for the families of the tsunami victims. If there was no tsunami museum, who would pray for them? That's why with the prayer well, we hope that every visitor, even if they don't pray, but when they enter the room, there is always a prayer. There we have indirectly prayed for the martyrs who died. That is the most important room in this tsunami museum. We are not only remembering, but praying. That's where I think people come to the tsunami season on December 26th, not to look at photos, but that's where the room is most sought after.

Answer (Community Leader) Mrs. Eva

For me, I see it more like this. So actually the history before this tsunami, Aceh was a conflict area. The conflict between Aceh and Indonesia was quite severe.
If there are questions like that, why Dark Tourism?
If we look at today, if we didn't have the tsunami, people wouldn't come to Aceh, people wouldn't know what Aceh is.
Because if we bring Cruise guests, the Cruise people even ask, We only found out about Aceh after the tsunami. They don't understand that Aceh is part of Indonesia. Because they know it's Bali or Medan. So... I would call it a blessing in disguise, this tsunami. Because of what, it finally opened the way. Today Banda Aceh has many buildings with good facilities, good hospitals, we didn't have that before the tsunami. We didn't even have access to be able to study abroad more easily, get scholarships.
But it was after the 2004 tsunami. Aceh is one of the priority areas to get scholarships. So, there is always ease behind the difficulties. So, Alhamdulillah we are Aceh after the tsunami. Yes, even though some people see Aceh with the view of selling sadness. Or there are people who say this, "yes, why did the tsunami happen in Aceh? Because Acehnese people know how it is, so it's like wanting a new people, so that the old people are eliminated, destroyed".

Answer (Government) Mr. Is

Actually, trauma healing from the government also has a positive contribution. For example, with some assistance from NGOs, from foreign countries, and making trauma healing to the children of tsunami victims as well. Making them maybe not forget, but cheerful again after the tsunami came. And there was also a lot of assistance from the government including foreign countries and NGOs to build facilities for the people of Aceh. which at first maybe they did not have a decent place to live, after the tsunami they had a decent place to live. That is also one of the efforts made by the government. But the most important thing is the Acehnese's faith in Allah. Because we believe that everything that comes from Allah will be returned to Allah. And this disaster is a trial from Allah. And this will increase our faith in Allah. Maybe that's what makes the Acehnese still strong, not questioning when we sell dark tourism. Because indeed our faith and obedience to Allah after the disaster occurred. So that's what makes this Acehnese still strong, not a problem when selling Dark Tourism. Because of our faith and obedience to Allah, so people think that yes, everything is already ordained by Allah. And this will provide blessings for the people of Aceh and for the Aceh region itself. As evidenced by what Eva said, the many facilities that Acehnese have today. The roads are good, the city planning is also quite good, and also the education for Acehnese children has also improved.

Is there a story about the conflict in the museum?

Answer (Government) Mr. Is

Aceh went through several phases of gloom. Our conflict period was quite long, from the 70s. And the peak was in the 80s to 90s. And this prolonged conflict that Acehnese people live in is always tense. We had curfews, we had martial law, we had civil law. It's not free to go anywhere in Aceh, it's also very difficult for tourists to come to Aceh. In the 90s, foreign tourists wanted to go to Aceh, they had to have a blue visa. They still take care of it in Jakarta. So it's really special if you want to come to Aceh. Because it's a conflict area. And we see soldiers on the streets every day. Our streets are fenced. Made zigzag with oil drums that are poured with cement. We can't walk straight, in front of the posts. And that was the daily life of the people of Aceh at that time. If you want to say we are at war, we don't know who we are fighting against. But every day we were haunted by fear. Gunshots, grenades, fires.
There might be older people, I was already an adult at that time. Maybe we were on guard duty, we had night watches, at the village guard posts. We're on night watch, there's nothing going on, and then they come, and we're told to bathe in the Kubangan water, for example. There are things that are experienced by the community.

And when the tsunami came, we were still under martial law. We were still in conflict. And after the tsunami in August 2025, the blessing of the tsunami itself was the agreement, the peace agreement, the MoU between the Indonesian government and GAM, the Free Aceh Movement. Separatist movement.
It was also a blessing after the tsunami. As I said. Maybe if there was no tsunami we would still be in conflict today.
Answer (Leader Association) Mrs. Eva
Our people don't even dare to leave the house. These upright bodies can be raided. There are two kinds of raids. If not GAM raids, army raids. If you are considered a soldier at the time of the raid, you must show a Red and White colored reseidence car. If there is no such card, it will be mistaken for GAM.
Our residence card was special at that time. Not the yellow color. It used to be yellow, right? But ours was white like a book. Like a marriage book.
And at that time, we didn't know which government employees were not, because they didn't dare to wear uniforms. The only ones who wore uniforms were white health workers. And that was the most neutral. So if in the incident near my house there was a policeman who was shot at the Red Light Intersection, if the health workers don't pick it up until tomorrow, it will be left alone because no one dares to pick it up. If we pick it up, we will be accused by the police. Or if we pick it up over there, GAM will also be angry, like that. That's how dark we used to be.
Dark tourism is not only the tsunami but also the actual conflict. We must remember back to this dark history.
Maybe the last topic of my question is actually about memory transmission. Because we may have agreed that tourism in Aceh is indeed the focus for education, for memory, and not for profit. I can conclude like that, sir. Because I also saw that the entrance ticket costs almost the same as the museum in Japan. Very cheap, because the focus is not to be an income.
For example, sir, yes we agree that tsunami tourism must continue even though the generation has changed, the current administrators are the first generation, I can say that when the tsunami occurred, they felt, realized, and remembered. So how do you do it? Maybe in 20 years I won't see Mr. Putra anymore and the next generation. How can the next generation have the same feelings at the time of the story, sir? Even though maybe they can't have direct experience. How does your generation, Mr., Mrs., make the next generation able to continue this tourism? What efforts have been made?
Answer (Academician) Mr. Putra
Yes, actually from the organizational side, we always pass on knowledge to anyone who has just entered the Tsunami Museum. Our educator friends, when they enter, they are always provided with knowledge. There is a collection, for example, complete with an explanation, where it is affected so that they will also feel after we provide education, especially with the videos that are shown.
We hope that the videos are not replaced with more modern ones. But like what we have in audio-visual now, why is it real what happened at Simpang Lima, when the water rose, people ran, we have to ... Capture those images. Immortalize, those images. For others, in the future, I told you earlier, we will go digital, we will make this even more real. More real, with video mapping, for example in the sea, making animation as if the waves are approaching him, so that even though he did not see it during the 2004 disaster, he gets a deeper picture.
Does the technology mean, from her opinion as a tour guide. Isn't there a fear, ma'am, that if it is replaced by this technology, what will be the fate? The tour guide who then chose to be his livelihood, right? Which then, oh with technology alone is enough it seems?
Answer (Community Leader) Mrs. Eva

Because in reality, even though during Covid we also do virtual tours, people prefer to come directly, right? The feeling is different, yes, between seeing it in person, feeling it yourself and using technology. Because now there are many people who are worried that some professions will be replaced by technological sophistication. But what does it mean? On the other hand, people also need direct information, direct witnesses, right? People who are natives for example. So if for example there are people who come to Aceh, but it turns out that the tour guide is a person from Medan for example. The feeling is also different. But God willing, the profession will exist, because as long as we are still trying to improve ourselves, capacity building, people will come looking for us too. So the information we convey is the most important. Because everywhere, it is the locals who will become tour guides. Just like our friends who are educators at the tsunami museum, they are also local people who are already well educated to convey that information. Then maybe if my friends in the museum are more into the formal format.
Because the method of informing the young generation does not always have to come to the museum. When together with children or with children's friends, when we meet, or when we go to the mosque, say at the Grand Mosque, people will only see, oh this is the Grand Mosque. But we can show you, this wall is cracked. Do you know why it's cracked? It's because of the tsunami. The earthquake caused that. Because in Aceh, when the tsunami happened, the mosques remained strong. In Lampuuk, to the Rahmatullah Mosque, see there is a corner that is deliberately made into a site that is indeed, there you can see there are shells that have been carried away, sand that has been carried away, poles that are already somewhat collapsed but left there. So what, actually the education is more there. Because they don't always have to go to the tsunami museum. There are also many other places that have left traces of the tsunami.

Answer (Academician) Mrs. Diamond

As a museum worker, we are also worried that the story of the tsunami will only become a story. So there is one activity that the tsunami museum is constantly doing, which is historical studies. Historical studies. So the study of history is to collect stories of how people survived the tsunami. So our goal is to keep that history from being lost. Maybe when we interviewed the tsunami victims, they were already 50 years old and they had a lot of stories behind the tsunami. Whether it's the characteristics, the signs or the history that she witnessed.
So we tried to collect these stories and make a collection at the Tsunami Museum in the form of a story, a book at first. Then when the exhibition is held, we present the story to the public. So the Tsunami Museum's efforts like that were made to keep the history preserved.

Answer (Academician) Mr. Putra

Another one might be this, like Hiroshima and Nagasaki. They still recognize the history of their ponds through ceremonies.
We too, God willing. Whoever the leader is in the future, maybe 50-60 years from now we will still remember December 26 as a big day for the people of Aceh.
So that when the children are young they have to remember that year. There was a tsunami memorial ceremony.

Answer (Government) Mr. Is

We have tsunami warnings now. The point is that what we want to touch is actually the emotions of the children now.
How can we touch them emotionally, about the tsunami. So that it will affect how they can tell the story later to the next generation.
Even though they are not survivors of the tsunami themselves, but here are also friends from education, so when a new guide comes to the tsunami museum, they will definitely educate him on what it is like to be emotional.
We appeal to her emotionally, even though she is not a survivor but we tell her about what happened in the tsunami itself from its impact, from its influence, from what has happened in

Aceh because of the tsunami maybe it will have a strong emotional impact on the next generation of Acehnese.
So that they will be able to tell a lot about what a tsunami is and how it happens. Some of the information that I wanted to convey earlier, maybe in the future we will be able to make it a video or book, or according to a documentary that tells the story of the tsunami incident itself, and also the collection in the tsunami museum itself at this time The videos may be if we see that they are still low quality, still VCR, still not HD, there is no GYMBALL, still shaking the video But that's what we show, the real situation at that time. So it will continue to leave a deep mark on the people of Aceh, not only for survivors but also for Acehnese children whose families were lost during the tsunami. They will also feel the loss that for example their grandparents died because of the tsunami. So it will also have a positive impact on their emotional state.

Answer (Academician) Mrs. Mila

Yesterday we just held a theatrical drama competition. So we adopt from the survivors who have been collected by the collection. So which stories are heartwarming, that's what we make the theme of the drama. And we saw at the time of the eradication, Mr. Latif, the school children were amazing, they adopted everything from there. And we gave an extraordinary story, a survivor, a father, already holding his son's corpse. He wanted to bury it himself, but maybe there was no ability at that time for him to bury it. So he kept his son's corpse, when he returned his son was no longer complete with his limbs. it was not intact because it was eaten by one of the animals. So that was taken as one of the stories for the drama performance. It was amazing during the performance. The kids when they were on stage, they hadn't seen it happen. But when they were competing, it was amazing. It was like they were in the story.
They look for information themselves, through their teachers. Because between schools it happened that the children who participated in the competition were mostly born after the tsunami. And we just found out that there is a Chinese school next door, they also participated, we thought they didn't participate in the competition, it turns out there are Chinese fishermen, we thought our people were all Acehnese, it turns out there are Chinese people who survived the tsunami, so they will also bring that story to the performance. We don't have the video, but we have the files from them.

Is it for regeneration, for example, deliberately recruited to become a tour guide or maybe a successor?

Answer (Academician) Mr.

Currently, our average work is 20 years and above. That's who still feels the tsunami. We don't know maybe in the next 10 years, it could be that, now he's still in high school, he's already working, he comes here, that's our new job. But we always pass on this educational knowledge to whoever is new. We make them feel as if they have to experience it. Because there are many educators who don't feel, but they can tell stories. He tells a story about a collection, he tells a story that makes visitors also enter the atmosphere of December 26.

And then they are already more structured, like the HPI association, which is structured, ma'am, they already have a certificate, right?

Answer (Community Leader) Mrs. Eva

It's just that currently in Aceh, what we don't have is a law, an official regulation, which states that only those under an association are allowed to guide. Well we don't have that yet. It's different from other regions. In foreign countries, for example, or in other regions, it already exists. Let's say like in Jakarta, Bali, only HPI is allowed to guide. Outside HPI is not. But in Asia, until now there is no regional regulation. Borobudur. Even North Sumatra already has one. So for us, we can't be like that yet. Because there are still other associations. But yes, as long as we still convey the right information, God willing, it will be safe. Unless we are afraid

that for example there are other associations whose information is at odds with the current one, well that's what we have to worry about.

Answer (Government) Mr. Ir
That's probably why tourism in Acah is still developing. It's not advanced. If we make restrictions like that, it's hard to move forward.
Because we have made regulations, but in practice they are still not needed. For example, if we want to limit travel to Aceh, it is mandatory to use local travel, non-local tour guides are not allowed. If we want to apply that, maybe people won't want to go to Aceh. So we are still in the developing stage, not yet advanced. So slowly we have also coordinated with the Chairperson of HPI. We have already formulated it related to guiding so that travel agents who go to Aceh are required to use local guides, for example. But we are still exploring and we certainly coordinate with the leader of the association of tour guides, there is also slowly the government, we try to raise the issue again, but due to considerations, if we are strict in such restrictions, people will think that going to Aceh is difficult, not easy, but we appeal verbally, indeed not in a circular or regulation we appeal to friends, especially at meetings when there is business matching or meetings with business people outside Aceh, we invite them to use local travel and if there is travel outside Aceh that gives a distorted or wrong explanation about Aceh, yes we reprimand them. We don't just let them loose in Aceh.
Where sir, to get a certified tour guide sir?
Answer (Government) Mr. Ir
In Indonesia, we are fast responding to whatsapp now, rarely do people from the agency want to alert other agencies via Whatsapp. So more often via whatsapp now, because it is the trend. So because we think on whatsapp, so email is neglected, no one specifically monitors periodic emails.
Probably Indonesia I think, because I've worked with people from other countries several times.
Question
So where to go mom, if you want to find a certified and genuine tour guide?
Answer (Academician) Mrs. Eva
Because we do have an organization, we are not as sophisticated as those in Japan who have a website because Indonesia itself also does not have an official website that displays its members.
But because we have an association, we have a contact number. Bang Ismail also has our contact number. We all have contact with each other. It's like we have an unwritten regulation. So if I come with a group, to the tsunami museum, to the floating power plant, at some sites there are local guides, so we will coordinate with friends too. So we are more about the city tour, but when on site they will be guided by others who are more expert, so if it is related to us, we are actually all connected.

Appendix 2 (m): Mrs. Ihsan from Media

MEDIA PRESS INTERVIEWS IN ACEH
Mrs. Ihan
February 25, 2025

As a Media, what topics do you write about?

For the past few years, it's mostly been about the environment and women's issues. There are also, for example, profiles of women working at the grassroots. They have various backgrounds, some are tsunami victims, some are victims of conflict, then they become paralegals. Paralegals work like lawyers but they are based in the community. So, he's not a lawyer, if he's a lawyer, he goes to a special school there, but he's based in the community. So, in the community, he usually partners with NGOs (Non-Governmental Organizations) then he is given training on how to advocate, provide assistance to the legal realm. But he is technically different from a lawyer.
He can't do the defense, but he can accompany people who might be in trouble with the law and help bridge the gap.
Now like that, victims of conflict, for example, I have written about Kak Yos Darita, who is now deceased, yes in January 2025 yesterday she passed away. Yusdarita was a victim of conflict but then she became a women's fighter in her area, meaning she lived in Bandar Meriah Regency, about 8 hours away from the Gayo highlands.
So Mrs. Yus, his father is missing, his father is missing. His father was the village head in his village and also a community leader, a village leader, then he was Tokey. Tokey is a local businessman, he buys and sells coffee in Central Aceh. Well then one day his father disappeared. Lost then he looked for it not knowing where. He searched, searched, searched, didn't find it and then years later it was around 2006 if I'm not mistaken.
Then he got his father back but he was already a skeleton. And during that period, he searched for his father to the posts. Wherever he heard the news, he looked for his father. So then after the tsunami, in peacetime, there were other challenges. If for example during the pre-conflict period, maybe people's challenges were more about security.
Then after peace, the challenge becomes the economy, then if it is more specific to women and children, cases such as sexual violence, for example domestic violence cases, are sticking out. finally, Yusdarita was involved there. She joined the women's civil society movement and then she helped victims of domestic violence in her area, helping victims of victims to provide assistance to children who were victims of sexual crimes, for example like that.
And her house also became like a kind of safe house too, right? And Alhamdulillah, for example, her husband also supported her children, but then she was also not okay, meaning that when we do social work there are people who may not be happy to get those kinds of pressures, but then she died of breast cancer after many years.
What stories have you written that relate to the survivors of the 2004 Tsunami?
There is one in particular that I wrote about, I wrote about Bunda, yes, she is very old, her age is probably around 70 or so, she lives from Dehyah village, her name is from behind Ulee Lheue, I wrote about her specifically in 2022, her profile is called Bunda Rasyida.
So, this Mami Rasidah is also very unique, her husband is a policeman and she is originally from this area then married to her husband then her husband was assigned to the Langsa area. Langsa was before he separated from East Aceh Regency in the capital of East Aceh Regency. Well, her husband died in a firefight. So, she is a double conflict survivor. Then she is also a tsunami survivor and Mami Rasyida's leg was run over by a Reo truck when she was in East

Aceh and then she moved to Banda Aceh shortly after she moved to Banda Aceh then she was hit by the tsunami so all her family was lost.
Finally, after some time, Mami Rashidah met the Flower community. Not a community but an NGO.
There was a women's NGO called Flower Foundation. In the early days after the tsunami, Flower did recovery work. Psychosocial recovery for women, because Acehnese people have a double trauma, not only tsunami trauma but also conflict trauma, so most of them got the tsunami trauma, while the conflict trauma was never recovered. So, this Flower, because she has started to move far away, she was born in 1989.
Before the 2004 tsunami.
Make this association active from before the tsunami.
So, when they provide recovery, perhaps compared to the NGOs that came in specifically for tsunami recovery, the Flower association is more accepted by the community. Because it uses the method of approaching conflict victims as well.
Mami Rashidah was one of them, she participated in the mentoring and then they formed a women's group and finally Mami Rashidah was chosen.
Mami Rasyidah was once taken to Japan by the Banda Aceh City Government at that time to share her experience as a tsunami survivor. Now 73 years old, she lives in a tsunami relief house.

His extended family is also all gone.
Because his house was close to the sea in the Ulee Lheue area. That area was flattened to the ground after the tsunami.
So yes, he then thinks that the family is no longer there, but then how can I be more useful for the community. And the person is also very very active. Maybe because of her background as a Bhayangkara mother too.
At first, he was used to social activities so he was quickly called. It didn't take long for her to go blank.
What is the difference between recovering from a riot and a tsunami? What do communities need during recovery?
One is a social disaster and the other is a natural disaster.
So, people's acceptance is different if for example a social disaster people think the cause is human. So maybe to forgive is a bit harder. But if for example it's like a tsunami, oh this is God's will. So the acceptance is faster.
That's why maybe there have also been many articles on why Acehnese people seem to recover so quickly.
From the tsunami because it was thinking that this is indeed a disaster from God. whatever we want, God has willed. So the term for what we are dragging on is that most of the people I meet, for example, the first thing that is said is like this is God's will, this is God's will.
What lessons do you think the people of Aceh learned from the tsunami? Why did the people of Aceh after the tsunami focus more on piety? What is the connection
Maybe it departs from different beliefs so yes, sometimes we can't also religious aspects, for example, a communal society so if for example we look at it communally, for example religiously, there must be differences in Indonesia, for example, which is predominantly Muslim between in Aceh and in Java, even though the same is Islam, but it is definitely different in the way he believes in religion.
In Aceh, people say that Islam is fanatical. For example, he will be very angry if he doesn't care even if he doesn't pray. But if we say Kafir, he will be angry. Even though if we look at the context, yes, one of the things that indicates that we are Muslim, for example, we as believers pray. If we don't pray, we can be called infidels too.

But that's sometimes the tendency, too, when scholars speak, sometimes they are listened to more than those who speak, for example, in universities or academia, who are more knowledgeable.
An example that recently happened was when the fasting day was determined this year. There was also a debate.
The central government has sent two experts to look at Hilal. They have brought complete equipment. But then why is it that those who are sworn in, for example, are not the ones who see the hilal. Those who were sworn did not see the moon. This is also like a public question mark.
Then for example, like in most communities in Aceh it is also patterned. In certain areas with a strong pesantren base, instead of for example hearing the announcement from the government, they listen more to what the tengku daya says. That's why many approaches in Aceh also embrace the ulama.
For example, the Ulema Consultative Assembly. Including this is a bit wide, but maybe to get the context, right in terms of vaccinations for example. That's also like that. So when the ulama began to be embraced, for example, the ulamas were immediately taken to the factory where at that time they were taken to Kimia Farma in Java. They have seen how the vaccine is made, so the issues that say the vaccine has ingredients from pigs can be dismissed.
But if the person speaking, for example, is not a cleric, then they tend not to be listened to.
In the context of the tsunami, when the Ulama said that the Tsunami was the wrath of Allah, it seemed easier to accept than we blamed ourselves. Blaming ourselves is like this, for example, we have been told not to build houses near the coast, but we still build houses there, and in the end, there are casualties. That's our fault.
So, we are like denial. We don't want to blame, the only one we blame is God. If it's from God, who can sue? So, it's more comfortable, yes, this is indeed because of God's anger.
God's anger. So, it's like that. So that's why finally because of things like that, now if we look at the market. The main market used to be in Peunayoung. Then now it's moved to the Syah Kuala area. That's close to the beach. So, because there was a Main Market there, many shops appeared there. What if for example the tsunami comes again. That is the policy of the government. Even in the past, the Banda Aceh City Government wanted to make the name Nurul A'la Islamic Center.
So, like the Islamic Center is in the Ulee Lheue area, the beach area. And it's a big location. One of my friends criticized it by writing about it in the media. Looking at considerations, that this is a sea route for example, and the link between the Strait of Malacca and the Indian Ocean is in Ulee Lheue. Well, there will be an Islamic Center built there, which automatically means that people will gather for every Islamic activity.
What if there is an earthquake and tsunami. Now the criticism is like that. But what happened later was responded to by him being policed even though it eventually ended in peace.

That was the government policy during the time of Mr. Aminullah Usman. Each of our governments wants to create its own lighthouse project. Whereas if for example we look at Banda Aceh, there is already the Baiturrahman Grand Mosque and it has a large capacity. The yard is also spacious, how many tens of thousands of people can be accommodated there.
There is also the Blang Padang field for large events with a single duration, such as the Akbar lecture, there is no need for us to build a new building, where public safety is at stake. And thank God until now, it was about to be built, indeed the foundation was already there. But until now it has not been built. Even yesterday, one of the Heads of Service went to jail because it turned out that there was fraud in the compensation process
What do you think is the purpose of the Aceh government building the Tsunami Museum?

Actually, the basic goal is good so that we can learn that disasters have happened. That's the first thing. Yes, the hope is that it actually becomes like a space for us to introspect. When disasters exist and how in the future when disasters occur, we can be safe. But safety is not only because we have faith. Even if we have faith, if we don't take anticipatory steps, it's silly not to save ourselves.
But maybe there is often only a ceremonial once a year. For example, every December 26 tsunami commemoration.
So, after praying, for example, dhikr together and there is a lecture, then it's over. But the question is how this curriculum can enter education. It looks like Banda Aceh doesn't even exist yet.
Disaster in Banda Aceh does not yet have a Kanun, or a Dearah Regulation. Even though Banda Aceh is also very vulnerable to disasters besides being close to the coast, tsunamis also have a high potential for liquefaction because the lowlands are close to the sea. Not only against tsunamis, but conflicts are also like that. The commemoration for conflict is every August 15. because the Helsinki MoU is August 15, 2005.
So, every August 15th, what do the people of Banda Aceh do?
Ceremony. Closed with a prayer together. So, it's more ceremonial.
Meanwhile, yes, the ceremony is only once a year. What do we want to do in the other 11 months? One lecturer once gave a lecturer testimony in one of his classrooms and said; "do you know the name Mali Mahmud?" the student answered "don't know". Yet these were central figures in the Aceh peace process. When asked "what is the Helsinki MoU?" many still do not understand the substance of the agreement, and sometimes it is forgotten
So yes, they prefer to recite the recitation, which means that remembering that moment by praying for the martyrs is more focused there, right?
I've been focusing more on that direction
Why do Acehnese people focus more on religion than understanding history and how to survive disasters
Maybe it's easier to do. So far, for example, there are rescue simulations but they are not massive. I personally hope that the real policy is what it looks like, and continue to carry out evacuation simulations.
But if, for example, the construction of the market in the center of the city must be moved to the seafront, it is dangerous. It is like a contradiction between policies and other efforts made towards disaster mitigation.
Whereas the Banda Aceh area was the worst hit by the tsunami, such as the Meulaboh area, Aceh Jaya was an area that was badly hit by the tsunami. But why is that not a consideration for the government. Then also in the issuance of IMB (Building Permit).
If you want to talk about disaster mitigation, for example, a radius of how many kilometers or how many tens of meters there should be no housing. But now the housing complex is getting very, very close to the sea.
If the government only pursues regional income, perhaps yes. That is one source of income for the local government. But that means there is no mitigation for the long term. Moreover, from the studies conducted, it seems that tsunamis also have a high potential for recurrence, even though we cannot predict, for example, when the time will come, as with earthquakes.
Even tsunami markers or tsunami early warning devices have been damaged because they were built in the early days, a long time ago by NGOs during the BRR (Rehabilitation and Recovery Agency) period.
The evacuation route is also not well-maintained.
Is it true that people from East Aceh are more knowledgeable about disasters such as earthquakes and tsunamis?

At the time of the tsunami, I was in Sigli City. I was already in college at the time, although I lived in Banda Aceh but because it was Christmas 25th and I had a day off from college, I went home to my grandmother's house.
As for the specific knowledge of the East Acehnese, I don't know much about it.
What I understand is the knowledge of the people of Simeuleu Island. In Simeuleu it started after the big earthquake in 1907 which was followed by a tsunami. Then it was a story passed down from mouth to mouth that they passed on to their children and grandchildren. fSo, when the tsunami happened in 2004, they already understood that it was what they called Smong, and it didn't cause many casualties. About 10 people.
The people of East Aceh may have a better understanding of earthquakes and tsunamis than the people in the city center, because the book Takbir of the earthquake does exist. Older people who are good at using Jawi Arabic can understand it, but for those who have entered my generation, I have never heard it again. Even the term tsunami only became popular after 2004.
Yes, when I was in elementary school, we saw news in the 90s that there was an earthquake and tsunami in Japan. But I don't remember it anymore.
The Acehnese have another term for the tsunami, "Ieu Beuna".
Ieu beuna, especially residents in the North Aceh area, yes, Aceh Besar the term is Ieu Beuna. Simeuleu Islanders, the term is Smong. in Singkil, the term is "Geluru" from the word "Gelora".
When it comes to earthquake takbir, there is another museum owned by C'midi, his name is Tarmizi, who also has a book of gempai takbir. So, if for example there is an earthquake at what time in Aceh, he likes to read and share the meaning of the earthquake
Is this an Acehnese tradition?
Yes, that's because there are traces of literacy right. Because there are traces of literacy then there are those who can read there is also another one who is a manuscript expert, Mr. Herman, he is a lecturer.
He is a lecturer at UIN.
I also wrote about the earthquake in the past, he was also one of the sources. Bang. Tarmidzi is also one of the sources.
Even myths in the community, for example, say that an earthquake occurs when an ox or buffalo has horns under the earth.
Well, the earth is above the horn. So, when the ox sways, the earth sways. But that's a myth. I have confirmed it with Bang Herman. But yes, that means folklore that develops in the community. Because animals are more sensitive than humans.
What do Academicians think about the book of the earthquake veil?
He told me about the takbir of the earthquake that it should be passed down to the next generation. But all this time, the book was hidden. It was only discovered after the 2004 tsunami.
But this was an influence during the conflict.
I myself see that the span of conflict in Aceh is quite long.
Starting from the Dutch era, the Dutch war, the Aceh War vs the Dutch (1873-1904). Then after that there was the war in the Resistance against DII/TII (Darul Islam/Indonesian Islamic Army) (1953-1962). Yes, the Islamic Emergency, the Indonesian Islamic Army also existed throughout Indonesia. Then there was the Jungko War/Local Conflict in Aceh, then the war against the Free Aceh Movement, (1976-2005).
It was only after 2005 that people were able to study freely. During the conflict, many schools were burned down.
I myself also had my school burned down, for example my elementary school was burned down. In fact, my elementary school was burned twice, and my high school was burned. So it means that Acehnese people who were able to study during the conflict, go to university and even

leave the country are very extraordinary, meaning that there are a lot of challenges that they can solve here so that they can leave the country.
Remembering that at that time two rectors at the University in Aceh were shot in 2001, Mr. Dayan Daud and Professor at UIN.

If the Ancestors understood the concept of tsunami, why didn't the next generation?

Because in times of conflict, many people lose their homes, lose their economic resources. Some lost land for example, some lost it because for example they had to move, some lost it because they left it for a long time so it became a forest again and they needed more time, for example, to grow crops again. Yes, automatically when peace occurs, we must prioritize primary needs first. Yes, it means that if for example we want to talk about disaster if the primary needs have not been resolved, it will be difficult.
Although, for example, now that the tsunami is 20 years old, it may no longer be relevant for us to talk about primary needs. But when we talk about statistical data, Aceh is also the poorest province in Sumatra, so we also don't know where the governance is wrong.
Well, it means that if for example we look at long-term programs, for example, we can no longer blame the conflict because the pause is long, it's been 20 years. So we have to go to the next step, but yes, this is like a bonus, not a positive bonus but a negative bonus, maybe the effect of what happened in the past, now Aceh is feeling an extraordinary impact. Because more and more conditions in Aceh are not getting better, they are getting worse, for example, the spread of drugs is very high here. even some points in Aceh have actually become entry points for international drug transactions such as in Pidie Jaya because of its close access to the Malacca Strait. Or in the areas of East Aceh, Aceh Tamiang. In addition, cases of domestic violence are also very

What is the applicable punishment in Aceh

If you violate the Qannun Sharia Islam such as gambling, drinking alcohol or committing adultery, you will be punished with flogging

Is the traditional way of transmitting knowledge then relevant for Acehnese?

The traditional transmission process, in my opinion, is also not relevant anymore for the current conditions. First of all, for example, the *nandong* tradition in Simeuleu uses the language there, even though we memorize the lyrics maybe as a poem as a means of entertainment we can memorize. It's like we don't speak English but we can memorize English songs. But we still don't understand the substance, it will be useless.

What if this is made using Aceh language?

If it's made in Acehnese, it will have a different feel. Because the value of local wisdom cannot be produced like we produce songs. But it happens by itself and then maybe it will be recorded after a long time. Even then, it's only recorded now. In the past, it was just sung orally.
So, it's like a spontaneous response from the community. Like the Acehnese make lullabies with verses of sholawat, with heroic verses. So, the spirit to fight colonialism, for example, is one that is often sung when parents put their children to sleep. This means that sometimes it happens as a response.
Meanwhile, if we look at the tendency of today's children, they are also not typical of those who like to learn about the past.
If we look at the medium, it's always what's on social media, they tend to prefer instant, fast ones, so yes, the methods taught or, for example, educational tools must be adapted to the needs of today. Because this is also related to disaster communication, it must be able to enter the communication of today's children whose basis is technology.
But I also agree that some places in Aceh that are iconic tsunami icons are always promoted as tsunami tourist attractions. so indeed, people come there for tourism. Like the tsunami season now, it's a 3D simulation when the sea water comes so when we enter there, we go "wow cool!" So we prefer to look at the visual effects, but after that, we forget again.

In addition, for example, access to the museum is in the provincial capital and cannot be reached by the vast Acehnese community.

Then how do we equalize disaster education?

In my opinion, the most effective way is through the curriculum at school there must be local content. But in fact, there is none.

In Aceh, there should be two local content curricula, one on disaster and the other on peace. I remember when I was in elementary school there was a PSBB lesson called Education for the History of the Nation's Struggle.

It contains pieces of historical events, yes, but mostly those in Java.

Aceh should be able to make something like that.

If it's part of the curriculum, it means it's always being studied, but so far there hasn't been any.

If I see so far, the effective way is like

The problem in our place is that the infrastructure is also not supportive, for example if we go under the table, we are not sure that the table is sturdy or the building is strong, it becomes a problem

Nowadays, young people understand that after a big earthquake, and the water recedes, there is the potential for a tsunami. But before 2004, when there was a big earthquake and the tide receded, people would go fishing.

Because if that's the distance from 2004 to now, it hasn't been too long. It's still 20 years. This means that there are still many survivors from that time. For example, people like me. Automatically, I will also probably tell my children, grandchildren. But the problem is how long we want to be able to tell the story. That's right.

How long can we tell the story? But efforts to do more have also been made, for example through a movie like has been done. Other efforts such as producing animations that tell stories about disaster mitigation with the title "Nafang" Produced by the Khadam Indonesia foundation, the title is Nafang.

It was a movie, yes, at that time I wrote the script. But I don't know where it was screened.

The essence is given because it is adopted from Simeuleu, so it is more about local wisdom. So, there are stories of Smong-speaking grandmothers to Simeuleu children compared to children who live in the city.

When this city boy returned to his village, he took a ship. Starting from the ship, the tsunami was already under the ship, but the tsunami, which was illustrated as a sea monster in the form of a large, tentacled octopus, just stood there. Then when the octopus surfaced, the children ran to the hills. This is a teaching for them to evacuate to higher ground where the octopus tentacles are tsunami water. The higher the hill, the more unreachable it is.

What about evacuation to the escape building?

Yes, and the escape building is also near the sea. In Banda Aceh, there are two escape buildings, one in Meraksa, the other in the Pekan Bada area.

A multi-level building with ramps. But people don't run there when there's an earthquake. Alhamdulillah, so far there have been no big earthquakes. For example, the last time before fasting there was an earthquake around 5.6 on the Likert scale, it was quite felt too, but yes, because the earthquake was only one blow, people did not panic too much. After 2004, there was another big earthquake in 2012. In 2012, the election for governor had just finished.

The people were extremely panicked. It was really chaotic. But that was . Then because there was an earthquake takbir, people saw, well what is this earthquake? At that time it was also associated with this. The leadership in Aceh. The time was before the sun rose, at that time it was indeed around noon. So it means that this country will not be good.

How did the media respond to the narrative of Syakh Kuala's tomb and the mosque that remained standing strong from the tsunami?

The fact is that it is like that. For example, here in Makan Syakh Kuala, it is safe. The Great Mosque is also safe because its location is far from the sea, compared to the Baiturrahim Mosque in Ulee Lheue and the Rahmatullah Mosque in Lampuuk, which are very close to the sea.
But if I myself see it this way, the name of the big wave can be missed, not because of the sturdy building.
But if the wave is high, the bottom will be missed and not hit by the wave. But it fell to the other side of the mosque. Because it did see the waves rise first and then descend.
But there were also other buildings that were destroyed as well because the wave hit the building.
The Baiturrahim Mosque is also an old mosque building just like the Great Mosque and is very sturdy, we also have to look at the structure. In addition, Banda Aceh also has a building that survived, namely Banda Aceh High School 1, where the water was so high that it left its mark. They built a monument. On average, if you look at each region, there is a marker of the high tsunami water. In addition, the reason why the building was safe from the tsunami was because it was a Dutch building. So, the building is sturdier, and according to information on the fence of the building there is also a water breaker.
Many journalists after the tsunami focused their stories on what survived. We see the survivors in the mosque, sometimes there is a narrative that is created to make it more bombastic so that people are more happy and want to read it even if it's just for entertainment.
More and more, sometimes people become journalists not from the heart.
But because of economic pressure. So yes, I think as an alternative, I ended up becoming a journalist because there were no other opportunities in the post-disaster conditions in Aceh. Sometimes the bombastic news is the important thing to get views on clickbait. Although not all journalists are like that, but yes there are. Because to write we must have an out of the box way of thinking and we must have skills that are more than just reporting.
For example, if we want to say that the survivor has a sturdier building, our effort to find sources to explore the building itself is automatically needed. Therefore, if there are limited journalists in Indonesia who have such abilities, it can be difficult to write about it. Except for the most famous one, Mas A'i, Ahmad Arief, who is a specialist in disaster journalism at Kompas, so he already understands it very well. You could say that his knowledge about disaster is extraordinary. So for journalists like that, writing is no longer just about the 5W1H, but what are the benefits for reading.
The practices of journalists should explain what is blurred, but now sometimes Makin is blurred. Because information from social media is more trusted by the public than other news.

What have you written about conflicts or disasters or any stories in Aceh in the recent past?

I wrote a book with my senior Mr. Ermin called Ziarah Kuburan Mass. There are two stories that I raised to complete the book. First, the story of the tsunami season gravediggers. The first gravedigger at Blang Bintang Airport was Mr. Rusdi. So he was the first person to dig a mass grave there. He told me that at that time he was still working for the company as a heavy equipment operator. At the time of the tsunami his job was to clean up the debris.
Then he got a call from his boss. He was ordered to go to Blang Bintang to dig graves. When digging, it took 11 days using full hazmat suits. And at that time, dead bodies from wherever they came from were brought to that place.
He told me that there were up to 40,000 corpses. Because there were so many bodies that were lifted using heavy equipment alone. Until he had a dream. Finally, on the 11th day, he couldn't take it anymore. He worked together with his friend, let's call him Mr. Amy. Because he was no longer able, he was finally replaced by someone else. The second story is about Mr. Samarlin. He lives in the Darussalam area, at the time of the tsunami there were no waves, just water. The

water there went on for a long time, until it finally became high. When he started working, he saw the flood coming. He thought it was a flood, but it was the bodies of children.
After that he saw more and more people. Then he took the bodies to the mosque in that area until they were there for days, because he didn't understand where to bury them. He wanted to bury them in the mosque area because it was not allowed, because it was too close to the settlement and there were many of them, so he looked for a location and got an approved area and was finally able to dredge a grave that was that large. There are about 3000 bodies.
So until now many families do not understand which grave their family is in?
Yes, every December 26, the most pilgrimage places are in Ulee Lheue and the Blang Bintang area near the airport. Not only Muslims make pilgrimages, there are also Chinese people. There are many Chinese people here in Peunayong. Cross-religious people come to pray with their own beliefs and sometimes there are even people who come from Medan to make a pilgrimage.

Appendix 2 (n): Village tourism.

INTERVIEW WITH THE MANAGEMENT OF A GAMPONG TOURISM VILLAGE IN ACEH THAT WAS FORMED AFTER THE TSUNAMI DISASTER WITH THE THEME OF TRADITIONAL DISASTER MITIGATION
Mrs. Nurhayati, February 2025

Can you tell us about your experience with the 2004 tsunami?

During the tsunami on Sunday, I was alone at home making preparations for an event at home. Some neighbors had come to the house at 7:30 AM to help prepare food and drinks.

Because in Aceh, especially in the villages, the attitude of mutual cooperation is still very high. Then the first earthquake was quite strong. I told my neighbors to go home and look at their houses, so they went home and I turned off the stove and went outside to see the situation. Not long after, the second earthquake was quite strong, even more so than the first. After that I prayed two rakat, and when I finished I went to the river. I heard a big bang, I thought it was a bomb or another conflict.
I didn't understand that it was the breaking of the earth's plates. then I went home and I said to our father and mother to evacuate to the mosque. I felt in my heart saying that, we have to go to the mosque. My mother and my brother went to the mosque on a motorcycle with my brother. Then I, my father and aunt ran towards the mosque. As I was running, I saw the water coming fast.

Although it was a bit far but we could see. When we got to the top of the hill, at 1pm we went back home. Because I saw the water had receded little by little although there was still a lot of water. Then I said to the young people here, please cut a banana tree for me, what is "Anyak" for? They called me "Anyak", I want to assemble with banana trees to cross. Because we couldn't swim, there were so many materials that destroyed houses and so on.
so I walked with a banana tree that I made into a float, finally I was able to cross the place where I was evacuated to the Mosque. I passed through the rice fields where there was a lot of material. I went down to see my mother because I had taken my mother's medicine for asthma. Then, I gave the medicine to my mother.
Then in the afternoon, the water had receded, even though it was a little bit, the land was visible even though it was covered with a lot of material. That was on the first day.
Then, on the first night, we were still in the evacuation camp in Hidayatullah, where we were crowded.
The rain and earthquakes continued, albeit briefly. The next morning we went down to seek shelter, and there happened to be someone who wanted to take us in. We were accommodated there for one month.

Does that mean this village was affected by the tsunami?

The tsunami entered Des Aini at a height of 4 meters, 12 people died.

When did the Gampong Asri tourism village begin

This tourist village was launched in 2015. It was launched as a tourist village in 2015. From 2005 to 2014, there were many things that we did to wake up from the downturn. We cleaned up the garbage in the house and so on, then recycled the garbage. From recycling waste, there were products that at that time did not exist in other villages, so there were many visits to Nusa. From these visits we get income. Finally, in 2014 we tried to explore what other than waste recycling there is in Nusa, it turns out that there are still many community activities, the daily life of the community that we can sell.
Then I mapped with the young women of PKK, Ustadzah, then the existing communities to find what other potentials there are in Nusa. In addition to beautiful nature, Nusa has a lot of beautiful scenery with rice fields equipped with river tributaries. In addition, there are also community activities to make dodol or make cakes and so on that can become tourist attractions. Finally, from our discussions together, several tour packages were born, including traditional games, traditional dance which also raises local wisdom for disaster mitigation, cooking class of traditional products, weaving, fishing, fishing, which uses homestays in community homes. So that finally we ventured to launch into a CBT Community-based tourism village

Is there funding provided by the local government?

No, we didn't. We started with self-help until today there has never been village funds. maybe yes the road infrastructure is on Village Land. directly the institution continues to improve and continues to do what activities to seek donations.

What is the community's knowledge of tsunami disasters?

We didn't know anything. On that Sunday there happened to be an Australian, David by name, who worked in this area. When the earthquake hit, he ran to Des Aini because he knew there was a small hill here. While running, he shouted to the young people gathered in the coffee shop, "The water is rising... Go home and tell your families that the sea is rising". So all the young men ran to the village and shouted "the sea has risen, please run to the mountain".

At that time David spoke Indonesian. From there we all Alhamdulillah, yes but from Allah we all survived. even though the three people who died in this village were parents who were separated from their children's hands and rolled in the water.

What is the distance to be traveled to reach the evacuation site?

If we walk for 30 minutes, it's a run.
At that time, I myself felt that I could run as if I was flying. And I was able to lift the weight

of my father and aunt at that time and that's where Allah A'lam because Allah wants to save us maybe the way Allah we don't understand how suddenly I was able to pull my aunt's hand and my father, reaching the top of the hill.
(Sobbing)

Where am I a guest who comes to this tourist village?

Many are from Malaysia, because most of them are people who live in cities like kualalumpur and its surroundings, so they want to feel how to live in the village. what are the activities in the village.
Then there are also many school children guests, staying here for 4 nights from East Aceh, and many things they learn here education education how to live in the village, how to manganyam, how to fish, how to take shrimp at night, then cultural exchange. In addition, we also tell the history of the tsunami that occurred in this village.

Then what efforts have been made by residents here to be more aware of disasters? And tell the next generation?

Once a month we provide disaster preparedness knowledge, through the lecture method. I start with a story that the world is no longer normal, and we must be prepared if for example there is an earthquake, how to protect ourselves, we still educate the children here. then if for example it has been raining continuously for three nights, what does it mean to be ready with clothes in a backpack and so on for basic needs in it, later when the water comes we are ready with the materials that we must bring.

In addition to children, mothers are also given such debriefings. There are still many of our residents who are traumatized, especially when it rains for two nights, it is a frightening thing for us, because when we have felt the tsunami

Why are many houses in Des Aini made of wood

Because wooden houses will be safer against earthquakes and water. However, if the water comes with materials, it will still damage the house.

Actually, the philosophy of the Acehnese people to build higher houses is because there was a tsunami disaster. so they build high houses if there is water, the water is below and Acehnese houses do not use nails to connect wood. So that if the earthquake shakes just shake, but if the concrete house is more easily destroyed.
That's actually what our ancestors understood better, but when people want to live in a modern way, they think concrete houses are modern, without considering the advantages and disadvantages when we build houses like this.

What other ways are there to transmit disaster literacy

We use the da'wah method, for example, we have to remember Allah, children have to read the Koran, after that ask Allah not to end the world first because there are still many people who want to pray, fast, like that. indeed, the song that the child swings is more to invite the child to get closer to Allah.

Appendix 3: Archive and Monument

Archive from Old Ancestor about the Disaster that ever Happened in Aceh Province and Tohoku Region

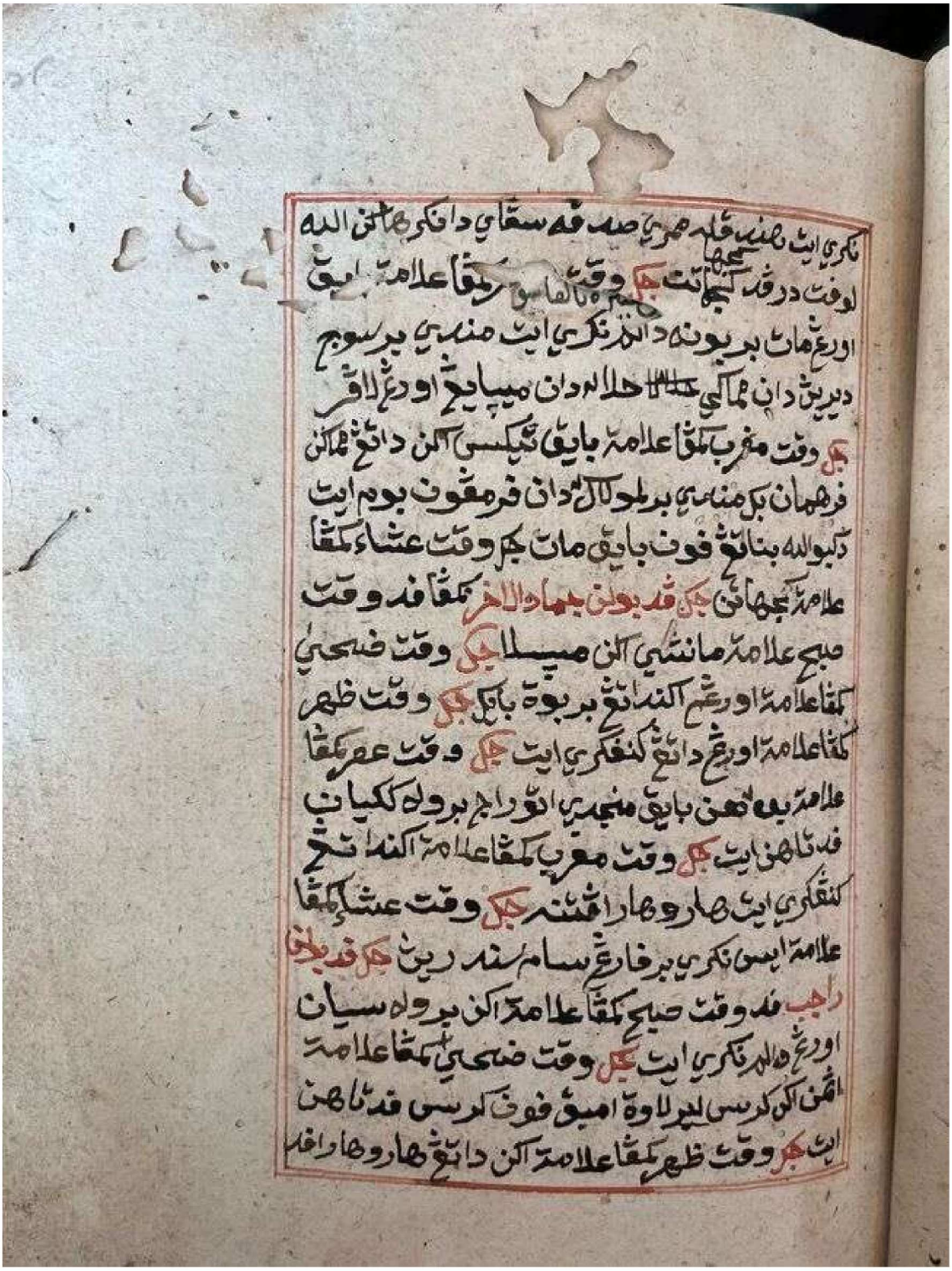
Picture 1 and 2. Showing the Archive that was written about the 869 Jogan Earthquake and Tsunami and the 1611 Keicho Oshu Earthquake and Tsunami, found in the Iwate Tsunami Memorial Museum

Picture 3. Monument for the Tsunami Warning after the 1933 Showa Sanriku Tsunami Occurred, in Otsuchi Memorial monument for the Great Tsunami of March 3, 1933, Iwate Prefecture, Japan[267]

[267] Tsunami monument in Otsuchi. *Otsuchi Town Tourism Association*. Retrieved June 1, 2025, from https://otsuchi-ta.com/tourism/?p=2609 (In Japanese)

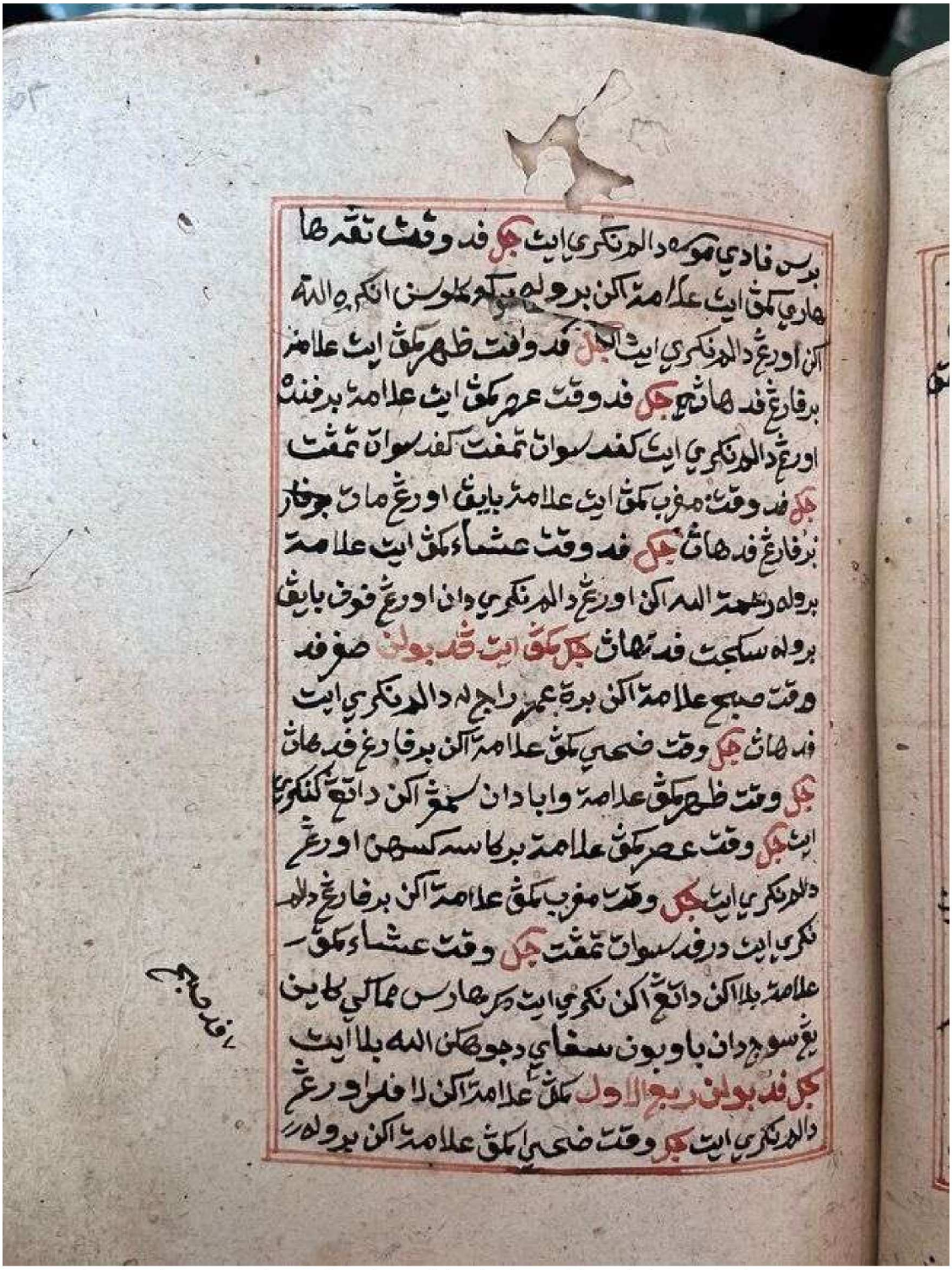
Picture 3. Monument for the Tsunami Warning after the 1896 Meiji Sanriku Tsunami Occurred (Erected in 1909), in Otsuchi City, Iwate Prefecture, Japan

Picture 4. Showing the manuscripts written in Jawi (Malay in Arabic script) contain the Information about what would happen if an Earthquake occurred in the month of Islam on *Rabiul Akhir dan Jumadal Ula*
Source: Ali Hajsmy Museum Collection, Banda Aceh
Archive no.: 29A/FK/23/YPAH/2005
29B/TH/14/YPAH/2005

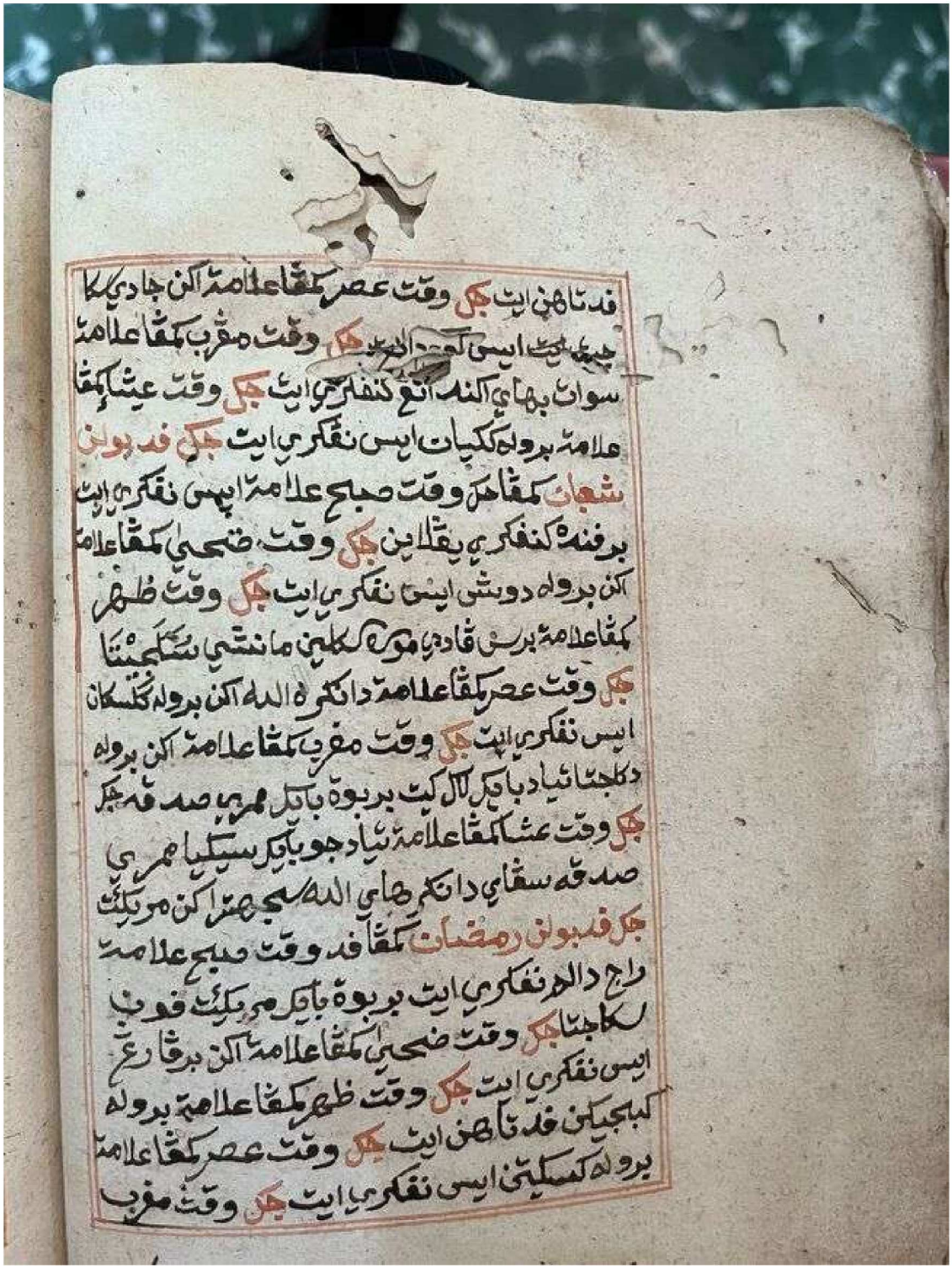


Picture 5. Showing the manuscripts written in Jawi (Malay in Arabic script) contain the Information about what would happen if the Earthquake occurred in the month of Islam on *Jumadal Akhir* and *Rajab*
Source: Ali Hajsmy Museum Collection, Banda Aceh
Archive no.: 29A/FK/23/YPAH/2005
29B/TH/14/YPAH/2005

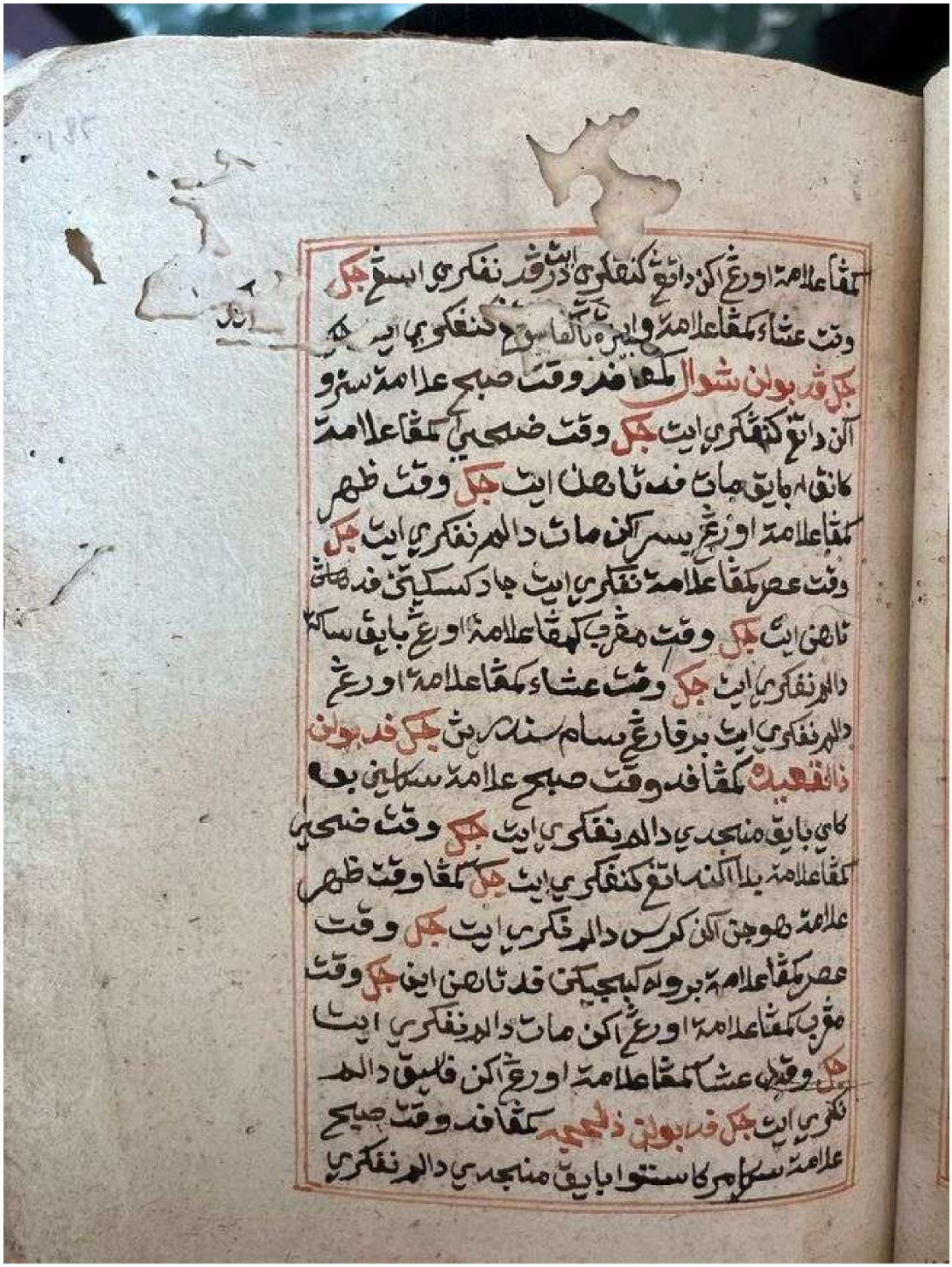
Picture 6. Showing the manuscripts written in Jawi (Malay in Arabic script) contain the Information about what would happen if the Earthquake occurred in the month of Islam on *Muharram*
Source: Ali Hajsmy Museum Collection, Banda Aceh
Archive no.: 29A/FK/23/YPAH/2005
29B/TH/14/YPAH/2005



Picture 7. Showing the manuscripts written in Jawi (Malay in Arabic script) contain the Information about what would happen if the Earthquake occurred in the month of Islam on *Shafar* and *Rabiul Awal*
Source: Ali Hajsmy Museum Collection, Banda Aceh
Archive no.: 29A/FK/23/YPAH/2005
29B/TH/14/YPAH/2005



Picture 8. Showing the manuscripts written in Jawi (Malay in Arabic script) contain the Information about what would happen if the Earthquake occurred in the month of Islam on *Syaban* and *Ramadhan*
Source: Ali Hajsmy Museum Collection, Banda Aceh
Archive no.: 29A/FK/23/YPAH/2005
29B/TH/14/YPAH/2005



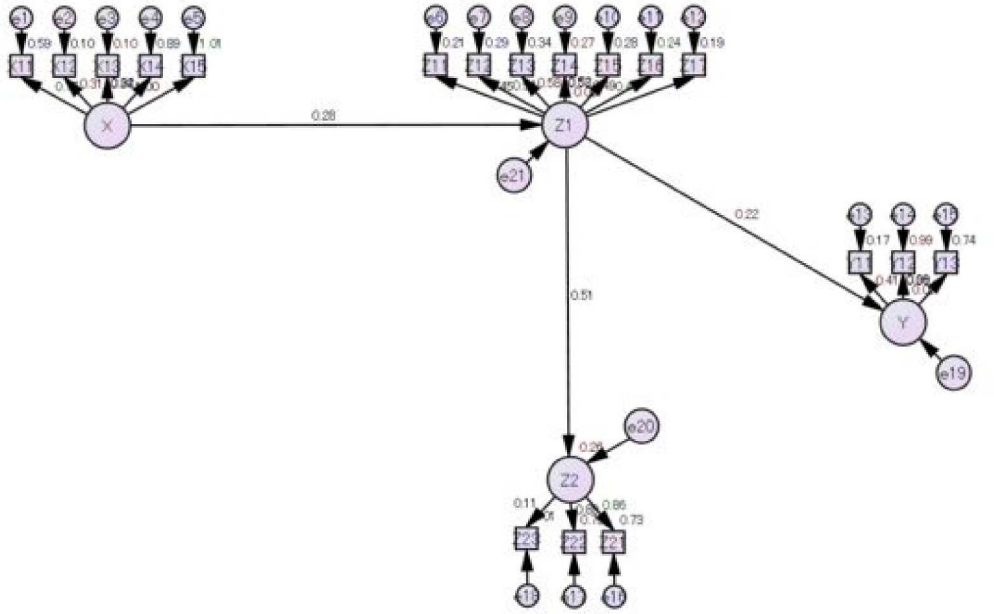
Picture 9. Showing the manuscripts written in Jawi (Malay in Arabic script) contain the Information about what would happen if the Earthquake occurred in the month of Islam on *Syawal, Dzulqo'dah* and *Dzulhijjah*
Source: Ali Hajsmy Museum Collection, Banda Aceh
Archive no.: 29A/FK/23/YPAH/2005
29B/TH/14/YPAH/2005

TRANSLATION:

1. 869 Jogan Earthquake and Tsunami
   On the night of July 13, 869 (May 26, 11th year of the Jogan era), a large earthquake and tsunami occurred on the Pacific coast of the Tohoku region. This was recorded in the Nihon Sandai Jitsuroku, which was compiled by the government at the time, and is the oldest recorded case of a tsunami in the Sanriku region. At the time, many castle buildings, warehouses, gate towers, and fences collapsed in Taga Castle (now Tagajo City, Miyagi Prefecture), where the naval base was located. The tsunami then reached the castle town, and the area around Taga Castle became like a sea, and about 1,000 people who were unable to escape in time drowned. Sediments from this tsunami have been found over a wide area from the Sendai Plain to the coast of Iwate Prefecture, and the earthquake is thought to have been 8.3 or 8.4 on the Richter scale.
2. 1611 Keicho Oshu Earthquake and Tsunami
   In the morning of December 2, 1611 (October 28, 1611), an earthquake occurred over a wide area from the current Tohoku region to Tokyo. Afterwards, a tsunami struck the coast of Oshu (currently the Pacific coast of Tohoku), drowning 1,783 people in the Sendai domain and 700 people in the Soma-Nakamura domain. There was also great damage in various places along the coast of Morioka domain, including 800 people drowning in Otsuchi village (currently Otsuchi town). In the report of the Spanish explorer Vizcaino, who encountered this tsunami, it was written that almost all the houses in Imaizumi (currently Rikuzentakata city) were washed away and about 50 people were killed. Previous research had estimated the magnitude of the earthquake to be around 8.1 on the Richter scale, but research conducted after the Great East Japan Earthquake and Tsunami has suggested that it was a much larger earthquake.
3. Translation of Monument for the Tsunami Warning after the 1933 Showa Sanriku Tsunami Occurred, in Otsuchi Memorial monument for the Great Tsunami of March 3, 1933, Iwate Prefecture, Japan“
   After the earthquake, watch out for a tsunami”
   “If a tsunami is coming, evacuate to the higher ground”
   “Don’t build houses at the lower dangerous zone”
4. Translate pictre 7 – 9

The warnings left by ancestors in Aceh Province often appear to be based on superstition. For example, a manuscript states that if an earthquake occurs during Duha time in the month of *Dzulqa’dah*, a great disaster will follow, bringing powerful seawater and causing many deaths. Both *Dzulqa’dah* and Duha are terms commonly used in Islam. Interestingly, the earthquake on December 26, 2004, coincided with the 14th of *Dzulqa’dah* 1425 in the Islamic (Hijri) calendar, making this manuscript particularly intriguing for researchers in manuscript and historical studies. These manuscripts can be found in several locations, including the Ali Hasjmy Museum and Library and the PEDIR Historical Museum. According to experts in Islamic cultural history at the PEDIR Museum, 100 years ago, many elders relied on these manuscripts because their communities were in earthquake-prone areas. When an earthquake occurred, they would refer to the manuscript to determine the Islamic month and prayer time in which the event took place. The manuscript records six Islamic prayer times as time markers: *Subuh* (dawn, before sunrise), *Duha* (morning, before noon), *Zuhur* (midday), *Asar* (afternoon), *Maghrib* (evening, after sunset), and *Isya* (night). This practice reflects how local communities integrated religious timekeeping with disaster awareness.

Appendix 4: Output IBM AMOS VER 28.



Estimates (ALL - model number 1)

Scalar estimates (ALL - model number 1)

Maximum likelihood (ML) estimates

Coefficients: (ALL - model number 1)

Table: Estimates, standard error, test statistics, and Significance Level

推定値 (ALL - ﾓﾃﾞﾙ番号 1)

ｽｶﾗｰ推定値 (ALL - ﾓﾃﾞﾙ番号 1)

最尤(ML)推定値

係数: (ALL - ﾓﾃﾞﾙ番号 1)

			推定値	標準誤差	検定統計量	確率ﾗﾍﾞﾙ	
Z1	<---	X	.150	.042	3.542	***	par_15
Y	<---	Z1	.234	.090	2.603	.009	par_16
Z2	<---	Z1	1.155	.223	5.178	***	par_17
X11	<---	X	1.000				
X12	<---	X	.355	.066	5.412	***	par_1
X13	<---	X	.383	.068	5.621	***	par_2
X14	<---	X	1.304	.067	19.385	***	par_3
X15	<---	X	1.340	.065	20.722	***	par_4
Z11	<---	Z1	1.000				
Z12	<---	Z1	1.381	.244	5.666	***	par_5
Z13	<---	Z1	1.397	.234	5.967	***	par_6
Z14	<---	Z1	1.226	.224	5.468	***	par_7
Z15	<---	Z1	1.156	.190	6.077	***	par_8
Z16	<---	Z1	1.208	.231	5.227	***	par_9
Z17	<---	Z1	1.071	.213	5.030	***	par_10
Y11	<---	Y	1.000				
Y12	<---	Y	2.734	.380	7.200	***	par_11
Y13	<---	Y	2.803	.370	7.566	***	par_12
Z21	<---	Z2	1.000				
Z22	<---	Z2	1.042	.103	10.120	***	par_13
Z23	<---	Z2	.115	.067	1.709	.087	par_14

Standardized coefficients: (ALL - model number 1)

標準化係数: (ALL - ﾓﾃﾞﾙ番号 1)

			推定値
Z1	<---	X	.279
Y	<---	Z1	.217
Z2	<---	Z1	.514
X11	<---	X	.766
X12	<---	X	.308
X13	<---	X	.317
X14	<---	X	.944
X15	<---	X	1.005
Z11	<---	Z1	.453
Z12	<---	Z1	.541
Z13	<---	Z1	.579
Z14	<---	Z1	.522
Z15	<---	Z1	.530
Z16	<---	Z1	.485
Z17	<---	Z1	.432
Y11	<---	Y	.409
Y12	<---	Y	.994
Y13	<---	Y	.862
Z21	<---	Z2	.857
Z22	<---	Z2	.889
Z23	<---	Z2	.106

Estimate (EVDT - model number 1)

Scalar estimate (EVDT - model number 1)

Maximum likelihood (ML) estimate

Coefficient: (EVDT - model number 1)

Standard error of estimate

Table: Test statistic and Significane Level

推定値 (EVDT - ﾓﾃﾞﾙ番号 1)

ｽｶﾗｰ推定値 (EVDT - ﾓﾃﾞﾙ番号 1)

最尤(ML)推定値

係数: (EVDT - ﾓﾃﾞﾙ番号 1)

			推定値	標準誤差	検定統計量	確率ﾗﾍﾞﾙ	
Z1	<---	X	.156	.065	2.384	.017	par_32
Y	<---	Z1	.191	.083	2.313	.021	par_33
Z2	<---	Z1	1.060	.276	3.834	***	par_34
X11	<---	X	1.000				
X12	<---	X	.285	.095	2.996	.003	par_18
X13	<---	X	.509	.110	4.628	***	par_19
X14	<---	X	1.463	.114	12.856	***	par_20
X15	<---	X	1.519	.110	13.769	***	par_21
Z11	<---	Z1	1.000				
Z12	<---	Z1	1.152	.269	4.278	***	par_22
Z13	<---	Z1	1.069	.266	4.022	***	par_23
Z14	<---	Z1	1.124	.244	4.599	***	par_24
Z15	<---	Z1	1.148	.244	4.700	***	par_25
Z16	<---	Z1	.800	.249	3.218	.001	par_26
Z17	<---	Z1	1.092	.274	3.979	***	par_27
Y11	<---	Y	1.000				
Y12	<---	Y	5.183	1.509	3.434	***	par_28
Y13	<---	Y	5.519	1.594	3.461	***	par_29
Z21	<---	Z2	1.000				
Z22	<---	Z2	1.103	.141	7.812	***	par_30
Z23	<---	Z2	.393	.104	3.767	***	par_31

Standardized coefficients: (EVDT - model number 1)

標準化係数: (EVDT - ﾓﾃﾞﾙ番号 1)

			推定値
Z1	<---	X	.251
Y	<---	Z1	.378
Z2	<---	Z1	.556
X11	<---	X	.739
X12	<---	X	.243
X13	<---	X	.361
X14	<---	X	.935
X15	<---	X	1.015
Z11	<---	Z1	.507
Z12	<---	Z1	.500
Z13	<---	Z1	.479
Z14	<---	Z1	.530
Z15	<---	Z1	.583
Z16	<---	Z1	.352
Z17	<---	Z1	.466
Y11	<---	Y	.276
Y12	<---	Y	.985
Y13	<---	Y	.852
Z21	<---	Z2	.805
Z22	<---	Z2	.873
Z23	<---	Z2	.324

Estimate (NEDVT - Model number 1)

Scalar estimate (NEDVT - Model number 1)

Maximum likelihood (ML) estimate

Coefficient: (NEDVT - Model number 1)

Estimate the standard error test statistic

Table: Probability and Significance Level

推定値 (NEDVT - ﾓﾃﾞﾙ番号 1)

ｽｶﾗｰ推定値 (NEDVT - ﾓﾃﾞﾙ番号 1)

最尤(ML)推定値

係数: (NEDVT - ﾓﾃﾞﾙ番号 1)

			推定値	標準誤差	検定統計量	確率	ﾗﾍﾞﾙ
Z1	<---	X	.084	.049	1.715	.086	par_49
Y	<---	Z1	-.093	.197	-.472	.637	par_50
Z2	<---	Z1	.565	.428	1.319	.187	par_51
X11	<---	X	1.000				
X12	<---	X	.364	.091	4.011	***	par_35
X13	<---	X	.244	.087	2.810	.005	par_36
X14	<---	X	1.185	.083	14.360	***	par_37
X15	<---	X	1.226	.080	15.304	***	par_38
Z11	<---	Z1	1.000				
Z12	<---	Z1	1.714	.619	2.771	.006	par_39
Z13	<---	Z1	2.433	.704	3.454	***	par_40
Z14	<---	Z1	1.963	.693	2.831	.005	par_41
Z15	<---	Z1	1.388	.431	3.222	.001	par_42
Z16	<---	Z1	1.964	.658	2.984	.003	par_43
Z17	<---	Z1	1.130	.463	2.442	.015	par_44
Y11	<---	Y	1.000				
Y12	<---	Y	2.163	.431	5.018	***	par_45
Y13	<---	Y	2.093	.341	6.137	***	par_46
Z21	<---	Z2	1.000				
Z22	<---	Z2	1.625	.593	2.740	.006	par_47
Z23	<---	Z2	-.286	.090	-3.173	.002	par_48

Standardized coefficients: (NEVDT - model number 1)

標準化係数: (NEDVT - ﾓﾃﾞﾙ番号 1)

			推定値
Z1	<---	X	.213
Y	<---	Z1	-.050
Z2	<---	Z1	.228
X11	<---	X	.785
X12	<---	X	.322
X13	<---	X	.227
X14	<---	X	.945
X15	<---	X	1.001
Z11	<---	Z1	.330
Z12	<---	Z1	.499
Z13	<---	Z1	.745
Z14	<---	Z1	.608
Z15	<---	Z1	.470
Z16	<---	Z1	.589
Z17	<---	Z1	.353
Y11	<---	Y	.455
Y12	<---	Y	1.019
Y13	<---	Y	.852
Z21	<---	Z2	.694
Z22	<---	Z2	1.151
Z23	<---	Z2	-.226

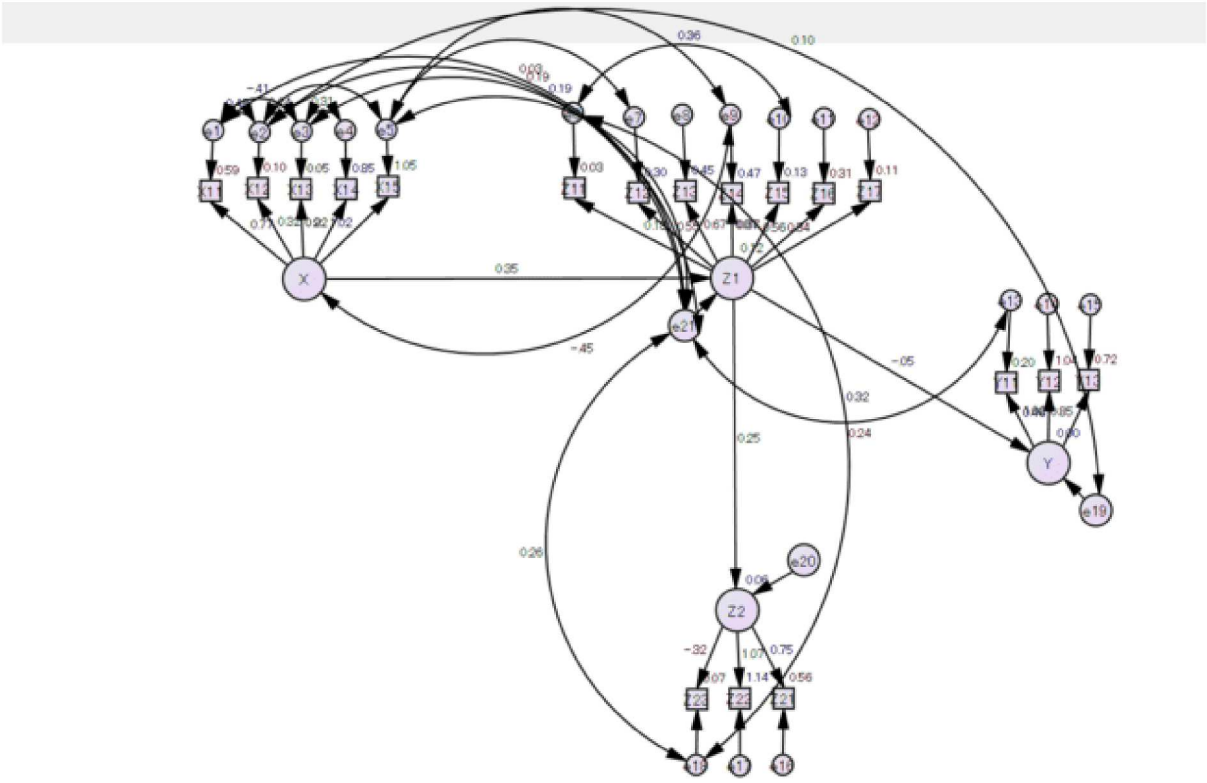


Figure: Output for Model 2 that meets the Model Fit.

Conclusion of the Goodness of Fit of the Model

PMT Paths	All	Degree of Experience	
		EVDT	NEVDT
Source of Information → Threat Appraisal	0.368***	0.334**	**0.353**
Threat Appraisal → Evacuation Motivation	0.216**	0.372**	**-0.049**
Threat Appraisal → Fear of Fatality	0.470**	0.532***	**0.249**
Cmin/df	2.210		
RMSEA	0.044		
CFI	0.925		
TLI	0.900		
GFI	0.888		
IFI	0.926		
**p<0.05; ***p<0.01; standardized path coefficient and correlation; EVDT (Experience Visiting Disaster Tourism; NEVDT (No Experience Visiting Disaster Tourism.			

Estimates (ALL - model number 1)

Scalar estimates (ALL - model number 1)

Maximum likelihood (ML) estimates

Coefficients: (ALL - model number 1)

Table: Estimates, standard error, test statistics, and Significance Level

推定値 (ALL - ﾓﾃﾞﾙ番号 1)

ｽｶﾗｰ推定値 (ALL - ﾓﾃﾞﾙ番号 1)

最尤(ML)推定値

係数: (ALL - ﾓﾃﾞﾙ番号 1)

			推定値	標準誤差	検定統計量	確率ﾗﾍﾞﾙ	
Z1	<---	X	.157	.040	3.906	***	par_15
Y	<---	Z1	.277	.101	2.743	.006	par_16
Z2	<---	Z1	1.325	.299	4.436	***	par_17
X11	<---	X	1.000				
X12	<---	X	.363	.062	5.819	***	par_1
X13	<---	X	.393	.076	5.202	***	par_2
X14	<---	X	1.305	.071	18.342	***	par_3
X15	<---	X	1.404	.075	18.832	***	par_4
Z11	<---	Z1	1.000				
Z12	<---	Z1	1.769	.348	5.086	***	par_5
Z13	<---	Z1	1.709	.329	5.192	***	par_6
Z14	<---	Z1	1.845	.370	4.987	***	par_7
Z15	<---	Z1	1.244	.226	5.503	***	par_8
Z16	<---	Z1	1.504	.318	4.723	***	par_9
Z17	<---	Z1	1.312	.288	4.551	***	par_10
Y11	<---	Y	1.000				
Y12	<---	Y	2.988	.436	6.859	***	par_11
Y13	<---	Y	3.008	.422	7.122	***	par_12
Z21	<---	Z2	1.000				
Z22	<---	Z2	1.087	.126	8.593	***	par_13
Z23	<---	Z2	-.026	.085	-.305	.760	par_14

Standardized coefficients: (ALL - model number 1)

標準化係数: (ALL - ﾓﾃﾞﾙ番号 1)

			推定値
Z1	<---	X	.368
Y	<---	Z1	.216
Z2	<---	Z1	.470
X11	<---	X	.746
X12	<---	X	.310
X13	<---	X	.317
X14	<---	X	.921
X15	<---	X	1.030
Z11	<---	Z1	.356
Z12	<---	Z1	.546
Z13	<---	Z1	.555
Z14	<---	Z1	.618
Z15	<---	Z1	.445
Z16	<---	Z1	.472
Z17	<---	Z1	.413
Y11	<---	Y	.374
Y12	<---	Y	1.003
Y13	<---	Y	.854
Z21	<---	Z2	.837
Z22	<---	Z2	.907
Z23	<---	Z2	-.023

Estimate (EVDT - model number 1)

Scalar estimate (EVDT - model number 1)

Maximum likelihood (ML) estimate

Coefficient: (EVDT - model number 1)

Standard error of estimate

Table: Test statistic and Significance Level

推定値 (EVDT - ﾓﾃﾞﾙ番号 1)

ｽｶﾗｰ推定値 (EVDT - ﾓﾃﾞﾙ番号 1)

最尤(ML)推定値

係数: (EVDT - ﾓﾃﾞﾙ番号 1)

			推定値	標準誤差	検定統計量	確率ﾗﾍﾞﾙ	
Z1	<---	X	.184	.065	2.819	.005	par_49
Y	<---	Z1	.155	.075	2.052	.040	par_50
Z2	<---	Z1	1.170	.310	3.781	***	par_51
X11	<---	X	1.000				
X12	<---	X	.310	.097	3.185	.001	par_35
X13	<---	X	.539	.130	4.139	***	par_36
X14	<---	X	1.486	.124	11.944	***	par_37
X15	<---	X	1.616	.135	11.970	***	par_38
Z11	<---	Z1	1.000				
Z12	<---	Z1	1.263	.302	4.184	***	par_39
Z13	<---	Z1	1.155	.293	3.946	***	par_40
Z14	<---	Z1	1.263	.296	4.272	***	par_41
Z15	<---	Z1	1.134	.248	4.582	***	par_42
Z16	<---	Z1	.940	.280	3.358	***	par_43
Z17	<---	Z1	1.142	.298	3.831	***	par_44
Y11	<---	Y	1.000				
Y12	<---	Y	7.561	3.132	2.414	.016	par_45
Y13	<---	Y	7.453	2.999	2.485	.013	par_46
Z21	<---	Z2	1.000				
Z22	<---	Z2	1.084	.140	7.722	***	par_47
Z23	<---	Z2	.312	.126	2.473	.013	par_48

Standardized coefficients: (EVDT - model number 1)

標準化係数: (EVDT - ﾓﾃﾞﾙ番号 1)

			推定値
Z1	<---	X	.334
Y	<---	Z1	.372
Z2	<---	Z1	.532
X11	<---	X	.710
X12	<---	X	.255
X13	<---	X	.368
X14	<---	X	.912
X15	<---	X	1.040
Z11	<---	Z1	.443
Z12	<---	Z1	.479
Z13	<---	Z1	.450
Z14	<---	Z1	.519
Z15	<---	Z1	.503
Z16	<---	Z1	.358
Z17	<---	Z1	.423
Y11	<---	Y	.193
Y12	<---	Y	1.025
Y13	<---	Y	.817
Z21	<---	Z2	.807
Z22	<---	Z2	.862
Z23	<---	Z2	.254

Estimate (NEDVT - Model number 1)

Scalar estimate (NEDVT - Model number 1)

Maximum likelihood (ML) estimate

Coefficient: (NEDVT - Model number 1)

Estimate the standard error of the test statistic

Table: Probability and Significance Level

推定値 (NEDVT - ﾓﾃﾞﾙ番号 1)

ｽｶﾗｰ推定値 (NEDVT - ﾓﾃﾞﾙ番号 1)

最尤(ML)推定値

係数: (NEDVT - ﾓﾃﾞﾙ番号 1)

			推定値	標準誤差	検定統計量	確率	ﾗﾍﾞﾙ
Z1	<---	X	.077	.044	1.765	.078	par_83
Y	<---	Z1	-.171	.339	-.505	.613	par_84
Z2	<---	Z1	1.218	.802	1.519	.129	par_85
X11	<---	X	1.000				
X12	<---	X	.368	.085	4.337	***	par_69
X13	<---	X	.244	.091	2.664	.008	par_70
X14	<---	X	1.181	.086	13.712	***	par_71
X15	<---	X	1.272	.089	14.312	***	par_72
Z11	<---	Z1	1.000				
Z12	<---	Z1	3.411	1.789	1.907	.057	par_73
Z13	<---	Z1	3.931	1.944	2.022	.043	par_74
Z14	<---	Z1	4.669	2.478	1.884	.060	par_75
Z15	<---	Z1	1.968	.894	2.202	.028	par_76
Z16	<---	Z1	3.369	1.745	1.930	.054	par_77
Z17	<---	Z1	1.981	1.106	1.792	.073	par_78
Y11	<---	Y	1.000				
Y12	<---	Y	2.135	.384	5.561	***	par_79
Y13	<---	Y	2.055	.322	6.380	***	par_80
Z21	<---	Z2	1.000				
Z22	<---	Z2	1.396	.274	5.098	***	par_81
Z23	<---	Z2	-.383	.087	-4.393	***	par_82

Standardized coefficients: (NEVDT - model number 1)

標準化係数: (NEDVT - ﾓﾃﾞﾙ番号 1)

ıvigation tree

			推定値
Z1	<---	X	.353
Y	<---	Z1	-.049
Z2	<---	Z1	.249
X11	<---	X	.771
X12	<---	X	.321
X13	<---	X	.223
X14	<---	X	.924
X15	<---	X	1.023
Z11	<---	Z1	.184
Z12	<---	Z1	.552
Z13	<---	Z1	.668
Z14	<---	Z1	.811
Z15	<---	Z1	.366
Z16	<---	Z1	.558
Z17	<---	Z1	.339
Y11	<---	Y	.463
Y12	<---	Y	1.021
Y13	<---	Y	.850
Z21	<---	Z2	.749
Z22	<---	Z2	1.069
Z23	<---	Z2	-.319

Model Fit Summary, Standard Comparison, Parsimony Corrected Measure

ﾓﾃﾞﾙ適合の要約

CMIN

ﾓﾃﾞﾙ	NPAR	CMIN	自由度	確率	CMIN/DF
ﾓﾃﾞﾙ番号 1	168	762.290	345	.000	2.210
飽和ﾓﾃﾞﾙ	513	.000	0		
独立ﾓﾃﾞﾙ	54	5995.255	459	.000	13.062

RMR, GFI

ﾓﾃﾞﾙ	RMR	GFI	AGFI	PGFI
ﾓﾃﾞﾙ番号 1	.130	.888	.834	.597
飽和ﾓﾃﾞﾙ	.000	1.000		
独立ﾓﾃﾞﾙ	.371	.476	.414	.426

基準比較

ﾓﾃﾞﾙ	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
ﾓﾃﾞﾙ番号 1	.873	.831	.926	.900	.925
飽和ﾓﾃﾞﾙ	1.000		1.000		1.000
独立ﾓﾃﾞﾙ	.000	.000	.000	.000	.000

倹約性修正済み測度

ﾓﾃﾞﾙ	PRATIO	PNFI	PCFI
ﾓﾃﾞﾙ番号 1	.752	.656	.695
飽和ﾓﾃﾞﾙ	.000	.000	.000
独立ﾓﾃﾞﾙ	1.000	.000	.000

NCP

モデル	NCP	LO 90	HI 90
モデル番号 1	417.290	341.228	501.081
飽和モデル	.000	.000	.000
独立モデル	5536.255	5289.695	5789.264

FMIN

モデル	FMIN	F0	LO 90	HI 90
モデル番号 1	1.231	.674	.551	.810
飽和モデル	.000	.000	.000	.000
独立モデル	9.685	8.944	8.546	9.353

RMSEA

モデル	RMSEA	LO 90	HI 90	PCLOSE
モデル番号 1	.044	.040	.048	.988
独立モデル	.140	.136	.143	.000

AIC

モデル	AIC	BCC	BIC	CAIC
モデル番号 1	1098.290	1137.237		
飽和モデル	1026.000	1144.928		
独立モデル	6103.255	6115.774		

ECVI

モデル	ECVI	LO 90	HI 90	MECVI
モデル番号 1	1.774	1.651	1.910	1.837
飽和モデル	1.658	1.658	1.658	1.850
独立モデル	9.860	9.462	10.269	9.880

HOELTER

モデル	HOELTER .05	HOELTER .01
モデル番号 1	319	335
独立モデル	55	57

Conclusion of the Goodness of Fit of the Model

PMT Paths	All	Degree of Experience	
		EVDT	NEVDT
Source of Information → Threat Appraisal	0.368***	0.334**	**0.353**
Threat Appraisal → Evacuation Motivation	0.216**	0.372**	**-0.049**
Threat Appraisal → Fear of Fatality	0.470**	0.532***	**0.249**
Cmin/df	2.210		
RMSEA	0.044		
CFI	0.925		
TLI	0.900		
GFI	0.888		
IFI	0.926		
**p<0.05; ***p<0.01; standardized path coefficient and correlation; EVDT (Experience Visiting Disaster Tourism; NEVDT (No Experience Visiting Disaster Tourism.			

Appendix 4 (a): Output OF IBM SPSS VER 23.

Correlations

		X11	X12	X13	X14	X15	Source of Information
X11	Pearson Correlation	1	.515**	-.046	.687**	.767**	.789**
	Sig. (2-tailed)		.000	.423	.000	.000	.000
	N	311	311	311	311	311	311
X12	Pearson Correlation	.515**	1	.293**	.293**	.316**	.622**
	Sig. (2-tailed)	.000		.000	.000	.000	.000
	N	311	311	311	311	311	311
X13	Pearson Correlation	-.046	.293**	1	.410**	.324**	.514**
	Sig. (2-tailed)	.423	.000		.000	.000	.000
	N	311	311	311	311	311	311
X14	Pearson Correlation	.687**	.293**	.410**	1	.948**	.905**
	Sig. (2-tailed)	.000	.000	.000		.000	.000
	N	311	311	311	311	311	311
X15	Pearson Correlation	.767**	.316**	.324**	.948**	1	.910**
	Sig. (2-tailed)	.000	.000	.000	.000		.000
	N	311	311	311	311	311	311
Source of Information	Pearson Correlation	.789**	.622**	.514**	.905**	.910**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	
	N	311	311	311	311	311	311

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

		Z11	Z12	Z13	Z14	Z15	Z16	Z17	Threat of Appraisal
Z11	Pearson Correlation	1	.234**	.283**	.165**	.403**	.099	.168**	.539**
	Sig. (2-tailed)		.000	.000	.003	.000	.080	.003	.000
	N	311	311	311	311	311	311	311	311
Z12	Pearson Correlation	.234**	1	.268**	.391**	.224**	.218**	.314**	.641**
	Sig. (2-tailed)	.000		.000	.000	.000	.000	.000	.000
	N	311	311	311	311	311	311	311	311
Z13	Pearson Correlation	.283**	.268**	1	.378**	.329**	.355**	.157**	.657**
	Sig. (2-tailed)	.000	.000		.000	.000	.000	.005	.000
	N	311	311	311	311	311	311	311	311
Z14	Pearson Correlation	.165**	.391**	.378**	1	.251**	.250**	.250**	.638**
	Sig. (2-tailed)	.003	.000	.000		.000	.000	.000	.000
	N	311	311	311	311	311	311	311	311
Z15	Pearson Correlation	.403**	.224**	.329**	.251**	1	.193**	.229**	.604**
	Sig. (2-tailed)	.000	.000	.000	.000		.001	.000	.000
	N	311	311	311	311	311	311	311	311
Z16	Pearson Correlation	.099	.218**	.355**	.250**	.193**	1	.240**	.569**
	Sig. (2-tailed)	.080	.000	.000	.000	.001		.000	.000
	N	311	311	311	311	311	311	311	311
Z17	Pearson Correlation	.168**	.314**	.157**	.250**	.229**	.240**	1	.568**
	Sig. (2-tailed)	.003	.000	.005	.000	.000	.000		.000
	N	311	311	311	311	311	311	311	311
Threat of Appraisal	Pearson Correlation	.539**	.641**	.657**	.638**	.604**	.569**	.568**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	
	N	311	311	311	311	311	311	311	311

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

		Z21	Z22	Z23	Fear of Fatality
Z21	Pearson Correlation	1	.763**	.115*	.866**
	Sig. (2-tailed)		.000	.042	.000
	N	311	311	311	311
Z22	Pearson Correlation	.763**	1	.038	.833**
	Sig. (2-tailed)	.000		.502	.000
	N	311	311	311	311
Z23	Pearson Correlation	.115*	.038	1	.498**
	Sig. (2-tailed)	.042	.502		.000
	N	311	311	311	311
Fear of Fatality	Pearson Correlation	.866**	.833**	.498**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	311	311	311	311

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Correlations

		Y11	Y12	Y13	Evacuation Motivation
Y11	Pearson Correlation	1	.408**	.322**	.652**
	Sig. (2-tailed)		.000	.000	.000
	N	311	311	311	311
Y12	Pearson Correlation	.408**	1	.857**	.924**
	Sig. (2-tailed)	.000		.000	.000
	N	311	311	311	311
Y13	Pearson Correlation	.322**	.857**	1	.904**
	Sig. (2-tailed)	.000	.000		.000
	N	311	311	311	311
Evacuation Motivation	Pearson Correlation	.652**	.924**	.904**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	311	311	311	311

**. Correlation is significant at the 0.01 level (2-tailed).

Reliability Statistics

Cronbach's Alpha	N of Items
.812	5

Reliability Statistics

Cronbach's Alpha	N of Items
.707	7

Reliability Statistics

Cronbach's Alpha	N of Items
.582	3

Reliability Statistics

Cronbach's Alpha	N of Items
.777	3

Frequencies

Statistics

		X11	X12	X13	X14	X15
N	Valid	311	311	311	311	311
	Missing	0	0	0	0	0
Mean		3.41	3.77	2.87	2.85	3.02

Statistics

		Z11	Z12	Z13	Z14	Z15	Z16	Z17
N	Valid	311	311	311	311	311	311	311
	Missing	0	0	0	0	0	0	0
Mean		3.70	3.68	4.05	3.73	3.72	3.48	3.52

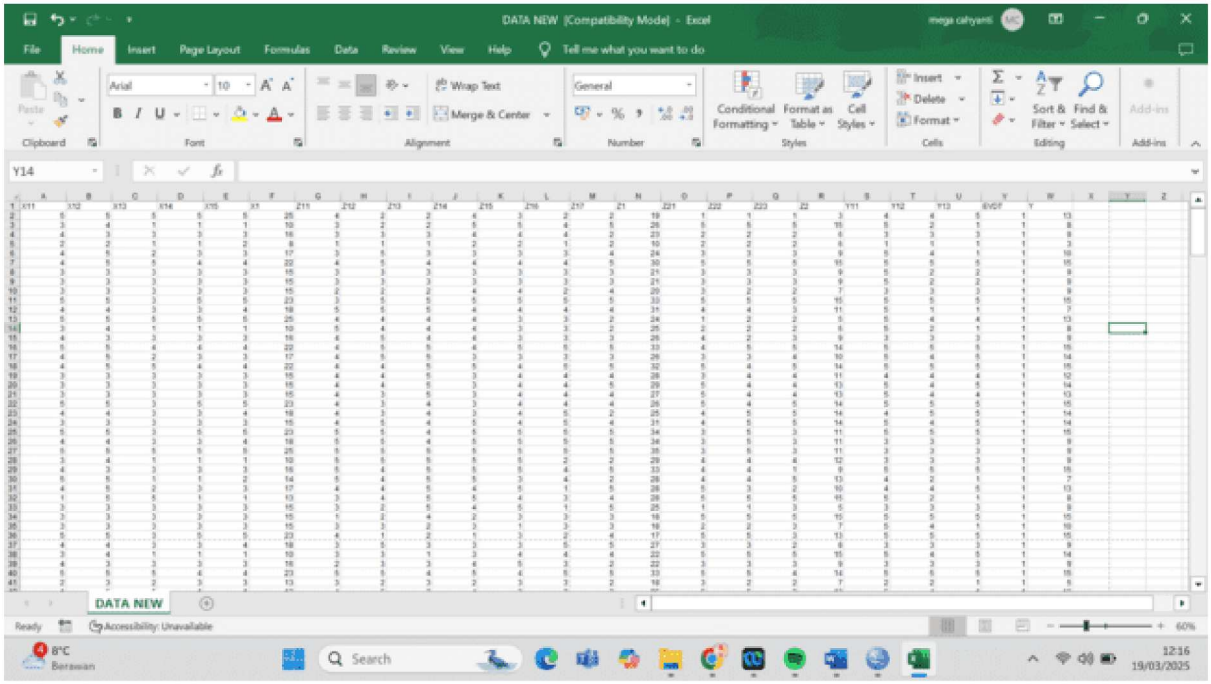
Statistics

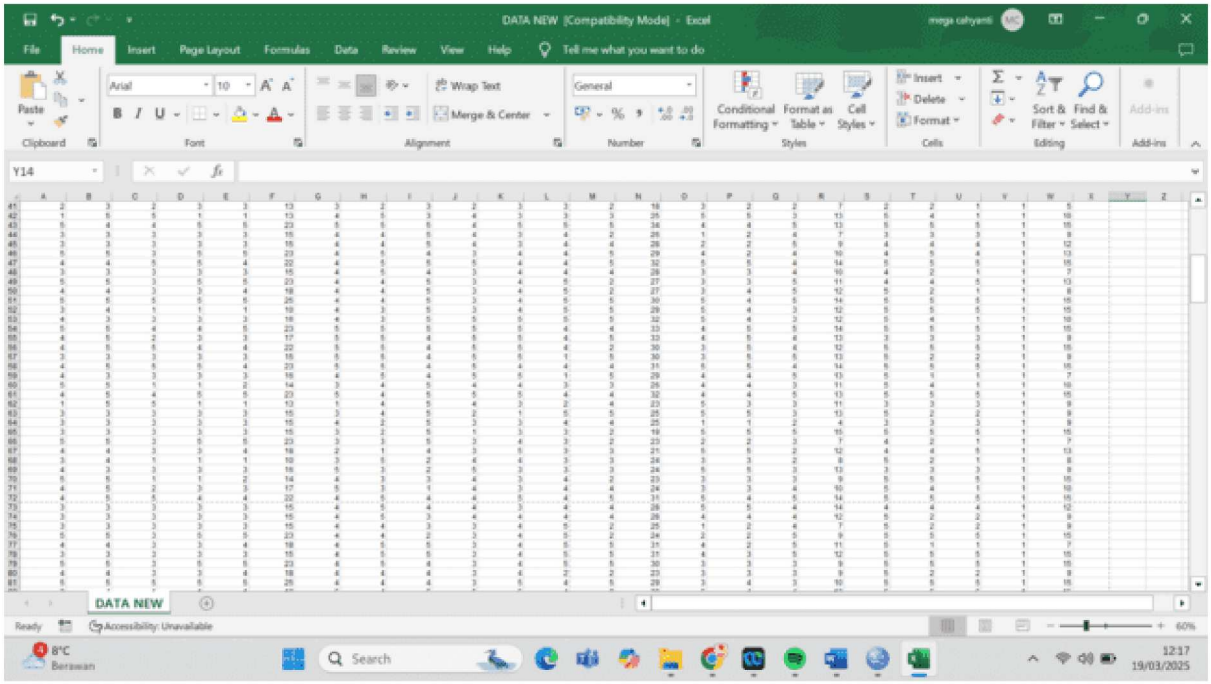
		Z21	Z22	Z23
N	Valid	311	311	311
	Missing	0	0	0
Mean		3.53	3.50	3.49

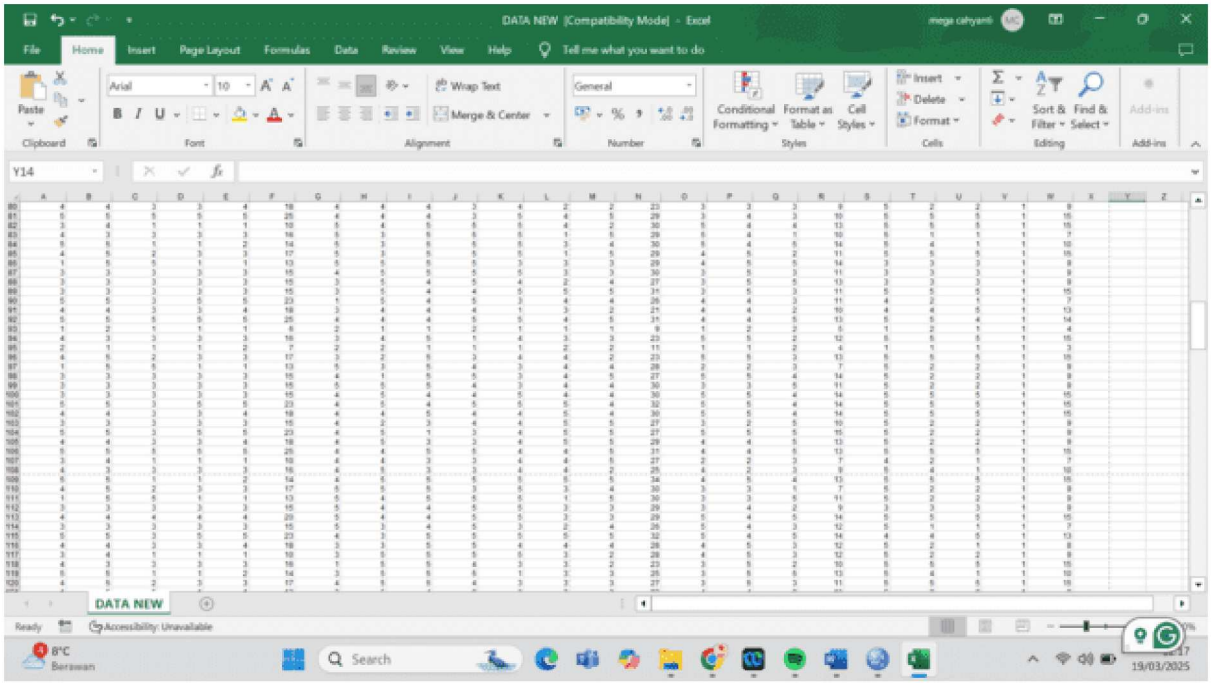
Statistics

		Y11	Y12	Y13
N	Valid	311	311	311
	Missing	0	0	0
Mean		4.27	3.17	2.92

Appendix 4 (b): Raw Data



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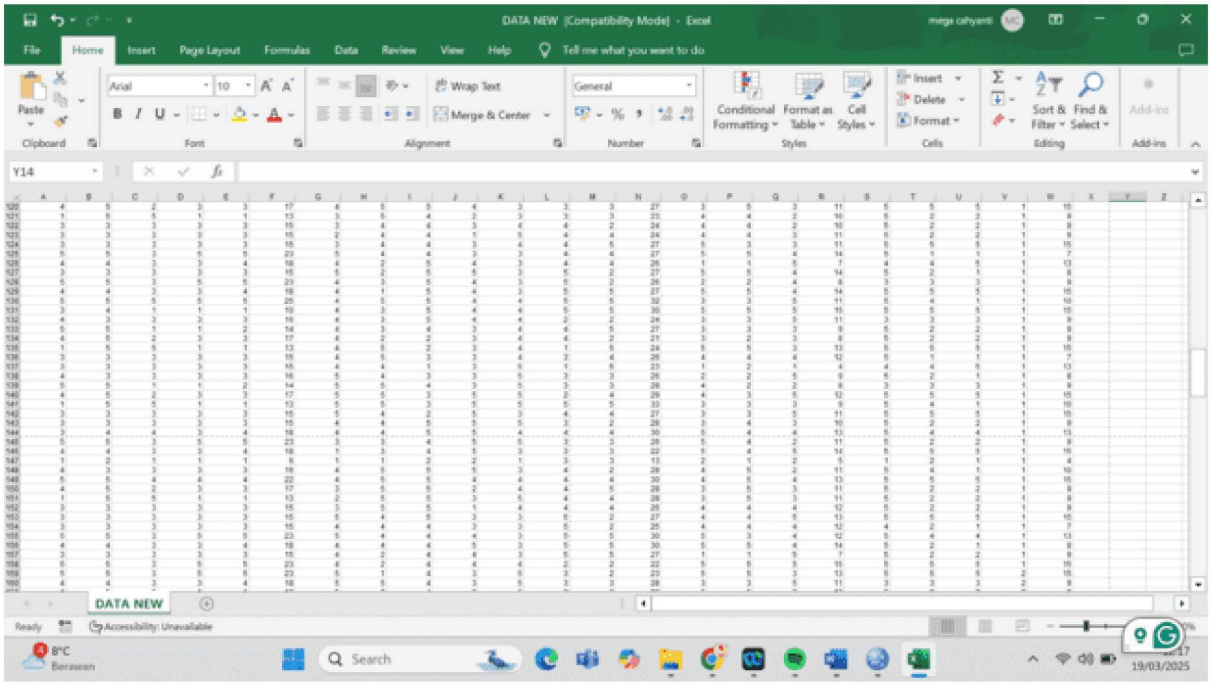
DATA NEW
Ready
Accessibility: Unavailable
8°C
Berawan
Search
19/03/2025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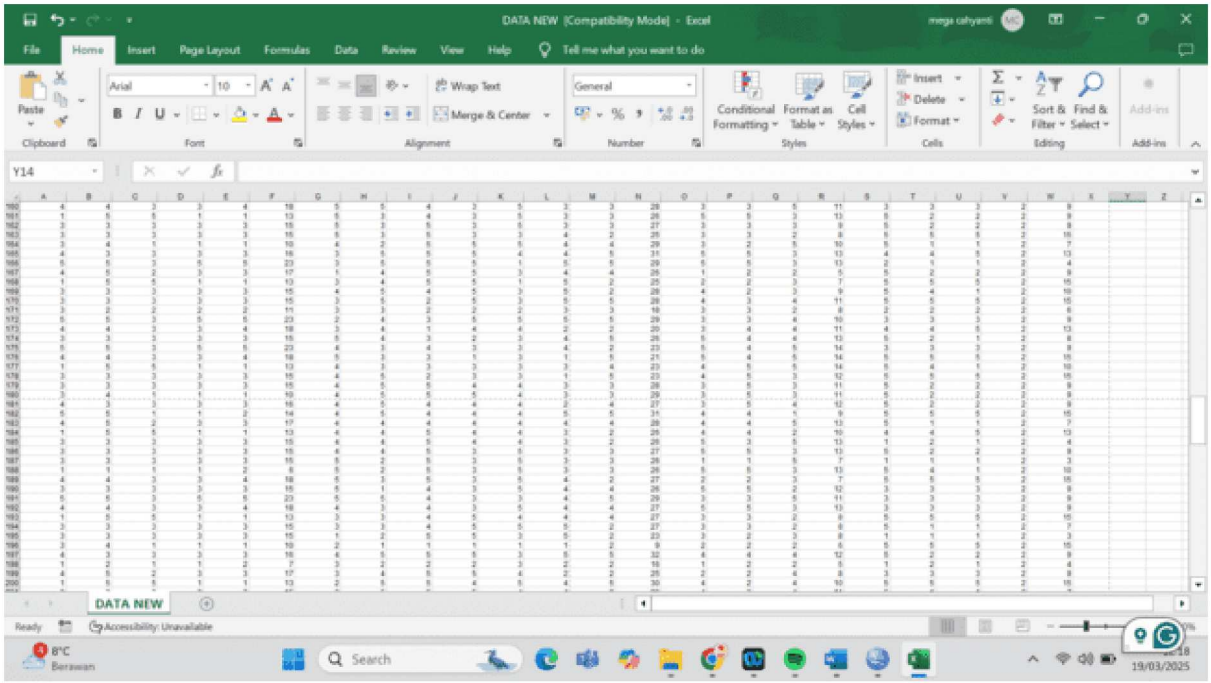
DATA NEW
Ready
Accessibility: Unavailable
8°C
Berawan
Search
19/03/2025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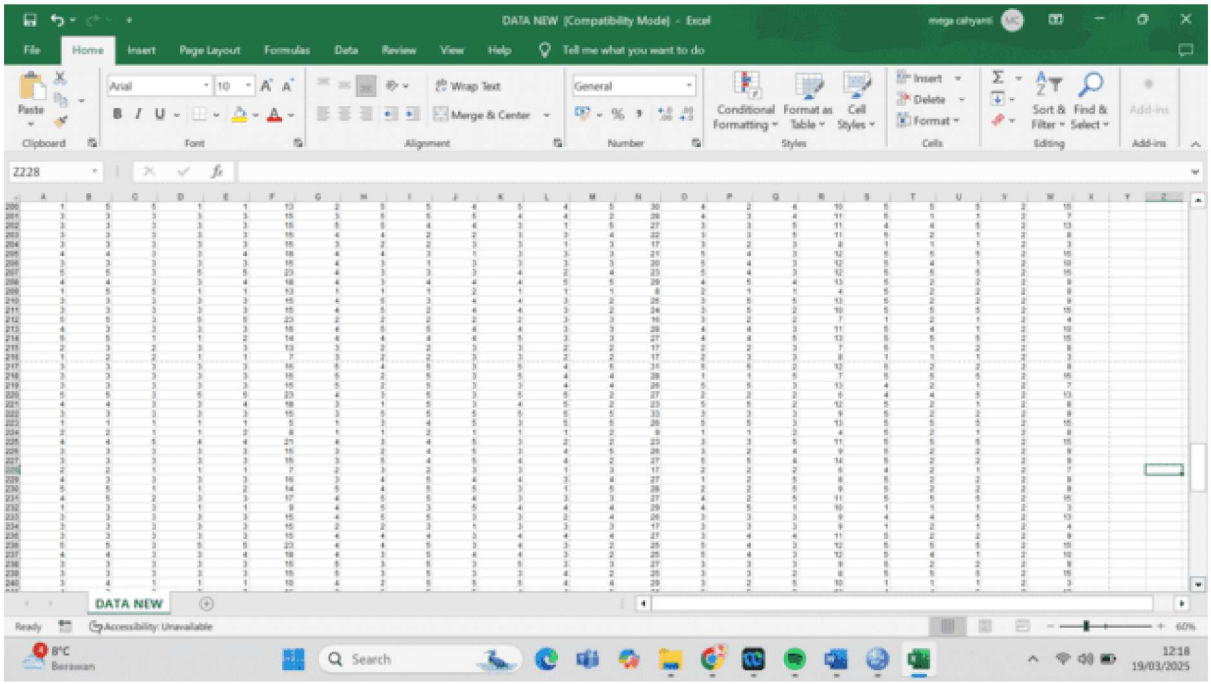
DATA NEW
Ready
Accessibility: Unavailable
Search
19/03/2025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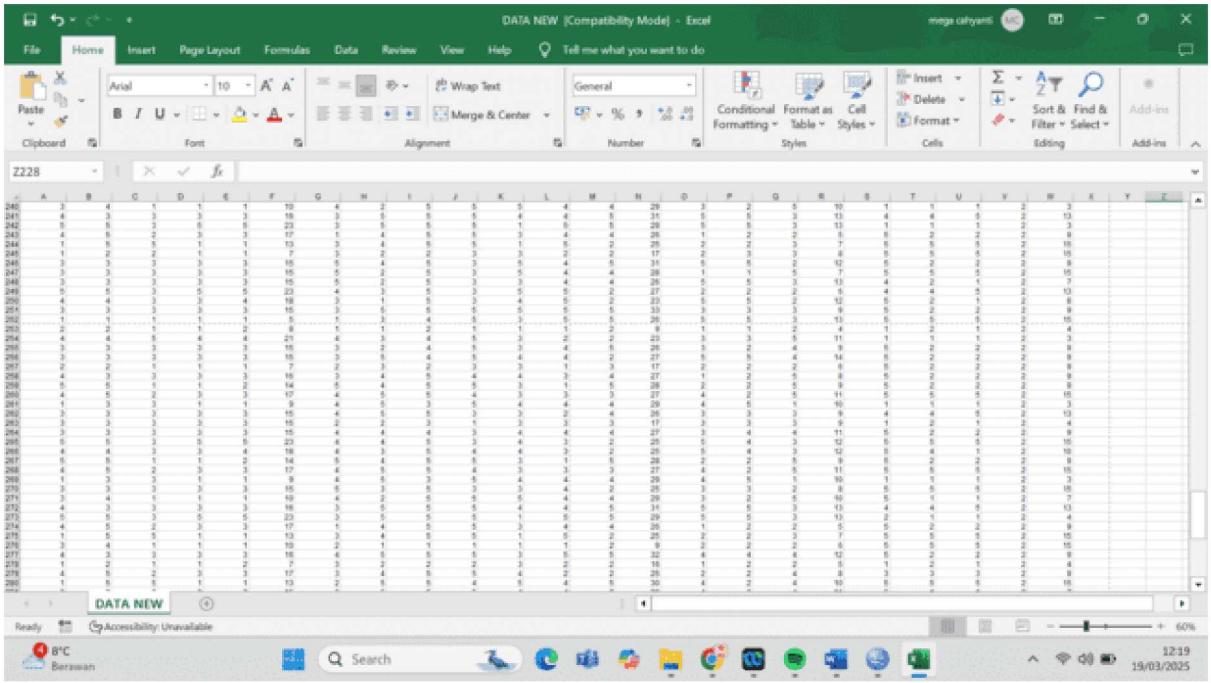
Search
19/03/2025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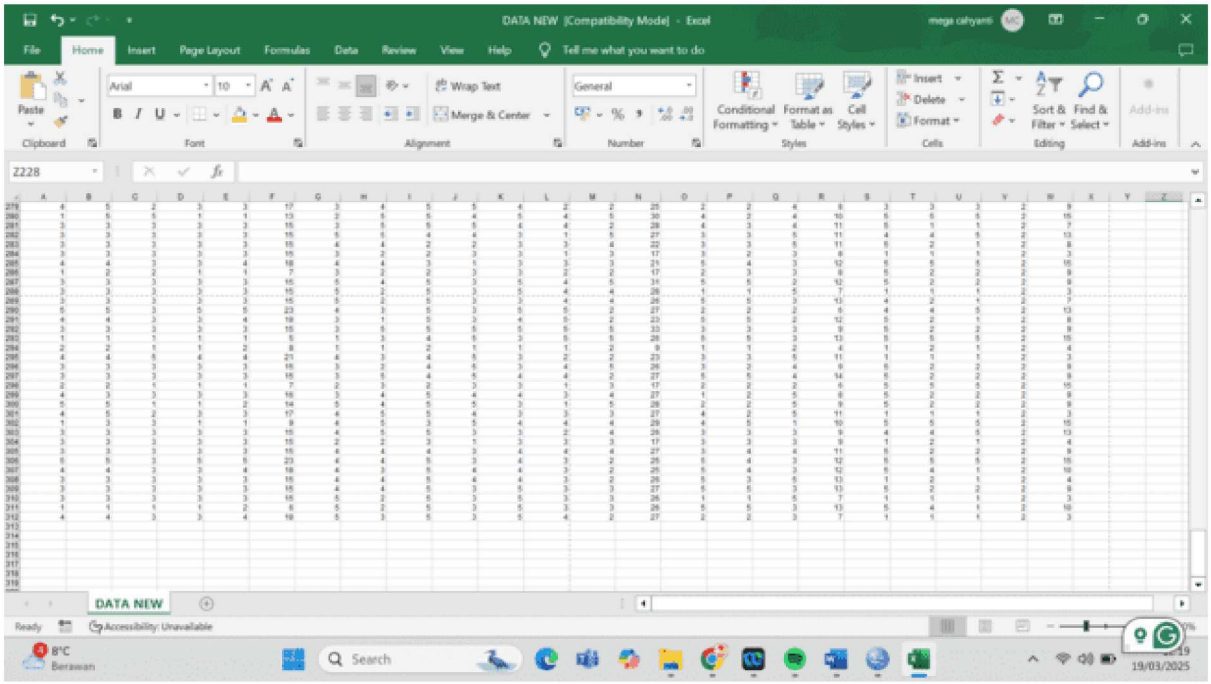
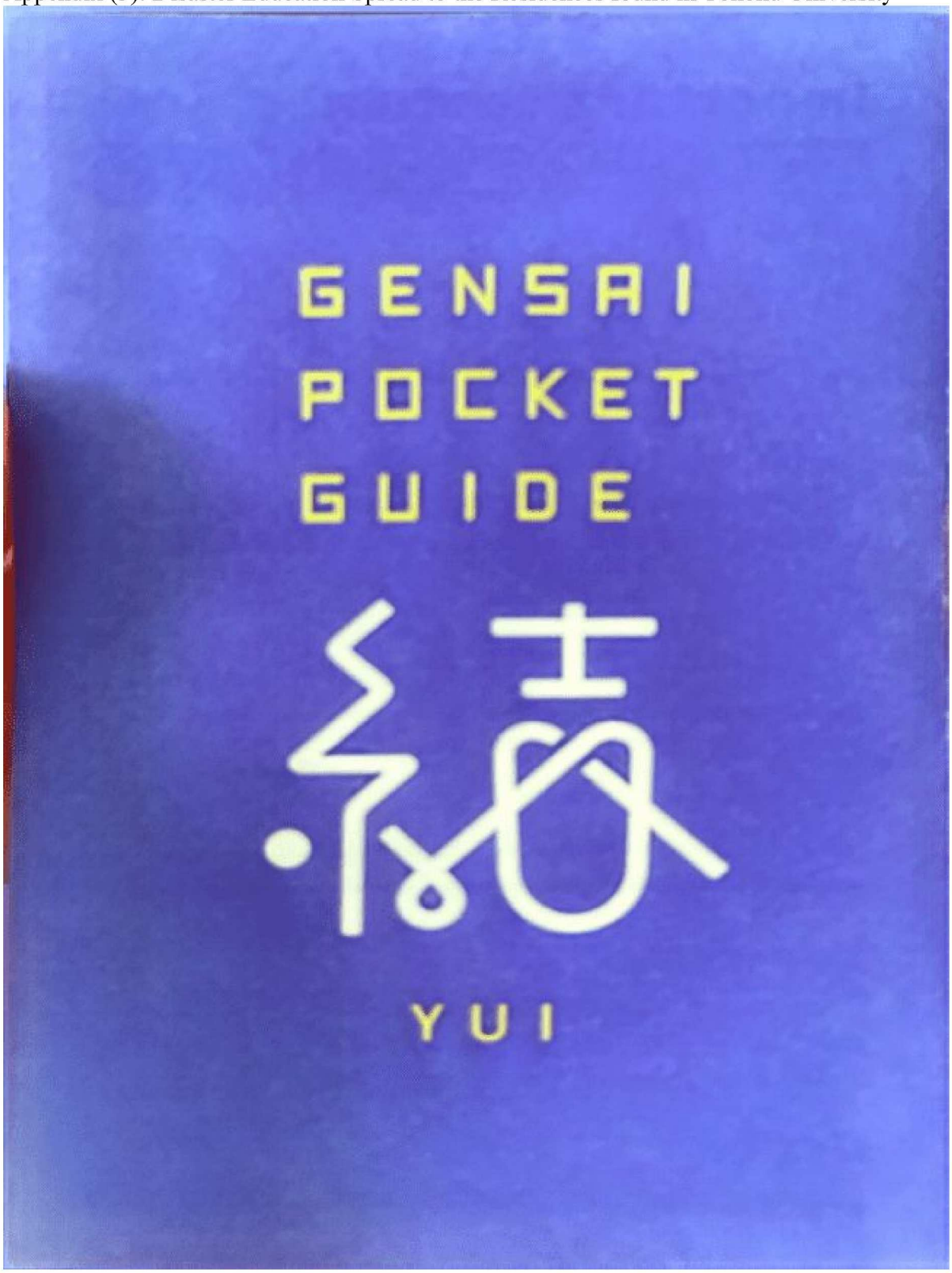
DATA NEW


DATA NEW [Compatibility Mode] - Excel
DATA NEW

Appendix (5): Disaster Education Spread to the Residences found in Tohoku University



Gensai Pocket Guide found in Tohoku University, which is spread to the Residence, Source: Author (2024)

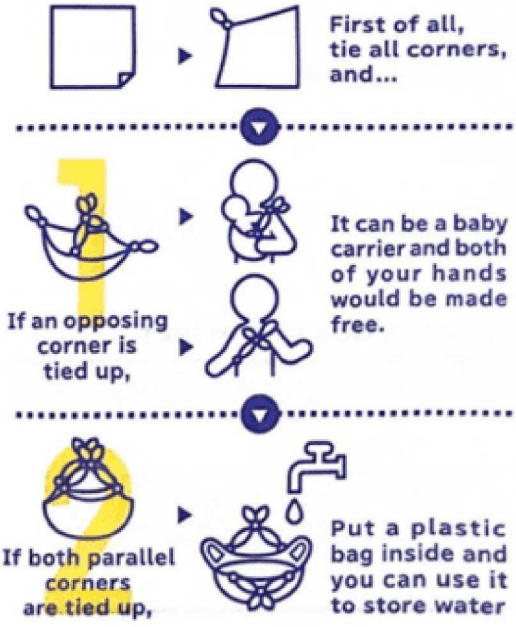
01 | When to use

Uses of the wrapping cloth

This wrapping cloth is an item designed to help reduce disaster impact to the human body. There are many ways to use it during an emergency. It can be used as a (an):

How to use

Now a little more advanced techniques for using the cloth would be :



02 | Things to remember

The 3.11 Great East Japan Tsunami

The maximum runup height of 40.5m was measured in Aneyoshi area of Miyako city

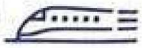
The maximum inundation distance inland of 5.4km was measured in Takekoshi area of Natori city

Tsunami had run around 50km upstream from the mouth of the Kitakami River

Tsunami is faster than you expect

- **At 4,000m of sea depth**
  The same speed as jet aircraft, 720km/h

- **At 500m of sea depth**
  The same speed as bullet train [Shinkansen], 250km/h



- **Inland**
  The same speed as bicycle, 20km/h

Caution is needed for a long shake

Evacuate as soon as possible because a long period shake has the possibility to generate a large tsunami

Be aware of tsunami after a large earthquake magnitude with shallow epicenter

Do you know about evacuation shelters?

Let's confirm evacuation shelters to use during an emergency. Try to walk to those places at least once.

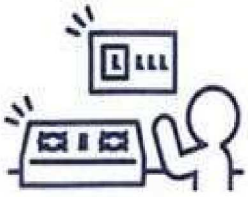
03 | How to survive

From earthquake

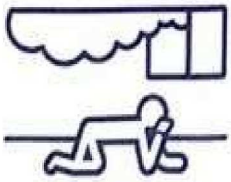
In case of fire, cover your nose to prevent from sniffing the smoke and crawl on the floor

When you are outside, move to wider places.

Hide yourself under a desk or a table.



Turn off gas and electricity after the quakes subside.



A mouth is covered in case of a fire and it crawls on a floor so that smoke may not be inhaled.

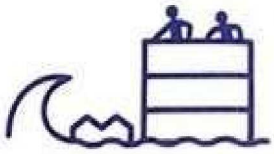
From tsunami

If tsunami starts inundating during an evacuation, go to the top of a strong building

Evacuate to higher places quickly when receiving a tsunami alarm.

Never use cars for evacuation. Evacuate on foot with minimal belongings.

Evacuate individually to nearby higher places, while calling out evacuation loudly.



If flooded [begin] during refuge, it is to a strong nearb... building ta...

From typhoon

Arranging what can be possible to be blown and strengthen roofs or walls. Stay at a safe place inside your house during the approaching of the typhoon

From gust/squall/Tornado

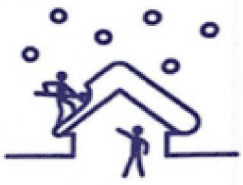
Stay underground if there is a cellar, if not, put on a helmet and body protection clothes and hide yourself if you are around weak buildings.

From heavy rain (Flood)

Those who live nearby mountain, hill, river or lowland area should evacuate fast. and rope together with others.

From heavy snow

Shovel snow from the roof in the morning while the snow is still hard.



From volcanic eruption

Evacuate immediately after a level 1-5 warning Importantly, do not panic.

04 | Useful items during an earthquake disaster

Food, drink and health related items

☐ Drinking water, Emergency canned food

☐ Warm Pack Pocket Warmer, Cooling Gel Sheet

☐ Kitchen paper, wrap

☐ Emergency drug and medicine

☐ Toilet paper

☐ Hand Sanitizer gel or spray

Safety measures

☐ Battery radio

☐ Helmet

☐ Whistle

☐ Gloves

☐ Rope

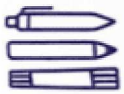
☐ Hammer

Apparel and daily use items

☐ Cloth, underwear

☐ Towel, blanket

☐ Raincoat, umbrella



☐ Pen, pencil

☐ False tooth, eyeglass

☐ Knife, can opener

disaster

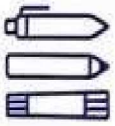
☑ Please check the items listed below

ɔarel and daily use items

loth, nderwear

☐ Towel, blanket

aincoat, mbrella



☐ Pen, pencil

ılse tooth, ʻeglass

☐ Knife, can opener

Fuel, illumination related items

☐ gas fan heater

☐ Lighter

☐ Portable gas stove

☐ Candle

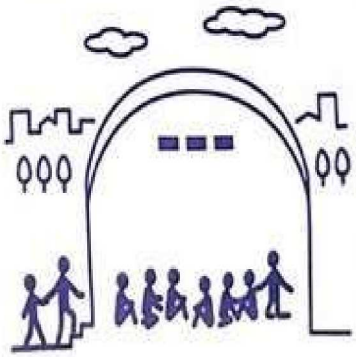
☐ Solar light

☐ Solar charger

Actions after an earthquake disaster

Stay in office or school until the safety is confirmed

There will be aftershocks after a large earthquake, you should stay in your company or school until it is confirmed to be safe to go back home. The distance in case of returning home by walk should be less than 20km. Do not trust any gossips or chain mails but the accurate information from radio or TV.



減災風呂敷、減災ポケット

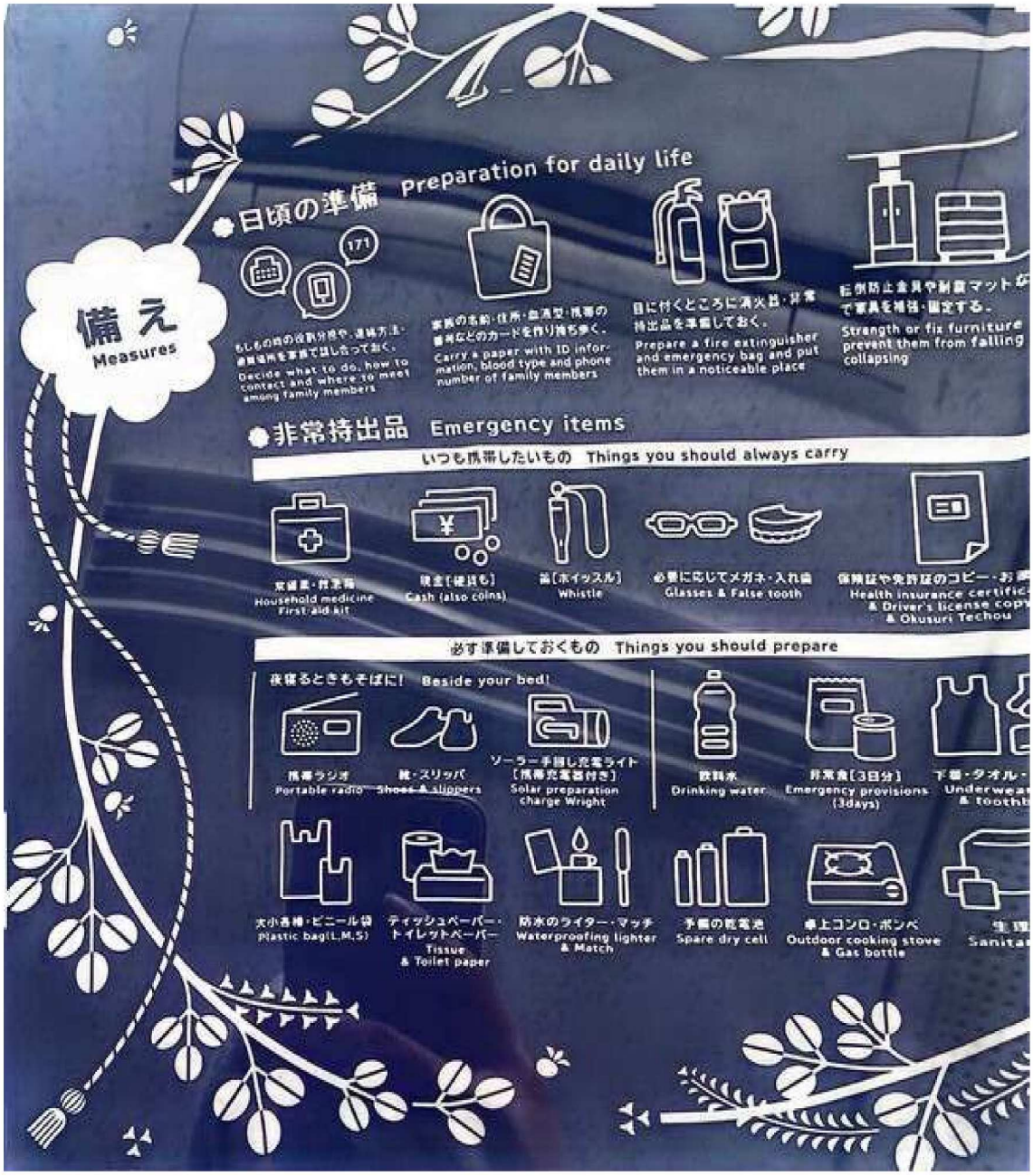
Disaster mitigation furoshiki and pocket

寄附研究部門

減災風呂敷と減災ポケットには、生地に減災の知識がプリントされており、日常では、減災意識啓発ツールとして活躍します。災害時には、防災頭巾代わりの使用や物を包んで運ぶなど、実用的に使用することができます。日本の伝統文化と災害科学の融合で生まれました。

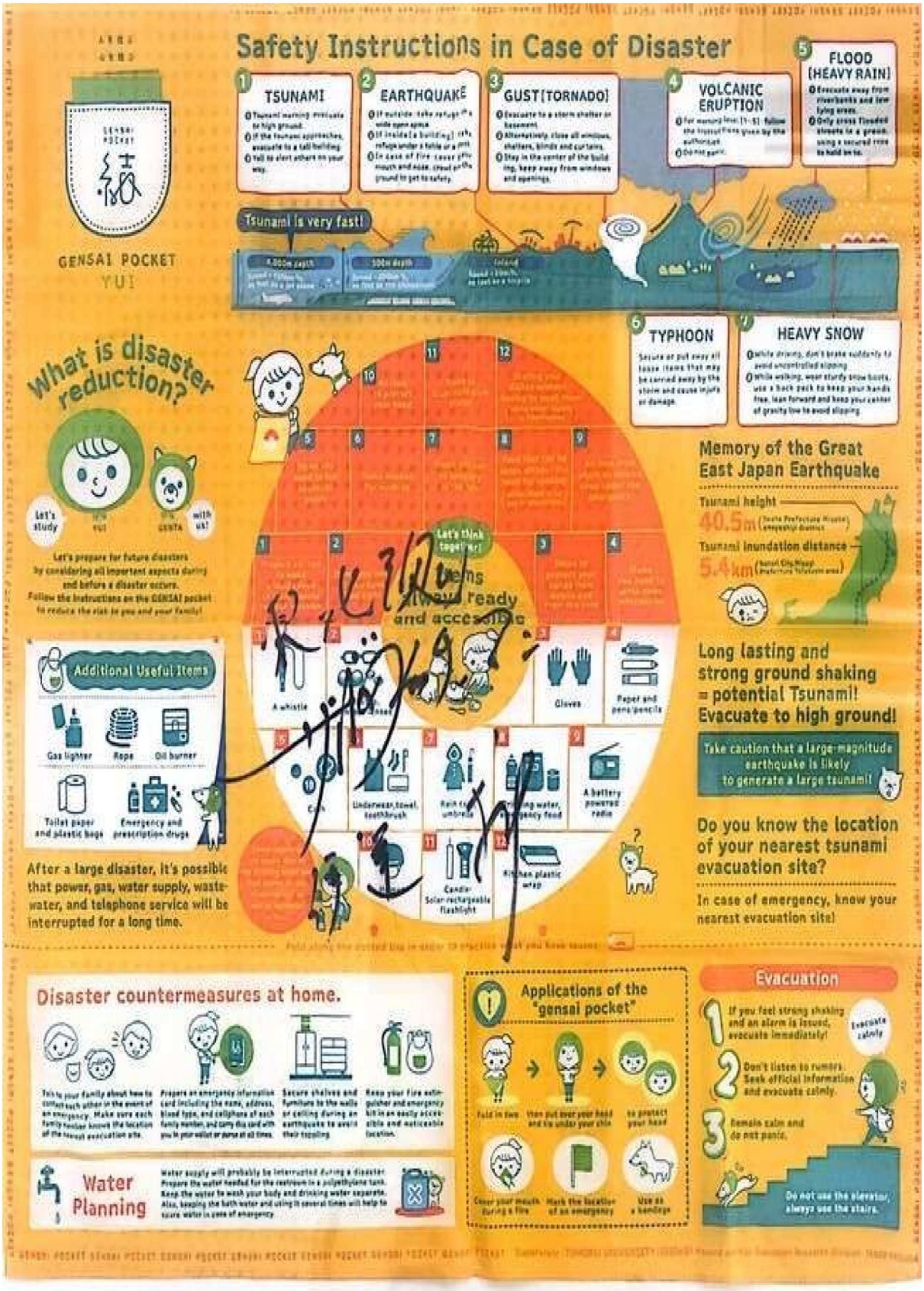
Disaster mitigation furoshiki (a Japanese wrapping cloth) and pocket, on which disaster risk reduction information is printed, are tools made to raise disaster mitigation awareness. When a disaster occurs, these can be used to protect your head or to carry emergency items. These were conceived through a fusion of traditional Japanese culture and disaster science.

Disaster Mitigation Furoshiki and pocket found in Tohoku University, which is spread to the Residence, Source: Author (2024)



Disaster Preparation for daily life found in Tohoku University, which is spread to the Residence, Source: Author (2024)


減災
GENSAI
東日本大震災の記憶
津波の高さ
約40.5m
津波がきた距離
約5.4km
熊本地震の記憶
震度7が2回
余震の数
2016.4.14から
2016.12.31まで
4,209回
長いゆれには注意！
知ってる？避難場所
減災って知ってる？
災害が発生したらどう行動すればいいの？
津波
地震
洪水（氾濫）
火山噴火
家庭の災害対策は？
津波はこんなに速い！
崖崩れ
谷筋
火災
避難！となったら…
日頃から何を用意しておけばいいの？
ホイッスル・防犯ブザー
メガネ・コンタクトレンズ
お金
下着・タオル・歯ブラシ
ラジオ（電池）
ヘルメット
ロウソク・ソーラーライト



***Gensai* Pocket found in Tohoku University, which is spread to the Residence**, Source: Author (2024)


減災ポケットYUI
減災って知ってる?
災害が発生したら
どう行動すればいいの?
地震
津波
台風
突風(竜巻)
豪雨(洪水)
大雪
火山噴火
東日本大震災の記憶
津波の高さ
約40.5m
津波がきた距離
約5.4km
長いゆれには注意!
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知っていますか?避難場所
津波はこんなに速い!
家庭の災害対策は?
日頃から何を用意しておけばいいの?
ホイッスル
メガネ・コンタクトレンズ
筆記用具
小銭
雨具
使い捨てカイロ
ラジオ(電池)
ヘルメット
トイレットペーパー
ソーラー充電器
避難!となったら…

Disaster Risk Reduction Information Pocket by JICA life found in Tohoku University, which is spread to the Residence, Source: Author (2024)