Exploring Gaps and Strategies: A Pilot Interview for Enhancing Disaster Risk Governance in Malaysia through Integrated Climate Change Adaptation for Resilience in the Future

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ABSTRACT
Global climate change has led to a surge in climate-related disasters. Effectively managing these crises requires adopting disaster risk reduction strategies that account for climate change’s profound impact. This article explores gaps in Malaysia’s disaster risk reduction governance and climate change adaptation through literature review and preliminary interview. It highlights critical shortcomings which are outdated policies, challenges in multiple disciplinary collaboration and data sharing, and a lack of a robust strategic plan. While these findings are not exhaustive, they open the opportunity and emphasize the pressing need for further research. Future studies should focus on uncovering networks among actors, policies, and practices in Malaysia to develop a governance framework for a safer and more sustainable future amid evolving climate challenges. This requires thorough examination of the overlaps and distinctions in both fields, paving the way for a governance strategy aligned with the Paris Agreement, Sustainable Development Goals, and Sendai Framework.

KEYWORDS: Disaster risk governance, Disaster risk reduction, Climate change adaptation

1. INTRODUCTION
Over the previous 200 years, human and natural factors have caused a 1.1-degree Celsius temperature rise and global warming. Thus, many climate-related risks are rising, putting the community at risk. From 1850 to 2019, anthropogenic CO2 emissions were 2400 ± 240 GtCO2 (IPCC, 2023). IPCC targeted that the global temperatures must remain below 1.5°C before the year 2025 to prevent more climate-related disasters. It is recommended by the IPCC that the carbon emissions should be reduced by 43% by 2030, and by the year 2035, the carbon emission should be decreased by 60%. In early 2050, we should have zero carbon emissions or net zero (IPCC, 2022).

Climate-related disasters are divided into 3 types: (1) hydrological type, such as floods, landslides, and wave action; (2) climatological type, such as drought, heat waves and rapid wildfire; and (3) meteorological type, such as cyclones; and rising sea levels have escalated. Climatological, meteorological, and hydrological hazards represent multifaceted threats with the potential to inflict significant harm upon ecosystems, leading to the depletion of vital water and food resources. Furthermore, these hazards can profoundly disrupt various human economic endeavors, thereby exacerbating socio-economic vulnerabilities and posing formidable challenges for sustainable development efforts (UNDRR, 2022a; Valente et al., 2022).

Between 2000 and 2019, climate-related disasters comprised 6,681 out of 7,348 major disasters, resulting in profound ramifications, as referred to in Figure 1. These events precipitated the loss of over 1.2 million lives, affected an estimated 4 billion individuals, and incurred economic losses totalling US$2.97 trillion (CRED & UNDRR, 2020). This requires a better climate risk governance structure is needed to handle climate-related dangers (UNDRR, 2022a).
Researchers have shown significant interest in combining disaster risk reduction with climate change adaptation, especially when the UNFCCC Bali Action Plan was introduced. Numerous studies have been conducted to explore strategies for effectively amalgamating these initiatives. However, there are more areas to be explored as both fields having discretely separated by three global agendas (UNISDR, 2009).

The Paris Agreement sets a target on climate mitigation and adaptation and only focuses on climate issues (UNFCCC, 2015). Conversely, the Sendai Framework for Disaster Risk Reduction 2015-2030 (Sendai Framework), also introduced in 2015, emphasizes reducing fatalities and enhancing disaster risk reduction strategies, encompassing both climate and non-climate-related hazards (UNISDR, 2015). Furthermore, the Sustainable Development Goals (SDGs), launched in the same year, aim to foster resilience across various dimensions of societal development (United Nations, 2015). This convergence of global agendas in 2015, encompassing sustainable development goals, disaster risk reduction targets, and the integration of climate change adaptation, marks a pivotal moment in international efforts toward sustainability (Wen et al., 2023). Combining all three targets should focus on how to adapt to changing weather patterns and the relation with the occurrence of natural disasters. The final goal is to have a sustainable nation that is able to face climate-related disasters (Teebken et al., 2021).

Converging Disaster Risk Reduction (DRR) with Climate Change Adaptation (CCA) is an essential and key component of managing climate risks to mitigate catastrophic weather events and environmental degradation caused by climate change (Begum et al., 2014a; Forino et al., 2015a). However, DRR covers risks from various natural events like volcanic eruptions and earthquakes, not just climate change (UNDRR, 2019; Wen et al., 2023). Embracing climate change adaptation involves tackling its effects on biodiversity, ecosystems, human well-being, and the emergence of pandemics, while disaster risk reduction places paramount importance on safeguarding lives and property by proactively averting potential losses (IPCC, 2022; Wen et al., 2023). Hence, the convergence of CCA and DRR can form a holistic governance framework where both agendas work harmoniously towards the common goal of fortifying resilience (UNDRR, 2022a, 2022b; Wen et al., 2023).

The research paper unfolds in five distinct sections. The introduction presents the idea of integrating DRR and CCA. In the second section, an exhaustive exploration of existing literature is presented to define gaps in converging both DRR and CCA. The third section vividly elucidates the research methodology, which encompasses a literature review and qualitative interviews. The fourth section, the domain of findings and discussion, unveils the research outcomes, showcasing any discernible patterns or emerging trends derived from the data analysis, mainly on the gaps, challenges, and way forward of DRR and CCA governance in Malaysia. The fifth and final section serves as a culmination, offering a conclusion and a strategic roadmap for achieving efficient disaster risk reduction governance with the convergence of climate change adaptation.

2. METHODOLOGY

2.1 Literature Review

An extensive examination of existing literature reveals a notable scarcity of articles addressing the enhancement of Malaysia’s disaster risk governance
through the synergistic integration of policies aimed at both climate change adaptation and disaster risk reduction. Instead, the prevailing focus within scholarly discourse predominantly centers on singular facets of community resilience, often compartmentalized into distinct domains of either climate change adaptation or disaster preparedness. This fragmentation within the literature underscores a critical gap in understanding the potential synergies and mutual benefits that could arise from a more integrated approach to policy formulation and implementation in Malaysia's disaster risk management framework (Forino et al., 2017; Rani et al., 2017; UNDP, 2017; Rahman, 2018). Preliminary investigations have been undertaken through systematic exploration of scholarly databases such as Web of Science, Scopus, ScienceDirect, and Google Scholar. The primary objective of this inquiry is to delineate the interrelation between disaster risk reduction and climate change adaptation within the context of disaster risk governance. The search parameters were configured to encompass keywords such as “disaster risk reduction,” “climate change adaptation,” and “governance.”

The search criteria were meticulously refined to exclusively include scholarly papers that specifically addressed the integration of Disaster Risk Reduction (DRR), Climate Change Adaptation (CCA), and governance, aiming to deepen comprehension of these interconnected concepts. Despite concerted efforts, the outcomes did not meet initial expectations. Many of the identified papers predominantly focused on global-scale studies, thus leaving notable gaps in the literature, particularly concerning the context of Malaysia. To address these deficiencies, additional sources were meticulously scrutinized. This encompassed a thorough examination of Malaysia’s own Disaster Risk Reduction (DRR) and Climate Change Adaptation (CCA) policies, coupled with a comprehensive review of reports issued by prominent global entities such as the UNDRR and the World Bank. Furthermore, insights from local researchers were diligently sought to augment the understanding of climate change adaptation within the framework of disaster risk reduction, thereby contributing to a more nuanced and comprehensive research landscape in Malaysia.

2.2 Semi-structured Interviews

To explore the potential of converging DRR and CCA governance in Malaysia, this research has employed semi-structured interviews, a flexible approach where a set of topic-based questions will guide both face-to-face and online interactions with respondents. This method encourages two-way discussions initiated by the interviewer, enabling the collection of relevant and reliable data pertaining to our research questions and objectives (Saunders et al., 2009). Following an interview protocol method introduced by Jacob and Furgerson (2012), the semi-structured interviews use a guide that focuses on addressing the research’s purpose. However, this guide is not meant to be followed rigidly but serves to structure the conversation’s natural flow in each unique interview (Adeoye-Olatunde & Olenik, 2021). The sample size for these interviews is not fixed, and the interview guide will include open-ended and probing questions (Aung et al., 2021).

The research commenced with a pilot interview, serving dual purposes: firstly, to collect preliminary data and ascertain the research potential (Harvey, 2022) and secondly, to validate the reliability of data collection instruments, thereby ensuring their effectiveness in subsequent data gathering endeavors (Aung et al., 2021). Additionally, the pilot interviews facilitated an acclimatization to the interview setting, enabling the research team to garner valuable insights from participants (Yeong et al., 2018).

The pilot interview was conducted with multiple objectives: testing the clarity and relevance of pre-design interview questions in relation to the research goals, gaining a deeper understanding through observations, and addressing potential issues in advance to enhance the trustworthiness of interview questions (Shakir & Atteq Ur Rahman, 2022). Although the literature on pilot studies in qualitative research is limited compared to quantitative research, these interviews played a crucial role in the overall research process, helping to shape the approach and snowballing questions (Malmqvist et al., 2019).

For this particular study focused on the integration of climate change adaptation into disaster risk reduction, participants were purposively selected from pertinent sectors in Malaysia. The pilot interviews were conducted in two distinct phases. Initially, the aim was to establish a contextual understanding of climate change. In the initial phase of pilot interviews, a total of three individuals were engaged. This group comprised two participants associated with government agencies tasked with climate change and adaptation responsibilities. The third participant represented the private sector, as well as a prominent non-governmental organization (NGO) actively engaged in climate change initiatives within Malaysia.

Subsequently, for the second phase of pilot interviews, a larger cohort of ten individuals was involved to validate and confirm the reliability and appropriateness of the semi-structured interview questions. Semi-structured interview questions served as a flexible guide rather than a strict script derived earlier from previous research (Greenidge, 2017; Forino, 2019; Samaru, 2021; Yazar, 2021; Blanken, 2022). This adaptability allowed us to explore fruitful inquiries, adjust questions based on input, and incorporate new ones as needed. This extended group featured a researcher and a technical agency...
officer with additional of two representatives from federal agencies and six officials responsible for disaster management in state governments participated in these interviews.

The information derived from our semi-structured interviews will then be analyzed through a thematic analysis. This approach involves transcribing and categorizing the data into themes with a methodical step-by-step process. It includes selecting the relevant data, defining units and categories, establishing a set of coding rules (themes), and then reviewing the data in accordance with these coding rules (Vaismoradi et al., 2013; Vaismoradi et al., 2016). Thematic analysis stands as a widely adopted methodological approach renowned for its efficacy in elucidating patterns and facilitating data interpretation by discerning commonalities and distinctions within diverse datasets or individuals. This methodological choice is deemed particularly suitable and beneficial for our research (Braun & Clarke, 2012).

Table 1 summarizes the whole methodology for conducting the pilot interview, sample size and data analysis.

3. MALAYSIA CLIMATE AND GOVERNANCE SYSTEM

3.1 Malaysia Climate Profile

According to the Koppen-Geiger system, Malaysia falls under the climate classification characterized by a predominantly humid tropical climate with consistently warm temperatures exceeding 18°C throughout the year. The country’s climate is primarily tropical rainforest, maintaining an average temperature of 24.5°C. Notably, January records the lowest average temperature at 24.9°C, while May experiences the highest at 25.9°C. Over the period from 1991 to 2020, Malaysia saw an average annual precipitation of 3,085.5 mm, with monthly averages staying relatively stable, ranging from 200 mm in June and July to 250 mm in November and December (The World Bank Group and the Asian Development Bank, 2021).

By 2050, temperatures in Malaysia are projected to increase by 1.5 degrees Celsius. Peninsular Malaysia exhibits more negative anomalies compared to Sabah and Sarawak, suggesting a likely increase in simulated rainfall between 2020 and 2029. According to the Malaysian Meteorological Department, precipitation is anticipated to peak between 2090 and 2099 (Rahman, 2018). A notable escalation in Malaysia’s annual average downpour is observed when comparing data from the 1970s and 1980s to that of 2000 to 2007, with an increase of 17% for one hour, 29% for three hours, and 31% for six hours (UNDRR, 2020).

Malaysia’s climatic characteristics, though captivating, have heightened its vulnerability to a variety of natural disasters, such as floods, landslides, droughts, and infectious disease outbreaks. The escalation in precipitation and sea levels, associated with global warming, has exacerbated the frequency of storm surges, saline intrusion, and coastal erosion, posing significant challenges for the nation’s resilience and adaptation efforts (World Bank, 2018; UNDRR, 2020; CFE-DM, 2022). The repercussions of climate change in Malaysia extend far beyond the obvious. They encompass rising tides and sea levels, the proliferation of diseases, the endangerment of biodiversity, as well as alterations in land use and crop yields. These multifaceted impacts underscore the complexity of the climate challenge facing the nation (Rahman, 2018).

Forecasts paint a worrisome picture whereby, in 2030, the compounding effects of climate-driven disasters are poised to chip away at 6% of Malaysia’s annual GDP when measured against a baseline scenario. The logging and fishing sectors are set to crumble, coupled with a decline in export demand, all due to these looming threats that undermine the environment and likely trigger economic perturbations (World Bank and Bank Negara Malaysia (BNM), 2022). This underscores the critical imperative for the establishment of resilient disaster risk governance frameworks and the undertaking of thorough, extensive research endeavors dedicated to effectively integrating disaster risk reduction strategies with climate change adaptation measures within Malaysia.

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<tr>
<th>Methodology</th>
<th>Description</th>
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<td>Approach</td>
<td>Semi-structured interviews</td>
<td>Saunders et al., 2009</td>
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<tr>
<td>Interview Guide</td>
<td>Flexible guide, not a rigid script</td>
<td>Jacob &amp; Furgerson, 2012; Adeguye-Olatunde &amp; Otenik, 2021</td>
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<tr>
<td>Sample Size</td>
<td>Variable, includes open-ended and probing questions</td>
<td>Aung et al., 2021</td>
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<td>Pilot Interviews</td>
<td>Conducted in two phases to test clarity, relevance, and effectiveness of interview questions</td>
<td>Yeong et al., 2018; Malavyist et al., 2019; Aung et al., 2021; Harvey, 2022; Shakir &amp; Afteq ur Rahman, 2022</td>
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<tr>
<td>Second Phase</td>
<td>Validation of semi-structured interview questions, involving 10 participants from various government and technical agencies</td>
<td>Greenidge, 2017; Forino, 2019; Samaru, 2021; Yazzar, 2021; Blanken, 2022</td>
</tr>
<tr>
<td>Analysis</td>
<td>Thematic analysis method, involving transcribing, categorizing, and establishing coding rules</td>
<td>Vaismoradi et al., 2013; Vaismoradi et al., 2016; Braun &amp; Clarke, 2012</td>
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3.2 Malaysia DRR Governance Mechanism
Following the 1993 Highland Towers apartment collapse, Malaysia adopted Directive No. 20 as its disaster management policy, established in 1997 (Norizan et al., 2021). The disaster management mechanism in Malaysia operates within a hierarchical structure spanning national, state, and district levels, where the disaster management committees are delineated accordingly, as referred to in Figure 2.

At the national level, ministerial leadership assumes paramount importance, overseen by a designated minister within the Prime Minister’s Office. Conversely, at the state and local levels, responsibility is vested in the state secretary and district officer, respectively (MKN, 2012). The system allocates responsibilities based on factors like severity, resources, expertise, available aid, and required response time (MKN, 2012). Various laws, such as the Malaysia Civil Defence Force Act 1951 (Amended in 2016), the Fire Services Act 1988, and the National Security Council Act of 2016, play a role in disaster management, focusing primarily on response and recovery (UNDRR, 2020). In 2015, Malaysia revamped its approach, appointing the National Disaster Management Agency (NADMA) as the committee secretary at the national level and the Malaysia Civil Defence Force at the state and district levels, a change from the National Security Council’s previous role (CFE-DM, 2022). NADMA, the National Disaster Management Agency, assumes the pivotal role of formulating overarching national policies pertaining to disaster management. Meanwhile, at the grassroots level, the implementation and execution of these policies are entrusted to state and local governments (MKN, 2012; UNDRR, 2020; CFE-DM, 2022).

3.3 Governance of Climate Change in Malaysia
Malaysia’s National Policy on Climate Change, in effect since 2009, serves as the country’s climate framework, with a focus on environmental preservation, resource management, resilience-building against climate risks, and synergy with relevant adaptation policies (NRE, 2009; Norizan et al., 2021). In Malaysia, climate governance is structured around three primary pillars: policymakers, development planners and implementers, and guidance and reporting agencies. Central to this framework is the Malaysia Climate Change Action Council (MyCAC). MyCAC’s composition includes influential Cabinet members, with the Prime Minister serving as its chairperson, thereby assuming a pivotal role in climate governance (KASA, 2020). Figure 3 shows the whole climate change governance system in Malaysia.

The Ministry of Environment and Water (KASA) and the Ministry of Energy and Natural Resources (KeTSA) amalgamated in December 2022 to form the Ministry of Natural Resources, Environment, and Climate Change (NRECC). The Secretary-General of NRECC leads the National Steering Committee on Climate Change (NSCCC), which looks into providing national communications and biennial update reports to the UNFCCC. Six Technical Working Groups support this endeavor (KASA, 2020; NRECC, 2022). Complementing these efforts, Malaysia has established committees such as the National Steering Committee and Technical Working Committee for REDD Plus, aimed at mitigating the impact of deforestation and forest degradation on the global climate (KeTSA, 2022). The Clean Development Mechanism (CDM) Committee was established in 1994 and is led by the Deputy Secretary-General of the Ministry of Environment and Water, with the Secretary-General acting as the Designated National Authority (Malaysia Energy Center, 2009; KASA, 2020). The Economic Planning Unit (EPU) oversees Malaysia’s five-year Rolling Plan for Development, with a notable emphasis on addressing the impacts of climate change (KASA, 2020; EPU, 2021b).

Figure 2: The current structure of Malaysia Disaster Management Mechanism based on MKN20 (MKN, 2012; CFE-DM, 2019; UNDRR, 2020)
In December 2023, after a Cabinet reshuffle, the NRECC was divided into two new ministries: the Ministry of Energy Transition and Public Utilities and the Ministry of Natural Resources and Environmental Sustainability (Adib Povera, 2023; Ho, 2023), but it is claimed that the present strategy for handling energy, natural resources, and climate change will remain unchanged (Adib Povera, 2023; Sinar Daily, 2023). Through the reshuffling, the government will have more capacity to address environmental sustainability and animal conservation (Adib Povera, 2023).

Subsequently, in an updated commitment on July 30th, 2021, Malaysia reinforced its goal to decrease carbon intensity as a percentage of GDP by 45 percent by 2030 compared to the 2005 level, highlighting a mandatory 45% reduction (EPU, 2021a; UNDP, 2021; UNFCCC, 2021). Malaysia initially pledged, in its Intended Nationally Determined Contributions (INDC) submitted on November 27th, 2015, to reduce greenhouse gas emissions as a percentage of GDP by 45 percent from 2005 levels by 2050, with a target of 35% unconditional and 10% conditional reduction (Rasiah et al., 2017; Zen & Mohamad, 2021).

3.4 Untangling Complexity: Harmonizing Disaster Risk Reduction and Climate Change Adaptation Strategies

Delving into the intricate field between disaster risk governance and climate change adaptation reveals a tapestry of complexities. This intricate interplay is woven with threads of divergent policies, disparate actors, conflicting ideologies, financial constraints, the scarcity of shared knowledge, and a scarcity of effective resource management, all serving as obstacles on the path to aligning these twin imperatives [Forino et al., 2014; Forino et al., 2015a; Nemakonde & Van Niekerk, 2017; Fleming et al., 2020; Islam et al., 2020; Rahayu et al., 2020; Hallwright & Handmer, 2021a]. In the world of development plans, a common narrative unfolds, where disaster response and recovery steal the limelight, overshadowing risk reduction and adaptation efforts (Tierney, 2012a). This fragmented approach is widespread, casting policy and disaster risk governance into silos, perpetuating the cycle of insufficient preparedness (Forino et al., 2015a; Forino et al., 2017; UNDP, 2017).

Insufficient funding at the local government level, myopic short-term strategies, and a penchant for reactive responses rather than proactive risk reduction pose formidable challenges (Gall et al., 2014). Bureaucratic entanglements and resource shortages further complicate the landscape, obstructing the execution of disaster risk reduction (DRR) and climate change adaptation (CCA) (Islam et al., 2020). In striving to cultivate resilient communities amidst the looming threats of climate-induced risks, this study advocates for the formulation of evidence-based policies. It endeavors to provide a thorough examination of disaster risk governance practices in Malaysia, shedding light on the intricate interplay between Disaster Risk Reduction (DRR) and Climate Change Adaptation (CCA). By delving into this complex relationship, the study aims to elucidate how strategic integration of DRR and CCA initiatives has the capacity to bolster local communities, empowering them to withstand and thrive amidst the tumultuous challenges posed by climate change.

4. RESULTS AND DISCUSSION

4.1 Addressing the Gaps

The literature reviewed for this study highlights a conspicuous absence of research within Malaysia focusing on how governmental entities, along with other parties, can respond to the evolving risks posed by global climate change and proactively mitigate the forthcoming impacts of natural disasters.
The imperative for Malaysia to modernize and integrate its policies for sustainable development, disaster risk reduction, and climate change adaptation has become increasingly urgent. Although the country faces a relatively lower risk of climate-related disasters compared to its neighbors, there is a pressing need to enhance the effectiveness of its current top-down disaster risk reduction policy and ensure local integration. This entails adopting a proactive approach that not only addresses immediate challenges but also fosters resilience and sustainability in the face of evolving climate dynamics (Shariff & Hamidi, 2019; UNDRR, 2020).

The disaster risk reduction policy of the National Security Council, last revised in 2012, lags behind contemporary needs and emerging threats. Similarly, the National Policy on Climate Change, initially published in 2009, persists in an unchanged and outdated state, failing to adequately address the evolving challenges posed by climate variability and change. It is evident that these outdated policies require a comprehensive revamp to ensure alignment with current scientific knowledge, technological advancements, and societal needs. Moreover, a more efficient and proactive approach to policy implementation is imperative to enhance resilience and effectively mitigate the impact of disasters in Malaysia. (MKN, 2012; NRE, 2009; UNDRR, 2020; UNICEF, 2021; UNDRR, 2023).

Evidence suggests that Malaysia’s climate change and urban development policies are ineffective, hindering disaster risk efforts. Insufficient preparedness, stakeholder commitment and investment, and regulatory noncompliance cause much severe problems. The bureaucratic and compartmentalized Malaysian government limits information sharing across agencies (Rani et al., 2017).

The Climate Change Act and Disaster Risk Reduction Act are notably absent from the scene. Despite continuous efforts to formulate and enact these vital legislations, they remain in the drafting stage and have yet to be officially gazette (CFE-DM, 2019; UNDRR, 2020; Abdul Majid, 2021; NADMA & JICA, 2021; CFE-DM, 2022). What’s missing in these proposals is a clear and comprehensive policy framework, as well as specific guidelines regarding budget allocation and defined objectives (Varkkey, 2019).

Malaysia’s emergency management approach, while prioritizing natural and certain technological hazard preparedness and response, falls short in incorporating essential early warning and recovery elements (IFRC, 2015; IFRC, 2022). Climate change management in Malaysia faces numerous challenges due to inadequate enforcement, legislation, and monitoring of ecosystem-damaging development and economic activities. The absence of a versatile climate change competency framework exacerbates the situation, with insufficient efforts to enforce and establish necessary climate change laws. Additionally, the lack of harmonized environmental protection regulations across Peninsular Malaysia, Sabah, and Sarawak further complicates climate change legislation (UNICEF, 2021; CAN & CGM, 2022; Yaacob et al., 2022).

In Malaysia, disparities among government levels hinder the effective implementation of disaster and climate change mechanisms (Kharirimzal et al., 2016; Zen et al., 2019). Historically, top-down disaster management limits community involvement and preparedness, exacerbated by poor inter-agency collaboration and a lack of climate policy integration (Shariff & Hamidi, 2019; Palermo & Hernandez, 2020; Sandaran & Selvaraj, 2021; CAN & CGM, 2022).

Multi-stakeholder collaboration and cross-sectoral participation challenges call for adaptable, innovative, and transboundary regulation (Mustafa et al., 2018). The current disaster management policy is government-centric, lacks public participation and fails to address climate change (Sobian, 2016; Salleh et al., 2020). A lack of disclosure policies hinders public and private sector involvement, emphasizing the need for environmentally sound policies (Mustafa et al., 2018; Omar & Amran, 2018; UNICEF, 2021; Apurva Sanghi, 2022; Yaacob et al., 2022).

Communities affected by climate-related disasters are often portrayed as helpless victims due to the government’s conservative disaster management approach and the key policies lack clarity and goals for building disaster resilience (Salleh et al., 2020). Divergent priorities among urban planners hinder community participation and neglect adaptive disaster measures in local development (Shakirand & Utaberta, 2019; Norizan et al., 2021).

The challenges of climate change adaptation and disaster risk reduction present significant obstacles for Malaysia, echoing global concerns. This highlights the pressing need for more effective policy implementation to bolster disaster risk governance in the country. Despite government efforts to raise awareness, there remains a lack of comprehensive understanding among many Malaysians regarding the consequences of climate change on their communities. Malaysia’s susceptibility to climate change and natural disasters is exacerbated by inadequate planning and construction practices. Although the government has initiated measures to address these issues, resource disparities pose a current barrier, potentially hindering adaptation and mitigation efforts. Community engagement, crucial for effective adaptation and risk reduction, often fails short in Malaysia. Without widespread support and collaboration, the successful implementation of these initiatives will remain a challenge.
4.2 Results from First Phase Pilot Interviews
The findings from the first phase of interviews highlight several key aspects of Malaysia’s approach to climate change and disaster risk management. Firstly, the Malaysian government is actively promoting the integration of climate change adaptation strategies across various sectors, emphasizing the need for collaboration among different groups, including public and private organizations, nonprofits, and citizens. The creation of the Malaysia Action Climate Council (MyCAC) represents a major advancement in improving climate change governance and adhering to global agreements like the Sendai Framework for Disaster Risk Reduction and the Sustainable Development Goals (SDGs).

Secondly, the interviews revealed the ongoing efforts to develop the National Adaptation Plan (MyNAP) to address a wide range of issues, including public health, infrastructure, safety, water resources, agriculture, forestry, and biodiversity. Integrating climate considerations into water and infrastructure projects is viewed as a proactive step to mitigate the danger of floods and other climate-related risks.

Additionally, the review and potential revision of the National Climate Change Policy and the forthcoming Climate Change Act in Malaysia reflect the country’s commitment to addressing climate change comprehensively. This includes considerations of disaster risk reduction concerns and alignment with global goals, such as achieving net-zero emissions by 2050.

One interviewee stresses the significance of a multi-stakeholder platform with respectful involvement among all relevant stakeholders. It is crucial to combine economic, climate, and energy priorities to safeguard the well-being of Malaysian citizens, emphasizing the importance of adapting to climate change within the framework of disaster risk reduction. These findings collectively provide insights into Malaysia’s climate change and disaster risk management efforts and the challenges it faces in achieving its climate goals.

4.3 Results from Second Phase Pilot Interviews
Addressing the complexities of global warming and climate change governance involves finding a balance among stakeholders’ interests, managing phased and balanced change implementation, overcoming financial constraints, and dealing with hierarchical systems and treasury direction during disasters. Bridging the trust gap among agencies due to lower officer grades is another challenge.

At the organizational level, challenges include the lack of coordination and understanding, divergent interests among stakeholders, and limited awareness of climate change impacts. Cross-agency collaboration and data sharing are insufficient, and concerns persist regarding institutional capacity, resource allocation, and reputation enhancement. Priorities should focus on resource management training, improving departmental allocation capacity, and comprehensive integration of actions.

It is recommended to adopt a “holistic approach” to improve stakeholder participation and tackle global warming and climate change challenges. This approach considers geographical, geopolitical, and value considerations. It involves commitment from involved agencies, provision of short- and long-term mitigation plans, empathy for disaster victims, and upgrading staffing grades at the State and District levels.

Key strategies to improve governance and collaboration include enhanced coordination, clear communication, and knowledge and education. Collaboration involves sharing information through regular meetings and forums, while effective communication emphasizes understanding differing interests, particularly in natural features like mangrove swamps. Raising awareness and educating communities about climate change and disaster risks is essential.

Implementing these strategies can enhance policy effectiveness, promote public sector integrity, and ensure efficient collaboration across government levels. Information utilization is crucial for disaster research and management, emphasizing the need for understanding the scientific basis of climate-induced disasters. This approach includes advocating for climate change mitigation and adaptation plans and engaging with public organizations to shape policy frameworks.

The agency emphasizes three key goals: developing disaster-resistant infrastructure, increasing public awareness, and harnessing advanced technology. They highlight the importance of creating structures that can withstand disasters, elevating public understanding of climate change impacts, and using technology for early warning systems. They stress improved intergovernmental coordination for effective climate change risk management.

In the long term, effective data management is essential for temporal comparisons demonstrating significant changes over time. Political structure changes have disrupted sustainable disaster management practices, affecting adaptation efforts and communities. Budget allocation and timeframe challenges underscore the need for accuracy in disaster risk reduction and mitigation planning. The education sector plays a key role in promoting climate change awareness and preventive measures.

Amid demographic, financial, and environmental
challenges, governments are reevaluating their roles to address future issues and enhance public governance systems. The quality and effectiveness of public governance are vital for addressing these challenges and supporting economic growth. Effective global governance systems are increasingly important to navigate complex and interconnected challenges in today’s interconnected world. Climate change and financial crises highlight the need for agile government responses to dynamic environments. The analysis of the results from the initial and subsequent phases of the pilot interview is presented in Table 2.

4.4 Discussions: Converging DRR and CCA in Malaysia
The term “disaster risk governance,” coined by the United Nations Office for Disaster Risk Reduction (UNDRR), involves frameworks for effectively steering disaster risk reduction and related policies. It necessitates good governance marked by openness, inclusion, collaboration, and efficiency to mitigate existing and emerging risks (UNDRR, 2016). Additionally, comprehensive policies accounting for climate change’s impact on disasters are integral to this governance (Tierney, 2012b). Urban governance plays a critical role in building resilient communities, with adaptive and anticipatory governance strategies being vital when integrating disaster risk reduction (DRR) and climate change adaptation (CCA) (UNDP, 2017). Addressing real-world challenges like DRR and CCA integration requires alternative perspectives, research, consensus, and multidisciplinary collaboration (Begum et al., 2014a; Ni’mah et al., 2021; Valente et al., 2022).

Coordination and synergies are essential at national and international policy levels for DRR and CCA. Sustainability in implementing DRR with CCA is the research focus. This involves organizational capacity building, efficient funding, education, stakeholder networks, and more (Pereira et al., 2010; Shaw et al., 2010; Forino et al., 2015b; Serrao-Neumann et al., 2015; Ni’mah et al., 2021). Efforts to incorporate DRR and CCA aim for sustainability at various administrative levels. A transdisciplinary approach involving government, nonprofits, and businesses can create equitable adaptation strategies, especially with a focus on marginalized groups (Begum et al., 2014b; Forino et al., 2015b; Serrao-Neumann et al., 2015; Islam et al., 2020; Hallwright & Handmer, 2021b).

Effective governance encompasses multiple perspectives, public participation, and the incorporation of social and economic analysis into hazard and vulnerability assessments. Bridging the gap between scientists and policymakers is crucial for maximizing the value of scientific research in DRR (Choi & Pak, 2006; Serrao-Neumann et al., 2014; Matsuura & Razak, 2019). Key components of scientific integration in the DRR and CCA research field include setting research priorities, linking various knowledge areas, and addressing obstacles. Initiatives like research innovation centres, ecosystem-focused vulnerability assessments, and risk assessment integration promote CCA’s integration into DRR (Matsuura & Razak, 2019; Nohrstedt et al., 2022). Incorporating climate change into disaster risk reduction is essential for improving disaster risk governance, albeit challenging. Collaboration, networking, resource allocation, and robust institutional structures are crucial for achieving this integration. To address real-world or intricate issues like integrating DRR and CCA, it is essential to offer different viewpoints, conduct thorough research, agree on definitions and guidelines, and deliver comprehensive services through a collaborative multidisciplinary governance approach. Malaysia should further examine these approaches to enhance the governance of disaster risk reduction and climate change adaptation operations. Table 3 displays areas for enhancement in integrating Disaster Risk Reduction (DRR) and Climate Change Adaptation (CCA) within Malaysia’s governance framework.

### Table 2: Result Analysis

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<th>Aspect</th>
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<th>Findings from Second Phase</th>
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<tbody>
<tr>
<td>Government Actions</td>
<td>Actively promoting the integration of climate change adaptation strategies</td>
<td>Addressing complexities of global warming and climate change governance</td>
</tr>
<tr>
<td>Key Initiatives</td>
<td>Establishment of Malaysia Action Climate Council (MyCAC), development of National Adaptation Plan (MyNAP)</td>
<td>Emphasis on holistic approach, multi-stakeholder engagement, and key strategies for governance improvement</td>
</tr>
<tr>
<td>Challenges</td>
<td>Lack of coordination, divergent interests, limited awareness</td>
<td>Challenges include financial constraints, hierarchical systems, insufficient collaboration</td>
</tr>
<tr>
<td>Strategies</td>
<td>Incorporation of climate considerations, revision of policies and forthcoming Climate Change Act</td>
<td>Recommendations for enhanced coordination, communication, and education</td>
</tr>
<tr>
<td>Long-term Considerations</td>
<td>Commitment to global goals, multi-stakeholder engagement</td>
<td>Focus on effective data management, sustainable disaster practices, and the role of education sector</td>
</tr>
<tr>
<td>Government Response</td>
<td>Reevaluation of roles amid challenges</td>
<td>Emphasis on effective governance systems and agile responses</td>
</tr>
</tbody>
</table>
Table 3: Areas for enhancement in integrating Disaster Risk Reduction (DRR) and Climate Change Adaptation (CCA) within Malaysia's governance framework.

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Challenges</th>
<th>Organizational Level</th>
<th>Strategies</th>
<th>Key Goals</th>
<th>Long-term Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Governance</td>
<td>- Balancing stakeholders' interests - Managing phased change - Overcoming financial constraints - Dealing with hierarchical systems - Bridging trust gap among agencies</td>
<td>- Lack of coordination and understanding - Divergent stakeholder interests - Limited awareness of impacts - Insufficient cross-agency collaboration and data sharing</td>
<td>- Adapting a holistic approach - Commitment from agencies - Provision of mitigation plans - Upgrading staffing grades</td>
<td>- Developing disaster-resistant infrastructure - Increasing public awareness - Harnessing advanced technology</td>
<td>- Effective data management for temporal comparisons - Disruptions due to political structure changes - Budget allocation and time frame challenges - Role of education sector</td>
</tr>
<tr>
<td>Collaboration</td>
<td>- Bridging trust gap among agencies due to lower officer grades - Insufficient cross-agency collaboration and data sharing</td>
<td>- Enhanced coordination - Clear communication - Knowledge and education</td>
<td>- Improving intergovernmental coordination</td>
<td>- Addressing future issues and enhancing governance systems</td>
<td>- Importance of information utilization for disaster research and management - Advocating for climate change plans - Engaging with public organizations</td>
</tr>
<tr>
<td>Governance Effectiveness</td>
<td>- Importance of public governance quality and effectiveness - Need for agile government responses - Priorities on resource management training and integration of actions</td>
<td>- Promotion of public sector integrity - Efficient collaboration across government levels</td>
<td>- Addressing future issues and enhancing governance systems</td>
<td>- Importance of effective global governance systems for navigating complex challenges</td>
<td>- Importance of effective global governance systems for navigating complex challenges</td>
</tr>
</tbody>
</table>

5. CONCLUSION

In a world where climate change looms as a global threat, the impacts of climate-induced disasters are being felt across countries, bearing social, economic, and vulnerability consequences. Amidst this growing concern, the importance of integrating climate change into disaster risk reduction strategies becomes evident. Year after year, studies on this subject multiply, underscoring its significance.

As discussions surrounding the inclusion of climate change in disaster risk reduction policies continue to gain momentum, Malaysia stands at a crucial juncture, poised to further embed climate change in its disaster risk governance system. With limited research on Malaysian governance policy, the time is ripe to scrutinize current strategies and pinpoint the key actors responsible for shaping its course.

This research has the potential to address information gaps and improve disaster risk governance in Malaysia. Examining the interconnected areas of disaster risk reduction and climate change adaptation provides insight into upcoming patterns. Future investigations could explore the laws and regulations concerning disaster risk reduction and climate change adaptation in Malaysia, providing insight into the status of disaster risk governance theory and practice. Examining existing stakeholders and network dynamics in both sectors from a larger perspective would be an interesting area to study. Further investigations could explore the challenges in aligning international frameworks with Malaysian realities, uncovering the intricacies of implementing global agendas. This study has only collected surface-level data since it was merely gathered through a pilot interview. Further investigation into the interplay between government and private sectors, as well as regulatory bodies, academic institutions, and local communities, is necessary to fill knowledge gaps. This research is a stepstone in finding the gaps in the network and targeting to establish a governance framework that might solve the current issues of integrating DRR and CCA in Malaysia. To seamlessly infuse both disaster risk reduction and climate change adaptation into Malaysian policy, it is imperative to dissect the commonalities and disparities between these domains. Such efforts pave the way for envisioning a policy that bolsters disaster risk governance in Malaysia. In the not-so-distant future, there’s hope that we will stride closer to realizing the aspirations laid out in the Paris Agreement, the Sustainable Development Goals, and the Sendai Framework for Disaster Risk Reduction 2015-2030.

REFERENCES


Nohrstedt, D., Parker, C. F., von Uexkull, N., Mård, J., Albrecht, F., Petrova, K., Nyberg, L., Göteman, M.,


Sinard Daily. (2023, December 14). NRECC restructuring
won’t alter government’s environmental commitment - Nik Nazmi. Sinar. https://www.sinar daily.my/amp/Article/213817


UNFCCC. (2021). Malaysia Update on National Determined Contribution. https://www4.unfccc.int/sites/submissions/INDC/Published%20Documents/Malaysia/1/INDC%20Malaysia%20Final%202021%20Revised%20Final%20UNFCCC.pdf


Wen, J., Wan, C., Ye, Q., Yan, J., & Li, W. (2023). Disaster Risk Reduction, Climate Change Adaptation and


