

Socio-Ecological Resilience and the Role of Organizations in Addressing the Complexity of Climate Change in Malaysia

Eka Prastuty¹

¹Faculty of Forestry and Environment, Universiti Putra Malaysia

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Corresponding Author:

Eka Prastuty

Email:

ekaprastuty@yahoo.com

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ABSTRACT

Purpose: This study examines how governmental, non-governmental, and community-based organizations in Malaysia contribute to socio-ecological resilience amid climate change. It focuses on identifying organizational strategies, collaborative practices, and key challenges influencing adaptation effectiveness.

Subjects and Methods: A qualitative exploratory approach was employed involving 20 participants from governmental agencies, NGOs, and community-based organizations selected through purposive sampling. Data were collected through semi-structured interviews, observations, and document analysis, then analyzed using thematic analysis through open, axial, and selective coding.

Results: The findings identified four major themes: organizational awareness and commitment, collaborative approaches, socio-ecological strategies, and institutional challenges. Organizations increasingly integrated climate adaptation into policies and operational practices, while multi-stakeholder collaboration enhanced community participation and knowledge-sharing. Ecosystem-based adaptation and disaster preparedness programs contributed to long-term resilience, although funding limitations, governance fragmentation, and technical constraints remained significant barriers.

Conclusions: Socio-ecological resilience in Malaysia depends on institutional commitment, adaptive governance, collaborative engagement, and integrated environmental strategies to address increasingly complex climate challenges.

INTRODUCTION

Climate change represents one of the most pressing global challenges of the twenty-first century, with profound impacts on ecological systems, human societies, and economic structures (Malhi et al., 2020; Prantl & Goh, 2022; Hinkel et al., 2018). Malaysia, as a Southeast Asian nation with extensive tropical forests, coastal regions, and diverse ecological zones, is particularly vulnerable to climate-induced hazards such as floods, droughts, and rising sea levels. These environmental changes not only threaten natural ecosystems but also disrupt social systems, including livelihoods, public health, and infrastructure, underscoring the necessity for resilience-oriented approaches (Lv & Sarker, 2024).

Socio-ecological resilience, which emphasizes the capacity of human and ecological systems to absorb disturbances while maintaining functionality, has emerged as a critical framework for understanding adaptive capacity in the face of complex climate threats (May, 2022). Organizations, including government agencies, non-governmental organizations (NGOs), community-based organizations (CBOs), and private sector actors, play a central role in

promoting socio-ecological resilience (Sharifi, 2023). These organizations serve as catalysts for change by implementing adaptation strategies, mobilizing resources, and facilitating community engagement (Muhammad et al., 2023).

In Malaysia, governmental initiatives such as the National Policy on Climate Change and regional disaster management frameworks have sought to integrate resilience-building into national planning, emphasizing proactive rather than reactive measures (Madnor et al., 2024; Zreik, 2024). Simultaneously, NGOs and CBOs complement governmental efforts by delivering localized programs that address specific vulnerabilities and leverage traditional ecological knowledge. The role of organizations extends beyond implementing projects; they are pivotal in shaping adaptive governance structures that coordinate multi-stakeholder responses to climate impacts (Gannon et al., 2021).

Multi-level collaboration between national, regional, and local actors enhances the effectiveness of climate interventions by aligning objectives, sharing knowledge, and pooling resources (Fisher et al., 2022). For instance, community-driven initiatives that integrate local knowledge with scientific research have demonstrated enhanced adaptive capacity and improved ecological outcomes in flood-prone and coastal areas of Malaysia (Gioia, 2024). Such approaches underscore the importance of organizations not only as implementers of programs but also as facilitators of inclusive governance processes that empower communities to actively participate in resilience building (Sánchez-Soriano et al., 2024; Rosales et al., 2023; Kangana et al., 2024; Awoonor, 2025).

Despite these efforts, multiple challenges constrain organizational effectiveness in promoting socio ecological resilience. Fragmented governance, limited financial and technical resources, and institutional inertia often impede coordinated action (Kim et al., 2021). The complexity of climate change characterized by uncertainty, nonlinearity, and interconnected socio-ecological impacts requires flexible and adaptive strategies that many organizations struggle to operationalize. Addressing these challenges demands a comprehensive understanding of how organizations perceive climate risks, design adaptive strategies, and interact with communities and ecosystems to foster resilience.

In Malaysia, socio-ecological resilience is particularly relevant due to the country's high dependency on natural resources, vulnerability of coastal communities, and exposure to extreme weather events (Solorio, 2021; Vangana, 2025). Organizations operating in this context must balance ecological sustainability with social equity, ensuring that adaptation measures protect vulnerable populations while maintaining ecosystem services (Madnor et al., 2024). By examining the roles and strategies of organizations, it becomes possible to identify successful practices, gaps in implementation, and opportunities for enhancing integrated responses to climate change.

METHODOLOGY

This chapter presents a detailed description of the methodology used in this qualitative study. It explains the research design, participants, data collection methods, data analysis procedures, and strategies to ensure the credibility and trustworthiness of the findings. The methodology is designed to capture in-depth insights into how organizations contribute to socio-ecological resilience in Malaysia, and how they navigate the complexity of climate change.

Research Design

This study employed a qualitative research design, focusing on an exploratory and descriptive approach. The qualitative paradigm was chosen because it allows an in-depth understanding of complex phenomena, particularly the perceptions, experiences, and strategies of organizations in enhancing socio-ecological resilience. By prioritizing the lived experiences and interpretations of organizational stakeholders, this study sought to uncover the nuances of organizational roles, collaborative efforts, and adaptive strategies that are not easily measurable using quantitative methods. The design emphasized flexibility and responsiveness to the dynamics of the study context, enabling the researcher to capture rich, context-specific data.

Participants

The participants in this study were selected using purposive sampling, a technique commonly employed in qualitative research to identify individuals or groups who can provide in-depth information on the research topic. Participants included representatives from governmental agencies, non-governmental organizations (NGOs), community-based organizations (CBOs), and private sector entities involved in climate change adaptation and resilience-building in Malaysia. Selection criteria were based on participants' expertise, involvement in relevant projects, and their knowledge of socio-ecological systems. In total, 20 participants were engaged in the study, ensuring a diverse range of perspectives across organizational types and sectors.

Data Collection

Data collection was conducted through multiple qualitative methods to ensure comprehensive coverage and triangulation. Semi-structured interviews formed the primary data source, allowing participants to share their experiences, insights, and perceptions in a flexible yet guided manner. Interviews were conducted face-to-face or via virtual platforms, depending on participants' availability and logistical constraints, with each session lasting between 45 and 90 minutes. In addition to interviews, document analysis was employed to review organizational reports, policy documents, project plans, and relevant publications that provided supplementary evidence on resilience strategies and organizational roles. Observations of organizational activities, where feasible, were also conducted to capture contextual nuances and practical implementations of resilience initiatives. All interviews and observations were recorded, transcribed, and anonymized to maintain ethical standards and ensure participant confidentiality.

Data Analysis

Thematic analysis was employed to analyze the qualitative data, following a systematic process of coding, categorization, and theme development. The analysis began with familiarization, where the researcher repeatedly read transcripts and documents to immerse in the data. Open coding was then applied to identify meaningful units of information, followed by axial coding to link related codes and organize them into broader categories. Finally, selective coding was conducted to extract overarching themes that captured the roles of organizations, strategies implemented, and challenges encountered in promoting socio-ecological resilience. This iterative process allowed the researcher to refine themes continuously and ensure that interpretations accurately reflected participants' perspectives. NVivo software was used to manage and organize data efficiently, supporting the transparency and rigor of the analysis.

RESULTS AND DISCUSSION

Overview of Thematic Analysis

The qualitative data obtained from interviews, observations, and document analysis were analyzed using thematic analysis through three stages: open coding, axial coding, and selective coding. During the open coding stage, the researcher identified recurring statements related to organizational awareness, collaborative governance, ecosystem adaptation, and institutional challenges. These initial codes were then grouped into broader conceptual categories during axial coding. Finally, selective coding was conducted to integrate categories into overarching themes representing the organizational role in strengthening socio-ecological resilience in Malaysia. The analysis process generated four major themes: (1) Organizational Awareness and Commitment, (2) Collaborative Approaches and Multi-Stakeholder Engagement, (3) Socio-Ecological Strategies, and (4) Institutional and Operational Challenges. These themes emerged consistently across interviews, organizational documents, and field observations.

Table 1. Thematic Analysis Framework

Main Theme	Subtheme	Evidence
Organizational Awareness and Commitment	Climate policy integration	Interview GOV-1, NGO-2
	Internal organizational adaptation	Interview GOV-3

	Resource prioritization	Interview CBO-1
Collaborative Approaches and Multi-Stakeholder Engagement	Government-NGO partnerships	Interview NGO-2, GOV-4
	Community participation	Observation notes, CBO-2
	Knowledge sharing	Interview NGO-4
Socio-Ecological Strategies	Mangrove restoration	Observation data, NGO-1
	Community-based disaster preparedness	Interview CBO-3
	Sustainable agriculture practices	Interview NGO-5
Institutional and Operational Challenges	Funding limitations	Interview GOV-2
	Bureaucratic fragmentation	Interview NGO-3
	Technical and human resource constraints	Interview CBO-4

Source: Processed by the Researcher Based on Interview, Observation, and Document Analysis Data (2025)

The thematic analysis framework derived from qualitative data collected through interviews, observations, and document analysis. The framework illustrates how the coding process produced four major themes representing the organizational dimensions influencing socio-ecological resilience in Malaysia. Each theme was further divided into several subthemes that consistently emerged across participant narratives, organizational reports, and field observations.

The theme Organizational Awareness and Commitment reflects the increasing recognition among organizations that climate change requires institutional responses and long-term adaptation planning. The findings indicate that governmental agencies, NGOs, and community-based organizations have gradually incorporated climate-related considerations into internal policies, operational strategies, and resource allocation mechanisms. Subthemes such as climate policy integration, internal organizational adaptation, and resource prioritization demonstrate that organizational awareness is no longer limited to conceptual understanding but has begun influencing institutional practices and strategic decision-making.

The theme Collaborative Approaches and Multi-Stakeholder Engagement highlights the importance of partnerships and participatory governance in strengthening resilience initiatives. The analysis revealed that organizations depend heavily on collaboration between governmental institutions, NGOs, local communities, and academic actors to address the complexity of climate-related challenges. Subthemes including government-NGO partnerships, community participation, and knowledge sharing indicate that collaborative governance enhances program effectiveness by integrating technical expertise, local knowledge, and shared responsibilities within adaptation processes.

The theme Socio-Ecological Strategies represents the practical adaptation measures implemented to strengthen ecological sustainability and community resilience simultaneously. The findings show that organizations apply ecosystem-based adaptation strategies such as mangrove restoration, disaster preparedness programs, and sustainable agriculture initiatives to reduce environmental vulnerability while supporting local livelihoods. These subthemes demonstrate that socio-ecological resilience emerges through integrated approaches that combine ecological protection with social adaptive capacity.

The theme Institutional and Operational Challenges captures the structural barriers encountered by organizations during the implementation of climate adaptation programs. The data reveal that limited funding, fragmented governance systems, and insufficient technical expertise remain significant obstacles affecting organizational effectiveness. Participants also emphasized that adaptive learning, inter-organizational collaboration, and continuous capacity building are essential for overcoming institutional limitations and sustaining long-term resilience initiatives.

The thematic analysis framework demonstrates that socio-ecological resilience in Malaysia is influenced by the interaction between institutional commitment, collaborative governance, adaptive socio-ecological strategies, and the ability of organizations to respond to operational and structural challenges under increasingly complex climate conditions.

Coding Tree

The coding tree below illustrates the hierarchical structure of themes generated through the thematic analysis process. The framework was developed from interview transcripts, observation notes, and organizational documents using open coding, axial coding, and selective coding procedures. The coding structure demonstrates how recurring concepts identified during data analysis were systematically grouped into broader thematic categories representing organizational responses to climate change adaptation in Malaysia.

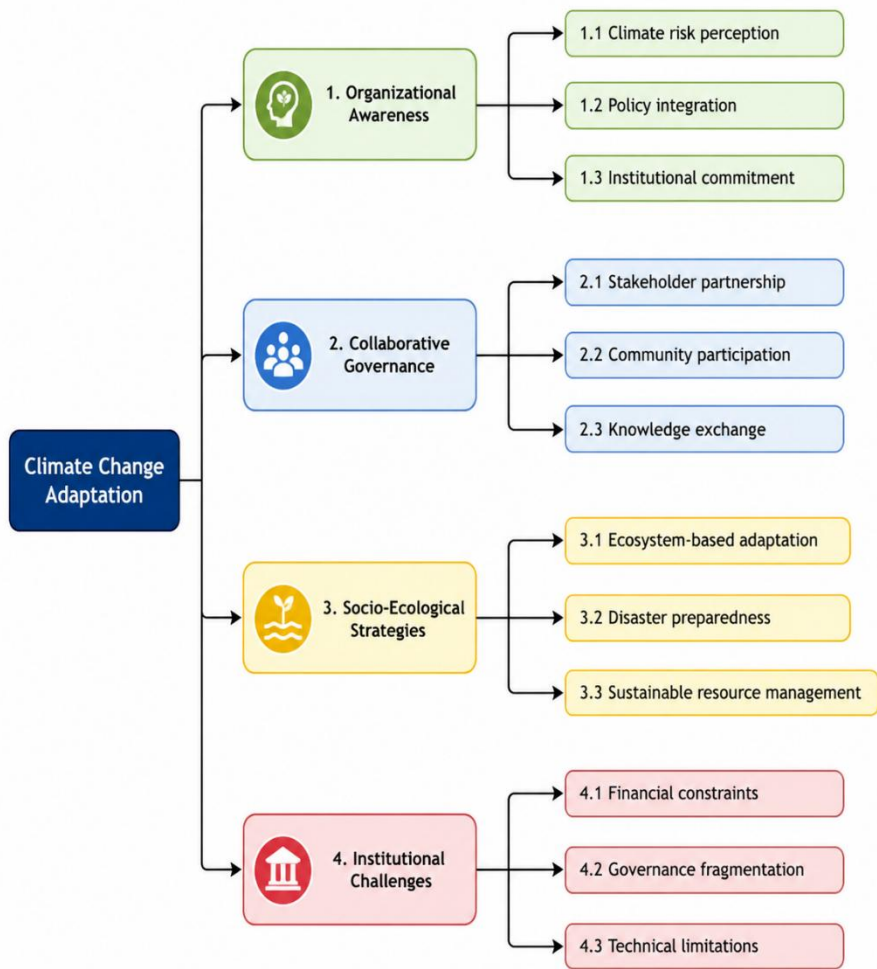


Figure 1. Coding Tree of Organizational Roles in Climate Change Adaptation and Socio-Ecological Resilience

The coding tree identifies four major thematic dimensions shaping socio-ecological resilience efforts: Organizational Awareness, Collaborative Governance, Socio-Ecological Strategies, and Institutional Challenges. Each theme contains several subthemes that emerged consistently across participant narratives and field observations. The structure highlights the interconnected nature of institutional awareness, stakeholder collaboration, adaptive ecological strategies, and operational constraints within climate adaptation processes. The coding framework also demonstrates that resilience-building is influenced not only by environmental interventions but also by governance capacity, organizational commitment, and community participation in addressing complex climate-related challenges.

Category Mapping

The category mapping process was conducted to organize the initial qualitative codes into broader analytical categories and overarching themes. During the open coding stage, the researcher identified recurring concepts, statements, and experiences appearing across interview transcripts, observation records, and organizational documents. These initial codes represented specific issues related to climate adaptation practices, institutional responses, collaborative mechanisms, and operational constraints experienced by organizations involved in resilience-building initiatives in Malaysia. Through axial coding, related codes were systematically grouped into conceptual categories based on similarities in meaning and contextual relevance. This process enabled the researcher to identify patterns and relationships among the data, facilitating the development of higher-level thematic interpretations. The category mapping framework presented below demonstrates how individual codes evolved into broader analytical constructs that explain the organizational dimensions of socio-ecological resilience.

Table 2. Category Mapping

Initial Codes	Categories	Main Theme
Flood preparedness, climate planning, risk awareness	Institutional climate awareness	Organizational Awareness and Commitment
NGO partnership, stakeholder meetings, local participation	Collaborative governance	Collaborative Approaches
Mangrove restoration, wetland protection, farmer training	Ecosystem adaptation strategies	Socio-Ecological Strategies
Funding shortage, overlapping authority, lack of expertise	Institutional barriers	Institutional and Operational Challenges

Source: Developed by the Researcher Through Open Coding and Axial Coding Processes (2025)

The category mapping illustrates the analytical transition from fragmented empirical findings into structured thematic interpretations. Codes associated with flood preparedness, climate planning, and risk awareness were grouped under institutional climate awareness because they reflected organizational recognition of climate-related threats and the integration of adaptation considerations into institutional practices. These categories contributed to the broader theme Organizational Awareness and Commitment, which emphasizes the role of institutional responsiveness in climate governance. Codes related to NGO partnerships, stakeholder meetings, and local participation were categorized as collaborative governance due to their focus on inter-organizational cooperation and participatory decision-making processes. These findings formed the basis of the Collaborative Approaches theme, highlighting the importance of multi-stakeholder engagement in strengthening adaptive capacity and resilience initiatives.

The category ecosystem adaptation strategies emerged from codes connected to mangrove restoration, wetland conservation, and sustainable agricultural training programs. These findings demonstrate that organizations increasingly adopt integrated socio-ecological approaches combining environmental protection with community resilience-building. Such categories were incorporated into the broader theme Socio-Ecological Strategies, reflecting practical adaptation mechanisms implemented across different organizational contexts. Codes associated with funding shortages, overlapping institutional authority, and limited technical expertise were grouped into institutional barriers because they represented recurring structural constraints affecting program implementation. These categories contributed to the Institutional and Operational Challenges theme, illustrating how governance fragmentation and resource limitations continue to influence organizational effectiveness in climate adaptation efforts.

Evidence Matrix

The evidence matrix was developed to strengthen the transparency and credibility of the qualitative analysis by linking participant responses with the thematic findings generated during the coding process. This matrix demonstrates how empirical evidence obtained from interviews contributed directly to the identification of categories and overarching themes. Each participant code represents a specific organizational actor involved in climate adaptation and socio-ecological

resilience initiatives in Malaysia, including governmental agencies, non-governmental organizations (NGOs), and community-based organizations (CBOs). The matrix also illustrates the diversity of organizational perspectives captured during data collection. By presenting the relationship between participant statements, organizational roles, key issues discussed, and thematic classifications, the analysis provides a clearer understanding of how the thematic framework was grounded in empirical field data rather than solely based on theoretical interpretation.

Table 3. Evidence Matrix

Participant Code	Organization Type	Key Issue Mentioned	Related Theme
GOV-1	Government Agency	Flood preparedness planning	Organizational Awareness
NGO-2	NGO	Community empowerment	Collaborative Approaches
CBO-1	Community Organization	Mangrove rehabilitation	Socio-Ecological Strategies
GOV-3	Government Agency	Budget constraints	Institutional Challenges
NGO-4	NGO	Knowledge-sharing networks	Collaborative Approaches
CBO-3	Community Organization	Disaster preparedness training	Socio-Ecological Strategies

Source: Compiled from Semi-Structured Interview Data and Field Observations Conducted by the Researcher (2025)

The evidence matrix demonstrates that each major theme identified in the analysis emerged consistently across different organizational contexts and participant experiences. Statements from governmental agencies primarily highlighted institutional planning, policy integration, and structural barriers associated with climate adaptation implementation. Issues such as flood preparedness planning and budget constraints reflected the administrative and operational dimensions of resilience governance within public institutions.

Responses from NGO participants emphasized collaborative governance, community empowerment, and inter-organizational knowledge exchange. These findings indicate that NGOs function not only as implementing actors but also as facilitators of participatory adaptation processes and communication networks among stakeholders. Community-based organizations contributed practical insights regarding local adaptation activities, including mangrove rehabilitation and disaster preparedness training, illustrating how grassroots actors play a significant role in strengthening socio-ecological resilience at the local level.

The matrix also confirms the consistency of the thematic analysis process, as similar issues emerged repeatedly across participants from different institutional backgrounds. This recurring pattern strengthened the reliability of the coding structure and supported the interpretation that organizational awareness, collaborative governance, socio-ecological strategies, and institutional challenges are interconnected dimensions influencing climate adaptation efforts in Malaysia.

Organizational Awareness and Commitment

The findings revealed that organizational awareness regarding climate change has significantly increased among governmental agencies, NGOs, and community-based organizations in Malaysia. Participants consistently emphasized that climate change is no longer perceived as a distant environmental issue, but rather as a direct threat affecting local livelihoods, infrastructure, and ecological systems. Organizations increasingly integrate climate-related considerations into policy development, project planning, and community programs. A government officer explained that repeated climate-related disasters had gradually transformed institutional priorities:

“A few years ago, climate issues were mostly discussed only in environmental departments, but now every agency is involved because floods and extreme weather are affecting almost everything. We realized that if we keep treating climate change as a separate issue, our planning will always be reactive instead of preventive.” (GOV-1)

Similarly, NGO participants described how organizational commitment evolved through direct engagement with vulnerable communities. One NGO coordinator stated:

“When we started working in coastal villages, people kept telling us that the sea conditions were changing and fishing was becoming harder every year. At first, some organizations only focused on short-term aid, but over time we understood that communities needed long-term adaptation support, not just emergency assistance after disasters.” (NGO-2)

The findings also indicated that organizational commitment was reflected through internal resource allocation and strategic planning. Several organizations continued implementing adaptation programs despite limited financial capacity. A community-based organization representative noted:

“Sometimes funding is uncertain, and honestly we do not always have enough equipment or staff. But the community keeps asking for support, especially after storms and floods. So even with limited resources, we still continue small rehabilitation projects because stopping completely would make the situation worse.” (CBO-1)

Field observations further showed that organizations demonstrating higher institutional commitment were more likely to establish long-term adaptation frameworks, monitoring systems, and continuous community engagement mechanisms. Organizational awareness therefore functioned not merely as knowledge acquisition, but as a catalyst for sustained adaptive action.

Collaborative Approaches and Multi-Stakeholder Engagement

The study found that collaboration among governmental institutions, NGOs, universities, and local communities played a central role in strengthening socio-ecological resilience. Participants repeatedly emphasized that climate adaptation could not be effectively implemented through isolated institutional action. Instead, resilience initiatives depended heavily on partnerships, resource-sharing, and participatory decision-making.

One government participant described the importance of collaboration in flood management initiatives:

“We used to implement projects independently, but many programs were not sustainable because communities were not really involved. Now we work together with NGOs, researchers, and village leaders from the beginning. The solutions become more practical because local people understand the real conditions better than anyone else.” (GOV-4)

NGO representatives also highlighted how collaborative governance improved project effectiveness and community trust:

“If organizations come into villages without listening first, communities usually become skeptical. But when local leaders, NGOs, and government officers sit together and discuss the problems openly, people become more willing to participate. Trust is very important in adaptation projects because communities need to feel that their voices matter.” (NGO-4)

Community participants similarly emphasized the value of participatory engagement:

“Before, most projects were decided outside the village and we were only told what to do. Now organizations involve us in discussions and planning sessions. We can explain which areas flood the most or which coastal areas are damaged badly. That makes the projects more useful for us.” (CBO-2)

The findings suggest that multi-stakeholder engagement not only strengthened project implementation but also enhanced knowledge exchange, collective learning, and local ownership of adaptation initiatives.

Socio-Ecological Strategies

Organizations implemented various socio-ecological strategies that integrated environmental protection with community resilience-building. Ecosystem-based adaptation emerged as one of the most prominent approaches identified during the study, particularly through mangrove rehabilitation, wetland restoration, and sustainable agricultural programs.

One NGO participant explained how ecological restoration directly benefited coastal communities:

“At first, some villagers thought mangrove planting was only about protecting nature, so participation was low. But after several years, they started seeing fewer coastal damages during storms and fish populations slowly improved. That was when people became more motivated to join the program seriously.” (NGO-1)

Community-based disaster preparedness was another important strategy identified in the findings. Several organizations conducted preparedness workshops, evacuation training, and local risk mapping activities. A community facilitator described the practical importance of these activities:

“Floods happen almost every year here, so training becomes very important. Before, many residents panicked because they did not know what to do during emergencies. Now at least people understand evacuation routes, emergency communication, and basic preparedness. The response is much more organized compared to before.” (CBO-3)

Organizations also emphasized sustainable resource management as part of long-term resilience-building. One NGO agricultural officer stated:

“We encourage farmers to reduce practices that damage soil and water systems. Some farmers were hesitant initially because they worried about crop yields, but after seeing better soil conditions and lower costs over time, more people started adopting sustainable methods.” (NGO-5)

These findings demonstrate that socio-ecological resilience strategies become more effective when ecological conservation is directly connected with community livelihoods and adaptive capacity.

Institutional and Operational Challenges

Despite ongoing resilience efforts, organizations continued facing significant institutional and operational barriers. The most commonly identified challenges included limited funding, fragmented governance structures, technical limitations, and inconsistent policy implementation.

A government participant described how bureaucratic fragmentation often delayed adaptation initiatives:

“Different agencies sometimes have overlapping responsibilities, and coordination can become very slow. One department may prioritize infrastructure, while another focuses on environmental protection. Without stronger coordination, projects take longer and communities become frustrated waiting for results.” (GOV-3)

NGO participants also highlighted financial constraints as a persistent issue:

“A lot of adaptation programs depend heavily on temporary project funding. When the funding cycle ends, maintaining activities becomes difficult even if the community still needs support. Sometimes organizations spend more time applying for grants than actually implementing programs.” (NGO-3)

Technical capacity limitations were particularly evident in smaller community organizations. One participant explained:

“Communities are willing to participate, but technical knowledge is still limited. For example, not everyone understands climate projections or ecosystem monitoring. We still need continuous training and guidance from universities and government experts.”
(CBO-4)

The interview findings collectively demonstrate that socio-ecological resilience in Malaysia is shaped through the interaction between institutional awareness, collaborative governance, adaptive environmental strategies, and organizational capacity to address structural challenges. Participants from governmental agencies, NGOs, and community-based organizations consistently emphasized that climate change has evolved into a multidimensional issue affecting environmental sustainability, community livelihoods, and institutional planning simultaneously. Increased organizational awareness encouraged institutions to integrate climate considerations into policies and operational frameworks, while collaborative approaches strengthened trust, participation, and knowledge-sharing among stakeholders. The interviews also revealed that ecosystem-based adaptation strategies, disaster preparedness programs, and sustainable resource management practices were perceived as effective mechanisms for reducing vulnerability and enhancing long-term community resilience. At the same time, recurring concerns regarding funding instability, fragmented governance systems, and limited technical expertise highlighted the institutional constraints affecting adaptation implementation. Despite these limitations, participants repeatedly stressed that continuous learning, participatory engagement, and inter-organizational cooperation remain essential for strengthening adaptive governance and sustaining socio-ecological resilience under increasingly complex climate conditions in Malaysia.

Discussion

Strengthening Socio-Ecological Resilience Through Organizational Commitment, Collaborative Governance, and Adaptive Climate Strategies in Malaysia

This study provides a nuanced understanding of how organizations in Malaysia are navigating the complexities of climate change through socio-ecological resilience strategies. By examining organizational awareness, commitment, collaborative approaches, and the implementation of ecosystem-based and community-driven initiatives, the research underscores the critical role of management practices in fostering adaptive capacities. The findings not only contribute to the academic discourse on climate adaptation but also offer practical insights for policymakers and organizational leaders aiming to enhance resilience in the face of escalating environmental challenges (Arzo & Hong, 2024; Mani & Goniewicz, 2023; Ferguson, 2019; Sethi et al., 2021; Adebayo, 2025; Abbasov, 2025).

The study reveals a significant shift in organizational awareness regarding climate change, with many institutions recognizing the interconnectedness of ecological systems and human communities. This awareness is pivotal, as it drives the integration of climate considerations into organizational policies and practices. Awareness alone is insufficient; it must be coupled with a strong commitment to action. The research highlights that organizations demonstrating a high level of commitment are more likely to allocate resources towards climate adaptation initiatives, engage in long-term planning, and foster a culture of resilience. This aligns with findings from previous studies, which emphasize the importance of organizational commitment in translating awareness into effective action (Wang, 2022; Lee & Kim, 2023; Xueyun et al., 2023).

The complexity of climate change necessitates collaborative efforts across various sectors and stakeholders (Elia et al., 2020; Van et al., 2018; Bulmer, E., & Yáñez-Araque, 2023; Doh et al., 2019). The study underscores the effectiveness of multi-stakeholder engagement in developing comprehensive adaptation strategies. By involving government agencies, NGOs, community organizations, and the private sector, organizations can leverage diverse expertise and resources, leading to more robust and contextually appropriate solutions. This collaborative approach is consistent with the literature, which highlights the benefits of inclusive decision-making processes in enhancing adaptive capacity. The research indicates that such engagement fosters a

sense of shared responsibility and ownership, which is crucial for the sustainability of resilience initiatives (Uzorka et al., 2024; Khatter et al., 2024; Baker et al., 2021).

The implementation of strategies is a central theme in the study, illustrating how organizations utilize natural systems to mitigate climate impacts. Initiatives such as mangrove restoration, reforestation, and wetland conservation not only enhance biodiversity but also provide essential services like flood protection and carbon sequestration (Jakovac et al., 2020; Ola & Benjamin, 2019; Hagger et al., 2022; Arifanti et al., 2022; Lovelock et al., 2025; Adame et al., 2024). The study's findings corroborate previous research that advocates for as a cost-effective and sustainable approach to climate adaptation. The research also identifies challenges in scaling up initiatives, including limited technical capacity, insufficient funding, and policy barriers. Akpuokwe et al. (2024) said that, addressing these challenges requires concerted efforts to build institutional capacity, secure financing, and create enabling policy environments.

The study highlights the importance of community involvement in disaster risk reduction, emphasizing that local knowledge and participation are vital for effective climate adaptation (Vasileiou et al., 2022; Panda et al., 2023). By empowering communities to take an active role in identifying risks, planning interventions, and implementing solutions, organizations can enhance the relevance and effectiveness of their strategies. This approach aligns with the principles of CBDRR, which advocates for community-led initiatives in disaster management. The research also points to the need for capacity-building programs that equip communities with the skills and knowledge necessary to manage climate-related risks independently (Hermans et al., 2022).

The findings of this study have several implications for management practice in the context of climate change adaptation. First, organizations must move beyond awareness and develop a deep commitment to integrating climate considerations into their core operations and strategies. This involves setting clear objectives, allocating resources, and establishing accountability mechanisms to ensure the effective implementation of adaptation initiatives. Second, fostering a collaborative culture within and between organizations can enhance the development and execution of resilience strategies. This includes promoting open communication, trust-building, and joint problem-solving among stakeholders (Tamara et al., 2021; Agbodzakey, 2024; Ishola et al., 2024). Third, organizations should prioritize the adoption of EbA and CBDRR approaches, recognizing their dual benefits for ecological conservation and community well-being. This requires investment in capacity building, research, and policy advocacy to overcome existing barriers and facilitate the scaling up of these approaches. Finally, organizations must adopt an adaptive management framework that allows for continuous learning and adjustment of strategies in response to changing climate conditions and emerging challenges.

CONCLUSION

This study illuminates the critical role of organizations in fostering socio-ecological resilience amidst the complex challenges of climate change in Malaysia, demonstrating that effective adaptation requires more than awareness it demands strategic commitment, collaborative engagement, and the integration of ecosystem-based and community-driven approaches. The findings underscore that organizations capable of aligning internal policies, resource allocation, and stakeholder partnerships not only enhance ecological sustainability but also empower communities to actively participate in resilience-building, thereby creating adaptive systems that are both socially inclusive and environmentally robust. The study highlights the necessity of adaptive management and continuous learning as central components of organizational practice, ensuring that strategies remain responsive to evolving climatic and social conditions. By bridging management practices with resilience imperatives, this research provides actionable insights for policymakers, organizational leaders, and practitioners, emphasizing that the deliberate integration of socio-ecological considerations into organizational strategy is indispensable for achieving sustainable development and long-term climate resilience in Malaysia.

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