Horizon J. Hum. & Soc. Sci. Res. 7 (S): 106 – 116 (2025)

Journal of Humanities and Social Sciences Research
www.horizon-JHSSR.com

RESEARCH ARTICLE
*Peer-reviewed* | Open Access

# Strengthening Resilience in Schools and Communities: The Strategic Role of Universities in Climate Crisis Management

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## ARTICLE INFO

*Article history*
**RECEIVED:** 10-Mar-25
REVISED: 07-Jun-25
ACCEPTED: 16-Jun-25
**PUBLISHED:** 15-Jul-25

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**Citation:** Reni Juwitasari (2025). Strengthening Resilience in Schools and Communities: The Strategic Role of Universities in Climate Crisis Management. Horizon J. Hum. Soc. Sci. Res. 7 (S), 106–116. https://doi.org/10.37534/bp.jhssr.2025.v7.nS.id1299.p106-116

## ABSTRACT

**Introduction:** In the context of escalating climate-related disasters, building resilience in schools and surrounding communities has become a critical priority. This study explores the strategic role of universities in advancing climate crisis management, aligning with Sustainable Development Goal 13 (Climate Action), by facilitating knowledge dissemination, capacity-building, and multisectoral collaboration. **Methods:** Through a collaborative initiative led by the School of Social Innovation (DRES-ARCID), in partnership with experts from Kumamoto University and Hiroshima University, a community-based disaster resilience framework was implemented at Santikhiri Witthayakom School, located in the highland forest area of Doi Mae Salong, Chiang Rai Province. The initiative employed a mixed-method approach, beginning with a situational analysis of school capacities in three domains: institutional systems, physical infrastructure, and external stakeholder relations. Based on this assessment, targeted training sessions were delivered to 25 school administrators and teachers. **Results:** Findings revealed significant gaps in disaster preparedness, particularly in the absence of a robust early warning system and limited emergency response planning. The training enhanced the school's capabilities in emergency communication, logistical coordination, first aid, and its function as a community shelter. The participatory design and implementation process also fostered stronger community engagement, positioning the school as a focal point in local disaster resilience. **Conclusions:** The study underscores the pivotal role universities can play in bridging academic expertise with local needs by designing and delivering integrated climate crisis response programs. It recommends the institutionalization of university-led initiatives such as Community Emergency Response Teams (CERT) training and certification, to strengthen school-community partnerships and enhance resilience at the grassroots level.

**Keywords:** Climate Change, Community Service, SDGs, Role of Higher Education, Capacity-building, *Tsunagaru*

## 1. INTRODUCTION

The escalating impacts of climate change are a pressing global issue, with vulnerable communities in Southeast Asia, particularly rural and highland areas, facing disproportionate risks. The Intergovernmental Panel on Climate Change (IPCC) reports a rising frequency and severity of hydrological disasters, such as floods and droughts, due to increasing global temperatures and shifting weather patterns (IPCC, 2013). These disasters not only threaten livelihoods but also exert immense

pressure on social infrastructures, especially schools, which are pivotal for community safety and education. Schools in disaster-prone regions are expected to safeguard children and serve as shelters for the broader community (Fernandez et al., 2022). However, without adequate preparedness, these schools and their communities remain highly vulnerable (UNDP, 2020). Universities, as knowledge hubs, must actively bolster community resilience through education, training, and applied research (Virji et al., 2012).

This study addresses the critical need to improve disaster risk reduction (DRR) within educational institutions in regions vulnerable to climate-induced disasters. While universities have traditionally advanced climate science and sustainability, there is a growing need for direct engagement with local communities through capacity-building initiatives (Storms et al., 2024; Sims et al., 2020). Recent studies highlight universities' unique position to support disaster resilience by developing localized solutions that empower communities to respond to and recover from disasters (Virji et al., 2012). This shift aligns with Sustainable Development Goal (SDG) 13, which calls for urgent climate action (UN, 2015). By collaborating with local schools, universities can foster sustainable and scalable preparedness (World Bank, 2019). Educational institutions play a key role in fostering community resilience, particularly in disaster-prone areas (Virji et al., 2012; Sims et al., 2020). Schools are well-positioned to disseminate critical disaster preparedness information and serve as community hubs for resilience initiatives (UNESCO, 2015). Integrating DRR into school curricula educates students on climate risks and equips them with practical emergency response skills (UNICEF, 2016). This aligns with global calls to incorporate DRR into national education strategies, as outlined in the Sendai Framework for Disaster Risk Reduction (UNISDR, 2015). By fostering a culture of resilience in schools, communities can better prepare for and recover from climate-related disasters.

The study focuses on *Santikhiri Witthayakom* School in Doi Mae Salong, Chiang Rai, Thailand, a region particularly vulnerable to flash floods, landslides, and droughts. The school not only educates students but also serves as a potential community shelter during emergencies. However, like many rural schools, it lacks the infrastructure, training, and resources to manage disaster risks effectively. Previous research underscores the importance of school-based DRR initiatives for enhancing student safety and community resilience (UNESCO, 2014). In response, this study, in collaboration with Kumamoto and Hiroshima Universities, developed a comprehensive school safety framework tailored to *Santikhiri Witthayakom* School (Storms et al., 2024; Fernandez et al., 2022). This study aims to create a comprehensive framework for school safety and disaster preparedness at *Santikhiri Witthayakom* School, serving as a model for similar institutions in high-risk areas. It assesses the school's institutional capacities, physical conditions, and external relations with the local community and government authorities (Sims et al., 2020). Training sessions conducted with university experts emphasize participatory approaches involving the community in disaster preparedness (UNDP, 2020). The training also includes CERT certification to enhance the school's role as a community leader in disaster resilience, ensuring that both students and residents are prepared for natural disasters (UNESCO, 2015). This study contributes to the discourse on disaster resilience and higher education's role in climate crisis management. By focusing on the intersection of education, community service, and climate action, it shows how universities can act as catalysts for building resilience in vulnerable communities. The case study of *Santikhiri Witthayakom* School provides insights into transforming educational institutions into hubs of disaster preparedness, contributing to local and global efforts to mitigate climate change impacts (Virji et al., 2012; Sims et al., 2020). Through participatory approaches, capacity building, and university-community collaboration, this study offers a scalable model for integrating DRR into schools, fostering resilience in high-risk regions.

## 1.1. Literature Review

### *1.1.1 Tsunagaru: University Presence through Capacity Building for Resilience*

Resilience, as defined by the UNDRR, is "the ability of a system, community, or society exposed to hazards to resist, absorb, accommodate, adapt to, transform, and recover from the effects of a hazard" (UNDRR, 2015). However, recent debates emphasize resilience as an ongoing, transformative process where systems evolve to face both current and future risks rather than merely returning to a pre-disaster state (Cutter, 2016; Manyena, 2006). In educational settings, resilience involves building adaptive capabilities that strengthen preparedness and response to future hazards, particularly in high-risk areas prone to disasters like floods, landslides, and droughts (Pelling & Dill, 2010; UNESCO, 2014).

In high-risk, rural areas, resilience requires more than physical reconstruction. It must include community preparedness, resource access, emergency plan implementation, and collective recovery efforts (Twigg, 2015). Educational resilience involves both infrastructural improvements and institutional capacity-building, with schools often serving as community centers for disaster

preparedness and recovery (Sims et al., 2020). Debates continue about balancing physical and social resilience in educational settings. Gaillard (2019) argues that disaster management frameworks focus too heavily on infrastructure, overlooking local knowledge and the role of students and teachers. In contrast, Paton and Johnston (2017) advocate for a community-based resilience approach, where schools serve as focal points for community-wide disaster risk reduction (DRR) efforts through collaborative planning and capacity-building initiatives.

Capacity building, a key pillar of resilience, involves developing the skills, knowledge, and resources necessary to manage disaster risks effectively (Virji et al., 2012). In schools, it includes emergency preparedness training, crisis communication, and recovery planning, equipping staff and students to act during emergencies and contributing to long-term community resilience (Gaillard, 2019). Universities (multisectoral collaboration or *Tsunagaru)* play a critical role in facilitating capacity-building efforts in disaster risk management by providing technical expertise, research-based solutions, and institutional support, particularly in under-resourced regions (Sims et al., 2020). However, university-led initiatives often face criticism for being short-term and project-based, which limits their long-term impact (Twigg, 2015). These programs, constrained by funding cycles, may prioritize immediate outcomes over sustainable resilience, leading to a decline in effectiveness once external support ends (Pelling & Dill, 2010).

### *1.1.2 Disaster Risk Reduction (DRR) in Schools and School Safety Indicators*

Disaster education has been promoted internationally since the Hyogo Framework for Action (HFA) 2005–2015 established Priority for Action 3, which emphasizes the use of knowledge, innovation, and education to build a culture of safety and resilience at all levels (UNISDR, 2005). It highlights the role of "Knowledge and Education," with both formal and non-formal education and awareness-raising being crucial components of disaster risk reduction (Shaw et al., 2011).

In the context of climate change, vulnerable populations, especially children, require special attention and protection, including the need to mitigate and adapt to its impacts. Child-centered disaster risk reduction (DRR) in schools is critical for creating a culture of safety. This requires linking old and new curricula, addressing natural and social issues, and fostering participation from various stakeholders, including students, teachers, school administrators, government agencies, NGOs, private sectors, media, and the local community. The 2016 Kumamoto disaster case study illustrates Japan's promotion of disaster education through the concept of *tsunagaru*, which emphasizes the connection between different elements, disciplines, and stakeholders in fostering a culture of safety in schools. Japan has proactively developed disaster preparedness capacities, integrating multilayered institutional cooperation and community participation through *tsunagaru* in the educational process. However, Thailand, despite facing increasing climate change-related disasters, continues to implement a reactive approach to disaster management. The country's disaster risk management strategies lack integration of institutional and community participation in prevention efforts (Singkran, 2017; Hungspreug et al., 2000; Tingsanchali, 2012). Thus, tsunagaru underscores the importance of linking institutions and fostering community participation in building disaster-resilient school environments, providing valuable lessons for Thai schools in addressing the challenges posed by climate change.

Hitherto, DRR, a key component of resilience, involves proactive measures to reduce vulnerability and mitigate the impacts of natural hazards (UNISDR, 2015). In schools, DRR includes developing safety protocols, improving infrastructure, and integrating disaster preparedness into daily operations (UNESCO, 2015). A comprehensive approach combines retrofitting buildings with robust emergency preparedness plans (World Bank, 2019). The Sendai Framework for Disaster Risk Reduction highlights schools as critical hubs for community safety, especially in rural, disaster-prone areas (UNDRR, 2015). However, a gap remains between global DRR frameworks and local school-level implementation (Gaillard, 2019). Key indicators of DRR effectiveness in schools include institutional capacity, physical resilience, and community engagement from Tong et al (2016).

Institutional capacity refers to a school's ability to develop and implement disaster protocols, maintain communication systems, and train staff and students in emergency procedures (UNESCO, 2015). This includes disaster response plans, regular drills, and integrating disaster management into school operations. Physical resilience involves the ability of school buildings to withstand disasters, including durable structures, emergency shelters, and essential services like water, electricity, and medical supplies during crises (Storms et al., 2024). Resilient infrastructure not only protects students and staff but also allows schools to serve as shelters for the community. External relations or community engagement is crucial, as schools are often central to local disaster resilience efforts. In rural areas, schools frequently serve as evacuation centers

and coordination hubs during emergencies, requiring collaboration with local governments and organizations (Sims et al., 2020).

An example is *Santikhiri Witthayakom* School, located in a highland area prone to landslides and floods. The school faces challenges due to limited funding and support, hindering its ability to implement comprehensive DRR measures to protect both students and the wider community. In many rural areas, schools serve dual roles as educational institutions and community shelters. To fulfill these responsibilities, schools need adequate resources and infrastructure, such as retrofitting buildings for disaster shelter use—a costly investment that often requires external support.

### 1.2. Conceptual Framework

The conceptual framework of this study positions universities as central actors in climate crisis management, focusing on three core areas: capacity building, disaster risk reduction (DRR), and community engagement. Through capacity building, universities play a critical role in transferring knowledge to local schools and communities, equipping them with the necessary tools and expertise to address climate-induced challenges (Virji et al., 2012). This includes initiatives such as Community Emergency Response Teams (CERT) training, which provides practical skills in emergency response, first aid, and logistical coordination, ensuring that schools can act as effective response units during disasters (World Bank, 2019). In the realm of DRR, the development of a comprehensive school safety framework is crucial. This framework focuses on enhancing physical infrastructure and institutional resilience alongside the implementation of early warning systems that enable real-time monitoring and communication, thus improving preparedness and response capacities (Fernandez et al., 2022). Moreover, community engagement emerges as a vital component, with universities fostering a participatory approach that actively involves local stakeholders in the planning and execution of disaster management strategies (Sims et al., 2020). Schools are also positioned as community shelters, providing safe spaces for vulnerable populations during emergencies, thereby reinforcing their role as hubs of disaster preparedness and recovery (Storms et al., 2024). By integrating these elements, the framework underscores the multifaceted role of universities in building resilience at the intersection of education, community service, and climate action. Figure 1. addresses the conceptual framework of the study.

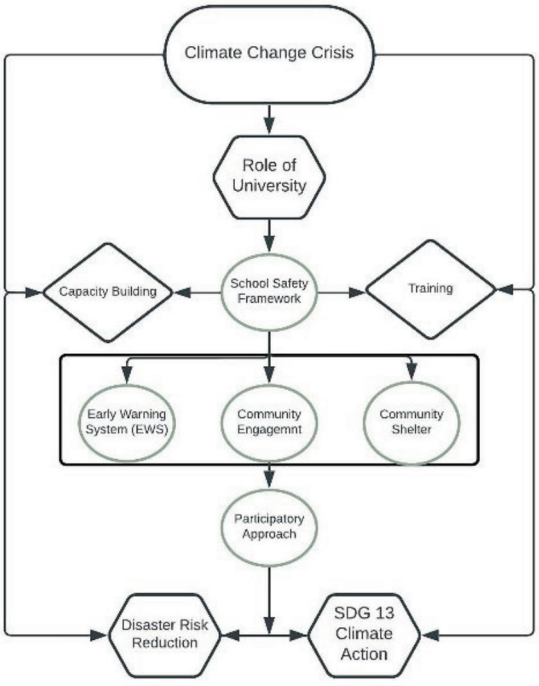


**Figure 1.**Conceptual Framework.

## 2. MATERIALS AND METHODS

### *2.1 Research Design*

This study adopts a mixed-method approach to assess the effectiveness of DRR strategies and resilience-building efforts at *Santikhiri Witthayakom* School in Thailand. The methodology combines both quantitative and qualitative methods to provide a comprehensive understanding of the school's current institutional capacity, physical infrastructure, and external relations, as well as the outcomes of capacity-building training provided to the school administrators. This approach ensures that the study captures not only the structural and procedural aspects of DRR but also the social dimensions of resilience (Creswell & Plano Clark, 2011). The study followed the action research model, which implemented a training program in order to improve the school's disaster preparedness and address gaps identified during the capacity assessment. The training was provided to the 25 school administrators and teachers and focused on the following keywords: institutional capacity, physical conditions, and external relations. Participants were encouraged to apply the knowledge gained during the training to develop specific action plans for improving disaster preparedness at the school. It allows participants to engage actively in the identification of problems and the co-creation of solutions (Reason & Bradbury, 2001).

### *2.2 Sample and Data Collection*

The study sample consists of 25 participants, including school administrators, executive board members, and teachers from *Santikhiri Witthayakom* School. These participants were selected through purposive sampling, as they are directly involved in the decision-making processes related to disaster

management and school operations. The sample size was deemed appropriate for generating in-depth qualitative data while also allowing for a quantitative analysis of institutional and infrastructural capacities (Palinkas et al., 2015). The quantitative phase of the study involved conducting a capacity assessment of the school's institutional preparedness and physical resilience before and after training. This assessment was based on the Institutional Capacity and Resilience Framework (ICRF), adapted from previous DRR studies (Twigg, 2015). Data was collected through structured questionnaires administered to school administrators. The questionnaires included both closed-ended and Likert-scale items designed to measure the presence and effectiveness of institutional DRR strategies, infrastructural resilience, and community partnerships.

In addition, the qualitative phase involved conducting semi-structured interviews and focus group discussions with the 25 participants to gain insights into their experiences and perceptions of disaster preparedness at *Santikhiri Witthayakom* School. The interviews focused on understanding the school's disaster response practices, the effectiveness of the training programs, and the challenges faced in implementing DRR strategies.

The semi-structured interviews allowed for flexibility in exploring individual perspectives. At the same time, focus group discussions facilitated the exchange of ideas among school staff, providing a deeper understanding of the collective experience of disaster management (Kitzinger, 1995). Participants were asked to reflect on their level of confidence in responding to disasters, the clarity of existing disaster plans, and the school's collaboration with local government and community organizations.

### *2.3 Data Analysis*

The quantitative data collected from the structured questionnaires were analyzed using descriptive statistics to provide a snapshot of the school's current disaster management capacities. Mean scores and standard deviations were calculated for each component of the capacity assessment (institutional capacity, physical resilience, and external relations), allowing for a detailed comparison of strengths and weaknesses across different areas of disaster preparedness (Creswell, 2014). The Likert Scale questions were analyzed by using the criteria from Çelik and Oral in 2016, addressed in Table 1.

Continuously, the qualitative data from interviews and focus groups were analyzed using thematic analysis, which involved coding the data and identifying key themes related to disaster preparedness, institutional challenges, and external relations (Braun & Clarke, 2006). The coding process was iterative, with initial themes being refined as additional data were analyzed. This approach allowed for the identification of recurring patterns in participants' experiences and provided deeper insights into the barriers and opportunities for enhancing the school's disaster resilience.

## 3. RESULTS

### *3.1 Training Program Established by Three University Networks*

The training program, a collaboration between Kumamoto University, Hiroshima University, and Mae Fah Luang University, aimed to build institutional capacity, enhance physical resilience, and strengthen external relations at *Santikhiri Witthayakom* School. It focused on empowering school administrators, teachers, and community leaders to lead disaster risk reduction (DRR) and climate crisis management, integrating the school's resources with broader community efforts.

The first area, institutional capacity, involved training on disaster preparedness protocols, emergency response planning, and crisis communication. Participants learned to create comprehensive disaster management frameworks, with a focus on coordination and role clarity during emergencies. Practical tools like scenario-based simulations and emergency drills were used to ensure staff preparedness and swift responses to natural disasters. Trainees were also equipped to train others, institutionalizing disaster preparedness throughout the school.

For physical resilience, the program focused on strengthening school buildings to withstand hazards like floods and landslides common in Doi Mae Salong, Chiang Rai. It provided guidance standards and improving structural integrity, retrofitting buildings to safety standards, and preparing the school to serve as a community shelter during emergencies. Participants were also trained in managing emergency supplies such as water, medical kits, and food, fostering a culture of resilience to protect students and the community.

The third focus, external relations, emphasized collaboration with local authorities and community organizations to ensure a coordinated disaster response.

**Table 1.** Likert Scale Evaluation Criteria by Çelik and Oral in 2016

| Score Interval (Mean) | Evaluation Criteria |
|---|---|
| 1.00 – 1.79 | Very Low |
| 1.80 – 2.59 | Low |
| 2.60 – 3.39 | Moderate |
| 3.40 – 4.19 | High |
| 4.20 – 5.00 | Very High |

**Table 2.** Training Program for School Safety of Disaster Risk Reduction (DRR) Adopted from Tong et al (2016)

| Key Following Thematic | Key Focus Areas Aligning with Institutional Capacity and Resilience (Framework) |
|---|---|
| Strengthening Institutional Capacity for Disaster Preparedness and Disaster Risk Reduction | 1. Disaster preparedness protocols<br>2. Emergency response planning<br>3. Crisis Communication<br>4. Disaster Training Drills |
| Enhancing Physical Resilience of School Infrastructure | 1. School resource management<br>2. School as a community shelter<br>3. Retrofitting |
| Building Effective External Relations and Community Engagement | 1. Building partnerships<br>2. Community engagement<br>3. Early Warning Systems |

Trainees were taught to build partnerships with local disaster management agencies, aligning efforts in disaster preparedness, including early warning systems. This collaboration positioned the school as a key player in the local disaster management network, enhancing community-wide resilience. The training module is addressed in Table 2.

In conclusion, the program took a holistic approach to DRR, addressing institutional, infrastructural, and external needs. By building capacity, enhancing resilience, and fostering partnerships, the collaboration ensured that *Santikhiri Witthayakom* School is well-prepared to protect students and serve as a community hub for climate action (SDG 13), ensuring long-term resilience for both the school and the region.

### *3.2 Understanding of Improvement Capacity from the Training Program Implementation*

This section highlights the school's capacity to implement disaster preparedness protocols, maintain communication systems, and ensure personnel are trained for emergencies. Clear, structured protocols that define roles during disasters are essential. Before training, participants rated their awareness of disaster management protocols at a low 2.5, indicating a significant gap. Post-training, confidence in understanding and implementing these protocols rose to 4.5, reflecting improved disaster management capacity. Before training, participants rated the school's emergency response plan at 2.4, citing outdated or unknown plans. One participant remarked, "We had no clear procedures, and communication was chaotic during emergencies." After training, participants confirmed the existence of a clear, updated response plan, raising the score to 4.1, signaling a proactive shift in disaster management.

Effective communication during crises is critical. Pre-training, participants rated their communication system at 2.0, citing inadequate channels and potential delays. Post-training, modernized communication systems increased the score to 4.7, significantly improving the school's real-time communication during emergencies and coordination with external responders. The effectiveness of disaster drills was also assessed. Pre-training, participants rated drill frequency at 2.3, showing a lack of practical preparedness. Post-training, regular drills were implemented, raising the score to 4.6, emphasizing the school's focus on practical disaster readiness, as recommended by Twigg (2015). Participants expressed that the training provided essential tools and knowledge. One teacher noted, "The training gave us structure. We now know who to contact, how to communicate with students, and how to coordinate with external responders."

The physical resilience component assessed *Santikhiri Witthayakom* School's infrastructure, emergency supplies, and capacity to serve as a community shelter during disasters. These factors are crucial for ensuring the safety of students, staff, and the community during natural hazards. Participants highlighted the vulnerability of the school's infrastructure, noting that most buildings had not been retrofitted to withstand floods and landslides. One administrator mentioned, "Our buildings are old, and some classrooms have visible cracks. We worry about student safety in a major disaster." Pre-training, the school's structural integrity scored 2.0 on a Likert scale, reflecting the lack of retrofitting and outdated infrastructure. Post-training, the score slightly improved to 2.3, but participants still emphasized the need for significant upgrades (World Bank, 2019; Gaillard, 2019).

The school's ability to function as a community shelter was also a concern. Before the training, participants rated the school's shelter capacity at 2.4, citing inadequate infrastructure to accommodate the community during extended disasters. Post-training, this perception improved to 3.2, but participants acknowledged that substantial retrofitting and resource investments were still needed to make the school a reliable shelter (Gaillard, 2019). Despite the desire to help the community, participants stressed that the school was not equipped to serve as a disaster shelter. A teacher

remarked, "We want to help, but we are not equipped." The need for retrofitting was widely recognized, with a very low pre-training score of 1.7. Although awareness of these needs increased during the training, no physical improvements were made, and the post-training score remained at 2.0, underscoring the urgent need for infrastructure upgrades to enhance disaster resilience.

The External Relations and Community Engagement component assessed *Santikhiri Witthayakom* School's ability to collaborate with local authorities, engage the community in disaster preparedness, and participate in Community Emergency Response Teams (CERT) training. Before the training, formal partnerships with local authorities were limited, reflected by a low Likert score of 2.4. Post-training, active collaboration significantly improved, raising the score to 4.1, demonstrating the success of the program in establishing disaster response protocols (Sims et al., 2020). Community engagement in disaster preparedness, initially weak with a score of 2.5, improved to 4.3 after the training. This participatory approach empowered the community to play an active role in disaster management, aligning with the importance of community involvement in resilience (Virji et al., 2012). The Early Warning System (EWS) also saw improvement. Pre-training, the system was inadequate, scoring 2.1. After the training, a more effective EWS integrating local knowledge and technology raised the score to 4.5, ensuring timely alerts and coordinated responses to potential disasters, consistent with UNISDR (2015) guidelines.

The study's results were examined using both quantitative and qualitative analysis. The explanation of the results is addressed below in accordance with three key factors: institutional capacity, physical resilience and external relations. In addition, Table 3 describes a summary of the improvement capacity.

## 4. DISCUSSION

A key outcome of the training was the successful implementation of an Early Warning System (EWS) that engages the community in monitoring climate-related hazards like floods and landslides. Pre-training, participants rated the EWS at a low 2.1, indicating a significant gap in preparedness. Post-training, the score rose to 4.5, reflecting a comprehensive, effective system tailored to local needs (UNISDR, 2015). The EWS combines local knowledge with technology, such as mobile alerts and radio communication, ensuring timely warnings for the school and community. This aligns with SDG 13's goal of enhancing resilience to climate hazards. Community involvement in the system's design and monitoring fostered ownership, critical for its sustainability and effectiveness, reflecting best practices in disaster risk reduction (Virji et al., 2012). The training significantly enhanced *Santikhiri Witthayakom* School's role in emergency response, focusing on first aid, crisis communication, and logistical coordination—critical for building climate resilience in disaster-prone areas. Pre-training, participants rated their disaster management confidence at a low 2.0. Post-training, this score rose to 4.0, reflecting improved preparedness.

Crisis communication systems also saw major improvements. Before training, communication delays and confusion were common, with a low score of 2.0. After training, robust protocols boosted the score to 4.7, ensuring quick, effective information dissemination within the school and to external stakeholders, aligning with SDG 13 goals (Cutter, 2016). The school's ability to

**Table 3.** Summary of Capacity Improvement from School Safety of Disaster Risk Reduction (DRR).

| Indicator | Pre-Training | Value | Post-Training | Value |
|---|---|---|---|---|
| **Institutional Capacity** | | | | |
| Confidence in Preparedness | 2.5 | Low | 4.5 | Very High |
| Emergency Planning Response | 2.4 | Low | 4.1 | High |
| Crisis Communication | 2.0 | Low | 4.7 | Very High |
| Disaster Training Drills | 2.3 | Low | 4.6 | Very High |
| **Physical Resilience** | | | | |
| School Resource Management | 2.0 | Low | 2.3 | Low |
| School as a community shelter | 2.4 | Low | 3.2 | Moderate |
| Retrofitting | 1.7 | Very Low | 2.0 | Low |
| **External Relations** | | | | |
| Building partnerships | 2.4 | Low | 4.1 | High |
| Community engagement | 2.5 | Low | 4.3 | Very High |
| Early warning systems | 2.1 | Low | 4.5 | Very High |

serve as a community shelter improved slightly, from 2.4 to 3.2, highlighting the need for further retrofitting to ensure safety during disasters, as supported by research on disaster-resilient schools (Gaillard, 2019). The absence of a formal Community Emergency Response Team (CERT) at *Santikhiri Witthayakom* School before the training represented a major gap in disaster preparedness. Interviews with administrators and community leaders revealed that only 25% of respondents were familiar with CERT, with many uncertain about their roles during emergencies. As one administrator noted, "We knew we had to respond, but there was no formal structure guiding us." This lack of coordination heightened the school and community's vulnerability to climate-induced disasters.

Without CERT, the school was not seen as a reliable community hub during disasters. A local leader stated, "The school was not prepared to help the wider community." However, after CERT was established, the school became a key resource in local disaster management, improving coordination with local authorities and organizations. CERT's importance in schools, especially in disaster-prone areas, is critical. Schools often serve as community centers during emergencies, and having an organized, trained team ensures quicker and more effective disaster response. The training at *Santikhiri Witthayakom* School showed how CERT can transform schools from vulnerable institutions into resilient community hubs, supporting disaster risk reduction (DRR) efforts at the local level (Twigg, 2015).

This study highlights the essential role universities (multisectoral collaboration or *Tsunagaru*) play in advancing SDG 13: Climate Action by facilitating capacity-building initiatives that strengthen local resilience to climate-related disasters. Universities like Kumamoto, Hiroshima, and Mae Fah Luang bridge the gap between academic research and practical disaster management, translating climate science into actionable community-level solutions. Their involvement is crucial for both climate mitigation and adaptation, helping communities better prepare for increasing natural disasters. The participatory model used in this study shows how universities can engage local stakeholders—school administrators, community members, and governments—by integrating local knowledge with technical expertise. This collaboration fosters community ownership of disaster management systems and ensures sustainable, culturally appropriate interventions. It aligns with SDG 13's goals to strengthen adaptive capacity to climate hazards.

Universities also advance climate education, a pillar of SDG 13.3, by improving institutional preparedness through training programs. This study demonstrates how universities can lead capacity-building efforts, improving the disaster resilience of *Santikhiri Witthayakom* School and setting a model for other vulnerable regions. By providing training in crisis communication, early warning systems (EWS), and logistical coordination, universities equip communities to respond effectively to climate disasters. Beyond technical expertise, universities strengthened local institutional capacity by empowering the school and community to take ownership of disaster preparedness. This localized approach enhances long-term sustainability and builds community independence in future crises, as supported by research from Virji et al. (2012).

In addition, Lotz-Sisitka et al. mentioned in 2012 that universities and schools are important partners in implementing Education for Sustainable Development (ESD), which addresses SDG 4 Quality Education, particularly SDG 4.7 of Global Citizenship Education as a foundation for lifelong learning. That said, reforming the curricula, which include important practical training for climate change adaptation, encompassing equally critical perspectives of climate justice (Roemhild & Gaudelli, 2021), is necessary.

The collaborative model presented here offers a replicable framework for educational institutions in disaster-prone areas, showing how universities can drive climate action by combining research with practical applications. By integrating local knowledge, technical solutions, and institutional support, universities under *Tsunagaru* contribute to both immediate and long-term disaster risk reduction (DRR). These university-led initiatives extend beyond the local community, contributing to national and global climate resilience. By enhancing local capacities, universities support global efforts to reduce vulnerability to climate disasters, aligning with frameworks like the Sendai Framework and the Paris Agreement. Their work at *Santikhiri Witthayakom* School exemplifies how higher education institutions can advance global climate governance and sustainability goals.

## 5. CONCLUSION AND RECOMMENDATIONS

This study highlights the transformative impact of the capacity-building training at *Santikhiri Witthayakom* School, showcasing significant improvements in disaster preparedness and resilience through a participatory approach. By aligning with SDG 13: Climate Action, the training led by Kumamoto, Hiroshima, and Mae Fah Luang Universities (multisectoral collaboration or *Tsunagaru)* addressed key gaps in the school's disaster management, including the establishment of an Early Warning System (EWS), enhanced crisis communication, and the introduction of a Community Emergency Response Team (CERT). Key improvements include better

coordination with local authorities, stronger community engagement, and the school's enhanced role as a disaster response leader. The EWS became a crucial tool for proactive disaster response, and the CERT program equipped school personnel and community members with essential skills in search and rescue, first aid, and crisis management. This participatory approach, aligning with global DRR best practices, highlights the importance of community-driven solutions for climate resilience. In conclusion, this study demonstrates the pivotal role universities can play in advancing climate resilience and disaster risk reduction by integrating local knowledge, technical expertise, and community engagement. The success at *Santikhiri Witthayakom* School offers a replicable model for other educational institutions in disaster-prone regions, emphasizing the importance of participatory approaches and institutional support in addressing climate challenges. Continued investment in education, infrastructure, and collaboration will enable schools to become central to sustainable disaster management and achieving SDG 13.

In addition, the study provides the recommendations as follows:

1) Institutionalize CERT Training: Regular refresher courses for staff and community members should be conducted to sustain the knowledge and skills acquired and adapt to emerging challenges.
2) Strengthen Physical Infrastructure: Invest in retrofitting school buildings to improve their resilience to floods and landslides, enabling the school to serve as a reliable community shelter.
3) Expand Early Warning Systems (EWS): Continuously update and enhance the EWS with new technology, such as geospatial monitoring and real-time data analysis, to improve hazard detection and response.
4) Develop a Comprehensive Disaster Management Plan: Create a plan that includes regular drills, resource management, and clear roles for school personnel and community members. Update it annually with input from local authorities and disaster experts.
5) Strengthen Partnerships with External Organizations: Build stronger relationships with NGOs and international relief agencies to access additional resources, technical expertise, and funding to enhance disaster resilience further.

## Acknowledgements

The author would also like to express her gratitude to the editors and editorial staff of JHSSR for their assistance during publication period.

## Funding

I am very grateful to all the professors from Hiroshima University, Kumamoto University and Mae Fah Luang University for supporting the training program and research under Sumitomo Grant Japan-Related Research 2022 No. 22802026.

## Declaration of Conflicting Interests

The author declares that they she has no competing interests.

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