



Development of Area Disaster Managers to Strengthen Integrated Operational Mechanisms at the Local Level: A Case Study of Lampang Province

Tanyarat Jinaoy^a, Punsu Runnoy^a, Dararat Thatrak^a, Natnaree Thongdeepan^a,
Punchabhorn Srichanapun^a, Wiraya Datsang^a, Kaweerat Tattiwong^b, Wanchai Khamseen^b,
Panithi Sanjit^b, Amnaj Patwang^b, Chiraphon Takeang^b, Thawinan Janthawang^b,
Nattapon Anuwong^b, Mongkonkorn Srivichai^c and Piyada Netsuwan^{a*}

^aFaculty of Business Administration and Liberal Arts, Rajamangala University of Technology Lanna Lampang, Lampang, Thailand

^bFaculty of Engineering, Rajamangala University of Technology Lanna Lampang, Lampang, Thailand

^cFaculty of Engineering, Rajamangala University of Technology Lanna Chiangrai, Chiang Rai, Thailand

*Corresponding author. E-mail address: piyada.netsuwan@rmutl.ac.th

Received: 10 February 2026; Revised: 31 August 2026; Accepted: 2 September 2026; Available Online: 18 September 2026

Abstract

This study investigates the development of Area Disaster Managers (ADM) as a means to enhance integrated disaster management at the local level, specifically in flood-prone areas of Lampang Province, Thailand. The objectives are to analyze the ADM conceptual framework and to explain the role of the Area Disaster Manager as a key coordinating figure connecting communities, local administrative organizations, and technical agencies. Using a Participatory Action Research (PAR) approach, the study developed and implemented an ADM training curriculum in Nakaew Subdistrict (Ko Kha District) and Maekua Subdistrict (Sop Prap District) by following the Plan-Do-Check-Act (PDCA) cycle. Fifty participants were purposively selected from individuals directly involved in local disaster management, including local leaders, local administrative organization officials, disaster management volunteers, and community stakeholders, based on their roles, experience, and ability to participate in the training and provide relevant information. The participants comprised 26 individuals from Na Kaew Subdistrict and 24 from Mae Kua Subdistrict. This process involved spatial and contextual analysis, curriculum development, hands-on training workshops, learning assessments, and follow-up on practical applications. Qualitative data were analyzed using content analysis, while quantitative data were analyzed using descriptive statistics, including means and percentages, to assess participants' knowledge, satisfaction, and changes between pre-training and post-training assessments. The findings indicate that the ADM framework strengthens data-driven and area-based decision-making, enhances inter-organizational coordination, and promotes stakeholder participation across all phases of disaster management. Participants demonstrated increased knowledge, understanding, and skills in disaster prevention, preparedness, emergency response, and post-disaster recovery. The study concludes that the Area Disaster Managers (ADM) framework reduces operational redundancy and supports a transition from centralized disaster management toward a participatory, area-based approach that is sensitive to the local context and sustainable.

Keywords: Area Disaster Manager, Integrated Disaster Management, Flood Risk Management, Local Governance

Introduction

Floods are natural disasters caused by heavy rainfall or the prolonged accumulation of precipitation, leading to flash floods, sudden flooding, inundation, and river overflows, resulting in damage to lives and property, as well as adverse impacts on communities and society (Department of Disaster Prevention and Mitigation, Ministry of Interior, 2022).

The synergistic effects of climate change, dynamic land-use transitions, and erratic precipitation patterns have intensified the frequency and magnitude of hydrological disasters, particularly within the recurrently inundated

regions of Northern Thailand. Lampang Province stands as a critical focal point of flood vulnerability, primarily dictated by its distinct basin morphology. The province's susceptibility is further exacerbated by the Wang River's central trajectory and a complex network of tributaries that channel mountain-driven runoff into the lowlands. Consequently, these physiographic determinants have inflicted profound socio-economic disruptions, compromising agricultural productivity, regional logistics, and communal well-being. A landmark catastrophic event occurred in 2024, during which flooding permeated all 13 districts, encompassing 92 subdistricts, 752 villages, and 14 urban communities. Notably, Na Kaew Subdistrict in the Ko Kha District emerged as the most severely impacted zone, with inundated agricultural and residential lands totaling 8,139 rai. Furthermore, Mae Kua Subdistrict within the Sop Prap District exemplifies the province's repetitive flood cycle, having endured three major events over the last decade, resulting in a collective damage area of 7,386 rai (Royal Irrigation Office No. 2 Lampang Province, 2024; Lampang Provincial Disaster Prevention and Mitigation Office, 2024).

Furthermore, the severe and widespread disaster impact on lives, property and social systems are not solely the result of natural hazards. Instead, they emerge as a result of the collision of hazards and vulnerability, as laid out by the Asian Disaster Preparedness Center (ADPC). This model accentuates that the catastrophic impacts on both humans and environment are cumulative outcomes of natural threats combined with social and economic developments that generate a cumulative vulnerability (as depicted with Figure 1).

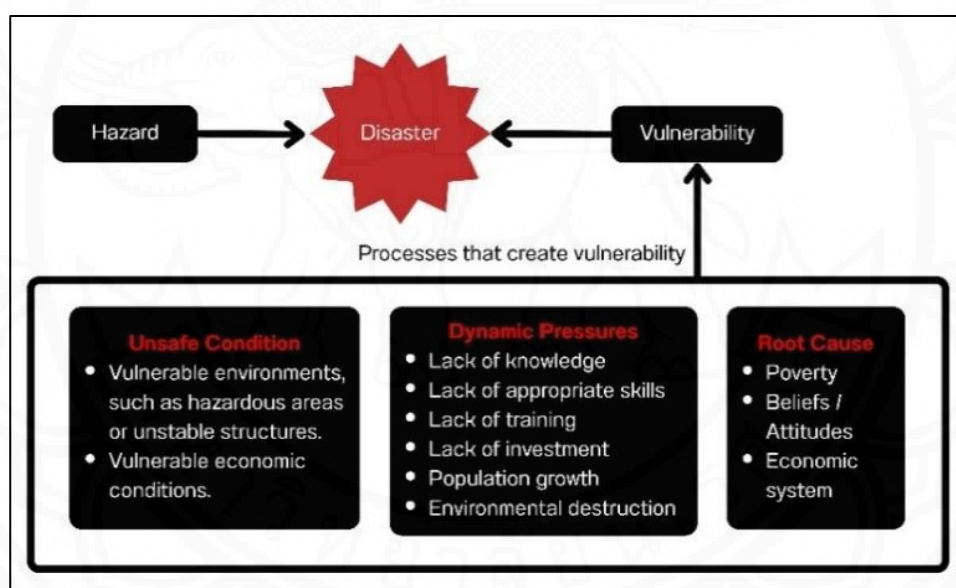


Figure 1 Link between hazard and vulnerability and the occurrence of disasters.

Natural hazard-induced disasters are hard to prevent, but the consideration of social and social context determining the capabilities of individuals/communities that affect disaster risk e.g. vulnerability, demonstrates that social determinants are manageable through relevant development processes (Department of Disaster Prevention and Mitigation, Ministry of Interior, 2022). Vulnerability is closely tied to human development and social strength, as dynamic constraints translate structural issues into constraints. Such pressures consist of knowledge, skill, and capacity weaknesses related to situation awareness & risk appraisal and proper disaster management in local context. This relation reinforces the theory suggesting that human development, the development of knowledge, learning, essential skills and active participation of communities, are crucial for combating vulnerability and curbing the wider adverse consequences of disasters. It is generally accepted that well-managed planning and human development have the potential to strengthen the preparedness of communities



and individuals for the disaster prevention, response, and post-disaster recovery, while also encouraging sustainable development and social benefits for the future (Blaikie et al., 2004).

In Lampung Province, the past disaster management activities typically required significant efforts from municipal or provincial government agencies, local government agencies, administrative organizations, and volunteers from different social sectors to offer shelter and assistance to the population impacted by disasters. Yet, their efficacy has largely been influenced by the capacity of local actors (Department of Disaster Prevention and Mitigation, Ministry of Interior, 2022). However, many barriers remain, including fragmentation of coordination mechanisms, unstructured data handling, and a shortage of people capable of performing spatial data analysis or effectively communicating risk information to the public. Disaster Risk Management (DRM) is an ongoing process that requires effective local management mechanisms, active community participation, and personnel with the capacity to connect these elements, covering the following three broad phases: 1) Disaster Risk Reduction, 2) Emergency Management, and 3) Recovery (Department of Disaster Prevention and Mitigation, Ministry of Interior, 2022). In a local environment, the preparation for disaster prior to the disaster event has been regarded as the key to successful risk management, because it carries the greatest potential for minimizing loss of life and property as well as for adapting measures to specific local conditions. In this process, particular emphasis should be placed on public participation in identifying and assessing risks, analyzing vulnerabilities, and jointly planning and implementing disaster management activities. This is consistent with the principles of Community-Based Disaster Risk Management (CBDRM), which draws on community knowledge, local capacities, and contextual conditions as the basis for developing risk management approaches appropriate to each area. However, putting CBDRM into practice also requires personnel with the knowledge, skills, and competencies needed to analyze risks, assess situations, communicate information, and coordinate between communities and relevant agencies. Strengthening the capacity of local personnel is therefore essential to ensuring that community participation can be translated into systematic disaster management that is appropriate to the specific context of each area. Enhancing disaster preparedness in this context requires at local levels. Human Resource Development (HRD) at the local level plays an important role in strengthening disaster preparedness and improving the effectiveness of disaster management operations. This method centers on creating local personnel's competencies and capabilities with relevant network partners such as community members, local administrative bodies and supporting agencies. Some key development areas include disaster identification and knowledge, risk assessment specific to areas and the analysis of a local spatial data, disaster preparedness planning, emergency communication, and inter-organizational collaboration. Investment in local human capital through training is therefore an important mechanism that enables personnel to assess risks, plan, communicate, and coordinate appropriately. Local human capital is invested into — training programs, improve the ability of disaster response, lessen impact, and facilitate context-relevant recovery from disaster. Ultimately, these initiatives build adaptive capacity and long-term community resilience. However, there remains limited understanding of how community participation, CBDRM, HRD, and area-based disaster management can be integrated to define the competencies and coordinating roles of Area Disaster Managers (ADM) in local disaster management. Accordingly, this study integrates Community Participation, Community-Based Disaster Risk Management (CBDRM), Human Resource Development (HRD), and area-based disaster management to explain the development of Area Disaster Managers (ADM). Community Participation and CBDRM provide the foundation for local engagement and the use of community knowledge, while HRD supports the development of personnel knowledge, skills, and competencies. Area-based disaster



management emphasizes the adaptation of these capacities to local risk contexts. Together, these concepts provide the basis for conceptualizing ADM as a coordinating mechanism linking communities, information, and relevant agencies throughout the disaster management cycle.

Within this context, this study aims to examine the development of Area Disaster Managers (ADM) as a mechanism for strengthening integrated operational practices at the local level. The research analyzes and explains the role framework of the Area Disaster Manager (ADM) to enhance understanding of the role of local personnel as a central coordinating mechanism that systematically links communities, local administrative organizations, and technical agencies. The ADM framework emphasizes data-driven decision-making supported by spatial analysis, inter-sectoral communication and coordination, and the promotion of collaborative engagement among local stakeholders throughout the entire disaster management cycle, including prevention, preparedness, emergency response, and post-disaster recovery. This study seeks to strengthen the capacity of Area Disaster Managers (ADM) to transform disaster management practices from a centralized approach to a more participatory, locally driven model.

In this light, the purpose of this study is to identify the emergence of Area Disaster Managers (ADM) as a mechanism for consolidating integrated operational practices locally. This paper aims to further the understanding of the local personnel as the central coordinating mechanism in a systematic way for the connection of communities, local administrative organizations and technical agencies through analysis of the conceptual framework of the Area Disaster Manager (ADM). In particular, the ADM concepts focuses on data-driven disaster decisions supported by Spatial Analysis as well as by inter-sectoral communication and coordination efforts. It also promotes collaborative development of local stakeholders to participate in decision making at all stages from the prevention phase through to the disaster preparedness (prevention, preparedness, emergency response, post disaster) phase. The present study aims to explore how the ADM model and framework can convert disaster response from a more centralised model of disaster management to a more cooperative and locally based one. Additionally, the objective of this study is to establish and assess the quality of the disaster management training program that takes into account the contextualised risk of disasters and the local situation and region-specific nature of Lampang Province, particularly in Na Kaew Subdistrict, Ko Kha District and Mae Kua Subdistrict, Sop Prap District, which are characterized by recurrent flooding that has extensive damages to villages. The curriculum seeks to build a systematic capacity for local personnel to better understand disaster risks, to analyze spatial data across the disaster area, to plan/decide on response strategy and response during emergencies, as well as to communicate their knowledge, coordinate with communities and to apply this knowledge in practice under community-based or emergency management. This research suggests that the role of the Area Disaster Manager (ADM) framework plays an important role in reinforcing local disaster management capacity. ADM training curriculum also facilitates cross agency collaboration, usage of spatial data, and risk communication development, thus facilitating appropriate disaster risk management in local contexts and policy-level scale-up into other areas.

Literature Review

Community Participation Theory

Community Participation Theory rests on a premise that sounds obvious once stated: people who are directly affected by a problem are not merely potential beneficiaries of solutions but also valuable resources. They possess knowledge about local conditions, risk patterns, social dynamics, and practical constraints that external actors often



lack, and rarely acquire quickly. Drawing on the broader tradition of participatory development, the theory argues that this knowledge is not simply a supplement to good development practice but central to it. Development efforts that bypass genuine community engagement tend to produce interventions that are less effective and less sustainable—a point articulated by Arnstein (1969) as early as the late 1960s and which researchers have consistently validated since. These principles are consistent with Community-Based Disaster Risk Management (CBDRM), which applies community participation to disaster risk management by using community knowledge, capacities, and local context as the basis for identifying and assessing risks, analyzing vulnerabilities, and planning preparedness jointly with relevant agencies. Community participation in flood management helps strengthen risk awareness, preparedness, and the capacity to recover after disasters, thereby contributing to stronger communities over the long term.

Flood management serves as a critical illustration of this principle. Communities engaged across the full arc—from initial risk assessment through preparedness planning and into post-disaster recovery—consistently produce better outcomes and absorb losses more effectively than those managed primarily through external direction (Makhfud & Mursyidah, 2024; Mahardhika & Pamungkas, 2024). Part of the reason is practical: participation generates shared knowledge. When communities and agencies work through problems together over time, each develops a more accurate understanding of the other's knowledge, capacities, and constraints. That mutual understanding tends to produce plans that are more realistic and responses that are faster and better calibrated than those that either party would have designed independently. This also highlights the importance of strengthening community capacity for disaster risk management.

Area-based Flood Management and Area Disaster Managers (ADM)

Flooding represents a catastrophic natural phenomenon triggered primarily by intense or sustained precipitation. These events often manifest as flash floods, sudden inundations, and river overflows, all of which inflict severe damage on life, property, and the broader social fabric (Department of Disaster Prevention and Mitigation, Ministry of Interior, 2022). Within Northern Thailand, a region plagued by chronic flood issues, the escalating frequency and magnitude of such disasters are driven by a complex interplay between climate change, shifting land-use patterns, and erratic rainfall.

Lampang Province is located within a basin drained by the Wang River, which is fed by mountain tributaries descending from high-altitude peripheries. This geographic configuration increases the province's vulnerability to flooding during periods of heavy rainfall, as runoff rapidly flows from the slopes into low-lying areas. As a result, drainage infrastructure can become overwhelmed, leading to the inundation of agricultural land and residential areas that have experienced such flooding patterns for generations, though that familiarity has not made it easier. The 2024 floods were extensive: all 13 districts affected, damage documented across 92 subdistricts and 752 villages. Na Kaew Subdistrict in Ko Kha District saw 8,139 rai go under water. Mae Kua Subdistrict in Sop Prap District is a different kind of case—not a single catastrophic event but a slow accumulation of recurring damage. Three major floods over the past decade, totaling 7,386 rai of affected land, have pushed that subdistrict into something close to permanent recovery mode (Royal Irrigation Office No. 2 Lampang Province, 2024; Lampang Provincial Disaster Prevention and Mitigation Office, 2024). The interval between events has become shorter than the recovery cycle.

Therefore, the Area Disaster Manager (ADM) plays a crucial role as a coordinating mechanism in disaster management. An ADM must possess a comprehensive understanding of the physical, social, and economic contexts



of the area and be capable of driving operations throughout the entire disaster management cycle, including preparation, prevention, response, and recovery (Department of Disaster Prevention and Mitigation, Ministry of Interior, 2022). The operational practices of Area Disaster Managers include, for example, conducting disaster preparedness drills and developing effective communication networks for early warning systems. To ensure effective implementation of disaster management practices, three core principles should be emphasized. First, disaster and data management should be conducted systematically, with an emphasis on planning, integrating inter-agency collaboration, and developing interconnected data systems, including early warning mechanisms, to enable rapid responses and minimize immediate losses. Second, the development of networks of capable local groups and disaster management practitioners is essential, focusing on enhancing personnel knowledge and skills, and on fostering community participation, to ensure that disaster management practices are aligned with local contexts and sustainable over time. Third, adequate and timely provision of disaster-related resources and assistance is required, covering necessities and the establishment of safe evacuation areas to protect lives and public safety (Department of Disaster Prevention and Mitigation, Ministry of Interior, 2016). The integration of inter-agency collaboration, community participation, and the development of Area Disaster Managers significantly enhances the effectiveness and timeliness of local disaster management. This perspective is consistent with the findings of Boonreang and Pathranarakul (2017), who argue that strengthening community capacity through knowledge enhancement and inter-agency cooperation improves flood management capabilities. Communities can apply acquired knowledge in practical ways before, during, and after disaster events. Consequently, disaster management at the local level necessitates collaboration among all sectors, with the Area Disaster Manager playing a central role in integrating information, facilitating cross-organizational coordination, and systematically communicating risk information to communities. These efforts contribute to reducing damage and losses while supporting efficient recovery and restoring affected areas to normal conditions. Previous studies also provide empirical support for these ADM functions. Community participation in flood management strengthens local preparedness, risk awareness, and recovery capacity, while inter-agency coordination and systematic information management improve the effectiveness of local disaster response (Boonreang & Pathranarakul, 2017; Makhfud & Mursyidah, 2024; Mahardhika & Pamungkas, 2024). Area-based disaster management further emphasizes the need to adapt coordination, information use, and operational practices to local physical, social, and institutional conditions (Chansrithada, 2021). These findings support the synthesis of ADM as a local mechanism responsible for information management, risk communication, coordination, community engagement, and operational support.

Human Resource Development (HRD)

Human Resource Development (HRD) is often described in fairly abstract terms—enhancing capacity, improving performance, aligning individual development with organizational goals—but its practical core is straightforward: it is about building, in people, the knowledge and capability they need to do important work well and sustain that over time (Swanson & Holton III, 2009). What distinguishes HRD from routine training is the insistence that this development does not occur in isolation. Individual growth is embedded in social and institutional contexts; it both influences and is influenced by the teams, organizations, and communities people belong to (McLean, 2006). This means that investing seriously in one person's development can have effects that extend outward, provided the conditions are right. Training is the mechanism through which this process is initiated and maintained, and the quality of that training determines whether competencies develop or merely appear to (Garavan et al., 2012).



Applied to ADM development, the HRD framework points toward a specific kind of training design. The goal is not to deliver a body of knowledge but to build capacities that hold up in real field conditions: a working command of disaster management principles, the ability to communicate risk in ways communities can act on, and the organizational capacity to coordinate effectively across agencies and sectors. None of these develop reliably through a single training event. They require practice in realistic situations, feedback, and enough time to embed the learning before the next demand arrives. ADM programs designed with HRD principles in mind would treat training as the beginning of a development process rather than its conclusion—creating conditions for competencies to deepen through continued use and reflection, and structuring follow-up to ensure that what was learned in training is actually being applied in practice. A synthesis of the related concepts and studies shows that Community Participation Theory emphasizes community participation; Community-Based Disaster Risk Management (CBDRM) emphasizes the use of community capacities and context; Area-based Flood Management emphasizes management that is responsive to local conditions; and Human Resource Development (HRD) emphasizes the development of personnel knowledge, skills, and competencies. Together, these concepts support disaster management at the local level and inform the synthesis of the Area Disaster Manager (ADM) role in coordinating participation, managing information, coordinating across relevant actors, and communicating risk in ways that are appropriate to local contexts.

Methods and Materials

Research Design

This study used Participatory Action Research (PAR) to guide the development and evaluation of an Area Disaster Manager (ADM) capacity-building process. The work was undertaken in two flood-prone communities in Na Kaew Subdistrict, Ko Kha District, Lampang Province, and Mae Kua Subdistrict, Sop Prap District, Lampang Province, where flooding occurs repeatedly. Throughout the project, community members collaborated with relevant agencies to co-design and refine activities in ways that were both feasible and responsive to local conditions. The overall approach was guided by Disaster Risk Reduction (DRR) principles and the Area Disaster Manager (ADM) conceptual framework, aiming to reflect the effectiveness of area-based capacity development processes in disaster management.

Study Area and Participants

The study focused on two subdistricts in Lampang Province, Thailand, where flooding occurs repeatedly: Na Kaew Subdistrict, Ko Kha District, and Mae Kua Subdistrict, Sop Prap District. These sites were chosen as pilot areas because they have experienced frequent and severe flood events, involve large affected areas, and include many communities impacted during August–October 2024. The site selection was based on secondary data from the Royal Irrigation Office No. 2 Lampang Province, and the Lampang Provincial Disaster Prevention and Mitigation Office.

The research participants were drawn from people who play direct roles in local disaster management, as well as key stakeholders in the two pilot communities. They included local leaders such as subdistrict leaders, village heads, and assistant village heads, staff from local administrative organizations responsible for disaster prevention and mitigation, disaster management volunteers, and other community stakeholders who contributed both information and practical input to the development activities. Participant selection was purposive, with the intention of capturing perspectives from the administrative, operational, and community levels. In addition to having a direct



role in local disaster management, the inclusion criteria required participants to 1) work or reside in the study areas of Na Kaew Subdistrict, Ko Kha District, or Mae Kua Subdistrict, Sop Prap District, Lampang Province, 2) have experience or responsibilities related to disaster prevention and mitigation, early warning, public assistance, or community disaster risk management, 3) voluntarily agree to participate and be able to attend the training, data collection, and feedback activities throughout the research process, and 4) be able to provide relevant information on the local context, problems, needs, and approaches to disaster management. In total, 50 participants took part in the training and data collection activities: 26 from Na Kaew Subdistrict, Ko Kha District, Lampang Province, and 24 from Mae Kua Subdistrict, Sop Prap District, Lampang Province. By role, the participants consisted of 26 community leaders and local administrative leaders (the subdistrict head, village heads, and assistant village heads), 21 staff from local administrative organizations responsible for disaster prevention and mitigation, 2 disaster management volunteer, and 1 community stakeholders, such as community representatives or groups involved in disaster management in the study areas. The composition of participants was determined to ensure adequate representation of perspectives at the administrative, operational, and community levels, thereby providing a comprehensive understanding of the local context, problems, and needs related to disaster management. The exclusion criteria included individuals who had no direct involvement with the study areas or community disaster management, were unable to participate adequately in the designated training or research activities, were unable to provide relevant information or contribute to the research process, or declined to participate or withdrew from the study during the research process.

Research Procedure

The research procedure followed the Plan–Do–Check–Act (PDCA) cycle, which provides a practical structure for continuous improvement through systematic planning, implementation, evaluation, and refinement. The study was conducted in four phases, as described below.

Phase 1: Plan – Context analysis and needs assessment

In the planning phase, the study examined local conditions and capacity–building needs. Data were gathered through in–depth interviews with personnel from district–level agencies, local administrative organizations, and disaster management practitioners across five districts in Lampang Province. The interview data were analyzed to identify gaps in knowledge and skills, as well as existing mechanisms for disaster management at the area level. Findings from this phase were used to guide the design of the Area Disaster Manager (ADM) training curriculum.

Phase 2: Do – Curriculum development and training implementation

Insights from the needs assessment were then used to develop the Area Disaster Manager (ADM) training curriculum tailored to the local context. The curriculum covered the four stages of the disaster management cycle: preparedness, prevention, response, and recovery. Appropriate spatial data tools and innovations relevant to community contexts were integrated into the training program. The curriculum was implemented through hands–on training workshops with target participants in the selected pilot areas.

Phase 3: Check – Assessment of learning outcomes and competencies

To evaluate the training, the study used multiple assessment tools, including participant satisfaction surveys, pre– and post–training knowledge tests, and post–training self–assessment questionnaires. These tools were used to examine changes in participants’ knowledge and perceived competencies, as well as overall feedback on the Area Disaster Manager (ADM) curriculum and training activities.



Phase 4: Act – Follow-up and evaluation of practical application

In the final phase, the study followed up on how participants applied what they had learned in practice. Data were collected through interviews with training participants and community stakeholders to capture observed behavioral and operational changes related to disaster preparedness and response. The results were then used to refine and strengthen the Area Disaster Manager (ADM) curriculum for future area-based implementation.

Data Analysis

The research instruments consisted of three instruments: 1) a disaster management knowledge and understanding assessment questionnaire consisting of 20 items, covering risk perception, preparedness, disaster monitoring and early warning, emergency response, and post-disaster recovery, 2) a semi-structured interview consisting of 20 questions, designed to collect information on the local context, problems, obstacles, needs, and approaches to disaster management in the study areas, and 3) an opinion and feedback assessment consisting of 10 items, covering appropriateness, feasibility, practical applicability, and recommendations regarding the disaster management system or mechanisms.

The research instruments were evaluated for content validity by experts who assessed the congruence between each item and the research objectives and calculated the Index of Item-Objective Congruence (IOC). In addition, the questionnaire was pilot-tested with a group having characteristics similar to those of the research participants to assess the clarity and appropriateness of the items. The reliability of the questionnaire was subsequently assessed using Cronbach's alpha coefficient before the instruments were administered for actual data collection.

Data analysis combined qualitative and quantitative approaches. Qualitative data were examined using content analysis to identify and synthesize key themes related to the Area Disaster Manager (ADM) role, learning processes, and patterns of practical application within the study areas. The qualitative findings also reflected the perspectives of stakeholders from both study areas, highlighting their views and experiences regarding local disaster management. Quantitative data were summarized using descriptive statistics, such as means and percentages, to describe participants' satisfaction with the training and to compare pre-training and post-training knowledge scores to assess changes following the program.

Results

This study reports on the outcomes of Lampang Province's implementation of Area Disaster Managers (ADM) are investigated in this study. It was carried out utilizing a framework that places an emphasis on community involvement, area-based settings, and workable capacity-building procedures for local personnel. Based on process-oriented analysis and qualitative data, the research findings can be summed up and divided into four main topics, which are given below.

1. Results of Needs and Context Analysis's Conclusions for Developing Area-Based Participation and Area Disaster Manager (ADM) Capacity

The contextual analysis's findings, which included in-depth interviews, indicate that each study location has established procedures for catastrophe prevention and mitigation. These protocols include disaster preparation, emergency preparedness drills, and community involvement. However, the overall operating procedures lack coordinated methods for interagency and interlevel cooperation and are fragmented. This issue is particularly apparent in domains such as risk assessment, emergency coordination, and disaster data management. These findings emphasize the importance of developing personnel who are capable of effectively integrating disaster



management efforts across multiple sectors at the local level. Stakeholders actively suggested that individuals actively involved in local operations—such as village heads, subdistrict heads, representatives from local administrative organizations, volunteers, and community members who are essential to their communities—could serve as Area Disaster Managers (ADM). Area Disaster Managers (ADM) should possess the following competencies, according to the research: inter-sectoral coordination and communication; spatial analysis and area-based planning; and the capacity to use technology and tools to aid in decision-making. In addition, effective ADM personnel should have the ability to collaborate with communities and possess practical fieldwork skills in order to ensure that disaster management protocols are suitable for local contexts. Participatory training sessions revealed that the ADM development process, which aimed to promote continuous stakeholder interaction across multiple sectors, also promoted a better knowledge of roles and responsibilities. Additionally, this collaborative strategy improved collaboration capacities and established functional networks for local catastrophe management.

Stakeholder perspectives from the two study areas revealed that Area Disaster Managers (ADM) perform both leadership and coordinating roles in local disaster management. In both Na Kaew and Mae Kua, ADMs were expected to facilitate information flow, coordinate communication among communities and relevant agencies, support local decision-making, and mobilize existing personnel and resources during disaster situations. These shared functions indicate a common leadership role of ADM as a local integrator connecting information, people, and operational actions. However, the way these roles were carried out differed according to local administrative arrangements, personnel readiness, community networks, available technology, and risk characteristics. These findings suggest that the ADM framework should consist of shared core leadership functions combined with context-adapted operational practices. This distinction between common roles and locally adapted implementation provides a basis for strengthening both the theoretical model of ADM roles and the operational model for applying the framework in different local contexts.

2. Results of Curriculum Creation and Practical Instruction for Area Disaster Managers

The training curriculum for Area Disaster Managers was developed by incorporating lessons learned from previous disaster management practices in Lampang Province, along with the ADM conceptual framework. Along with volunteers and community members, this curriculum positions ADM as an operational mechanism that enhances local disaster management capabilities. Adapted to particular geographical risk characteristics, the training focuses on improving knowledge and skills linked to flood management. Local circumstances and capabilities were taken into consideration in the design of the curriculum, learning procedures, and targeted competencies. A combination of information gathered from extensive fieldwork and discussions with disaster management stakeholders in five areas in Lampang Province—Mueang Lampang District, Ko Kha District, Sop Prap District, Thoen District, and Mae Phrik District—formed the basis of this design. Figure 2 provides a summary of the curriculum framework.



Figure 2 Shows field-based consultation for the pilot areas' training curricula.

It is evident from the results of field-based data collecting that local capacity for disaster management has to be increased. Additional skill development is still sorely needed, despite the fact that most areas are comparatively equipped for disaster prevention and mitigation, especially in terms of emergency exercises and disaster planning. Crucial areas for improvement include the use of technology to enhance risk communication and decision-making, inter-agency data integration, area-based risk assessment, and systematic data management and utilization. Additional capacity is needed for planning and situational analysis, incident reporting and communication, and context-sensitive field operations like community risk assessment and evacuation planning. Target groups for capacity building should prioritize local leaders, sub-district heads, village heads, assistant village heads, participants from local administrative organizations, volunteers, and members of the community. In order to address the unique capacity limitations revealed via fieldwork and to ensure alignment with local conditions, a hands-on training program for Area Disaster Managers was designed and placed together based on the identified needs.

The curriculum was structured around three primary parts of the Disaster Risk Management (DRM) cycle—Disaster Risk Reduction (DRR), Emergency Management, and Recovery—formed the core of the training plan. These phases, which can be further operationalized into four stages: 1) preparedness, 2) mitigation, 3) response, and 4) rehabilitation. Together these stages encompass measures taken prior to, during, and following catastrophe events (Department of Disaster Prevention and Mitigation, Ministry of Interior, 2022). The training session was therefore divided into two halves. The first session, “Hands-on Training on Area-Based Context Analysis, Scenario Simulation, and Spatial Planning,” focused on modeling catastrophe scenarios, evaluating local contexts, and developing area-based disaster response plans. The second session, titled “Hands-on Training on Area Disaster Manager (ADM) Development and Innovation for Disaster Management,” aimed to improve ADM’s capacity to employ developments and instruments for area-based disaster management. Figure 3 provides a summary of the training activities.

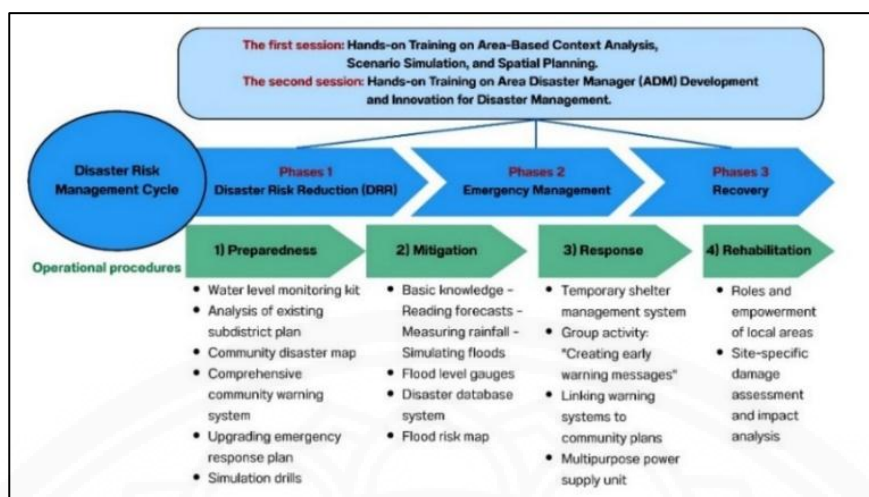


Figure 3 Learning modules aligned with the Disaster Risk Management (DRM) cycle.

To ensure that the curriculum was effective and in accordance with the tasks and responsibilities of disaster management staff under the National Disaster Prevention and Mitigation Plan (2021–2027), the research team invited a representative from the Lampang Provincial Disaster Prevention and Mitigation Office (DDPM Lampang) to act as an observer and evaluator during the training process. The assessment results indicated a high level of satisfaction with the training program, with an overall mean score of 4.78. When specific components were examined, the curriculum content received the highest score of 4.85, followed by the suitability for the target group at 4.80 and the overall administration and structure of the training program at 4.70. These results show that the training management process, activity design, curriculum structure, and content are adequate. Additionally, the outcomes align with assessments of the participants' preparedness, learning goals, and their ability to apply the knowledge and skills they acquired in practice.

3. Learning Outcomes and Competencies of Area Disaster Managers (ADM)

After the research team conducted two workshops for Area Disaster Managers (ADM), the evaluation results 10.92 percent increase in average knowledge scores, reflecting overall knowledge and comprehension. Overall, these results suggest that local leaders and volunteers acting as area mechanisms possess a foundational knowledge showed that participants had a high overall satisfaction. The first training session, focused on area-based context analysis, scenario simulation, and spatial planning, achieved a mean satisfaction score of 4.44, while the second session had an average score of 4.43. In terms of learning outcomes, the first training session showed a notable improvement in participants' knowledge and understanding. A comparison of pre- and post-training test scores indicated a base on area context analysis, community risk mapping, and local risk assessment, as presented in Figure 4.

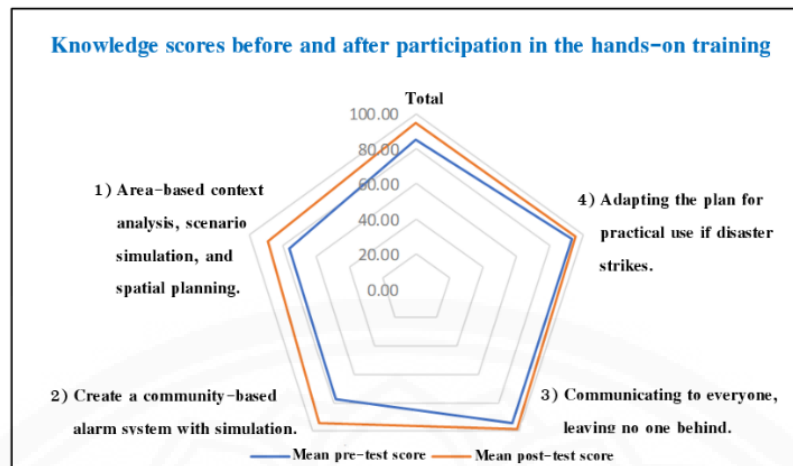


Figure 4 Comparison of knowledge scores before and after participation in the hands-on training, disaggregated by learning module.

For the second training session, conducted in Na Kaeo Subdistrict, Ko Kha District, the average knowledge scores the participants increased by 82.97 percent, and all participants had significantly higher post-training scores, representing a 100 percent improvement rate. These results are shown in Figure 5.

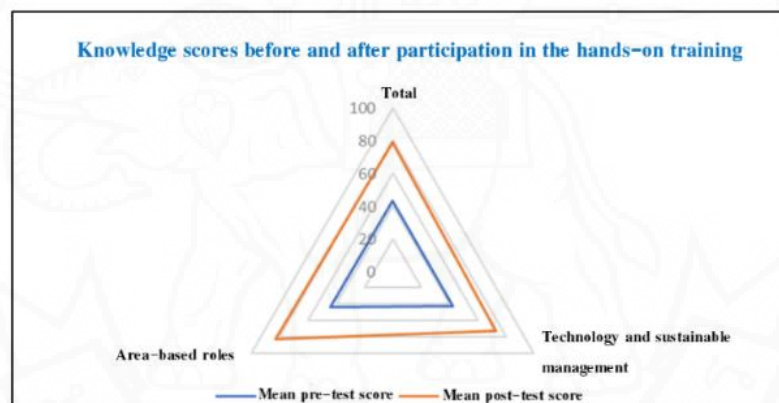


Figure 5 Comparison of knowledge before and after participation in the training across dimensions of area-based roles, technology, and sustainable management in Na Kaeo Subdistrict, Ko Kha District.

In Mae Kua Subdistrict, Sop Prap District, the results of the pre- and post-training knowledge assessments indicated that the average overall knowledge and understanding, with the average score increasing from 86.44 percent to 92.44 percent. All participants had post-training scores significantly higher than their pre-training scores, representing 100 percent improvement rate, as shown in Figure 6.

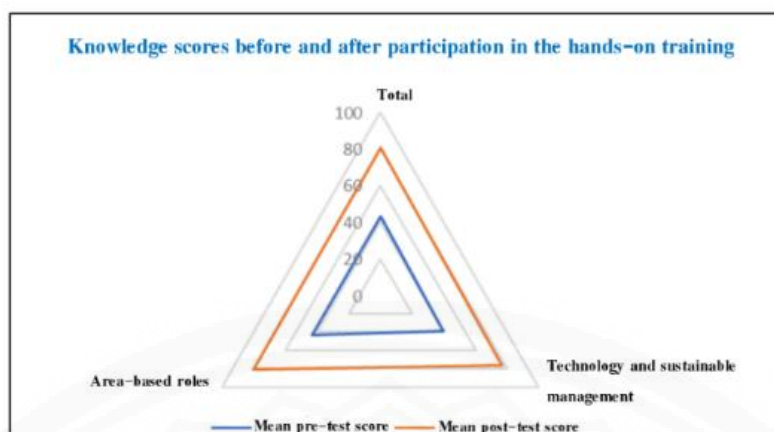


Figure 6 Comparison of knowledge before and after participation in the training across dimensions of area-based roles, technology, and sustainable management in Mae Kua Subdistrict, Sop Prap District.

The results of the second training session indicate that community leaders and volunteers possessed a good understanding of the roles of Area Disaster Managers (ADM), communication, inter-agency understanding, and the appropriate application of tools and innovations for area-based disaster management. Importantly, upon completion of the training, a self-assessment of their readiness to apply the acquired knowledge and skills in real-world context. The findings reveal that participants were highly prepared to apply the knowledge and skills in 1) analysis and planning, 2) communication and information exchange, 3) application of tools and innovations, and 4) collaboration and coordination at the local level. These results are shown in Figure 7.

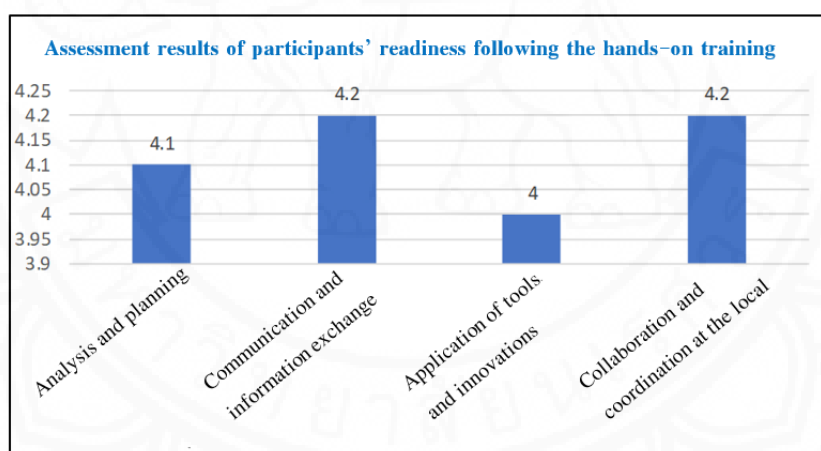


Figure 7 Assessment results of participants' readiness to apply acquired knowledge in practice following the hands-on training.

4. Follow-up and Practical Application Evaluation Results

The study team assessed actual implementation at the local level through community inquiries, based on participants' self-assessments of their readiness to apply newly acquired knowledge and abilities. The findings indicate that community leaders and volunteers were able to apply the knowledge and skills they acquired throughout the training to complete real-world context. For the purpose to evaluate the risks and enhance readiness beforehand, participants specifically used data from the provincial War Room in conjunction with digital tools such as rainfall sensor monitoring and climate prediction systems (such as Windy). Additionally, easily obtainable local channels, such village broadcasting systems and LINE groups, were used to disseminate information to community members regarding weather conditions, risk assessments, and recommended courses of action. This approach



allowed community people to exchange situational knowledge and encouraged early preparedness before disaster scenarios, which is comparable via the Area Disaster Manager (ADM) approach.

The previously stated conclusions on the process-based outcomes and the functioning of cooperative mechanisms for area-based catastrophe management. The setting of Area Disaster Managers (ADM) may be classified as a process-focused strategy meant to establish coordinated processes for operation at the local level. Stakeholder groups and agencies can work collaboratively methodically. due to this procedure, which combines data, technology, and operational processes. Three critical process-oriented lessons might be summed up from this point of view.

First, the development of Area Disaster Managers (ADM) should emphasize a strong local perspective and experiential learning in order to improve participants' ability to relate information to area-specific risks and on-site situations. Through this approach, participants were able to adapt and apply the tools and methods acquired during the training to the physical, social, and capacity-related characteristics of their respective areas. These findings underscore the suitability of the ADM development process within area-based context. Second, risk communication and the translation of scientific information into accessible knowledge for the general public are two crucial tools of disaster mitigation at the local level. Area Disaster Managers (ADM) serve as intermediaries delivering weather information, risk examinations, and recommended courses of action through local communication channels. Community readiness and shared situational awareness are progressively maintained by this method of promotion. Third, tools and innovations are employed to enhance disaster management operational procedures and decision-making, by working with community systems and local government structures. Through the integration of data from digital technologies, geographical information, and networks of communities, participants were able to improve local preparedness and assess circumstances in an efficient and relevant manner.

The findings allow the roles of Area Disaster Managers (ADM) to be synthesized into three main areas: 1) coordination and communication, 2) receiving, analyzing, and relaying information, and 3) supporting operations during emergency situations. The pre- and post-training knowledge tests reflect participants' competencies and help clarify the roles and responsibilities of ADMs. These three roles are interconnected as a process, beginning with data collection and analysis, followed by the coordination and communication of relevant information, and extending to support for decision-making and emergency operations. This demonstrates that ADMs play an important role in linking personnel, information, decision-making, and operational activities in local disaster management.

A comparison of the two study areas showed that both shared the same three core roles despite differences in context and disaster management arrangements. The differences lay not in the nature of the core roles, but in how clearly the roles were defined and how they were put into practice. In areas where ADM roles, responsibilities, and working structures were clearly defined, coordination, division of responsibilities, and information management could be carried out more systematically and continuously. In areas where roles remained less clearly defined, operations depended more heavily on collaboration among multiple agencies and local personnel, making network cooperation and personnel capacity especially important. Overall, the comparison indicates that ADMs perform common core roles in both areas—from receiving and analyzing information, through coordination and communication, to supporting decision-making and emergency operations—while the way these roles are implemented can be adapted to administrative structures, personnel readiness, network strength, and the risk profile

of each area. These findings provide a stronger basis for developing both theoretical and operational models by identifying shared roles as well as context-specific variations in implementation.

Additionally, the findings demonstrate that Area Disaster Managers (ADM) serve as a crucial conduit between communities, district and provincial agencies, and local administrative entities. Throughout a state of readiness early response, and recovery phases related to disaster management. This coordinating position promotes continuity and lowers operational redundancy. The development of this mechanism was achieved with the process of the Plan-Do-Check-Act (PDCA) cycle as a guide, research has taken place on this strategy. course development and hands-on training production (Do), method adjustment and refinement via use to reality follow-up (Act), and assessment of local context and requirements (Plan) were all components of this process. As seen in Figure 8, the culmination of these phases produces a methodical, based on processes approach to disaster management training to feed Area Disaster Managers.



Figure 8 Conceptual process model for the development of Area Disaster Managers (ADM) in disaster management.

Discussion

Area Disaster Managers (ADM) emerged from this study as a genuinely important component of local disaster management. The evidence points to ADMs functioning as connective tissue—drawing together community groups, district offices, provincial agencies, and local government bodies that would otherwise operate with limited awareness of each other. In areas where ADMs were well-established, practices stayed closer to local conditions, duplication dropped, and decision-making improved. ADMs work in the area rather than above it, which means their knowledge of local risk patterns is current and direct—precisely the logic Area-based Flood Management has long advanced (Department of Disaster Prevention and Mitigation, Ministry of Interior, 2022; Chansrithada, 2021).

A comparative analysis of Na Kaew and Mae Kua showed that the ADM mechanism comprised both shared core roles and context-specific operational practices. This helped connect information, support, and operations in a continuous and systematic manner. However, the comparison also showed that the nature and working processes of ADMs differed according to each community's context. Different areas placed different levels of emphasis on coordination, information management, and operational support. From a mechanism perspective, these differences reflected how stakeholders were connected, how information flowed, and how operational support was organized in each area. Although ADMs shared the same basic roles, their practices could be adapted to local



characteristics and relationships among stakeholders. This is consistent with area-based flood management, which gives greater weight to the physical, social, and economic context of each area than to a single uniform approach (Chansrithada, 2021).

From this comparison, the role of the Area Disaster Manager (ADM) can be synthesized into two dimensions: “shared roles” and “context-adapted roles.” Shared roles represent the basic mechanisms of coordination, information linkage, and operational support. Context-adapted roles reflect the ADM’s ability to adjust priorities, methods, and working processes to the conditions of each community, allowing responses to be tailored to local problems, resources, and constraints. ADM mechanisms and roles should therefore combine common core elements with flexibility for contextual adaptation. Rather than applying a single model to all areas, a common role framework should be established while allowing operational processes to be adapted to local contexts. This would increase flexibility in coordination, information management, and decision support, and provide a basis for designing disaster management mechanisms that combine shared standards with area-specific appropriateness.

Community participation emerged as a prominent theme in the data. The findings align with Community Participation Theory: disaster management sustains itself better when communities are genuinely involved—not informed after decisions have been made, but present while making them. One pattern worth noting: many ADMs in this study were already community leaders before taking on the role. Consequently, disaster management activities were often coordinated by individuals with established trust and social relationships, rather than introduced by external authorities with limited familiarity with local contexts. That changes how information travels and how much follow-through happens. The broader implication is a shift from communities as recipients to communities as participants with a real stake. Programs that communities feel ownership over tend to outlast those they were handed. Arnstein’s (1969) participation ladder captures this distinction, and studies by Makhfud and Mursyidah (2024) and Samiri et al. (2024) back it empirically: sustained involvement produces measurable improvements in preparedness and recovery.

The findings do not present an entirely positive story. The data surface two persistent structural challenges: inadequate systematic data management, and weak coordination between local administrative bodies and the provincial agencies above them. These constraints place a real ceiling on what local capacity development alone can achieve. An ADM working effectively in their community cannot compensate for a system that prevents that work from informing anything beyond the immediate area. What they gather, assess, and learn needs routes upward—and where those routes do not exist, the institutional value of local capacity gets lost. Digital platforms are relevant here as infrastructure—a shared layer through which data and knowledge can move across organizational levels. The Department of Disaster Prevention and Mitigation, Ministry of Interior (2016) and Chansrithada (2021) both make the same point: integrated data systems are not a technical luxury but a functional requirement for genuinely coordinated disaster management.

Placing the ADM initiative within a Human Resource Development (HRD) framework clarifies what kind of investment it actually is—not a training program with a certified output, but a sustained process of building capacity in people working in specific local contexts. The ADMs in this study were not simply trained and deployed; they continued to develop through a cycle where practice generates experience and experience informs judgment. Swanson and Holton III (2009); McLean (2006) and Garavan et al. (2012) all describe HRD this way: systemic capacity built over time, not just individual competence in the short term. In the ADM context, this means area-based disaster management, community participation, and human resource development are not three separate



programs—they reinforce one another, and that interdependence is likely part of why outcomes in this study appear to hold beyond the immediate training period.

Conclusion and Suggestions

This study makes a fairly direct case for investing in Area Disaster Manager (ADM) development. ADMs provide cross-phase continuity—across preparedness, mitigation, response, and recovery—that is difficult to build into decentralized systems any other way, reducing duplication when agencies pursue related goals without a common link. But individual competencies matter too. Reading a risk situation accurately, communicating it in terms a community can act on, making sound calls under pressure—these need deliberate cultivation. Generic training does not reliably produce them.

In addition, developing training curriculum for Area Disaster Managers grounded in local hazard profiles, social arrangements, and institutional realities rather than a generic template, it used participatory methods—group exercises, experience sharing, direct use of disaster management tools—so that theory stayed connected to scenarios participants recognized from their own work. As a result, participants demonstrate increased readiness and confidence in applying their acquired knowledge and skills to practical operations at the local level in tangible ways.

Beyond its immediate findings, this study offers a process-oriented framework that treats human resource development, community participation, and area-based disaster management not as separate interventions but as components of a single integrated approach. Whether that framing travels well to other contexts remains to be tested, but the underlying logic seems broadly applicable.

For areas with similar geographic and institutional characteristics to Lampang Province, this framework could serve as a workable starting point. The study recommends that both the ADM role and its curriculum be formally integrated into provincial and local disaster management systems—as a core structural element, not a project requiring renewal each budget cycle. Sustained monitoring and evaluation should accompany that integration: not as an add-on, but as the mechanism through which the approach is refined and the evidence base for broader implementation is built over time. Future research should further examine the application of the ADM framework in other flood-prone areas, particularly in Nan and Chiang Rai Provinces, which have different geographic, social, and institutional contexts. Such studies could assess the adaptability, effectiveness, and sustainability of the ADM framework across different local settings and identify contextual factors that may influence its implementation. Comparative research across provinces would also help refine the ADM framework and provide stronger evidence for its potential scaling and integration into broader disaster management systems in Thailand.

Acknowledgments

The authors would like to express their sincere appreciation to the Lampang Provincial Disaster Prevention and Mitigation Office for its valuable support and cooperation throughout this research. This research is part of the research project titled “Development of Participatory Flood Disaster Management Systems and Mechanisms in Lampang Province Using Area-Specific Appropriate Technologies.” The study protocol was reviewed and approved by the Human Research Ethics Committee of Rajamangala University of Technology Lanna (RMUTL-IRB 064/2025).



Conflict of Interests

The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analysis, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

Author Contributions

Tanyarat Jainaoy: Writing – original draft, Conceptualization, Investigation, Methodology, Formal analysis, Data curation, Resources.

Punsa Runnoy: Investigation, Formal analysis, Methodology.

Dararat Thatrak: Methodology, Conceptualization, Investigation, Formal analysis.

Natnaree Thongdeepon: Formal analysis, Investigation, Methodology.

Punchabhorn Srichanapun: Conceptualization, Investigation, Methodology, Validation.

Wiraya Datsang: Supervision, Investigation.

Kaweewat Tattiwong: Validation, Investigation.

Wanchai Khamsen: Project administration, Conceptualization, Investigation, Validation, Funding acquisition.

Panithi Sanjit: Software, Investigation.

Amnaj Patwang: Supervision, Investigation.

Chiraphon Takeang: Data curation, Investigation.

Thawinan Janthawang: Visualization, Investigation.

Nattapon Anuwong: Investigation, Visualization.

Mongkonkorn Srivichai: Investigation.

Piyada Netsuwan: Writing – review & editing, Conceptualization, Formal analysis, Investigation, Resources.

Funding

This research was funded by the Thailand Science, Research and Innovation Fund (TSRI Fund) through the Program Management Unit for Area Based Development (PMU A), grant number A11F680142.

Declaration of Generative AI and AI-assistant Technologies

During the preparation of this work, the authors used ChatGPT and Grammarly to improve language, grammar, and readability. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the published article.

References

- Arnstein, S. R. (1969). A ladder of citizen participation. *Journal of the American Institute of Planners*, 35(4), 216–224. <https://doi.org/10.1080/01944366908977225>
- Blaikie, P., Cannon, T., Davis, I., & Wisner, B. (2004). *At risk: Natural hazards, people's vulnerability and disasters* (2nd ed.). Routledge. <https://doi.org/10.4324/9780203714775>



- Boonreang, E., & Pathranarakul, P. (2017). The capacity building of community in the flood and drought disaster management in provinces of the lower northeastern region. *Journal of Politics and Governance*, 7(3), 100–118. <https://so03.tci-thaijo.org/index.php/jopag/article/view/157301>
- Chansrithada, N. (2021). *Flood disaster emergency management in south Thailand and Prachuap Khiri Khan Province 2017: Case studies of Cha-Uat District, Nakhon Si Thammarat Province and Bang-Saphan District, Prachuap Khiri Khan Province* [Master's thesis, Thammasat University]. TU Digital Collections, Thammasat University Library. <https://doi.org/10.14457/TU.the.2021.1106>
- Department of Disaster Prevention and Mitigation, Ministry of Interior. (2016). *Disaster risk reduction* (3rd ed.). Work Printing. https://www.disaster.go.th/upload/download/file_attach/58a6b30b90d96.pdf
- Department of Disaster Prevention and Mitigation, Ministry of Interior. (2022). *National disaster prevention and mitigation plan (2021–2027)*. Department of Disaster Prevention and Mitigation, Ministry of Interior. https://ndwc.disaster.go.th/ndwc/cms/inner_2744?id=44525
- Garavan, T. N., Carbery, R., & Rock, A. (2012). Mapping talent development: Definition, scope and architecture. *European Journal of Training and Development*, 36(1), 5–24. <https://doi.org/10.1108/03090591211192601>
- Lampang Provincial Disaster Prevention and Mitigation Office. (2024). *Disaster statistics summary for fiscal year 2024* [Unpublished data]. Ministry of Interior
- Mahardhika, G. R., & Pamungkas, A. (2024). A systematic review of participatory approaches in flood risk management: Methods and applications. *Jurnal Penataan Ruang*, 19(Special Edition), 37–46. <https://journal.its.ac.id/index.php/jpr/article/view/4137>
- Makhfud, & Mursyidah, L. (2024). Community participation in flood disaster management. *Indonesian Journal of Law and Economics Review*, 19(4), 10.21070/ijler.v19i4.1176. <https://doi.org/10.21070/ijler.v19i4.1176>
- McLean, G. N. (2006). *Organization development: Principles, processes, performance*. Berrett-Koehler. <https://archive.org/details/organizationdeve0000mcle>
- Royal Irrigation Office No. 2 Lampang Province. (2024). *Recurring floods in Lampang* [Unpublished data]. Royal Irrigation Department.
- Samiri, M., Nilwana, A., Nonci, N., Ahmad, J., & Fitriani (2024). Community engagement and participation in flood disaster mitigation: A case study of Sidenreng Rappang Regency, Indonesia. *Society*, 12(1), 129–139. <https://doi.org/10.33019/society.v12i1.472>
- Swanson, R. A., & Holton III, E. F. (2009). *Foundations of human resource development* (2nd ed.). Berrett-Koehler. https://archive.org/details/foundationsofhum0002edswan_h219