DEVELOPING FLOOD RISK PERCEPTION FOR SUSTAINABLE MANAGEMENT IN RIVERSIDE COMMUNITIES ALONG THE CHAO PHRAYA RIVER, ANG THONG PROVINCE

Pornpurin THESNGAMTHOUN[1], Wanjai LAMPROM[1] and Surasak JOTAWORN[1]

1 Department of Social Sciences, Faculty of Liberal Arts, Rajamangala University of Technology Thanyaburi, Thailand; pornpurin_t@mail.rmutt.ac.th (P. T.); wanjai_l@rmutt.ac.th (W. L.); surasak_jo@rmutt.ac.th (S. J.)

ABSTRACT

This qualitative study explores riverside communities' perceptions and flood risk management strategies in Ang Thong Province, Thailand. Emphasizing the integration of local wisdom with collaboration from local government agencies, the research aims to develop a sustainable, community-driven flood management approach. In-depth interviews were conducted with 18 key informants from 15 relevant agencies across three districts: Mueang Ang Thong, Chaiyo, and Pa Mok. The findings indicate that these communities experience recurring floods, primarily due to ineffective upstream water management and climate change impacts. Nevertheless, Residents have demonstrated adaptive capacity through traditional practices such as stilt housing, monkey-cheek water retention areas, and community-based water monitoring systems. Importantly, using LINE group messaging between government officials and residents has proven an efficient tool for real-time alerts and coordination during flood emergencies. This study highlights the critical role of community knowledge, the adoption of appropriate communication technologies, and participatory planning in enhancing disaster resilience. The resulting model offers a practical framework for flood-prone areas facing similar challenges and supports the achievement of Sustainable Development Goals (SDGs) 11 and 13 in a concrete and localized manner.

Keywords: Flood Risk Perception, Community-Based Management, Sustainable Resilience

INTRODUCTION

Over the past two decades, the world has witnessed a significant increase in the frequency and severity of natural disasters, with flooding identified by the United Nations as the most common and most damaging disaster globally (UNDRR, 2022). Key contributing factors include climate change, unplanned urban expansion, and unsustainable management of natural resources, resulting in many communities becoming chronically vulnerable and slow to recover from disaster impacts.

In the context of the United Nations Sustainable Development Goals (SDGs), flood management directly aligns with SDG 11 (Sustainable Cities and Communities) and SDG 13 (Climate Action), which emphasize the importance of enhancing community resilience, reducing vulnerability, and strengthening adaptive capacity in the face of disasters.

The Chao Phraya River Basin, particularly in Ang Thong Province, experiences annual flooding in Thailand. This is due to its low-lying geography, proximity to major waterways, and limitations in water drainage infrastructure. Additionally, rapid changes in land use have exacerbated flood risks. Districts such as Mueang Ang Thong, Chaiyo, and Pa Mok are identified as high-risk zones requiring localized flood management strategies.

While government agencies have developed warning systems and large-scale water management plans, there remains a lack of effective communication and participatory mechanisms at the community level. Official announcements are typically disseminated through formal channels such as government memos or meetings. However, residents and community representatives often rely on "LINE group messaging" as a primary tool for receiving and sharing information. This platform offers speed, accessibility, and real-time updates, making household- and community-level responses timelier and more actionable.

Moreover, communities rely on "local wisdom" passed down through generations to manage flood risks. Practices such as building elevated homes, designating temporary water retention areas (monkey cheeks), and observing seasonal cloud patterns with guidance from community elders have created informal yet effective self-managed systems that align closely with local contexts.

Considering these issues, this study focuses on "developing risk perception" for sustainable flood risk management in riverside communities along the Chao Phraya River in Ang Thong Province. It examines the flow of information between state agencies and the public, community-level disaster understanding, and the integration of local wisdom into participatory water management approaches. The aim is to develop practical models and strategies applicable to other similarly vulnerable areas.

LITERATURE REVIEWS

This study examines how communities perceive flood risks and identify locally appropriate flood management strategies in riverside areas of Ang Thong Province, Thailand. It emphasizes an in-depth analysis of local wisdom, the role of government in risk communication, and mechanisms of collaboration between civil society and relevant agencies. The review of pertinent literature is summarized as follows.

1) Perception of Flood Risk

The concept of risk perception is used to explain how people understand disasters. Slovic (1987) argues that such perception is not solely based on technical data but also reflects personal experience, media exposure, and trust in government institutions. An appropriate level of perception influences decisions on preparedness and participation in risk management.

Lindell and Perry (2004) further explain that individuals who anticipate risks and understand the tangible consequences are more likely to adapt their behavior and plan effectively, especially when the information comes from familiar and trusted community channels.

2) Local Wisdom in Flood Management

Communities along the Chao Phraya River have long relied on traditional knowledge, such as stilt house construction, monkey-cheek water retention systems, perimeter trenching, and informal evacuation networks—wisdom passed down through lived experience (Chaipattana Foundation, 2017; Uthai Unmuang, 2018).

The National Water Resources Office (2023) suggests that integrating indigenous knowledge with government water management plans can enhance the effectiveness of flood mitigation efforts. Understanding the local environment through community experience is key to developing sustainable management plans (Nattawadee Srisuwan, 2018).

3) Community and Civil Society Participation

The concept of community participation is rooted in theories of sustainable development and decentralization. The Research and Development Institute of Sukhothai Thammathirat Open University (2015) notes that local volunteers, such as Village Health Volunteers (VHVs) and community leaders, play crucial roles in grassroots disaster awareness. Community forums and communication mechanisms between villagers and local agencies help bridge gaps and foster practical cooperation.

FAO (2020) studied the Kamikatsu community in Japan and found that participatory public forums, community workshops, and mutual learning with local authorities effectively reduced disaster impacts and enhanced post-flood recovery capacity.

4) Government-to-Community Risk Communication

Lindell and Perry (2004) stress that effective risk communication must use accessible and trusted channels such as community radio, leaflets, or village leaders. In the study area, local authorities and villagers use LINE group messaging as the primary means for real-time information exchange and flood alerts. This aligns with UNDRR (2019), which encourages the integration of digital technologies and local knowledge in disaster communication.

Interview findings confirm that LINE group communication allows government messages to reach households quickly, enabling timely evacuation or asset protection decision-making, thus reducing tangible flood losses.

5) Sustainable Development Goals (SDGs)

Community-based flood management is directly aligned with the United Nations' Sustainable Development Goals, particularly SDG 11 (Sustainable Cities and Communities), which emphasizes disaster-resilient settlements, and SDG 13 (Climate Action), which focuses on climate change adaptation and reducing vulnerability (Siam Arunsrimorakot & Yongyuth Watcharadul, 2023).

Therefore, studying flood risk perception, collaboration, and local wisdom in Ang Thong Province contributes to effective flood mitigation and the broader national and regional sustainable development agenda.

RESEARCH METHODOLOGY

1) Individual characteristics such as gender, age, education level, and prior flood experience influence residents' understanding, belief, and behavior regarding flood risk in riverside communities along the Chao Phraya River in Ang Thong Province.

2) Sources and channels of flood-related information, such as government agencies, community leaders, or personal experiences, significantly affect community preparedness and planning for flood response.

3) Applying local wisdom, such as stilted housing, monkey-cheek water retention areas, and community-based drainage systems, plays an essential role in flood management and can be effectively integrated with modern water management approaches.

4) Community participation mechanisms, particularly the roles of Village Health Volunteers (VHVs), community leaders, and public forums, impact communication effectiveness, collective decision-making, and post-flood recovery processes.

5. Communication between government agencies and communities, primarily through local LINE groups or other channels, is critical in efficiently enhancing public understanding, early warning dissemination, and preparedness for flood situations.

Qualitative Conceptual Framework

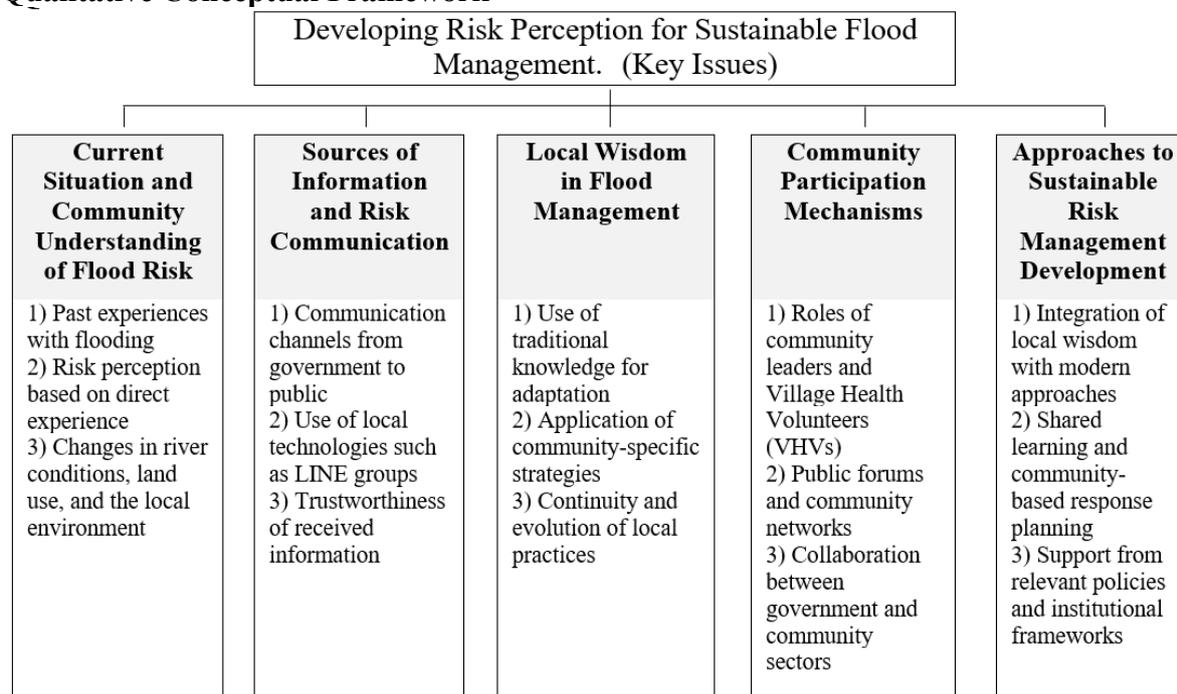| Developing Risk Perception for Sustainable Flood Management. (Key Issues)				
Current Situation and Community Understanding of Flood Risk	**Sources of Information and Risk Communication**	**Local Wisdom in Flood Management**	**Community Participation Mechanisms**	**Approaches to Sustainable Risk Management Development**
1) Past experiences with flooding 2) Risk perception based on direct experience 3) Changes in river conditions, land use, and the local environment	1) Communication channels from government to public 2) Use of local technologies such as LINE groups 3) Trustworthiness of received information	1) Use of traditional knowledge for adaptation 2) Application of community-specific strategies 3) Continuity and evolution of local practices	1) Roles of community leaders and Village Health Volunteers (VHVs) 2) Public forums and community networks 3) Collaboration between government and community sectors	1) Integration of local wisdom with modern approaches 2) Shared learning and community-based response planning 3) Support from relevant policies and institutional frameworks

Figure 1 Conceptual Framework for Analyzing Flood Risk Perception and Sustainable Management in Chao Phraya River Basin Communities, Ang Thong Province

RESEARCH METHODOLOGY

This study adopts a qualitative research approach to understanding how riverside communities in Ang Thong Province perceive and manage flood risks. It integrates local wisdom with governmental coordination to develop sustainable, community-based disaster preparedness and response strategies.

Using purposive sampling, 18 key informants from 15 government and local agencies were selected. The criteria included individuals directly participating in flood management, community planning, disaster response, and environmental coordination. These informants represented the three most flood-prone districts: Mueang Ang Thong, Chaiyo, and Pa Mok.

Semi-structured interviews were used as the primary data collection tool. The interview guide was designed to explore five key areas: 1) risk perception and community awareness, 2) local wisdom and traditional practices, 3) communication mechanisms between agencies and the community, 4) community participation and cooperation, and 5) recommendations for sustainable flood risk management.

Each interview lasted 45 to 60 minutes and was conducted in person at the respondents' offices or local administration centers. All interviews were audio-recorded with permission, transcribed verbatim, and analyzed using content analysis to identify recurring themes and patterns relevant to the research questions.

Ethical considerations were strictly followed. All participants were informed of the research objectives and verbally consented before participating. Confidentiality and anonymity were ensured throughout the research process.

RESEARCH RESULTS

This study gathered insights from 18 key informants across 15 agencies in Mueang Ang Thong, Chaiyo, and Pa Mok districts, revealing five core findings:

First, the most flood-prone areas are low-lying zones outside flood embankments, such as Bang Kaew, Phong Pheng, and Lak Fa, where upstream water releases from the Chao Phraya Dam cause annual flooding.

Second, community flood awareness is primarily shaped by direct experience, especially among elderly residents and farmers, rather than by formal government communication. However, vulnerable groups like the elderly and those without digital access still face challenges in receiving timely information.

Third, local communities continue to rely on traditional knowledge, such as stilt housing, earthen embankments, monkey-cheek retention areas, and vetiver grass planting, which have proven effective in mitigating flood impacts.

Fourth, LINE group messaging is vital for two-way communication between local authorities and communities. This enhances the speed and reach of flood alerts and facilitates coordination at the village level.

Fifth, effective awareness-building requires participatory mechanisms, including public forums, household-level preparedness drills, and local risk maps.

In summary, sustainable flood risk management in Ang Thong Province must build on lived experience, local wisdom, accessible communication technologies, and inclusive community participation, aligning with SDGs 11 and 13.
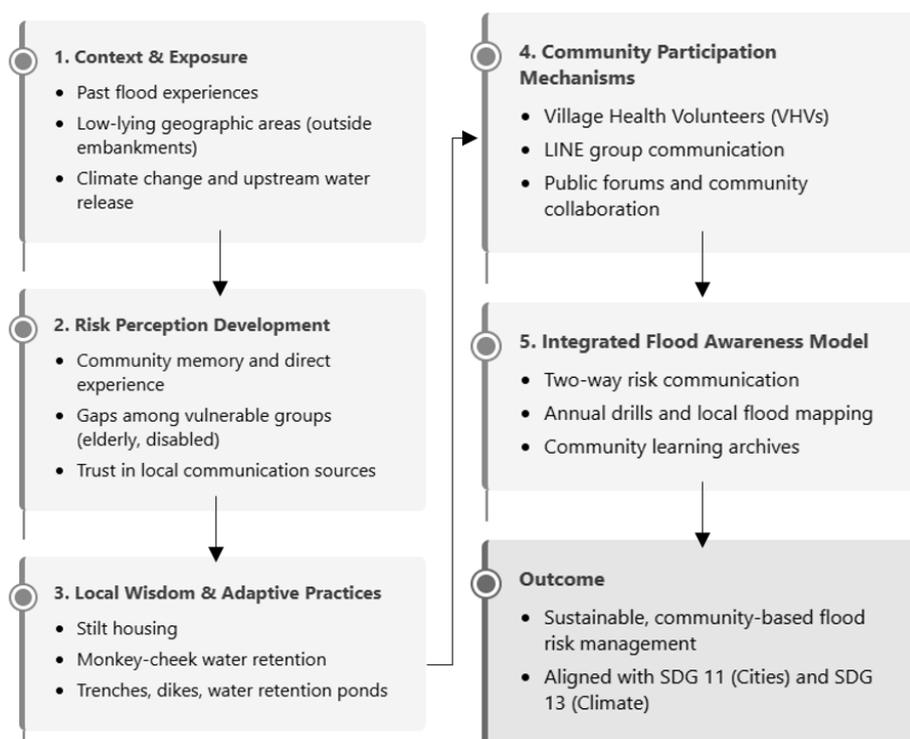

Figure 2 Conceptual Framework for Developing Flood Risk Perception in Riverside Communities

DISCUSSION & CONCLUSION

This qualitative study investigated how riverside communities in Ang Thong Province perceive and respond to flood risks, focusing on integrating local wisdom, government communication,

and participatory mechanisms. Data were collected through in-depth interviews with 18 key informants from 15 agencies across Mueang Ang Thong, Chaiyo, and Pa Mok districts.

The findings reveal that flood-prone areas, especially outside flood barriers such as Bang Kaew, Phong Pheng, and Lak Fa subdistricts, experience recurrent inundation annually. Local officials confirmed that geographical characteristics—low-lying terrain adjacent to the Chao Phraya and Noi rivers—are major contributing factors, particularly during monsoon seasons when water is released from upstream dams.

Community awareness of flood risk was high, particularly among elderly residents and farmers with direct flood experience. This understanding primarily stemmed from personal encounters rather than formal governmental communication. However, access to information remains limited among vulnerable groups, such as the elderly and those with limited access to technology.

Regarding indigenous knowledge, the study found that traditional practices, including stilt houses, raised earthen barriers around farmland, use of monkey-cheek water retention areas, and small-scale floodwater storage ponds, are still widely applied. These practices, passed down through generations, are effective and have been adapted to suit modern needs.

A notable aspect of flood risk management was LINE group messaging, which has emerged as a primary communication channel between local authorities and the public. Informants stated that this platform facilitates rapid information sharing, such as water levels, evacuation orders, or government measures, reaching households more efficiently than formal communication methods. It also fosters real-time coordination between villages and local administrative organizations.

The findings suggest that effective communication must be two-way regarding developing a localized flood awareness model. This means combining community forums and digital channels to enhance real-time situational awareness. Annual flood drills, community mapping, and participatory planning can improve household preparedness and long-term resilience.

In conclusion, the study affirms sustainable flood management in riverside communities must be grounded in lived experiences, strengthened by local knowledge, and supported by inclusive communication and participation. These findings align with SDG 11 and SDG 13 principles, advocating for resilient communities through localized, adaptive, and participatory approaches.

Recommendations Derived From the Study

Based on in-depth interviews with 18 key informants from 15 government agencies and community representatives in Ang Thong Province, several critical insights were identified that can be used to improve the long-term process of enhancing flood risk perception in Chao Phraya riverside communities. The following recommendations are proposed.

1) Develop a systematic community communication network.

Although LINE groups between government agencies and communities have proven to be efficient and rapid channels for disseminating flood-related information, they lack organized data management and consistent coordination. It is recommended that emergency communication flowcharts be established at the subdistrict or village level and that LINE group members be trained on their roles in disaster communication. A local database of key risk communicators should also be created to ensure ongoing, inclusive, and uninterrupted messaging, especially to vulnerable groups such as the elderly.

2) Systematically preserve and promote local wisdom.

Residents still effectively use traditional flood management methods such as earthen dikes, monkey-cheek retention areas, and elevated housing, yet these practices are not well documented or widely shared. It is recommended to create a community knowledge archive using photographs, maps, and videos, alongside annual post-flood reflection sessions to document lessons learned, which can then inform planning for future floods.

3) Empower VHVs and local leaders as core disaster awareness agents.

Village Health Volunteers (VHVs) are crucial communication intermediaries between the state and the community. Thus, they should receive ongoing training on risk communication, digital tools, public forums, and flood scenario simulations. This will enable them to become central facilitators for community-based learning and preparedness.

4) Develop contextualized models for awareness-building.

A community-based learning model should be developed based on four key components:

- Knowledge derived from lived experience
- Local communication channels
- Indigenous knowledge and natural resources
- Mechanisms for collaboration with government agencies

This model will help tailor flood preparation plans to each area's unique conditions and make them adaptable for similar communities.

5) Promote water communication as a shared public agenda.

Interview findings revealed that water management tasks often overlap across agencies. At least one annual policy-level coordination meeting should be organized between local administrative organizations (LAOs), provincial agencies, and community leaders. These meetings should review lessons learned, develop flood response plans collaboratively, and integrate subdistrict development plans with sustainable water resource management policies.

Limitations of the Study

This study has several limitations that should be acknowledged when interpreting the findings. First, the scope of the research was limited to three flood-prone districts in Ang Thong Province—Mueang Ang Thong, Chaiyo, and Pa Mok—which may affect the generalizability of the findings to other regions with different geographical, social, or administrative contexts. Second, the data collection relied on in-depth interviews with 18 key informants from 15 government agencies and local organizations. While these informants provided valuable insights from their institutional perspectives, the study did not include direct interviews with vulnerable populations such as elderly residents, people with disabilities, or low-income household groups that often face disproportionate risks during flooding.

Third, the study analyzed perceptions, practices, and communication mechanisms simultaneously. Therefore, it may not capture evolving dynamics, seasonal risk perception, and variations of preparedness behavior. Lastly, while the use of LINE groups for communication was highlighted as a key strategy, the study did not assess the actual effectiveness of this tool during emergencies involving disruptions in electricity or internet access.

These limitations suggest the need for broader, more inclusive, and longitudinal studies in future research to capture diverse community experiences and assess the long-term impact of local flood risk management models. e long-term effects of local flood risk management models.

Suggestions for Future Research

Several key factors influencing flood risk perception and management were identified based on this qualitative study involving in-depth interviews with representatives from government agencies and local communities in the Chao Phraya River Basin, Ang Thong Province. However, specific research gaps remain, which should be addressed in future studies:

1) Include Broader Community Voices

This study focused primarily on interviews with stakeholders in policy and administrative roles. However, it did not capture perspectives from vulnerable populations such as the elderly, people with disabilities, or agricultural workers who are often the most directly affected by flooding. Future research should be designed to include these grassroots voices for a deeper and more inclusive understanding.

2) Explore Alternative Communication during Emergencies

Research should assess the effectiveness of non-digital channels, such as village loudspeakers, community radio, or offline coordination systems, when digital tools are inaccessible.
3) Conduct Comparative Case Studies
Comparing communities with and without effective flood management practices would help identify successful factors and applicable models for similar risk-prone areas.
4) Develop Risk Perception Assessment Tools
Creating context-specific tools to measure community understanding and preparedness would support more systematic planning and evaluation.
5) Link Water Management with Local Development Planning
Future work should explore policy alignment between disaster management and local administrative plans to promote integrated and sustainable approaches.

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