Understanding Climate Immobility: Evidence from Mae Kha Canal Community

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1. Executive summary

This study aims to examine the factors influencing residents' decisions to remain and their adaptation to recurrent flooding along the Mae Kha Canal in Chiang Mai, Thailand. The canal is described as one of the seven wonders of Chiang Mai and historically an important water system for agriculture and transportation. However, rapid urban expansion, wastewater discharge, and inadequate waste management have contributed to recurring seasonal flooding that affects communities living along the canal banks. These floods disrupt livelihoods, damage property, and make it difficult to access basic services such as electricity, clean water, and sanitation.

The research used a qualitative approach and conducted group interviews with two residents in the Kampaeng Ngam community along the Mae Kha Canal. The interviews focused on flood experiences, livelihood impacts, adaptation strategies, and perceptions of relocation.

Findings from the interview show that flooding significantly affects household livelihoods and daily life, particularly for residents who rely on small businesses and tourism-related activities. Moreover, flood events can damage working equipment, reduce tourist visits, and interrupt income sources. In addition, disruptions to electricity, water supply, and sanitation during floods increase household hardship and psychological stress. Despite these challenges, strong community networks, local leadership, and volunteer support play an important role in helping residents cope with flood impacts through rescue efforts, temporary shelter, and communication systems.

The study also finds that several factors influence residents' decisions to remain in the area. These include strong place attachment, long-term residence within the community, economic dependence on local markets, and the perception that severe floods occur relatively infrequently. They also express trust in government water management systems. As a result, relocation is often not considered a practical option.

Based on these findings, the study recommends strengthening in-place adaptation rather than prioritizing relocation. Key policy recommendations include improving drainage and canal management, supporting flood-resilient housing improvements, clarifying land governance to allow safer housing upgrades, and strengthening community-based disaster preparedness. These measures can help reduce flood risks while

preserving the social networks and livelihoods that encourage residents to remain in the Mae Kha Canal community.

2. Background & Problem Statement

The Mae Kha Canal is one of the oldest water systems in Chiang Mai, stretching approximately 30 kilometers from Doi Suthep-Pui National Park to the Ping River. Historically, the canal served as an important source of water for agriculture, transportation, and daily life in the city. Today, the Mae Kha Canal functions as an urban drainage system. However, unregulated urban expansion, inefficient waste management, and wastewater discharge over the past several decades have contributed to flash flooding during the rainy season. It particularly affects communities located along the canal banks, where dense settlements have developed over time (Deutsche Gesellschaft für Internationale Zusammenarbeit, 2017; Manene et al., 2024).

From a climate displacement perspective, the Mae Kha Canal area illustrates how flood hazards intersect with exposure and vulnerability. Households located along the canal are directly exposed to recurrent flooding. At the same time, socioeconomic conditions - such as informal livelihoods, housing insecurity, and limited infrastructure - can increase vulnerability to climate impacts. Seasonal floods disrupt daily life, damage property, and affect income sources, particularly for residents engaged in small-scale trade or tourism-related activities.

Despite these risks, many residents continue to remain in flood-prone areas due to livelihood dependence, social networks, long-term attachment to their communities, drivers, and perception of flood severity. These conditions raise important questions about climate-related mobility and immobility in urban contexts. This study, therefore, examines what factors influence residents' decisions to remain in flood-prone areas, how communities adapt to recurrent flooding, and how residents respond to future flood mitigation strategies. By focusing on community experiences along the Mae Kha Canal, the research aims to better understand the drivers and triggers of climate-related displacement risk and the implications for inclusive climate adaptation policies.

3. Method

Mae Kha Canal is one of the famous canals in Chiang Mai, and the purpose of this study is to understand the situation of people affected by floods and the measures to mitigate and adapt. We conducted group interview with 2 interviewees; one is a 65-year-old male who is the head of the community, and the other

is a 38-year-old female who is a single mother running a small shop along the canal and also participates in the Mae Kha Canal volunteer group. They voluntarily share their experiences and perceptions on floods within the Mae Kha Canal community. The interview was conducted in the Kampaeng Ngam community along the Mae Kha Canal on 20th February 2026.

A group interview was conducted at a community center, and a translator was used. Researchers obtained verbal consent for audio recording and anonymous use of data. The interviews followed open-ended questions across key themes, including flood experiences, adaptation strategies, and policy recommendations, while allowing participants to skip sensitive questions. We have used the deductive thematic analysis for data analysis.

3.1. Limitation

The research is based on a small sample size of only two participants, which may not fully represent the diversity of experiences within the Mae Kha Canal community.

4. Field Findings and Observation

Theme 1 - Livelihood and economic impacts of flooding

Flooding along the Mae Kha canal has a significant impact on residents' livelihoods and economic stability. Interview participants reported that flood events damage work equipment, reduce business opportunities, and disrupt tourism-related activities in the area.

One participant described how floodwaters destroyed working equipment used for renting microphones and sound systems, resulting in losses exceeding 100,000 Thai Baht. As the equipment was essential for generating income, the damage immediately affected his ability to continue his business.

The participant said, "*It destroyed the equipment, so they cannot get income from that one. They needed to pay for the new equipment. I tried to buy new equipment, but it was a waste of time and a waste of money.*"

Similarly, another participant who operates a small food stall along the canal explained that flooding makes the canal area muddy and unpleasant, causing tourists to avoid the area and reducing daily income.

These experiences indicate that local livelihoods, many of which depend on tourism, are highly sensitive to environmental conditions. Flood-related economic losses, therefore, represent a key factor influencing household vulnerability in the community.

Theme 2 - Disruption of essential services and household hardship

Flooding also disrupts essential services such as electricity, water supply, and sanitation. Participants reported that during flood events, electricity was cut off and water systems stopped functioning, creating significant challenges for daily life. It destroyed the equipment, so they cannot get income from that one. They needed to pay for the new equipment.

A female participant explained that during the flood she had difficulty finding water for bathing and cleaning her children. As a single mother with two young children, she had to leave the house during the flood to search for clean water. She also described the difficulty of managing sanitation when toilets could not be used due to flooding.

In addition to physical hardship, residents reported psychological stress during the flood period. Community members were unable to sleep and worried about the safety of their homes and belongings. These conditions highlight how disruptions to basic services during disasters can intensify household vulnerability, particularly for families with children or elderly members.

Theme 3 - Community adaptation and coping mechanisms

Despite these challenges, the Mae Kha canal community demonstrates strong local coping mechanisms and collective adaptation strategies. Community leadership and volunteer support play an important role in helping residents manage flood events.

The community leader mentioned using two boats to rescue residents during the flood and providing temporary shelter for approximately 30 villagers on the second floor of the community center, where mats, pillows, and blankets were prepared. Volunteers within the community also helped neighbors clean houses and remove damaged items after the floodwaters receded.

Communication within the community is supported by several local mechanisms, including LINE group chats, community loudspeakers, and monthly committee meetings. These communication channels allow residents to share information quickly and coordinate responses during emergencies.

These examples demonstrate that local social networks and community leadership significantly strengthen adaptive capacity within the neighborhood.

Theme 4 - Factors influencing residents' decision to remain

Although the community faces recurring flood risks, residents largely choose to remain in the area rather than relocate. Several factors contribute to this decision. First, residents perceive severe floods as relatively infrequent. According to the community leader, major floods typically occur approximately once every ten years, which reduces the perceived urgency to move permanently. The flooding lasted only three to five days, indicating that it was a short-term event rather than a prolonged flood. said, "The biggest flooding like this happens once every 10 years. Not every year. That's why I decided to stay here." He added, "If flooding comes every year, I might think of moving."

Second, strong place attachment influences residents' decisions to stay. Many participants have lived in the community for decades. The community leader reported that he has lived in the area since birth and expressed no intention of leaving.

The community leader said, *"No. I have been living here since I was born, and I will not be forced to leave this place. Temple and house stick together."*

Female intervieweesaid, *"People of the same ethnic group as Akar, Lahu, and Lisu are also living here too."*

Third, economic considerations also discourage relocation. One participant explained that moving to another area would require rebuilding her customer base and finding a new market, which could be difficult and uncertain. The single mom said, "Money is not her problem. The problem is how to earn money. If I move to another place, I have to find a new market and settlement, and everything will be renewed again."

Finally, some residents expressed trust in government water management systems, including nearby dams and municipal canal maintenance. This perception that floods can be managed further reduces the motivation to relocate. Together, these factors demonstrate that decisions to remain in flood-prone areas are shaped by a combination of social ties, livelihood considerations, and perceptions of risk. The female interviewee said, "Mae Ngat dam, Mae Tam dam, Mae Kuwa dam need good flood water management. We still trust the central government for the management of water. Not a flood like this. The mechanism of the dam during rainy seasons. If the dam is saving water and doing good management, the flood will not come to this community, and it will not affect it much."

5. Policy Analysis

This analysis focuses on Thailand's Disaster Prevention and Mitigation Act B.E. 2550 (2007), which provides the main national framework for disaster risk management, along with local urban water management and canal rehabilitation policies implemented by Chiang Mai Municipality. These policies aim to reduce disaster risks through preparedness, response coordination, and infrastructure management, while assigning responsibility to local authorities for implementation.

From the perspective of the Risk Index for Climate Displacement (RICD), the policy framework recognizes hazard exposure but does not sufficiently prevent settlement in high-risk areas. In the case of Mae Kha Canal, communities continue to live in flood-prone zones due to weak land-use regulation and the absence of enforceable zoning policies. As a result, despite the existence of disaster management policies, residents remain physically exposed to recurrent flooding. This indicates a gap between policy design and spatial planning, where risk reduction is not fully integrated into urban development control.

In terms of vulnerability, the policy framework does not adequately address the socio-economic conditions of affected communities. While national policies emphasize disaster response and recovery, limited financial support and weak social protection mechanisms reduce the ability of low-income households to adapt or relocate. As shown in the Mae Kha Canal case, residents face unstable livelihoods, housing insecurity, and limited access to formal support systems. These factors increase vulnerability and highlight the limitations of current policies in addressing the needs of marginalized groups.

Furthermore, existing policies tend to prioritize technical and infrastructure-based solutions, such as drainage improvement and water management, while giving less attention to social dimensions of climate risk. The findings from this study show that decisions to remain in flood-prone areas are strongly influenced by place attachment, social networks, and livelihood dependence. However, these factors are not sufficiently incorporated into policy design. As behavioral migration theory suggests, environmental risk alone does not determine mobility; therefore, policies that assume relocation as a solution may not be effective or appropriate.

The case of Mae Kha Canal also reflects a pattern of short-term temporary displacement, where residents evacuate during floods but return shortly after. This suggests that current policies are more reactive than preventive, focusing on emergency response rather than long-term risk reduction. Although some

government support is provided after disasters, such as financial compensation, it is often insufficient to support full recovery or reduce future risks.

In addition, fragmented land governance along the canal further limits policy effectiveness. Multiple authorities, including temples, private landlords, and government agencies, control land in the area, making it difficult to implement coordinated planning or housing improvements. Existing policy frameworks do not adequately address these institutional challenges, resulting in barriers to safe adaptation.

Overall, the analysis reveals that while Thailand's disaster management policies provide an important framework for risk reduction, their effectiveness in Mae Kha Canal is constrained by weak implementation, limited integration with urban planning, and insufficient attention to social vulnerability. Addressing these gaps requires a more holistic approach that combines infrastructure improvements with inclusive governance, livelihood support, and community-based adaptation strategies.

6. Policy Recommendations

6.1. People-Centered and Voluntary Relocation

Relocation must not be forced, as resistance often stems from fear of losing income and community ties. Therefore, the provisional government needs to ensure voluntary participation with informed consent, conduct community consultations at every stage, and provide clear and transparent information on relocation benefits and risks.

6.2. Livelihood-Based Relocation Planning

One of the primary reasons why people refuse to move is economic insecurity. Therefore, the provisional government needs to select relocation sites close to existing workplaces and markets, provide job seeking programs and transport support, offer livelihood compensation packages during transition periods, support skills training and job placement programs outside high-risk areas, and provide secure and affordable housing provision like guarantee secure land tenure or long-term leases, provide subsidized or low-cost housing options, and design housing that allows home-based economic activities.

6.3. Clarify Land Governance to Enable Safe Housing Improvements

The Thai government and Chiang Mai municipality should establish clearer land governance arrangements along the Mae Kha Canal. Because land ownership and authority are currently fragmented across temples, landlords, and government agencies, residents face barriers to improving their homes. Clarifying land-use rights and coordinating relevant agencies would allow safe housing upgrades and better flood risk management.

6.4. Strengthen Drainage Maintenance and Water Management

Municipal authorities should improve canal and drainage management to reduce flood severity. This includes regular debris removal, improved stormwater drainage, and better coordination of water releases from upstream dams such as Mae Taeng. Maintaining clear waterways is a cost-effective way to reduce flood impacts in canal-side communities.

6.5. Support Flood-Resilient Housing Upgrades

Local authorities should provide targeted financial or material support for flood-resilient housing improvements. Measures such as elevating floors, reinforcing structures, and improving household drainage can significantly reduce damage during seasonal floods while allowing residents to remain safely in place.

6.6. Protect Vulnerable Residents During Flood Events

Local disaster preparedness plans should prioritize vulnerable groups, including elderly residents, children, pregnant women, and people with disabilities. Authorities and community leaders should establish evacuation plans, temporary shelters, and emergency supply systems to ensure safe and timely support during floods.

6.7. Strengthen Community-Based Flood Preparedness

Community leaders should work with municipal authorities to strengthen local flood preparedness. This includes maintaining emergency communication systems (such as LINE groups and loudspeakers), organizing community clean-up activities to prevent waste accumulation in the canal, and preparing basic emergency supplies such as food, clean water, and hygiene kits.

7. Conclusion

Flood risks along the Mae Kha Canal demonstrate how climate hazards intersect with social vulnerability in urban communities. Residents living near the canal are directly exposed to seasonal flooding due to blocked drainage systems, environmental degradation, and increasing rainfall intensity. These floods disrupt daily life, damage homes, and affect livelihoods, particularly for households that depend on informal businesses or tourism-related activities.

Despite these risks, many residents continue to remain in the community due to strong place attachment, livelihood dependence, and established social networks. At the same time, local coping mechanisms such as community leadership, volunteer support, and informal communication systems help residents manage flood events.

These findings suggest that climate adaptation policies should prioritize strengthening in-place resilience rather than assuming relocation as the primary solution. Improving drainage management, supporting flood-resilient housing, and protecting vulnerable households can help reduce climate displacement risks while enabling communities along the Mae Kha Canal to remain safely in place.

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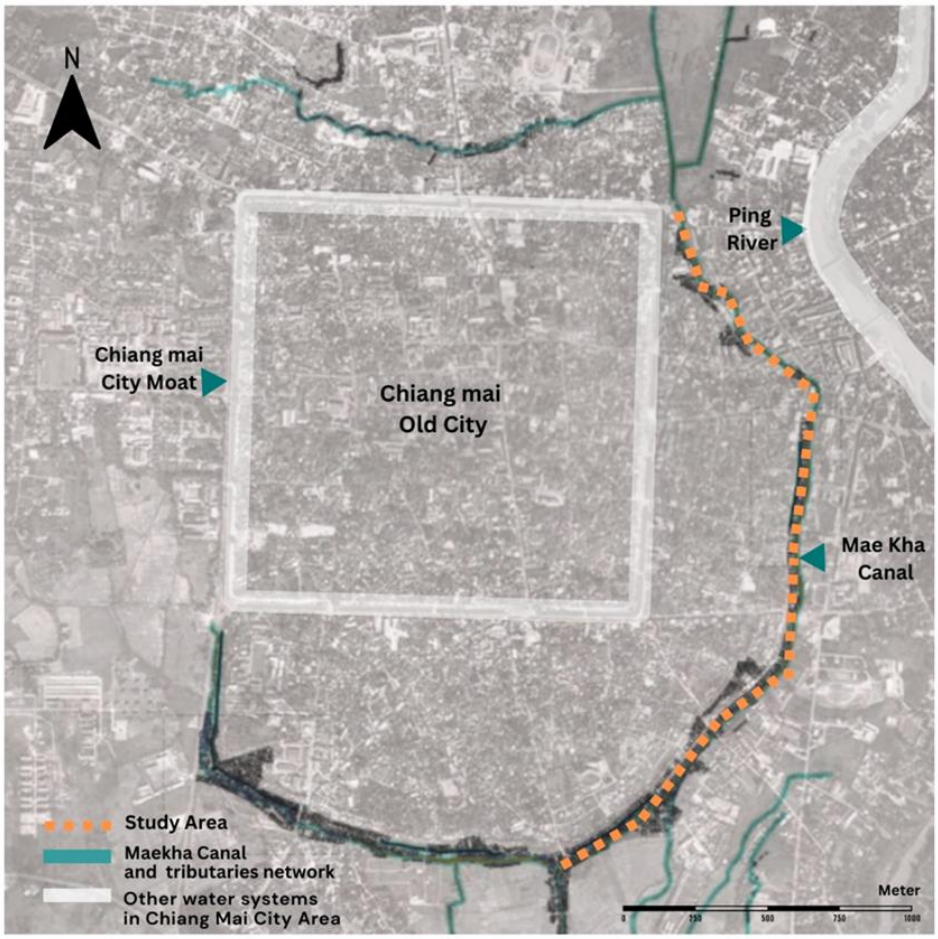
8. Annex



(9.1) Mae Kha Canal in Chiang Mai.

Note. Adapted from *Living Cultural Infrastructure as a Model for Biocultural Conservation by Wonglangka, Suwannarat and Auttarat*

(9.2) Observation Notes summary

1. Community Background

The Mae Kha Canal community consists of long-term residents and migrant households. One of the interviewees, Noi, the 65-year-old community head, has lived in the area since birth. Another participant, Phing, a 38-year-old single mother and street vendor, has lived in the community for 20 years after moving from Chiang Rai Province. Many residents rely on small businesses and tourism activities along the canal for their livelihoods.

2. Flood Experiences

Residents reported several major flood events in the area, including floods in 2005, 2014, 2017, and the most severe flood in 2024. The 2024 flood occurred twice, on 24 September and 4 October, and lasted approximately three to five days. Floodwater levels exceeded residents' expectations and damaged household assets and work equipment.

One participant lost over 100,000 Thai Baht worth of sound equipment used for renting microphones and audio systems. For other residents who depend on tourism and street vending, the flood significantly reduced income because the canal area became muddy and unattractive for visitors.

3. Household Challenges During Floods

Flooding disrupted basic services such as electricity, water supply, and sanitation. Residents reported that electricity and water were cut off during the flood period. For households with children, this created serious challenges in maintaining hygiene and daily routines.

Phing explained that she had to leave her flooded house to search for clean water for bathing and taking care of her two young children. The youngest child was only five years old, which made the situation more difficult. Residents also reported psychological stress, sleepless nights, and anxiety about property damage and safety.

4. Community Response and Coping Mechanisms

The community demonstrated strong collective responses during flood events. The community leader organized rescue efforts using two boats to help residents who were trapped by floodwaters. Around 30 villagers temporarily stayed on the second floor of the community center, where basic supplies such as mats, pillows, and blankets were provided.

Community volunteers also helped neighbors clean their homes after the flood receded. Residents reported strong cooperation within the community, including support networks to assist vulnerable households.

Communication during emergencies is coordinated through several channels, including a community LINE group, loudspeakers, monthly community meetings, and public forums. These communication mechanisms help residents share information and organize responses quickly.

5. Reasons Residents Remain in the Area

Despite repeated floods, most residents choose to remain in the community. Several factors influence this decision.

First, residents perceive severe floods as relatively infrequent. According to the community leader, major flooding occurs approximately once every ten years. Because floods do not happen every year, residents prefer to adapt rather than relocate.

Second, livelihoods are closely tied to the area. Many residents depend on local markets, tourism, and small businesses along the canal. Moving to another location would require rebuilding customer networks and economic opportunities.

Third, residents have strong attachment and social ties. Many families have lived in the area for decades and share close relationships with neighbors and community organizations.

Finally, some residents express trust in government water management systems, including nearby dams such as Mae Ngat, Mae Taeng, and Mae Kuang, which they believe help control flooding.

6. Land Tenure and Housing Issues

Most residents do not have formal land ownership documents. The land in the community is owned by temples and private landlords, and four different authorities are involved in managing the area. This situation makes housing improvements and infrastructure development more complicated.

Residents explained that they often need permission from landlords before making changes to their homes.

7. Government Support and Recovery

After the 2024 flood, some households received government assistance of approximately 9,000 Thai Baht. However, residents reported that this amount is not sufficient to cover the cost of repairing houses or replacing damaged property.

Some families received additional support from private foundations, such as scholarships and school supplies for children.

8. Social and Language Challenges

The community includes several ethnic minority groups, including Akha, Lahu, and Lisu residents. Language barriers sometimes create difficulties when accessing healthcare services or communicating with authorities.

Some families rely on younger family members to translate when visiting hospitals. Residents also reported mental health stress following the flood, especially among minority households who face additional economic and social challenges.

9. Community Needs and Policy Suggestions

Residents identified several areas where government support could improve community resilience.

First, they emphasized the need for better drainage systems and canal maintenance to prevent waste from blocking water flow. Second, they suggested clearer land management and coordination among government agencies. Third, residents requested stronger livelihood support for low-income households and students.

They also highlighted the importance of healthcare access, mental health services, and community markets to support local economic activities.

(9.3) Table of Group Interview composition

Table (A) Group Interview Composition (Participants)

Participant Code	Role in Community	Age Group	Household Situation	Occupation
Participant 1	Community Leader	Older adult (65)	Lives with family members	Community leader
Participant 2	Resident	Adult (38)	Single parent with two children	Street vendor / seller along Mae Kha Canal

Table (B) Interview Team Composition

Role	Number of Persons	Description
Moderator	1	Led the interview and asked main questions
Co-Moderator	1	Assisted with follow-up questions
Note Taker	1	Recorded key observations and responses
Translator	1	Assisted communication between researchers and participants