

Copin: Cultivating Resilience Through Collective Community Mapping

Project Overview

How can we support resource-limited communities' resilience planning efforts against natural disasters fueled by climate change?



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Climate-related disaster expenses have surged globally, impacting resource-limited communities in both urban and rural areas the hardest. These communities face a cascade of challenges, including loss of livelihood, displacement, and disruptions to disaster mitigation systems. The devastating effects of these disasters can trap communities in poverty, particularly those in high-risk areas dependent on informal economies and natural resources.

A research team led by MIT Professor Miho Mazereeuw (Architecture), which includes Aditya Barve, Mayank Ojha, Eakapob Huangthanapan, Pimpakarn Rattanathumawat, and Rutvik Deshpande, addressed this challenge by developing a digital toolkit that fosters preparedness at the grassroots level and helps build resilience for the most vulnerable populations. The team's toolkit, named *Copin* as a nod to "coping capacity" and "pinning" information on a map, facilitates community-led mapping of resilience traits (the ability to adapt, absorb, and anticipate change) and coordinates adaptation activities. It helps document essential resources, vital community roles, leadership frameworks, and climate risk data, all of which enhance local adaptive capacities. The toolkit tackles social equity and quality of life issues by offering methods to integrate hyper-local spatial information about hazards, vulnerabilities, and coping capacities – helping to mitigate the immediate impacts of climate disasters and strengthen long-term community resilience.

Beginning with a pilot project in Thailand, *Copin's* community-driven mapping incorporates local insights and enhances socio-cultural understanding of the environment, knowledge often missing from official maps. Thailand was chosen for the pilot because it is at the forefront of climate-related disasters and presented the opportunity to collaborate with the Community Organization Development Institute (CODI), a national agency with strong relationships in over 7,000 villages. This partnership offered the institutional support and local access necessary for impactful, community-led implementation at scale. By integrating grassroots data into official response strategies, *Copin* fosters a culture of consensual and inclusive policymaking around challenging decisions, such as relocation, in the context of increasing climate impacts. Currently, community-level data collection, coordination, and planning mostly rely on paper maps and traditional methods, resulting in information that is seldom useful for broader policymaking unless labor-intensive digitization occurs – a challenge that *Copin* successfully addresses.



The project aligns closely with the MCSC's Data & Computing and Social Dimensions pathways.

Findings & Outcomes

The team developed a tool for community-led mapping of resilience traits and for coordinating adaptation action to promote preparedness to climate-related disasters in vulnerable communities.

Copin is now active in over 30 provinces in Thailand. The toolkit offers a customizable web interface to ensure that information is accessible for regional and national policymaking. During the pilot of the tool, communities across Thailand used *Copin* to gather over two thousand data points in four categories:

- **Vulnerability reports** (60%) identifying household-level gaps in the Thai government data; these reports document housing insecurity, income instability, eldercare burdens, and overlooked households.
- **Community assets** (18%) that can be leveraged during times of stress, identifying local schools, temples, healthcare points, informal markets, etc., that serve as resilience nodes.
- **Community leaders and organization reports** (20%) identifying key local human resources, mapping key local actors and governance structures.
- **Disaster impact reports** (2%) cataloging flood and landslide impacts, capturing site-specific needs of the communities.

Copin has significantly shaped policy discussions at both subnational and national levels in Thailand. CODI has integrated data from the platform into vulnerability assessments that guide budget requests and development strategies at district and provincial tiers. Notably, 117 vulnerable households identified through *Copin* were previously absent from the National Poverty Database, a vital resource for determining social welfare eligibility. As a result, these households can now access national support, highlighting how community-sourced data can fill crucial gaps in formal systems. The high volume of vulnerability reports signifies a demand for visibility and inclusion from marginalized groups, showcasing the trust in the participatory process and recognizing the tool as a credible means of advocacy. Reports on assets and leadership underscore the significance of informal networks – such as temples, local health volunteers, and rotating savings groups – in fostering community resilience, pinpointing areas often neglected in standard hazard mapping. The limited number of disaster impact reports reflects both the pilot's timing and the opportunity for enhancing community capacity in post-disaster data gathering.



Community workshop of *Copin* tool in Chai Bat, Thailand.

Copin has effectively connected community voices with institutional planning. Its user-friendly design, use of familiar platforms, and adaptable card-based data format have facilitated wide adoption within a brief period. It has demonstrated how bottom-up data can improve inclusion, resource allocation, and multi-stakeholder coordination. The platform's increasing use by CODI and acknowledgment from policymakers indicate its potential for national expansion, while interest from private entities (such as Bangkok Bank) positions it as an important tool for cross-sector climate resilience partnerships.

Conference Presentations

MIT Professor Miho Mazereeuw, Principal Investigator on this project, presented at "Building Resilience for Thailand's Aging Society: Community-Driven Approaches Amidst Climate Change and Disasters" at the *Beyond Years: The Future of Longevity* conference in Bangkok. There, *Copin* was showcased to Her Royal Highness Princess Maha Chakri Sirindhorn of Thailand.

The work was also showcased at national workshops by CODI and highlighted as a best practice in an invited presentation at "Building Resilience Through Collaborative Community Mapping: Insights from *Copin* Thailand" at the International Workshop on Climate-Resilient Development in Southeast Asia at Harvard University. Aditya Barve and Pimpakarn Rattanathumawat delivered the presentation.

Opportunities for Implementation

Although the pilot project concentrated on Thailand, the team is interested in working with companies to pilot the *Copin* tool's other applications and synergies:

- **Strengthening circular economy transitions through community resource mapping.** Circularity relies on accurate material flow data across production and waste systems. In developing nations, informal networks are significant in these material flows. The *Copin* platform could help crowdsource hyper-local inventories of recyclable materials, informal waste collection networks, and community upcycling initiatives. This data could optimize reverse logistics networks for consortium members while supporting inclusive livelihoods. For example, consumer electronics manufacturers could use *Copin* to map formal and informal networks, identify micro-entrepreneurs for e-waste collection partnerships, and enhance circular supply chain transparency in the global south.
- **Mitigating agricultural supply chain risks through community asset mapping.** Companies are confronting climate-related risks to their agricultural supply chains. This concern is particularly salient in Southeast Asia and South America, where smallholder farmers drive production. *Copin's* community asset mapping methodology has the potential to pinpoint specific localized vulnerabilities, such as drought-prone areas within Thailand's rice belt, while also documenting the informal networks that contribute to the maintenance of crop diversity. Integrating this data with corporate sustainability platforms could significantly enhance overall resilience.
- **Utilizing community data for evidence-based ESG.** To enhance the success of ESG investments, it is vital that companies align their corporate social responsibility initiatives with the long-term needs of the communities that they are part of. By employing real-time, evidence-driven data from reports generated by the community, companies can guarantee transparency and monitor their progress, facilitating the focused distribution of ESG funding. This transparent impact tracking encourages trust and accountability among stakeholders.
- **Community-based ecosystem services monitoring and equitable carbon credits.** Through community-led monitoring, verifiable carbon sequestration programs could track reforestation and renewable energy projects. Such initiatives can provide real-time data to ensure accountability and meet corporate sustainability goals. These approaches help spur investment in projects that generate credible impact while building resilience for resource-constrained communities.