PANTAO
The International Journal of the Humanities and Social Sciences
Volume 4, Issue 4
ISSN 3028-0877 | doi 10.69651/2022PIJHSS

Beyond warnings: A perspective on disaster response and preparedness in the Philippines

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ABSTRACT

This perspective examines disaster response in the Philippines through the lens of early warning, suspension policies, evacuation, local mitigation, and overall preparedness across early response, infrastructure, communication, and education. It highlights notable gains—such as the national weather bureau's increasingly impact-based warnings, standardized class/work suspensions, and the routinization of pre-emptive evacuations—while surfacing persistent gaps in last-mile risk communication, uneven LGU (local government unit) capacities, infrastructure maintenance, and risk education. The paper proposes actionable improvements: fully impact-based, locality-specific alerts; clearer, harmonized suspension triggers for schools and workplaces—including SUCs (state universities and colleges); stronger pre-disaster logistics and forecast-based financing; community-owned evacuation protocols; nature-based defenses alongside resilient infrastructure; and continuous public risk education integrated with local planning.

Keywords: climate resilience, community-based disaster management, disaster risk reduction, early warning systems, Philippine disaster response, pre-emptive evacuation

Date Submitted: July 30, 2025
Date Accepted: September 2, 2025
Date Published: October 1, 2025

INTRODUCTION

The Disaster Risk Reduction and Management Act or RA (Republic Act) 10121 of 2010 marked a significant shift in the Philippines from a reactive disaster response approach to a proactive, risk reduction and preparedness framework, establishing the National Disaster Risk Reduction and Management Council (NDRRMC) and mandating comprehensive strategies across prevention, preparedness, response, and recovery (Alegado, 2021; Iuchi et al., 2019; Saldivar-Sali, 2015). The law requires national and local government agencies, as well as

DOI: http://doi.org/10.69651/PIJHSS0403486

Recommended citation:
Lor, D. C. (2025). Beyond warnings: A perspective on disaster response and preparedness in the Philippines. Pantao (The International Journal of the Humanities and Social Sciences) 4 (4), 5240-5249.
http://doi.org/10.69651/PIJHSS0403486

educational institutions, to institutionalize disaster risk reduction and management (DRRM) policies, structures, and programs, with a focus on building resilience and ensuring the continuity of essential services, such as education, even during disasters (Bartolome, 2020; Domingo, 2016; Sumbillo & Madrigal, 2020).

Implementation has led to improvements in local government capabilities, community engagement, and inter-agency collaboration, but challenges remain, including coordination inefficiencies, resource limitations, and the need for stronger accountability and inclusivity, especially highlighted by major disasters like Typhoon Yolanda (Alegado, 2021; Guardiano, 2024; Iuchi et al., 2019). The integration of DRRM into development planning and budgeting has influenced institutional initiatives, but further strengthening of RA 10121 through better translation into practice and more robust institutional arrangements is needed to fully realize its potential (Domingo, 2016; Saldivar-Sali, 2015). Recent studies emphasize the importance of continuous capacity building, community participation, and adaptive governance to address the Philippines' persistent vulnerability to multi-hazard risks, which are exacerbated by climate change and settlement patterns (Guardiano, 2024; Iuchi et al., 2019).

Statement of the problem

Despite significant progress in the Philippines' disaster risk reduction and management (DRRM) framework following the implementation of Republic Act 10121 of 2010, the country continues to face persistent challenges in translating policies and forecasts into timely, coordinated, and community-centered disaster response actions. While national agencies like PAGASA have advanced toward impact-based forecasting, and local governments have institutionalized DRRM offices, recurring disasters expose systemic gaps in early warning communication, evacuation management, infrastructure readiness, and risk education. These challenges highlight the urgent need to assess the coherence, responsiveness, and inclusivity of disaster preparedness and response mechanisms at the national and local levels. Specifically, this paper seeks to examine the following problems:

1. How effective are the current early warning systems of PAGASA and related agencies in translating hazard information into clear, locality-specific, and actionable messages that reach communities, especially in the "last mile" of communication?
2. To what extent are class and work suspension policies harmonized across DILG, LGUs, and State Universities and Colleges (SUCs), and how do inconsistencies in these policies affect public safety and continuity of operations during severe weather events?
3. How well are pre-emptive evacuation protocols implemented by local government units (LGUs), and what factors influence the safety, inclusivity, and dignity of evacuation centers and shelters during disasters?
4. What mitigation and preparedness measures—both structural (e.g., flood control, resilient infrastructure) and non-structural (e.g., land-use zoning, nature-based solutions)—are being adopted by LGUs, and how effective are these in reducing vulnerability and enhancing resilience?
5. How adequate are local preparedness assets and coordination systems, including logistics, communication, and education, in enabling rapid and organized disaster response at the community level?

6. What institutional, technological, and governance gaps persist in integrating disaster preparedness, communication systems, public education, and post-disaster learning into a unified and sustainable framework for disaster resilience in the Philippines?

METHODOLOGY

This article was developed through a careful review of existing disaster risk reduction practices and policies in the Philippines, particularly those issued by PAGASA, the DILG, and local governments. Instead of conducting fieldwork or data collection, the findings were drawn from official guidelines, case examples from recent disasters, and insights from published studies to understand how early warnings, class suspensions, evacuations, and local mitigation measures are carried out. By weaving together these sources with practical observations, the article reflects on both strengths and gaps in the current system and suggests realistic improvements that can be implemented without the need for new legislation.

RESULTS AND DISCUSSION

This perspective study was developed through a comprehensive review of existing disaster risk reduction practices and policies in the Philippines, particularly those issued by PAGASA, the Department of the Interior and Local Government (DILG), and local government units (LGUs). It did not involve fieldwork or direct participants but relied on secondary data gathered from institutional reports, official advisories, and published research on disaster management practices. The synthesis of these data sources revealed key insights into the country's progress in disaster preparedness, early warning, response coordination, and local resilience-building. Through this approach, the study highlights that while the Philippines has achieved significant milestones in disaster response and mitigation, it continues to face persistent operational and systemic challenges across various dimensions of disaster management.

Early warning systems by PAGASA

One of the most significant advancements in the country's disaster management framework is PAGASA's transition from hazard-based to impact-based forecasting. This represents a major step forward, shifting focus from merely describing hazard intensity to communicating the likely, location-specific consequences of disasters, such as flooding depth, road impassability, and landslide risk. Systems developed by the University of the Philippines Resilience Institute and NOAH Center use high-resolution data and local calibration to generate barangay-level predictions, which empower local governments to prioritize vulnerable communities and allocate resources effectively. For forecasts to be actionable, they must be clear, understandable, and tailored to end users—using plain language, standardized color codes, and detailed maps that identify potential impacts on key facilities such as roads, hospitals, and schools. Integrating local knowledge and community feedback further ensures that these forecasts are relevant and trusted. However, challenges persist in maintaining consistency among forecasters, aligning thresholds across regions, and bridging the gap between model developers

and disaster managers. Ultimately, the opportunity lies in deepening the localization of impact-based forecasting, ensuring that hazard information translates into specific, time-sensitive, and community-appropriate actions.

The effectiveness of warning systems depends not only on their accuracy but also on their dissemination. In the Philippines, multi-channel communication is crucial to ensure that warnings reach all sectors of society. Local government units primarily rely on text messaging and social media platforms, but these systems are prone to failure during severe weather or power interruptions. Studies emphasize the need for redundancy—combining SMS, radio, television, sirens, and community-based messenger systems—to maintain communication even when digital networks are disrupted. The integration of battery-supported sirens, two-way radio systems, and partnerships with civic and faith-based organizations into standard operating procedures has been recommended to strengthen last-mile communication. Interactive radio-SMS systems also promote community engagement and enable feedback during emergencies. While location-based alerts have improved in coverage and accuracy, regular maintenance, dedicated funding, and planning for system upgrades remain essential to ensure reliability, particularly for remote barangays that are often the last to receive warnings.

Complementing traditional forecasting is the growing use of nowcasting for short-term, high-impact weather events such as thunderstorms and flash floods. Nowcasting integrates satellite, radar, and ground-based data to predict extreme rainfall within minutes to hours, providing critical lead time for local governments to implement pre-agreed micro-actions like early class dismissals or traffic rerouting. Research shows that nowcasting can provide up to three hours of advanced warning—enough time for life-saving interventions. When enhanced with deep learning and probabilistic modeling, nowcasting achieves higher accuracy for extreme weather prediction and can be integrated into local early warning systems. However, the quality of data inputs and the capacity of LGUs to interpret and act upon this data remain determining factors of effectiveness. Real-time monitoring networks, coupled with impact-based modeling at the watershed or street level, are also recommended to improve safety outcomes. Pairing nowcasts with pre-planned, actionable community responses can significantly enhance disaster preparedness and reduce casualties in high-risk regions.

Class and work suspension policies of DILG, LGUs, and SUCs

Another critical dimension of disaster preparedness involves suspension policies for classes and work during hazardous weather conditions. Under the guidance of the DILG, local governments typically declare class and work suspensions based on PAGASA's advisories and on-ground observations. This decentralized system allows for timely and context-specific decision-making, but variability among LGUs often results in confusion for households and employers, especially when announcements are issued late at night. Studies recommend the adoption of clear, region-specific decision matrices that link specific weather advisories—such as Tropical Cyclone Wind Signals or Rainfall Warning levels—to standardized actions, including in-person, online, or full suspension. Such matrices, when designed to reflect local meteorological and geographic realities, increase transparency, build trust, and support consistent decision-making. However, the success of these systems depends on the clarity and usability of

information rather than the volume of technical data provided. Harmonizing decision protocols across jurisdictions is therefore essential to ensure coherence and public safety.

State Universities and Colleges (SUCs) also play a pivotal role in this system. While most SUCs adhere to LGU suspension announcements, many maintain the right to issue independent advisories, particularly when managing residential campuses with students from multiple provinces. This institutional autonomy, though well-intentioned, can result in inconsistencies that affect student safety and disrupt academic continuity. To address this, SUCs and LGUs are encouraged to establish formal Memoranda of Agreement (MOAs) defining coordination protocols, safety windows for commuting students, and remote-learning fallback mechanisms. Additionally, SUCs may serve as temporary evacuation sites during emergencies, necessitating that their facilities meet minimum safety, accessibility, and protection standards. Strengthening inter-agency coordination between SUCs and LGUs would ensure that decisions regarding suspensions and sheltering are timely, unified, and protective of both educational and humanitarian priorities.

Pre-emptive evacuation by LGUs

Pre-emptive evacuation has become a defining feature of effective disaster response in the Philippines. Shifting from voluntary to protocol-based evacuation ensures that actions are guided by measurable triggers such as rainfall thresholds, river water levels, tide tables, and weather signals. Studies reveal that integrating real-time rainfall-runoff models and water-level data enables LGUs to issue timely evacuation orders with two or more hours of lead time, significantly reducing casualties. However, the success of these operations relies on combining scientific indicators with social and political considerations to make context-appropriate decisions that communities will follow.

The dignity and safety of evacuees are central to successful pre-emptive evacuation. Best practices highlight the need for clear minimum standards in evacuation centers, emphasizing safety, sanitation, water access, hygiene, and protection for vulnerable groups. Effective shelter management requires proper planning, stakeholder coordination, and community training to ensure order and well-being during emergencies. Another critical consideration is the inclusion of pet and livestock arrangements in evacuation planning. Studies show that pet ownership influences evacuation behavior, with many families risking their lives to rescue pets when shelters do not accommodate them. Pet-friendly policies, therefore, improve compliance, reduce stress, and prevent unsafe re-entry into danger zones. Meanwhile, accountability mechanisms such as rapid registration, head counts, and family tracking systems help ensure equitable relief distribution, prevent duplication, and facilitate reunification during evacuations. The use of simple tools like logbooks, codes, and manual rosters allows authorities to maintain accurate records and coordinate efficiently even without digital systems.

Local government mitigation measures

Findings emphasize that LGUs play a pivotal role in reducing disaster risks through both structural and non-structural measures. Structural interventions include flood control

infrastructure, desilting operations, pumping systems, slope stabilization, typhoon-resistant buildings, and undergrounding of utilities. These are complemented by non-structural strategies such as enforcing no-build zones, updating zoning ordinances, maintaining drainage systems, and developing climate-smart land-use plans. Recently, nature-based solutions have gained attention for their long-term resilience benefits. These include mangrove rehabilitation, river easements, watershed reforestation, and the creation of blue-green infrastructure that allows water to flow naturally in urban spaces. While evidence of their effectiveness in tropical environments like the Philippines is still emerging, early results show promising outcomes in flood and sediment control. GIS-based assessments have further identified barangays most at risk of flooding, guiding targeted interventions such as retention ponds and pumping stations in coastal areas.

At the community level, adaptation preferences often lean toward in-situ solutions like elevated housing and stilted structures rather than relocation, though these may pose long-term vulnerabilities. Structural vulnerability studies underscore the importance of retrofitting public buildings, schools, and health centers to withstand multiple hazards. Preparedness assets—including logistics, communication systems, emergency supplies, and awareness campaigns—are essential to ensure that LGUs can respond quickly. However, gaps persist in human resources and financial support. Studies show that LGUs with proactive governance and compliance with DRRM policies demonstrate stronger institutional capacity and reduced disaster impacts, though these benefits are often limited by insufficient funding and trained personnel.

Overall preparedness: early response, infrastructure, communication, and education

Preparedness in the Philippines encompasses early response mechanisms, resilient infrastructure, robust communication systems, and continuous education. Pre-disaster logistics such as framework agreements with suppliers, transport contracts, and pre-positioned relief items enhance response speed and efficiency. Forecast-based financing (FbF) has also emerged as a transformative innovation, allowing funds to be released automatically once forecast thresholds are met, thereby enabling anticipatory actions like evacuation, pre-deployment of resources, and protective measures before disasters strike. Research demonstrates that FbF reduces humanitarian costs, displacement, and response time, though its success depends on forecast reliability and local integration.

Infrastructure readiness remains a critical concern, as schools, health centers, and lifeline facilities continue to face exposure to multiple hazards. Modern approaches recommend multi-hazard design standards and the use of rapid assessment tools to identify structures requiring retrofitting or replacement. Road and bridge redundancy, especially in remote barangays, ensures continued access to essential services during disasters. Regular “dark start” drills, which simulate power and communication outages, are also vital for testing operational readiness. Despite these measures, many LGUs remain only partially prepared due to limited manpower and fragmented data management. Building resilient infrastructure requires not just funding but sustained capacity development, training, and monitoring.

Communication systems are equally essential to preparedness. Standardized disaster message templates in the Philippines usually include the expected impacts, protective actions, and assistance sources. Research stresses the importance of clarity and multilingual

dissemination to ensure accessibility for all communities. When digital channels fail, barangay radio systems and public address equipment become indispensable. Strengthening these channels and establishing rumor control mechanisms involving local leaders can prevent misinformation and improve trust during emergencies.

Finally, education and drills serve as the foundation of a disaster-resilient culture. Integrating disaster risk reduction (DRR) into K–12 and higher education curricula has proven effective in cultivating awareness and preparedness. Programs that combine web-based hazard mapping with traditional cartography help students identify local risks and develop critical thinking about environmental hazards. Participatory mapping, simulation exercises, and scenario-based evacuation drills improve readiness and foster collective responsibility. Student engagement in designing disaster prevention maps has also been shown to enhance family and community preparedness. The inclusion of DRR in education not only strengthens safety awareness but also fosters long-term community resilience.

CONCLUSION

The Philippines has built a progressively stronger disaster response protocols: more actionable PAGASA warnings, routinized suspension and evacuation decisions, growing stocks of mitigation works, and a culture that increasingly values preparedness. In the end, what really matters is how clear the message is when it reaches the community, how prepared the local responders are, and how safe and dignified the shelters feel for the people who rely on them. The next step doesn't need a brand-new law to happen. It requires disciplined execution: fully impact-based, locality-specific warning-to-action playbooks; clear and coordinated suspension policies (including SUCs); dignified, inclusive shelters; resilient and well-maintained infrastructure; continuous public risk education; and predictable, threshold-based financing to act before hazards strike. If these become standard practice nationwide, disaster response will be faster, fairer, and far more lifesaving—turning forecasts into timely, collective action.

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