International Journal of Scientific Research and Engineering Development-– Volume 8 Issue 4, July Year 2025

Available at www.ijsred.com

RESEARCH ARTICLE OPEN ACCESS

TYPHOON-TRIGGERED HAZARDS IN TAYTAY, RIZAL: A STRATEGIC ACTION PLAN FOR FLOODING, LANDSLIDES, AND DENGUE PREVENTION

King Arthur Arambulo*, Edward G. Landayan**

*(*Batangas State University*, Batangas City, Philippines Email: 23-56543@g.batstate-u.edu.ph)

**(*Batangas State University,* Batangas City, Philippines Email: landayanedward4@gmail.com)

----------**********----------

Abstract:

The Municipality of Taytay in Rizal, Philippines, is increasingly exposed to overlapping natural and public health hazards. With the compounding impacts of typhoon-induced flooding, rain-induced landslides, and dengue outbreaks, the need for an integrated and strategic disaster risk reduction and management (DRRM) framework is urgent. This research presents a comprehensive multi-hazard action plan anchored on the four DRRM pillars: Prevention and Mitigation, Preparedness, Response, and Rehabilitation and Recovery. Through mixed-methods research—comprising community surveys, key informant interviews, and document review—the study identifies local strengths, weaknesses, and opportunities for hazard response. The action plan targets the municipality's most vulnerable barangays and outlines actionable programs, projects, and activities (PPAs), emphasizing capacity-building, early warning mechanisms, infrastructure maintenance, and community education. It aims to enhance coordination among stakeholders and strengthen Taytay's resilience to concurrent disasters. The study contributes a practical model for other local government units (LGUs) facing similar multi-hazard risks.

Keywords **— Disaster Risk Reduction and Management (DRRM), Multi-hazard planning, Flood mitigation, Rain-induced landslides, Dengue outbreak, Taytay Rizal, Strategic action plan, Local government unit (LGU), Climate resilience, Public Health emergencies, Urban Disaster Preparedness**

----------**********----------

I. INTRODUCTION

The Philippines ranks among the most disaster-prone countries globally, owing to its geographic location along the Pacific Typhoon Belt and the Pacific Ring of Fire. Each year, an average of 20 tropical cyclones enter the Philippine Area of Responsibility, causing significant flooding, landslides, and infrastructure damage. In addition to geophysical threats, the country contends with persistent outbreaks of vector-borne diseases like dengue, particularly during the rainy season. Taytay, a first-class municipality in Rizal province and part of Metro Manila's eastern periphery, is a representative case of compounding hazards.

Historically, Taytay has experienced severe typhoon impacts, including flooding as seen during Typhoon Ondoy (2009) and recurring dengue outbreaks, such as the 2019 epidemic. These hazards—flooding, landslides, and dengue—have largely been treated in isolation in contingency plans. However, as climate change intensifies the frequency and overlap of extreme events, there is a

growing need to adopt an integrated, multi-hazard perspective.

This study proposes a comprehensive action plan that addresses these risks not as separate events, but as interlinked phenomena. It synthesizes local data, risk perceptions, and planning gaps into a strategy aligned with the four pillars of DRRM. It serves both as an operational tool for Taytay's LGU and a replicable framework for similarly exposed municipalities.

II. SCOPE AND LIMITATIONS

The action plan covers all five barangays of Taytay: San Juan, Dolores, Sta. Ana, San Isidro, and Muzon. While these barangays differ in geography and risk profile, all are exposed to at least one of the hazards—flooding, rain-induced landslides, or dengue. San Juan and Sta. Ana faces seasonal and flash flooding due to low elevation and poor drainage, while Dolores and San Isidro face landslide threats due to deforestation and settlement on slopes.

The scope includes planning across DRRM's four pillars, focusing on achievable programs within a two- to three-year timeframe. The research concentrated on low-cost, high-impact interventions such as community-based early warning systems, maintenance of drainage systems, training of barangay responders, and health education.

Limitations include the relatively small survey size (30 respondents), reliance on self-reported data, and absence of engineering assessments. Additionally, while the plan includes guidance on cash-for-work and emergency relief distribution, it does not delve into complex infrastructure design or long-term resettlement options.

III. SITUATIONAL ANALYSIS

Global and National Context

Climate change has intensified rainfall and altered typhoon behavior, resulting in slower-moving storms with higher rainfall volume. In 2024 alone, record-breaking floods were recorded across Asia and Central America. Simultaneously, dengue—a vector-borne disease carried by Aedes mosquitoes—has become endemic in more than 100 countries. According to the World Health Organization, global dengue cases rose from 500,000 in 2000 to over 5 million by 2019. The Philippines is consistently among the top ten countries with the highest number of dengue cases.

Local Context

Taytay's geographic vulnerability is exacerbated by rapid urbanization. Barangays San Juan and Sta. Ana experiences regular flooding due to proximity to Laguna Lake and clogged waterways. Meanwhile, Dolores and San Isidro face landslide threats exacerbated by hillside settlements and deforestation. Muzon, though smaller in population, also experiences periodic flooding.

From 2020 to 2022, Taytay averaged 244 dengue cases annually. This surged to 644 in 2023–2025, linked to prolonged rainy seasons and poor waste management. Past typhoons like Ondoy (2009), Carina (2024), and Kristine-Leon (2024) caused widespread disruption. The convergence of these hazards—often within weeks of each other—overwhelms municipal response capacity and threatens public health, infrastructure, and economic activity.

IV. RESEARCH DESIGN

A mixed-methods approach was adopted. Quantitative data came from a structured survey administered to 30 residents evenly distributed across Taytay's barangays. The survey featured 28 Likert-scale questions and two open-ended items, covering themes such as disaster awareness, flood response, vector control, and sanitation compliance.

Qualitative data included key informant interviews with officials from the Municipal Disaster Risk Reduction and Management Office

(MDRRMO), the Municipal Health Office (MHO), and barangay captains. Secondary data were gathered from local DRRM plans, flood and landslide hazard maps, and Department of Health records.

Data analysis included:

- Descriptive statistics for survey responses

- Thematic coding of open-ended answers

- A combined SWOC and PESTEL framework analysis

Ethical considerations were followed, including anonymity of respondents and voluntary participation.

V. RESULTS OF THE SURVEY

Survey results suggest strong awareness but variable institutional effectiveness:

TABLE I.
Results of Survey (questions with high rating)

DRR Initiatives	Rating
Clarity of flood evacuation plans	4.3
Public awareness campaigns	4.4
Responsiveness to complaints	4.3

TABLE II.
Results of Survey (questions with high rating)

DRR Initiatives	Rating
Drainage system effectiveness	4.3
Residents' knowledge of early warnings	4.4
Compliance with sanitation regulations by businesses	4.3

On the other hand, open-ended responses emphasized three key gaps:

- Poor maintenance of canals and esteros
- Weak enforcement of waste management
- Limited community participation in clean-up efforts

VI. SWOC ANALYSIS

TABLE III.
SWOC Analysis

STRENGTH	WEAKNESS
Institutionalized DRRM Structures: Taytay has an operational MDRRMO with trained staff and established protocols.	**Outdated Equipment**: Existing rescue and medical equipment are insufficient for large-scale disasters.
Early Warning and Monitoring: The municipality operates an Emergency Operations Center (EOC) and uses CCTV surveillance and hazard maps.	**Poor Drainage Maintenance**: Blocked waterways due to waste accumulation and encroachment cause recurrent flooding.
Incident Command System (ICS): ICS is applied during emergency operations, enhancing inter-agency coordination.	**Weak Sanitation Enforcement**: Businesses and households often fail to comply with sanitation ordinances, facilitating mosquito breeding.
Supportive LGU Leadership: Local executives actively support DRRM planning and have allocated funding for preparedness and response.	**Low Community Participation**: Residents seldom join preparedness drills or clean-up campaigns, reducing collective resilience.
Community Partnerships: Engagements with schools, churches, and civil society groups strengthen community mobilization.	**Ineffective Risk Communication**: Warning systems (sirens, SMS alerts) are inconsistently deployed and not well-publicized.
OPPORTUNITIES	**CHALLENGES**
National Program Support: Initiatives like DOH's dengue campaigns	**Informal Settlements in Hazard Zones**: High-risk areas are often inhabited by vulnerable

and DPWH's flood infrastructure can be localized.	communities with limited relocation options.
Private Sector Involvement: Local waste contractors and recyclers can partner in vector control and drainage management.	**Jurisdictional Overlap**: Conflicting mandates among agencies hinder enforcement of zoning, sanitation, and housing policies.
Technology Integration: Mobile apps and social media can expand risk communication and community reporting.	**Resource Constraints**: Financial and bureaucratic barriers delay procurement and implementation of critical interventions.
Youth Engagement: The municipality's large and active youth sector can be mobilized for DRRM volunteerism and education	

VII. PESTEL ANALYSIS

Political

Politically, the municipality benefits from a proactive local government that prioritizes DRRM as part of its broader governance agenda. The leadership has institutionalized disaster planning through budget allocations, partnerships, and public pronouncements, reinforcing community trust in local authorities

Economic

Economically, Taytay's status as a first-class municipality with a large commercial base provides financial flexibility to fund DRRM activities, procure equipment, and mobilize logistics. However, disaster-related expenditures often compete with other local priorities such as education and infrastructure, creating funding trade-offs.

Social

Socially, Taytay has a large, youthful population with growing awareness of environmental and health issues. Community participation is strong in specific barangays, particularly where past disasters have left visible impacts. However, informal settlers remain highly vulnerable and often excluded from formal risk reduction programs. These settlements also experience overcrowding and sanitation challenges that heighten their exposure to disease and disaster impacts.

Technological

On the technological front, Taytay utilizes CCTV networks and has access to GIS hazard maps, although digital connectivity in upland areas remains limited. There is potential for enhancing early warning systems using SMS alerts and mobile apps, but technological uptake varies widely across barangays.

Environmental

Environmentally, Taytay is situated in a low-lying floodplain adjacent to Laguna Lake and receives high annual rainfall, exacerbating flood risk. Deforestation and poor waste disposal have contributed to erosion and blocked waterways, aggravating landslide and flooding conditions.

Legal

Lastly, the legal environment is framed by national legislation such as RA 10121 (DRRM Act), which mandates LGU responsibilities for DRRM. While the legal framework is comprehensive, enforcement of zoning laws, relocation policies, and sanitation regulations remains inconsistent, reducing the effectiveness of risk mitigation efforts.

VIII. ACTION PLAN

TABLE IV
ACTION PLAN FOR GOAL 1 OBJECTIVE 1.1

Goal 1	Strengthen the resilience of communities through enhanced mitigation measures, infrastructure, and policies minimizing the long-term impact of rain-induced landslides, flooding, and dengue on the population.
Objective 1.1	To sustain annual maintenance and cleanup of creeks, irrigation canals, drainage systems and similar waterways in Taytay, Rizal
Outcome	Creeks, canals, drainage systems, and similar waterways in Taytay, Rizal are consistently maintained and free of debris annually, ensuring their optimal functionality for flood control, irrigation, and public health.
Programs, Projects, and Activities (PPA)	1.1.1. Survey of key canals and waterways within Taytay 1.1.2. Maintenance and cleanup of key canals and waterways within Taytay

To strengthen community resilience against rain-induced landslides, flooding, and dengue, the matrix above shows the plan for a sustained maintenance and cleanup of its creeks, irrigation canals, and drainage systems. Under Objective 1.1, the municipality has outlined targeted programs, projects, and activities (PPAs) aimed at ensuring these waterways remain functional and debris-free throughout the year. These efforts include the survey of key canals and waterways across the five barangays and the regular cleanup and maintenance of critical waterways.

TABLE V
ACTION PLAN FOR GOAL 1 OBJECTIVE 1.2

Goal 1	Strengthen the resilience of communities through enhanced mitigation measures, infrastructure, and policies minimizing the long-term impact of rain-induced landslides, flooding, and dengue on the population.
Objective 1.2	To ensure 100% of business operators in Taytay are knowledgeable of and compliant to LGU regulations on waste management and sanitation.
Outcome	Effective dissemination and understanding of LGU regulations on waste management and sanitation among all business operators in Taytay, Rizal ensure full (100%) compliance
Programs, Projects, and Activities (PPA)	1.2.1. Conduct spot-checks to business establishments on compliance to waste management and sanitation guidelines.

To support community resilience against rain-induced hazards and health risks, the aim is to achieve full compliance among business operators with local waste management and sanitation regulations. Under Objective 1.2 regular spot-checks of business establishments are planned. This would ensure that all business operators are informed and held accountable, promoting cleaner environments, reducing disease risks, and reinforcing public health and safety standards across the municipality.

TABLE VI
ACTION PLAN FOR GOAL 1 OBJECTIVE 1.3

Goal 1	Strengthen the resilience of communities through enhanced mitigation measures, infrastructure, and policies minimizing the long-term impact of rain-induced landslides, flooding, and dengue on the population.
Objective 1.3	To implement vector control-strategies to reduce population of dengue-carrying mosquito on the onset of dengue season
Outcome	The implementation of vector control strategies at the onset of the dengue season leads to a demonstrable decrease in the population of dengue-carrying mosquitoes, contributing to a reduced risk of dengue transmission within the community.
Programs, Projects, and Activities (PPA)	1.3.1. Conduct Training on Health workers and volunteers on mosquito habitat and larval surveys 1.3.2. Distribution of IEC Materials on dengue prevention and source reduction methods

To reduce the impact of dengue during peak transmission periods, proactive vector control strategies are planned to lower the population of dengue-carrying mosquitoes.. These efforts include training health workers, volunteers, and barangay officials on effective mosquito surveillance methods and distributing targeted Information, Education, and Communication (IEC) materials to raise public awareness. By engaging multiple sectors of the community, these initiatives support early prevention, promote environmental sanitation, and contribute to the overall reduction of dengue risk in the municipality.

TABLE VII
ACTION PLAN FOR GOAL 1 OBJECTIVE 1.4

Goal 1	Strengthen the resilience of communities through enhanced mitigation measures, infrastructure, and policies minimizing the long-term impact of rain-induced landslides, flooding, and dengue on the population.
Objective 1.4	To engage DRRM Stakeholders on daily recycling and waste management initiatives
Outcome	Daily recycling and waste management initiatives are effectively integrated into the regular activities and responsibilities of DRRM stakeholders in Taytay, leading to enhanced community resilience and environmental stewardship.
Programs, Projects, and Activities (PPA)	1.4.1. Promote recycling and waste mgt initiatives in schools thru awareness raising activities 1.4.2 Conduct information dissemination activities regarding recycling and waste management initiatives in communities

To strengthen community resilience and promote environmental sustainability, the plan is to engage DRRM stakeholders in daily recycling and waste management initiatives. These efforts focus on raising awareness in schools to instill sustainable habits among students, as well as conducting community-based information campaigns to encourage grassroots participation. By integrating recycling and proper waste management into the regular responsibilities of stakeholders and the broader population, the municipality fosters a culture of environmental responsibility that supports long-term disaster risk reduction and public health.

TABLE VIII
ACTION PLAN FOR GOAL 2 OBJECTIVE 2.1

Goal 2	Enhance community preparedness and

	awareness on the risks and possible impact of Rain-induced landslide, Flooding and Dengue through active community engagement and early warning mechanisms
Objective 2.1	To develop and implement a comprehensive early warning system and standardized procedures for Dengue, Flooding and Rain-induced Landslides within one year
Outcome	A comprehensive early warning system and standardized procedures for Dengue, Flooding, and Rain-induced Landslides are developed, implemented, and accessible to all community members, ensuring timely and accurate hazard information dissemination
Programs, Projects, and Activities (PPA)	2.1.1. Installation of early warning mechanisms on flooding and rain-induced landslide (PA system) 2.1.2. Conduct of Training on Landslide Risk Assessment and Mitigation 2.1.3. CP Writeshop to enhance procedures on flooding, rain-induced landslides and dengue

To enhance community preparedness and awareness of rain-induced landslides, flooding, and dengue, the plan is to focus on active community engagement and the establishment of reliable early warning mechanisms. In addition, the aim is to develop and enhance existing contingency plans and standardized procedures that ensure timely and accurate hazard information is accessible to all community members. local response capacities and promote a proactive, informed, and resilient community.

TABLE IX
ACTION PLAN FOR GOAL 2 OBJECTIVE 2.2

Goal 2	
	Enhance community preparedness and awareness on the risks and possible impact of Rain-induced landslide, Flooding and Dengue through active community engagement and early warning mechanisms
Objective 2.2	Conduct quarterly community- centered evacuation planning and drills to increase the level of preparedness for Dengue, Flooding and Rain-induced landslides
Outcome	Communities are empowered to take ownership of their safety during Dengue, Flooding, and Rain-induced landslides, resulting in increased confidence and proactive participation in evacuation procedures.
Programs, Projects, and Activities (PPA)	2.2.1. Conduct community- led simulation drill

To enhance preparedness for rain-induced landslides, flooding, and dengue, the aim is to strengthen community capacity through regular, community-centered evacuation planning and drills. By training Barangay DRRM Committees (BDRRMCs) to lead simulation exercises and directly involving residents in these activities, the municipality fosters a culture of proactive readiness and local ownership of disaster response. These initiatives not only improve coordination during emergencies but also build confidence and empower communities to act swiftly and effectively during disaster events.

TABLE X
ACTION PLAN FOR GOAL 3 OBJECTIVE 3.1

Goal 3	

	Reduce the immediate impact of Rain-induced landslides, Flooding and Dengue by increasing the response capacity of the LGU and other DRRM stakeholders.
Objective 3.1	To increase LGU's capacity for response through the provision of additional equipment annually
Outcome	Provision of additional equipment expands the LGU's response capabilities, enabling them to address a wider range of disaster situations and provide more comprehensive assistance to affected communities
Programs, Projects, and Activities (PPA)	3.1.1. Procurement of additional response equipment for flooding and rain-induced landslide 3.1.2. Conduct of technical trainings on response (WASAR, MOSAR, etc)

To increase the municipality's response capabilities for rain-induced landslides, flooding, and dengue, the plan is to provide additional equipment and technical training for emergency responders. By equipping responders with updated tools and ensuring they are properly trained in their use, the municipality strengthens its ability to deliver rapid, efficient, and safe emergency response. These efforts enhance operational readiness and ensure that affected communities receive timely and effective assistance during disaster events.

TABLE XI
ACTION PLAN FOR GOAL 3 OBJECTIVE 3.2

Goal 3	Reduce the immediate impact of Rain-induced landslides, Flooding and Dengue by increasing the response capacity of the LGU and other DRRM stakeholders
Objective 3.2	To ensure timely delivery of aid to disaster affected population
Outcome	Timely and efficient delivery of aid enables affected populations to meet their immediate needs and begin recovery without delay.
Programs, Projects, and Activities (PPA)	3.2.1. Establishment of Emergency Stockpile for Rapid Disaster Response (Non-Food Items)

To reduce the immediate impact of rain-induced landslides, flooding, and dengue, the plan is to prioritize the timely and efficient delivery of aid to affected populations by strengthening its disaster response systems through the establishment of an emergency stockpile of essential relief items and training LGU personnel and volunteers in effective aid distribution. These initiatives ensure that life-saving resources are readily available and that responders are well-prepared to distribute them equitably and swiftly, enabling communities to meet urgent needs and begin recovery without delay.

TABLE XII
ACTION PLAN FOR GOAL 3 OBJECTIVE 3.3

Goal 3	

	Reduce the immediate impact of Rain-induced landslides, Flooding and Dengue by increasing the response capacity of the LGU and other DRRM stakeholders
Objective 3.3	To expand the pool of responders by forming additional response teams composed of different volunteers every year
Outcome	An expanded and diverse pool of trained responders is established annually, enhancing the capacity and flexibility of emergency response efforts
Programs, Projects, and Activities (PPA)	3.3.1 Establish bilateral agreements with other LGUs for response cooperation

The action plan above pertains to the plan for expanding the pool of trained responders by forging partnerships with nearby LGUs through formal agreements, establishing a buddy system that promotes inter-LGU cooperation and resource-sharing during disasters. These efforts enhance both local and regional response capabilities, ensuring greater flexibility and readiness in times of crisis.

	Restore and enhance the resilience of affected communities by ensuring the timely rehabilitation of damaged infrastructure, revitalization of livelihoods, and strengthening of social services to support long-term recovery
Objective 4.1	To provide timely and appropriate aid to assist recovery through Unconditional/Conditional Cash Transfers, Cash for Work and other livelihood programs within three months
Outcome	Crisis-affected individuals are supported in their early recovery within three months through timely and appropriate aid, including cash transfers, cash-for-work opportunities, and other livelihood programs
Programs, Projects, and Activities (PPA)	4.1.1. Establishment of Cash-for-work opportunities for affected population 4.1.2. Establishment of Livelihood restoration programs for affected population

To support long-term recovery and strengthen community resilience, the plan focuses on the timely provision of recovery assistance to disaster-affected populations through cash-based and livelihood restoration programs. These initiatives include cash-for-work programs that offer short-term employment while aiding community rehabilitation, and targeted livelihood support for individuals who have lost their primary sources of income. By enabling crisis-affected households to recover economically within three months, these interventions help restore stability, promote self-sufficiency, and lay the foundation for sustainable recovery.

TABLE XIII
ACTION PLAN FOR GOAL 4 OBJECTIVE 4.1

Goal 4	

TABLE XIV
ACTION PLAN FOR GOAL 4 OBJECTIVE 4.2

Goal 4	

	Restore and enhance the resilience of affected communities by ensuring the timely rehabilitation of damaged infrastructure, revitalization of livelihoods, and strengthening of social services to support long-term recovery
Objective 4.2	Establish Mental Health and Psychosocial Services (MHPSS) program within 3-6 months from the onset of disaster to help communities cope and recover
Outcome	Communities affected by disaster are supported in coping and recovery within 3–6 months through the establishment of accessible Mental Health and Psychosocial Support (MHPSS) services
Programs, Projects, and Activities (PPA)	4.2.1. Training/ Refresher of relevant personnel on MHPSS 4.2.2. Provision of MHPSS to affected population during rehab and recovery period.

To support the emotional recovery and long-term resilience of disaster-affected communities, Taytay is committed to establishing Mental Health and Psychosocial Support Services (MHPSS) within the early months of the rehabilitation phase. This includes training relevant LGU personnel and responders to provide culturally appropriate and compassionate care, as well as delivering direct MHPSS interventions to individuals and families. By prioritizing mental health alongside physical recovery, the municipality ensures that affected populations receive holistic support, helping them cope with trauma, rebuild their lives, and strengthen overall community well-being.

TABLE XV
ACTION PLAN FOR GOAL 4 OBJECTIVE 4.3

Goal 4	
	Restore and enhance the resilience of affected communities by ensuring the timely rehabilitation of damaged infrastructure, revitalization of livelihoods, and strengthening of social services to support long-term recovery
Objective 4.3	To ensure restoration of social services within a month (Health, Education, Police, Fire)
Outcome	Communities regain access to vital social services within a month, supporting stability and accelerating recovery efforts
Programs, Projects, and Activities (PPA)	4.3.1 Provide training on development of public service continuity plan for social services 4.3.2 Tabletop exercises for public service continuity plans.

Table 15 details the plan to restore social services within a month to enhance community resilience. This involves providing training for key personnel from various social services on the development of Public Service Continuity Plans (PSCPs), thereby improving their capacity to ensure service delivery during crises. Subsequently, a comprehensive and context specific PSCPs for the municipality's social services will be drafted. To validate these plans, tabletop exercises will be conducted to test and refine the BCPs, ultimately enhancing preparedness and coordination among stakeholders to maintain critical social services during emergencies.

IX. CONCLUSION

This strategic action plan provides a comprehensive, community-informed framework for addressing the increasing risks of flooding, rain-induced landslides, and dengue outbreaks in the Municipality of Taytay, Rizal. Grounded in the principles of the four DRRM pillars—Prevention and Mitigation, Preparedness, Response, and Rehabilitation and Recovery—the plan identifies actionable programs that are both context-sensitive and scalable. It highlights the importance of early warning systems, risk communication, capacity-building, and community engagement, while also

addressing structural issues such as drainage maintenance, sanitation enforcement, and emergency equipment readiness. The integration of both technical and social dimensions of disaster risk reflects a deliberate effort to promote inclusive, anticipatory, and adaptive resilience at the local level.

The success of this action plan will ultimately depend on sustained collaboration among local government units, barangay officials, civil society, and the residents of Taytay. Effective implementation will require consistent investment in training, equipment, and public awareness, as well as strengthened enforcement of local ordinances and policies. Moreover, regular monitoring, evaluation, and refinement of the proposed interventions must be institutionalized to ensure responsiveness to emerging hazards and community needs. By anchoring this multi-hazard approach in evidence-based planning and local participation, Taytay is well-positioned to become a model for other municipalities facing similar threats in an era of climate uncertainty and compounding disasters.

ACKNOWLEDGMENT

The successful completion of this action plan, entitled Typhoon-Triggered Hazards in Taytay, Rizal: A Strategic Action Plan for Flooding, Landslides, and Dengue Prevention, was made possible through the generous support of numerous individuals and institutions.

The proponent extends his deepest gratitude to his wife, Cha, and daughters, Keisha and Haven, for their boundless patience and understanding throughout the entire research process. Their constant question, “Why are you studying, Papa?” served as a heartfelt reminder of my greatest motivation — them.

The proponent also wishes to express heartfelt appreciation to Councilor Philip Jeison Cruz, whose initiative and commitment were instrumental in establishing the collaboration with the Municipality of Taytay, Rizal. His support opened the doors that made this partnership possible and significantly contributed to the success of this undertaking.

Sincere thanks are likewise extended to the local government of Taytay, Rizal, for granting permission to develop this plan and for their openness in sharing insights into their current Disaster Risk Reduction and Management (DRRM) framework. Their transparency in discussing both strengths and areas for improvement proved invaluable. Special acknowledgement is given to the dedicated staff of the Municipal Disaster Risk Reduction and Management Office (MDRRMO) of Taytay, particularly Mr. Paul Oliver Domingo and the rest of the team, for their generous time and for providing the essential data that underpinned this action plan.

The proponent is deeply grateful to his adviser, Prof. Edward Landayan, for his generous commitment of time and expertise, which played a vital role in refining this action plan. Appreciation is also extended to Dr. Nickie Boy Manalo, subject instructor and Chair of the MDRM Program, for his guidance and support during the formative stages of this work.

Lastly, the proponent sincerely thanks the panel of experts — Prof. Reyan Derrick Marquez, Prof. Reynante Sofera, and Mr.Chester Keith Villafuerte — for their invaluable insights and constructive feedback during the thesis defense.

REFERENCES

[1] Beroya-Eitner, M. A. (2020). Landslides in the Philippines: Geo-physical controls, triggers, and examples. Retrieved from https://www.researchgate.net/publication/344538329

[2] Case Centre. (n.d.). Case study: Disaster risk management. Retrieved from https://www.thecasecentre.org/products/view?id=110461

[3] Centers for Disease Control and Prevention (CDC). (2024). Dengue monthly update. Retrieved from https://www.ecdc.europa.eu/en/dengue-monthly

[4] Department of Health (DOH). (n.d.). Dengue prevention and control program. Retrieved from https://doh.gov.ph/uhc/health-programs/dengue-prevention-and-control-program/

[5] Department of Environment and Natural Resources (DENR). (n.d.). Waste management guidelines. Retrieved from https://www.denr.gov.ph

[6] European Centre for Disease Prevention and Control (ECDC). (2024). Dengue monthly update. Retrieved from https://www.ecdc.europa.eu/en/dengue-monthly

[7] National Disaster Risk Reduction and Management Council (NDRRMC). (2024). SitRep No. 37 for Combined Effects of TCs Kristine and Leon. Retrieved from https://ndrrmc.gov.ph/attachments/article/4271/SitRep_No_37_for_Combined_Effects_of_TCs_KRISTINE_and_LEON_2024.pdf

[8] Office of Civil Defense (OCD). (n.d.). Guidelines on the implementation of the DRRM Law. Retrieved from https://ocd.gov.ph

[9] Pediatrics and Maternal Care Journal (PMC). (2021). The risks of flooding: Protect yourself from floodwater diseases. Retrieved from https://www.pchrd.dost.gov.ph/news_and_updates/the-risks-of-flooding-protect-yourself-from-floodwater-diseases/

[10] Philippine Statistics Authority (PSA). (2020). 2020 Census of Population and Housing. Retrieved from https://psa.gov.ph

[11] Public Library of Science. (2021). Extreme flooding and landslides worldwide highlight need for anticipatory action. Retrieved from https://reliefweb.int/report/world/extreme-flooding-and-landslides-worldwide-highlight-need-anticipatory-action.

[12] ReliefWeb. (2024). Landslide report: LS-2024-000003-PHL. Retrieved from https://reliefweb.int/disaster/ls-2024-000003-phl

[13] Republic of the Philippines. (2010). Republic Act No. 10121: Philippine Disaster Risk Reduction and Management Act of 2010.

[14] United Nations Office for Disaster Risk Reduction (UNDRR). (2024). Global status of multi-hazard early warning systems. Retrieved from https://www.undrr.org/reports/global-status-MHEWS-2024

[15] United Nations Children's Fund (UNICEF). (2024). UNICEF aids children and families hit by Typhoons Kristine and Leon. Retrieved from https://www.unicef.org/press-releases/unicef-aids-children-and-families-hit-typhoons-kristine-and-leon-residents-brace

[16] Vax Before Travel. (2025, February 27). Philippines reports 56% more dengue cases. Retrieved from https://www.vax-before-travel.com/2025/02/27/philippines-reports-56-more-dengue-cases

[17] World Health Organization (WHO). (2024). Disease outbreak news: Dengue. Retrieved from https://www.who.int/emergencies/disease-outbreak-news/item/2024-DON518

