

Integrated Action Plan for Enhancing Community Resilience to Typhoon, Flooding, and Dengue in Barangay Santo Cristo and Barangay Banay-banay II, San Jose, Batangas

Philip Anthony C. Guerra*, Edward G. Landayan**

*(College of Accountancy, Business, Economics, and International Hospitality Management, Batangas State University – The National Engineering University, Batangas City, Philippines
Email: philipanthonyguerra@gmail.com)

**(College of Accountancy, Business, Economics, and International Hospitality Management, Batangas State University – The National Engineering University, Batangas City, Philippines
Email: edward.landayan@g.batstate-u.edu.ph)

Abstract:

This study was designed as an action plan to strengthen disaster resilience in Barangay Santo Cristo and Barangay Banay-banay II in the Municipality of San Jose, Batangas. The plan addresses recurring hazards such as typhoons, flooding, and dengue outbreaks, which have consistently affected the safety, health, and livelihoods of residents. These hazards are aggravated by climate change, environmental conditions, and gaps in preparedness and institutional capacity at the barangay level. While San Jose has existing disaster risk reduction and management mechanisms, recurring disaster impacts reveal the need for more localized, integrated, and community-based strategies.

The action plan adopts the framework of Republic Act 10121 and the Sendai Framework for Disaster Risk Reduction, emphasizing prevention and mitigation, preparedness, response, and rehabilitation and recovery. It highlights the importance of coordination among local government units, frontline responders, and community members, while integrating public health considerations, particularly dengue prevention, into disaster management planning. This summary presents the rationale, situational analysis, strategic goals, programs, projects, and activities, as well as monitoring and evaluation mechanisms that guide the implementation of the proposed interventions.

Keywords — Disaster Risk Reduction and Management, Flooding, Typhoon, Dengue, Community Resilience, San Jose Batangas.

I. INTRODUCTION

The Philippines is one of the most disaster-prone countries in the world due to its geographic location along the Western Pacific Typhoon Belt and its exposure to extreme weather events. Typhoons, flooding, and climate-related health risks such as dengue outbreaks pose continuous threats to communities, particularly at the local level. As climate change intensifies rainfall patterns and prolongs flooding, the impacts of disasters have become more frequent and severe.

In the Municipality of San Jose, Batangas, disaster risks are strongly felt in low-lying and flood-prone barangays. Barangay Santo Cristo and Barangay Banay-banay II have repeatedly experienced flooding during heavy rainfall and typhoon events, leading to damage to homes, roads, agricultural lands, and basic services. These physical impacts are often followed by public health concerns, particularly dengue outbreaks caused by stagnant water and compromised sanitation systems.

Although disaster risk reduction and management structures exist at the municipal level, recurring disaster impacts reveal gaps in preparedness, coordination, and community participation. Many residents are aware of hazards but are unable to consistently translate this awareness into preparedness actions due to economic constraints, limited access to resources, and competing daily priorities.

This action plan was developed to respond to these challenges by providing a structured, localized, and integrated approach to disaster risk reduction and management. It seeks to strengthen institutional capacity, empower communities, and promote sustainable recovery through coordinated and evidence-based interventions.

II. SITUATIONAL ANALYSIS

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A. Pestel Analysis

This PESTEL analysis examines the external political, economic, social, technological, environmental, and legal factors influencing disaster risk reduction and management in Barangay Santo Cristo and Barangay Banay-banay II, San Jose, Batangas. Understanding these factors provides important context for identifying constraints and opportunities that shape the implementation of the proposed action plan.

1) Political: Disaster risk reduction and management in San Jose, Batangas operates within a governance framework established under Republic Act 10121, which mandates the creation of disaster risk reduction and management structures at the local level. The presence of the Municipal Disaster Risk Reduction and Management Office and Barangay Disaster Risk Reduction and Management Committees provide an institutional foundation for planning and response activities. However, the effectiveness of these mechanisms depends on leadership priorities, administrative continuity, and the availability of technical and logistical support. While disaster response receives immediate attention during emergencies, sustained focus on

preparedness and mitigation remains a continuing challenge.

2) Economic: Economic conditions significantly influence disaster vulnerability and recovery capacity in Barangay Santo Cristo and Barangay Banay-banay II. The local economy's strong dependence on agriculture and poultry production increases exposure to losses caused by flooding and typhoons. Damage to crops, livestock, and infrastructure affects household income and limits the capacity of families to invest in preparedness measures. At the barangay level, limited financial resources also affect the implementation of long-term risk reduction initiatives, underscoring the importance of prioritizing preventive and cost-effective interventions.

3) Social: Residents generally demonstrate awareness of flood risks, typhoon hazards, and dengue threats; however, participation in preparedness activities such as drills, clean-up drives, and household planning remains inconsistent. Competing livelihood demands, household responsibilities, and limited engagement mechanisms contribute to this gap between awareness and action. Vulnerable groups, including children, elderly individuals, and low-income households, face heightened risks during disasters due to mobility limitations, health concerns, and resource constraints.

4) Technological: Technological capacity affects the efficiency of early warning, communication, and emergency response systems. Existing warning mechanisms and communication channels provide basic coverage, yet access to timely and reliable information remains uneven at the barangay level. Limitations in communication equipment, rescue tools, and information management systems can delay response actions and hinder coordination during emergencies. Enhancing access to appropriate technology and improving communication systems are therefore essential to strengthening preparedness and response capabilities.

5) Environment: Low-lying terrain, inadequate drainage systems, and recurring heavy rainfall result in frequent flooding. Stagnant water following flood events creates favorable conditions for mosquito

breeding, increasing the risk of dengue transmission. Climate change further intensifies these hazards by increasing rainfall intensity and prolonging flood duration, reinforcing the need for integrated approaches to flood management and public health protection.

6) **Legals:** The legal environment provides a strong foundation for the implementation of the action plan. Republic Act 10121, the Local Government Code of 1991, and related national policies clearly define the roles and responsibilities of local government units in disaster risk reduction and management. These legal instruments mandate preparedness planning, risk assessment, and the allocation of resources for disaster-related activities.

Despite this strong legal framework, challenges remain in translating policy mandates into consistent local action. Compliance varies across barangays due to capacity limitations, resource constraints, and administrative workload. Strengthening legal compliance through capacity building, clear operational guidelines, and regular monitoring can enhance the effectiveness of DRRM implementation at the barangay level

B. SWOC Analysis

1) Strengths

- Conduct of Risk Assessments Using CDRA and Hazard Hunter PH
- Maintenance and Public Display of Risk Maps
- Utilization of Traditional and Indigenous Monitoring Systems
- Installation of Automated Weather System (AWS)
- Formulation of Guidelines and Issuance of Local Policies (EOs, AOs, Memos, Ordinances)
- Provision of Appropriations for Priority DRRM Programs and Activities
- Presence of an Approved Local Disaster Risk Reduction and Management Plan (LDRRMP) 2023–2025 Aligned with the NDRRMP 2020–2030
- Approval of 33 Barangay Disaster Risk Reduction and Management Plans (BDRRMPs)
- Conduct of DRRM-Related Trainings for Responders and LGU Staff

- Organized Emergency Responders (MDRRM Office, BFP, MHO)
- Existence of an Ordinance on Pre-Emptive or Forced Evacuation
- Pre-Positioned Stockpiles of Relief Goods (Food, Water, and Non-Food Items)
- Availability of Camp Management, Women-Friendly, and Child-Friendly Space Kits Handled by the MSWDO
- Provision of Stress Management and Psychological Support by MSWDO and MHO
- Integration of Rehabilitation and Recovery Strategies in the LDRRM Plan

2) Weaknesses

- Low Functionality of Barangay Disaster Risk Reduction and Management Committees (BDRRMCs)
- Insufficient DRRM-Related Training for Local Chief Executive (LCE), MDRRMC Members, and Responders
- Lack of Technical Knowledge in Conducting Pre-Disaster Risk Analysis (PDRA) and Scenario-Building
- Limited Involvement of the Community in Disaster Risk Management
- Lack of Technical Knowledge in Conducting Pre-Disaster Risk Analysis (PDRA) and Scenario-Building
- Lack of Trained Barangay and LGU Search, Rescue, and Retrieval (SRR) Teams
- Absence of a Permanent Operations Center (OpCen) to House Concerned Agencies

3) Challenges

- Capacity Building and Trainings Provided by Higher Agencies and Authorities
- Utilizing Local Response Trainers for Community Preparedness
- Partnering with private construction companies and contractors gives the LGU access to heavy equipment like dump trucks, loaders, and backhoes, which are vital for clearing debris and rebuilding damaged infrastructure after disasters.

4) Opportunities

- Weak enforcement of land use and environmental laws
- Insufficient budget for the implementation of Fire Safety Programs of the BFP.
- Technological and infrastructure gaps.
- Effects of climate change.
- Urbanization and population growth.
- Limited funding and delayed appropriations.
- Weak enforcement of waste management ordinances and limited community participation in cleanliness drive.
- Resistance of residents to evacuation.
- Unwillingness to participate in community drills.
- Political and institutional instability.
- Road and evacuation center issues.
- Lack of Memorandum of Agreement (MOA) with hospitals.
- Insufficient funding and delayed financial support.
- Inconsistent continuity of recovery programs

III. GOALS AND OBJECTIVES***A. Goal 1:***

To reduce the vulnerability of San Jose through enforcement of land use planning, modernization of early warning and flood control system, and climate adaptive infrastructure development.

Objectives:

- 1.1 Assess the current implementation of land use and zoning ordinances and identify areas of weak enforcement contributing to hazard exposure.
- 1.2 Construct, upgrade, and maintain structural mitigation measures such as drainage systems, embankments, and flood-control channels.
- 1.3 Install and implement improved environmental and technological systems such as centralized warning alarms, hazard-monitoring equipment, and effective waste segregation facilities.

1) PPA Matrix: Goal 1 – Objective 1.1

Outcome: Improved land use governance and risk-informed spatial planning resulting in reduced

exposure of communities and assets to hazard-prone areas.

The Programs, Plans, and Activities (PPA) Matrix for Goal 1 of a strategic plan aimed at reducing the vulnerability of San Jose. This goal focuses on three primary pillars: enforcing land use planning, modernizing early warning and flood control systems, and developing climate-adaptive infrastructure. Specifically, Objective 1.1 seeks to evaluate current land use and zoning ordinance implementation to pinpoint areas where weak enforcement contributes to hazard exposure. The ultimate intended outcome is improved land use governance and risk-informed spatial planning, which will minimize the exposure of community assets to hazard-prone areas.

To operationalize this goal, the plan details a series of activities scheduled for 2026, led by municipal planning and disaster risk management offices. These actions include conducting comprehensive audits in hazard-prone areas, enforcing stricter adherence to building codes, and updating GIS-based hazard maps to integrate disaster risk reduction layers. The successful execution of these plans is expected to produce updated policy recommendations and functional digital mapping tools, ultimately strengthening the local government's ability to manage and mitigate disaster risks.

2) PPA Matrix: Goal 1 – Objective 1.2

Outcome: Improved flood mitigation and drainage performance through upgraded infrastructure, reduced obstructions in waterways, and sustained maintenance of drainage systems.

The Programs, Plans, and Activities (PPA) Matrix for Goal 1 – Objective 1.2, which targets the construction, upgrading, and maintenance of structural mitigation measures such as drainage systems, embankments, and flood-control channels to improve drainage performance and reduce waterway obstructions. The intended outcome is to achieve improved flood mitigation through modernized infrastructure and the removal of debris,

ultimately ensuring the sustained functionality and reliability of these local systems.

To operationalize this objective throughout 2026, the plan identifies three core initiatives led by the MEO, MENRO, MDRRMO, and local Barangay Councils. These activities involve rehabilitating drainage channels to increase capacity in flood-prone areas by 50%, organizing quarterly community clean-up drives to clear debris from waterways, and establishing a formal maintenance and monitoring program for all major barangays. By implementing regular maintenance schedules and quarterly monitoring reports, the plan seeks to produce tangible outputs like cleared creeks and functional drainage systems to minimize local flooding incidents.

3) PPA Matrix: Goal 1 – Objective 1.3

Outcome: Improved community disaster preparedness and environmental resilience through the installation of technological warning systems, hazard-monitoring equipment, and enhanced waste management facilities.

The Programs, Plans, and Activities (PPA) Matrix for Goal 1 – Objective 1.3, which focuses on the installation and implementation of improved environmental and technological systems, such as centralized warning alarms, hazard-monitoring equipment, and effective waste segregation facilities. The intended outcome is to enhance community disaster preparedness and environmental resilience through the integration of technological warning systems and improved waste management infrastructure.

The plan identifies three core initiatives led by the MDRRMO, MEO, MPDC, and MENRO. These activities include installing public alarm and siren systems in high-risk barangays, establishing a fully functional Automated Weather Station connected to the municipal monitoring center, and implementing a community-based solid waste segregation program across all barangays. By providing operational early warning protocols and functional waste segregation facilities, the plan seeks to equip local responders

and residents with the necessary tools to mitigate and respond to environmental hazards effectively.

B. Goal 2:

To strengthen institutional and community preparedness by building technical capacities, enhancing early warning communication, and promoting inclusive participation in disaster planning and training.

Objectives:

- 2.1 To formulate capacity building strategies aimed at improving the technical competence of DRRM personnel and sustaining preparedness programs across political transitions.
- 2.2 To conduct barangay-level drills and training for households and responders.
- 2.3 To evaluate the current accessibility and reliability of early warning and communication systems, which include the SMS alerts, local alarms, and traditional monitoring methods, and to install or upgrade necessary equipment to ensure timely evacuation and effective response.

1) PPA Matrix: Goal 2 – Objective 2.1

Outcome: A highly trained and continuously functional DRRM workforce and leadership structure capable of sustaining disaster preparedness programs and making informed decisions before, during, and after emergencies.

The Programs, Plans, and Activities (PPA) Matrix for Goal 2 – Objective 2.1, which focuses on formulating capacity-building strategies to improve the technical competence of DRRM personnel and ensuring the sustainability of preparedness programs across political transitions. The intended outcome is to develop a highly trained and continuously functional DRRM workforce and leadership structure capable of making informed decisions before, during, and after emergencies.

To operationalize this objective throughout 2026, the plan identifies three core training initiatives led primarily by the MDRRMO, in collaboration with

the MHO, BFP, and DILG Field Office. These activities include conducting ICS, First Aid, and BLS certification for at least 100 staff and volunteers, organizing crisis leadership training for municipal and barangay officials, and facilitating at least two contingency planning workshops. By equipping responders and leaders with specialized skills and formalized response plans, the initiative seeks to strengthen institutional readiness and community-level disaster coordination.

2) PPA Matrix: Goal 2 – Objective 2.2

Outcome: Increased household and community preparedness through regular evacuation drills, improved response coordination, and enhanced knowledge of emergency planning at the barangay level.

The PPA under Goal 2, Objective 2.2 aims to strengthen institutional and community preparedness by conducting barangay-level drills and training for households and responders. The two primary activities are conducting quarterly community evacuation drills and simulation exercises, and organizing household-level training focused on emergency kits and evacuation planning.

The specific targets and outputs prioritize high participation rates and tangible resource distribution to ensure readiness. For the evacuation drills, the target is to achieve at least 80% participation in all identified high-risk barangays, with key outputs including the annual conduct of drills and the creation of evaluation reports for each drill. For the household-level training, the target is to equip 1,000 households with basic emergency kits. The key outputs for this activity are the distribution of these emergency kits and the facilitation of first aid workshops.

3) PPA Matrix: Goal 2 – Objective 2.3

Outcome: Improved reliability and reach of early warning and communication systems, enabling faster evacuation, better coordination among responders, and more informed communities during disasters.

The Programs, Plans, and Activities (PPA) Matrix for Goal 2 – Objective 2.3, which focuses on evaluating and upgrading early warning and communication systems to ensure timely evacuation and effective disaster response. The two primary activities identified are the upgrade and expansion of early warning communications, which includes SMS alerts, sirens, and radios, and the establishment of a standby Municipal Emergency Operations Center (EOC) equipped with backup systems.

The targets for these activities are centered on total population coverage and operational reliability. Specifically, the program aims for the SMS alert system to cover 100% of the population by 2026 and for a dedicated EOC to be fully operational with redundant power by the same year. Key outputs to measure these successes include a functional SMS platform, the installation of a network of sirens and radios, an equipped EOC facility, and the integration of backup power and communication systems.

C. Goal 3:

To improve the efficiency, coordination, and inclusivity of disaster response operations through strengthened inter-agency collaboration, enhanced logistical capacity, and protection of vulnerable sectors.

Objectives:

- 3.1 To train and mobilize the Inter-Agency Response Team to strengthen operational readiness, coordination, and effective response during emergencies.
- 3.2 To evaluate the adequacy of evacuation centers, road networks, and health service facilities in ensuring safe, gender-sensitive, and child-friendly response environments.
- 3.3 To recommend the establishment of a permanent Operations Center and formal Memoranda of Agreement (MOAs) with nearby hospitals and partner agencies to institutionalize coordination and response protocols.

1) PPA Matrix: Goal 3 – Objective 3.1

Outcome: A fully trained and coordinated Inter-Agency Response Team capable of delivering fast,

organized, and unified disaster response operations across all sectors.

The Programs, Projects and Activities (PPAs) designed to improve disaster response efficiency by training and mobilizing an Inter-Agency Response Team (IART). The two primary activities include organizing and training the IART for emergencies and conducting quarterly inter-agency simulation exercises involving the MDRRMO, BFP, PNP, and MHO.

The specific targets for this objective focus on complete personnel readiness and broad inter-agency engagement. The program aims for 100% of MDRRMO, BFP, PNP, and MHO staff to be fully trained, with inter-agency teams from these offices and all 33 barangays actively participating in simulation exercises. Key outputs to measure these goals include the establishment of a functional IART with clearly defined roles, comprehensive training records, and the development of exercise scenarios, evaluation reports, and improvement plans to refine future response operations.

2) PPA Matrix: Goal 3 – Objective 3.2

Outcome: Improved safety, accessibility, and inclusiveness of evacuation centers, road networks, and health facilities, ensuring that disaster response services are gender-sensitive, child-friendly, and able to meet the needs of all affected populations.

The Programs, Projects and Activities (PPAs) centers on evaluating and enhancing the infrastructure and logistical capacity of essential disaster response facilities. The primary activities involve retrofitting municipal evacuation centers to ensure they are gender- and child-friendly and enhancing emergency health response by equipping Municipal Health Office (MHO) ambulances.

The targets for this objective prioritize the physical upgrading of facilities and the readiness of medical responders. Specifically, the plan aims to have at least three municipal evacuation centers in high-risk areas upgraded by the end of CY 2026 and to fully equip MHO personnel and EMS responders. Key

outputs include renovated centers featuring privacy kits and separate toilets, as well as ambulances fully stocked with medical kits and maintained through technical upgrades. These outputs are designed to ensure that disaster response services are inclusive, safe, and capable of meeting the needs of all affected populations.

3) PPA Matrix: Goal 3 – Objective 3.3

Outcome: Institutionalized disaster response system through an operational Municipal Operations Center, formal inter-agency agreements, and strategically positioned emergency stockpile hubs that ensure coordinated, timely, and efficient disaster response operations.

The Programs, Projects and Activities (PPAs) aim to institutionalize disaster coordination and response protocols through the establishment of permanent infrastructure and formal legal agreements. The three primary activities include establishing a permanent Municipal Operations Center (OpCen) for disasters, formalizing mutual aid agreements (MOAs) with nearby hospitals and partner agencies, and pre-stockpiling emergency relief goods such as food, water, and non-food items (NFIs).

The targets for this objective focus on operational permanence, legal coverage, and resource availability for all vulnerable residents. Specifically, the program aims to have a fully operational Operations Center by 2027, MOAs in place with all nearby hospitals, and relief goods pre-positioned for all residents in high-risk and hazard-prone barangays. Key outputs include a dedicated and renovated EOC facility with established operations protocols, signed MOA documents, and three fully functional stockpile hubs located strategically throughout the municipality.

D. Goal 4:

To restore and improve the livelihoods, infrastructure, and social services of communities affected by typhoons and flooding, ensuring greater resilience in the long term.

Objectives:

- 4.1 To relocate highly vulnerable families to safer, permanent resettlement areas with access to services.
- 4.2 To identify opportunities for partnerships with private construction firms, NGOs, and financial institutions to enhance resource mobilization and accelerate livelihood recovery.
- 4.3 To do immediate repair and reconstruction of roads, bridges, and flood control systems with climate-smart designs.

1) PPA Matrix: Goal 4 – Objective 4.1

Outcome: Disaster-affected families safely relocated to permanent, service-equipped resettlement areas with secured housing, access to basic services, and sustainable livelihood opportunities.

The Programs, Projects and Activities (PPAs) outline a comprehensive strategy to relocate families living in high-risk flood zones to safe, permanent resettlement areas equipped with essential services and livelihood opportunities. This initiative involves three core stages: identifying and relocating 100 families, developing the resettlement sites with necessary infrastructure like roads and water facilities, and establishing specialized livelihood and skills training programs for the relocated households.

The primary target for this objective is the successful relocation and socio-economic stabilization of 100 families currently residing in hazard-prone areas. Key outputs for the physical relocation include secured land (approximately 1-2 hectares), completed site development, and the construction of permanent shelters featuring climate-resilient designs. Beyond housing, the program aims to ensure at least one member per household is trained in new skills. Tangible outputs for this component include the distribution of livelihood starter kits, provision of micro-enterprise start-up capital, and ongoing technical support to ensure that relocated families can sustain themselves in their new environment.

2) PPA Matrix: Goal 4 – Objective 4.2

Outcome: Disaster-affected families safely relocated to permanent, service-equipped resettlement areas with secured housing, access to basic services, and sustainable livelihood opportunities.

The Programs, Projects and Activities (PPAs) aim to accelerate community rehabilitation by identifying opportunities for external partnerships and implementing immediate financial support mechanisms. The two core activities involve forging partnerships with NGOs and private firms to provide livelihood grants, and implementing a "cash-for-work" program specifically designed for disaster-affected individuals.

The targets for this objective are centered on providing rapid economic relief and establishing sustainable support networks for approximately 100 families and other vulnerable individuals, such as displaced workers and low-income households. Key outputs for these goals include the formalization of Memoranda of Agreement (MOAs) and CSR programs with private entities to secure external funding and resources. For the immediate response component, the key outputs are a validated list of qualified participants and the provision of short-term employment in community rehabilitation projects, ensuring that those who have lost income due to calamities receive essential financial assistance and tools.

3) PPA Matrix: Goal 4 – Objective 4.3

Outcome: Restored access and economic activity with reduced future disaster losses.

The Programs, Projects and Activities (PPAs) focus on the large-scale restoration of critical community infrastructure to re-establish access and economic activity following a disaster. The primary activity involves the rehabilitation of damaged roads, bridges, and flood control systems, specifically utilizing climate-smart designs to reduce future vulnerability.

The central target for this objective is the comprehensive recovery of all disaster-affected

communities through infrastructure stabilization. The key output is the delivery of rehabilitated and expanded flood control infrastructure that meets modern resiliency standards.

IV. MONITORING AND EVALUATION

Monitoring and evaluation will ensure that the action plan is effectively implemented and that its objectives in disaster risk reduction and management are achieved. Monitoring will track key activities and outputs related to preparedness, early warning, evacuation readiness, response capacity, and dengue prevention, with the Barangay Disaster Risk Reduction and Management Committees, in coordination with the Municipal Disaster Risk Reduction and Management Office, responsible for regular reporting and field validation.

Periodic evaluation will assess the effectiveness and sustainability of interventions by examining improvements in community preparedness, coordination among response actors, and reductions in disaster and health impacts. Results will be used to refine strategies, strengthen institutional capacity, and guide future planning to ensure that the action plan remains responsive to evolving risks and community needs.

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