Optimizing the Household Waste Segregation Policy in the Municipality of Bacolod: An Agent-Based Modeling and Deep Reinforcement Learning Approach

Advancing Smart Governance in Bacolod through Adaptive AI Simulation

Hussam M. Bansao
Jemar John J. Lumingkit

Supervised by
Dante D. Dinawanao, M.Sc.

Department of Computer Science
College of Computer Studies
MSU - Iligan Institute of Technology

December, 2025

A undergraduate thesis submitted in partial fulfilment of the requirements for the degree of B.S. in Computer Science.

www.msuiit.edu.ph

To The Avengers

You know, for saving the world.

Acknowledgements

These are the acknowledgements. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

Abstract

The ongoing struggle with low household compliance regarding solid waste segregation rules, as mandated by the Philippine Ecological Solid Waste Management Act (RA 9003), significantly constrains the effectiveness of municipal solid waste management. While Local Government Units (LGUs) employ various incentives and penalties, these strategies often fail to account for the heterogeneous behaviors of households or their long-term economic impact. This study proposes a comprehensive Agent-Based Model (ABM) and Deep Reinforcement Learning (DRL) framework to identify the optimal policy mix for maximizing segregation compliance in the Municipality of Bacolod, Lanao del Norte. The ABM simulates household decision-making by integrating the Theory of Planned Behavior (Attitude, Subjective Norms, and Perceived Behavioral Control) with socio-demographic factors and policy constraints. The model is parameterized using empirical behavioral data and secondary records from the Philippine Statistics Authority (PSA) and the local LGU. A DRL algorithm is then deployed to enable the LGU agent to autonomously discover the most cost-effective policy strategy—whether purely incentive-based, punitive, educational, or a hybrid approach. The ultimate goal is to develop a validated computational tool and a set of data-driven recommendations, providing LGUs with a robust, evidence-based method for designing policies that enhance compliance while optimizing public funds.

Keywords—*Household Waste Segregation, Agent-Based Modeling, Deep Reinforcement Learning, Theory of Planned Behavior, Policy Optimization, Local Governance*

Contents

List of Figures

List of Tables

List of Abbreviations

1

Introduction

The effective management of solid waste begins with a clear and functional definition of what constitutes "waste." At the most fundamental level, solid waste encompasses any discarded materials that are no longer required by their owner or user, including refuse, trash, and garbage (United Nations Environment Programme, 2024). This broad definition is not limited to materials that are physically solid; it can also include liquids, semi-solids, or contained gaseous materials that are discarded. The global waste stream is highly complex and is often categorized by origin (e.g., municipal, industrial, agricultural), type (e.g., electrical and electronic waste, or e-waste), and character (e.g., hazardous waste) to facilitate targeted management strategies (World Health Organization, 2024).

Within this broad landscape, Municipal Solid Waste (MSW) represents a critical and highly visible subset. MSW is generally defined as waste generated from residential and commercial sources and is typically managed by local governments (Kaza et al., 2021). This category includes household garbage, similar waste from commercial establishments and institutions, yard trimmings, and street sweepings, but it typically excludes waste from municipal sewerage networks, industrial processes, and major construction and demolition activities (Kaza et al., 2021). The effective management of MSW necessitates Solid Waste Segregation at Source (SWS), the required process of separating waste components—often into biodegradable, non-biodegradable, and recyclable streams—at the exact point of generation, typically the household or commercial establishment (World Bank, 2022). This initial sorting is mandated globally as the foundational step for resource recovery, recycling, and composting (World Bank, 2022). Academic literature indicates that the effectiveness of SWS is highly contingent upon behavioral factors and the provision of adequate infrastructure, such as appropriate bins and bags, that would

simplify the separation process for households.

The localized challenge of SWS is magnified by an escalating global solid waste crisis, making policy optimization a matter of urgent international significance. The volume of municipal solid waste (MSW) generated worldwide is currently over 2.0 billion metric tons annually (Kaza et al., 2021). Projections from the World Bank indicate that without drastic intervention, this figure is set to surge by 73 percent, reaching nearly 3.9 billion metric tons by 2050 (World Bank, 2021, 2025). This massive growth rate, driven primarily by increasing urbanization and consumption patterns in developing economies, places extreme pressure on municipal services globally. The failure to manage this escalating volume effectively incurs significant financial penalties. While the direct global cost of waste management in 2020 was an estimated 252 billion USD, the total cost—including the hidden costs associated with environmental pollution, climate change externalities (such as methane emissions), and detrimental public health outcomes—rose to an estimated 361 billion USD (United Nations Environment Programme, 2024). Should current trends persist, this comprehensive annual global cost is projected to almost double, reaching a staggering 640.3 billion USD by 2050 (United Nations Environment Programme, 2024). Globally, an estimated 33 percent of waste is improperly managed (often openly dumped or burned) (Kaza et al., 2021).

This global crisis is sharply realized in specific localized contexts. The definition of solid waste, however, is not merely descriptive; it is a prescriptive tool that shapes policy and regulation. In the United States, for example, the Resource Conservation and Recovery Act (RCRA) provides a highly legalistic framework where a material must first meet the definition of "solid waste" before it can be classified as "hazardous waste" and subjected to stricter controls (World Health Organization (2024)).

Similarly, the Philippines operates under a specific legal framework established by Republic Act No. 9003, the Ecological Solid Waste Management Act of 2000. Under RA 9003, "solid waste" is defined as all discarded household, commercial, non-hazardous institutional and industrial waste, street sweepings, construction debris, and agricultural waste (Republic of the Philippines, 2001). Critically, the Act explicitly excludes certain materials from this definition, including waste identified as hazardous, infectious waste from hospitals, and waste from mining activities, which are presumably managed under separate regulations (Republic of the Philippines, 2001). The Act further defines "municipal waste" as the combination of domestic, commercial, institutional, and industrial wastes and street litters generated within the jurisdiction of local government units (LGUs) (Republic of the Philippines, 2001).

The management of Municipal Solid Waste (MSW) remains a critical environmental and public health challenge in the Philippines. Despite the landmark Ecological Solid Waste Management Act of 2000 (RA 9003), which mandates segregation at source, compliance at the household level is inconsistent and often at a "less extent" (Carpio et al., 2025). This failure is attributed to a complex interplay of factors, including limited LGU resources, weak enforcement, insufficient public awareness, and a critical lack of functional infrastructure like Materials Recovery Facilities (MRFs) (Espino et al., 2025). Recent data from the Philippine Statistics Authority (PSA) reveals a crucial qualitative failure in the solid waste management system. Between 2023 and 2024, the Philippines saw significant quantitative growth in mandated facilities: the number of Material Recovery Facilities (MRFs) increased by 8.7 percent, reaching 12,855 nationwide (Philippine Statistics Authority, 2024). Simultaneously, however, the number of reported illegal dumpsites surged by a massive 84 percent, climbing from 43% in 2023 to 79% in 2024 (Philippine Statistics Authority, 2024). This contradictory trend constitutes the MRF paradox, demonstrating that the primary operational bottleneck is the failure of source waste segregation (SWS), not merely a lack of infrastructure investment (Carpio et al., 2025; World Bank, 2022).

Local Government Units in the Philippines currently operate under a system of trial-and-error, experimenting with a range of behavioral policy instruments to boost SWS compliance. These approaches vary widely, from strictly punitive measures such as the "No Segregation, No Collection" (NSNC) fine policies (Collado et al., 2024), to various incentive-based programs like the "Basura Store," which allows residents to exchange recyclable wastes for essential goods such as rice or canned items (Camarillo and Bellotindos, 2021). However, the effectiveness and sustainability of these policies are highly variable and remain poorly understood across diverse socioeconomic settings. The current lack of a standardized, evidence-based policy framework leads to suboptimal waste outcomes and wasted public resources. In this study, the researchers will systematically quantify and determine the optimal settings for policy instruments—specifically incentives and punitive measures—required to maximize sustained household solid waste segregation compliance within a representative Philippine Local Government Unit (LGU), taking into account local socioeconomic determinants.

1.1 | Background of the Study

The Municipality of Bacolod is a 4th Class Municipality located in the Province of Lanao del Norte, Northern Mindanao (Region X), Philippines. It is a coastal town characterized by a blend of urban and rural barangays. This distinct classification provides a valuable context for solid waste management (SWM), as the challenges faced by municipalities differ significantly from those of highly urbanized cities—often involving more constrained financial resources, logistical difficulties in collection across disparate areas, and the preservation of natural resources like coastlines and agricultural land.

According to the 2024 Census of Population and Housing (CPH), the Municipality of Bacolod has a total population of 24,963 inhabitants (Philippine Statistics Authority, 2024). The daily waste generated by this population, while lower in absolute volume than a large city, still requires a systematic and effective management system to prevent environmental degradation, especially given its coastal location along Iligan Bay.

Figure 1.1: Bacolod in highlight Lanao del Norte Map

The foundation of SWM in the Philippines is the Republic Act No. 9003, also known as the Ecological Solid Waste Management Act of 2000. This law mandates all Local Government Units (LGUs)—including the Municipality of Bacolod—to implement an ecological and comprehensive SWM program. Key legal requirements of RA 9003 that guide and challenge Bacolod include:

- Mandatory separation of waste into biodegradable, recyclable, and residual categories at the household and establishment level.
- Functional facilities in every barangay or cluster of barangays for final sorting, composting, and recycling.
- Prohibiting the use of open dumpsites and mandating the development of compliant sanitary landfills or alternative technologies.
- Requiring the LGU to craft and implement a comprehensive, long-term plan approved by the National Solid Waste Management Commission (NSWMC).

To enforce this, Bacolod Lanao del Norte operates under Municipal Ordinance No. 2018-05, also known as the "Ecological Solid Waste Management of 2018" (refer to Appendix A.1). This local legislation formalizes the mandates of RA 9003, detailing the mandatory source segregation using a four-color-coded bin system (Green for biodegradable, Black for residual, Blue for recyclable, and Red for toxic) (refer to Appendix A.1, Sec. 8). It also explicitly prohibits single-use plastics and polystyrene (Styrofoam) (refer to AppendixA.1, Sec. 13) and outlines a schedule of fines for individual and establishment non-compliance (refer to Appendix A.1, Sec. 15).

A core provision of this policy is the mandatory "no segregation, no collection" rule, which is explicitly stated in the ordinance as "Unsegregated waste shall not be collected" (refer to Appendix A.1, Sec. 8). The Municipal Environment and Natural Resources Office (MENRO) confirms this, clarifying that the LGU is responsible for collecting waste from the Barangays, but only if that waste has already been properly segregated at the barangay level (refer to Appendix B.1).

This thesis aims to determine the optimized policy so that citizens comply with these SWM policies by focusing on the performance of two critical institutional functions: policy implementation and citizen behaviors towards household waste segregation.

The research explores the dynamics between local policy formulation and on-the-ground reality, particularly the persistent challenge of citizen attitude and compliance towards waste segregation. Despite the existence of the ordinance, the MENRO Head estimates the segregation rate at the household source to be only about 10% (refer to Appendix B.1). The successful implementation of RA 9003 ultimately hinges on the active and consistent participation of every household—a behavioral factor that the environmental enforcement structure is tasked to influence.

However, this enforcement structure faces severe limitations. The MENRO identifies its main challenges as a lack of budget and manpower (refer to Appendix B.1). The SWM program budget of approximately 1.5 million pesos is described as "kulang" (insufficient) to cover all SWM activities, biodiversity projects, and collection, which in turn prevents the hiring of more enforcers and leaves many plans on an aspirational planning due to budgetary deficits. (refer to Appendix B.1). This resource gap creates a difficult enforcement dilemma: the MENRO Head notes that if the ordinance were strictly enforced, "all households would be penalized," which is considered unfeasible. Consequently, the LGU must balance limited enforcement (e.g., citation tickets, "Eco-warriors") with continuous Information, Education, and Communication (IEC) campaigns, viewing the primary obstacles as "social norms, acceptance, and behavioral constraints" (refer to Appendix B.1).

The Municipality of Bacolod, Lanao del Norte, has been strategically selected as the research locale due to its geographic accessibility and the established collaborative relationships with the key municipal government offices, as evidenced by the initial qualitative interviews. This logistical advantage is crucial for the research methodology. By focusing on a 4th Class Municipality, this study offers valuable insights into how smaller LGUs, facing confirmed budgetary and manpower constraints (refer to Appendix B.1) and significant logistical hurdles—such as collection from "very far" inland barangays (refer to Appendix B.1)—interpret and strive for compliance with stringent national environmental policies.

This study aims to systematically quantify and determine the optimal settings for policy instruments, specifically incentives, punitive, information and educational campaign measures, required to maximize sustained household solid waste segregation compliance within the Municipality of Bacolod, Lanao del Norte, by taking into account local socioeconomic determinants and budget-constraints.

1.2 | Statement of the Problem

This study aims to systematically quantify and determine the optimal settings for policy instruments, specifically incentive, punitive, information and educational campaign measures, required to maximize sustained household solid waste segregation compliance within the Municipality of Bacolod, Lanao del Norte, by taking into account local socioeconomic determinants and budget-constraints.

This study seeks to answer the following specific questions:

1. How do variations in the synthesized household behavioral parameters (e.g., the relative weight of Subjective Norms vs. Perceived Behavioral Control, derived from literature and LGU records) affect the stability and efficacy of policy outcomes within the Agent-Based Model?
2. What is the optimal long-term resource allocation ratio among the three policy levers (monetary incentives, punitive enforcement, and educational campaigns) that maximizes compliance per peso spent, as determined by the Reinforcement Learning agent?
3. Which dynamic policy strategy yields the highest overall compliance and cost-benefit ratio for the LGU while strictly adhering to the defined annual budget constraint?

1.3 | Research Objectives

The primary objective of this study is to develop and apply a coupled Agent-Based Model (ABM) and Deep Reinforcement Learning (DRL) framework to determine the optimal, budget-constrained allocation of resources across policy levers for maximizing household solid waste segregation compliance in the Municipality of Bacolod.

Specific objectives are:

1. To conduct a comprehensive synthesis of academic literature and utilize contextual financial and operational data from the Philippine Statistics Authority and LGUs records, including interviews with key implementing officers, to rigorously parameterize the ABM.
2. To develop a Multi-Level Agent-Based Model where household agent behavior is governed by a utility function incorporating Theory of Planned Behavior constructs and socioeconomic variables, and where policy levers dynamically update behavioral constructs.
3. To integrate a Reinforcement Learning algorithm that enables the LGU agent to autonomously learn the optimal policy (allocating funds among incentives, enforcement staff, and education campaign) that maximizes a composite reward function balancing compliance and financial cost, while adhering to a defined budget constraint.

4. To simulate and validate the efficacy and cost-effectiveness of budget allocation strategies (Pure Incentive, Pure Penalty, Pure Information Education Campaign, and Hybrid regimes) and provide actionable, data-driven recommendations on the optimal resource mix for the LGU enforcing RA 9003.

1.4 | Significance of the Study

The findings of this research are expected to yield significant contributions across academic, practical, and policy domains.

From an Academic Research perspective, this work contributes to the interdisciplinary fields of environmental science, computational social science, and public policy. It advances the application of Agent-Based Modeling by integrating a robust psychological framework (Theory of Planned Behavior) with Reinforcement Learning for policy optimization—a novel computational approach in the context of Philippine solid waste management. Furthermore, the study provides a validated and parameterized model that can be adapted and reapplied for other behavioral and policy studies focused on resource and behavioral challenges in developing countries. While traditional optimization in waste management often relies on static linear programming or heuristic methods, these approaches fail to capture the non-linear and adaptive nature of household behavior (Tian et al., 2024). This study advances the field by employing Deep Reinforcement Learning (DRL), specifically utilizing Deep Neural Networks (DNNs) as function approximators. Unlike standard tabular RL, which struggles with the 'curse of dimensionality,' DRL enables the LGU agent to process high-dimensional state spaces—such as varying compliance rates across seven distinct barangays—to autonomously discover complex, adaptive policy strategies (Dey, 2025; Ha and Minh, 2025). Furthermore, by formalizing the simulation environment as a Markov Decision Process (MDP), this research demonstrates how Agent-Based Models can serve as robust data generators for training AI policies in the absence of historical datasets (Jiménez, 2025; Kompella et al., 2020)

To Local Government Units (LGUs), the study directly addresses the operational challenges of policy implementation by providing a powerful, low-risk decision-support tool. Instead of relying on costly and time-consuming real-world trials, policymakers can use the developed Agent-Based Modeling and Deep Reinforcement Learning (ABM-DRL) framework to test and identify the most cost-effective policy mix (incentives, fines, or hybrid) tailored for their specific community context. The resultant data-driven

recommendations, such as an optimal fine-to-incentive ratio, are actionable and aim to lead to more effective waste management, better allocation of public funds, and ultimately, higher compliance with RA 9003.

On a broader scale, the successful implementation of the study's recommendations enhances National Policy and Environmental Sustainability. By improving segregation at source, the research contributes to crucial downstream waste management benefits: a reduced volume of waste going to landfills, increased recovery of recyclables, and the resulting promotion of a circular economy. This enhanced system ultimately leads to improved public health, environmental protection, and supports national climate change mitigation goals through the reduction of methane emissions from landfills.

1.5 | Scope and Limitations

This study is bounded by specific constraints concerning its geographical focus, methodological framework, and data utilization strategies.

The computational model is explicitly contextualized within the Municipality of Bacolod, Lanao del Norte, simulating the multi-level governance dynamics between the municipal Local Government Unit (LGU) and its constituent barangays. The study utilizes the municipality's local Solid Waste Management Ordinance to establish baseline structures for punitive and incentive-based policies. Crucially, the simulation is operationally limited to the seven (7) barangays currently covered by the municipal waste collection system. The remaining nine barangays are excluded from the scope due to logistical inaccessibility and their location outside the current service coverage area. Consequently, findings regarding optimal policy parameters are most directly applicable to LGUs sharing similar socioeconomic profiles and logistical constraints.

As an Agent-Based Model (ABM), this research serves as a necessary abstraction of reality. The scope is strictly focused on household solid waste segregation at the source. It does not model the entire solid waste management value chain—such as final disposal, sanitary landfill management, or the technical operations of Material Recovery Facilities (MRFs)—except where infrastructure availability directly influences the residents' Perceived Behavioral Control. The LGU agent's strategic space is limited to adjusting three specific policy levers: the magnitude of monetary incentives, the severity of punitive fines (modeled as enforcement costs), and the intensity of educational campaigns. The optimization process excludes operational logistics, such as waste collection routing or fleet management. Furthermore, the LGU agent's decision-making

is strictly constrained by a fixed, simulated annual operating budget.

The study is delimited to data synthesis from secondary sources and a rigorous literature review; All behavioral parameters required for the model (e.g., Theory of Planned Behavior construct weights) will be derived solely from a meta-analysis and synthesis of existing academic studies relevant to SWM in developing countries. Specifically, baseline agent values for Knowledge, Attitude, and Practice (KAP) will be calibrated using regional empirical data from Paigalan et al. (2025), which characterizes the KAP profile of riverside barangays in Northern Mindanao, serving as a high-fidelity proxy for the coastal Municipality of Bacolod. Therefore, the model's validity is conditional on the transferability and representativeness of these synthesized parameters. Finally, the simulation relies solely on the TPB as the cognitive framework for household agents, and the policy instruments are restricted to direct monetary incentives, punitive fines, information educational campaigns, and hybrid combinations thereof.

Crucially, this study clarifies the operational definition of *"policy optimization."* The research does not propose the drafting of a new legislative ordinance to replace Municipal Ordinance No. 2018-05 (reder to A.1). Instead, it focuses on the *executive implementation of the existing policy*. In this context, the study distinguishes between three policy states: the *Original Policy* which is the current status quo, *Modified Policies*that are experimental regimes, and the *New Policy* that is the optimized, adaptive resource allocation strategy generated by the Deep Reinforcement Learning agent.

Regarding enforcement integrity, the model operates under the assumption of honest agent interactions. While preliminary interviews in Barangay Liangan East (refer to Appendix B.2) suggest the existence of informal transactions—such as residents tipping collectors to accept unsegregated waste—this study focuses on optimizing official policy levers. The modeling of systemic corruption or bribery introduces game-theoretic complexities that are outside the scope of this research; therefore, informal tipping and enforcement bypass mechanisms are excluded from the simulation.

1.6 | Document Structure

Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like "Huardest gefburn"? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text

should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

2

Review of Related Literature

This chapter synthesizes the body of scholarly work that forms the foundation for this research, which aims to optimize solid waste management (SWM) policies for a Philippine Local Government Unit (LGU) using an Agent-Based Modeling (ABM) and Deep Reinforcement Learning (DRL) approach. The review is organized thematically. It begins by examining the specific context of SWM in the Philippines under the Ecological Solid Waste Management Act (Republic of the Philippines, 2001). It then explores the theoretical underpinnings of pro-environmental behavior and the policy instruments used to influence it. Subsequently, it delves into the computational methodologies of ABM and DRL, highlighting their applications in environmental management and their synergistic potential. The chapter concludes by synthesizing these areas to clearly identify the research gap that this thesis aims to address.

2.1 | Solid Waste Management in the Philippines

The national framework for waste management is defined by the Ecological Solid Waste Management Act of 2000 (Republic of the Philippines, 2001), which mandates source segregation, recycling, and the establishment of Materials Recovery Facilities (MRFs). However, Coracero (2021); Salsabila et al. (2021) confirm that the implementation of R.A. 9003 remains sub-optimal and unsustainable across Philippine LGUs, necessitating a strategic, computational approach to bridge the gap between policy and practice. This context defines the structural and behavioral challenges the proposed ABM-DRL framework must address:

2.1.1 | Systemic and Budgetary Constraints on LGUs

The primary challenge in implementing R.A. 9003 lies in the significant operational and institutional burden placed on Local Government Units (LGUs), which function as the chief implementers of the law (Nishimura, 2022). This burden is most evident in the financial and technical overload that municipalities face. Solid Waste Management (SWM) consistently constitutes a high financial drain on municipal budgets. This cost is compounded by systemic deficiencies, such as a scarcity of compliant sanitary landfills and a chronic lack of funding for local initiatives. Together, these issues often lead to a form of institutional failure that fundamentally weakens the law's effectiveness (Ibañez and Jr, 2022; Santos, 2025). Overcoming these deep-seated structural and financial constraints requires LGU officials to demonstrate considerable political initiative to improve performance (Nishimura, 2022).

Beyond financial hurdles, volatile enforcement undermines policy credibility. Assessments across the Philippines consistently report that while local ordinances are enacted, their enforcement on the ground is inconsistent, weak, or flagging (Dalugdog, 2021; Sagodaquil and John, 2023). Yazawa et al. (2025) characterize this as the critical "Act vs. Reality" gap, where barangay-level practices deviate significantly from the text of RA 9003. This observation is corroborated by Apostol-Jamoralin (2024); Villanueva et al. (2021), whose assessments confirm that without strict monitoring mechanisms and political will, the "status quo" of non-compliance persists despite clear legal frameworks. This lack of strict, sustained implementation erodes the punitive element of the policy, decreasing its credibility and, consequently, its effectiveness as a deterrent (Badua, 2022). This creates a critical optimization problem: a model must learn the most cost-effective threshold of enforcement required to build and maintain policy credibility, all while operating within a realistic and fixed budget constraint.

Finally, the governance structure of the Philippines complicates policy implementation. The Barangay, the basic political unit, serves as the primary level for both planning and implementing R.A. 9003 (Deleña et al., 2025). This multi-level structure necessitates a modeling approach, such as an Agent-Based Model (ABM), that can accurately simulate the flow of policy mandates from the Municipal LGU down to the Barangay level. Florida et al. (2023) emphasize that the performance rating of these barangays is heavily dependent on localized administrative capability, which varies significantly. Furthermore, specific geographical contexts exacerbate these governance challenges. Del Rosario (2023) highlights that coastal municipalities—similar to the Municipality of Bacolod—face distinct logistical burdens in preventing marine debris

that inland models often fail to address. Such a model must therefore account for the significant demographic differences and resource variations that exist between individual barangays (Brugière et al., 2022).

2.1.2 | Behavioral and Policy Intervention

A persistent gap between household awareness and actual practice highlights the limitations of simple mandates, underscoring the need for sophisticated behavioral interventions (Catiil and Daud, 2025). Studies across various Philippine cities demonstrate that a high level of resident awareness of R.A. 9003 often fails to translate into consistent, proper segregation (Abordo and Dalugdog, 2025). This dissonance is quantified by Paigalan et al. (2025), who observed that while residents in Northern Mindanao exhibited positive attitudes toward waste separation (Mean=3.17), improper practices such as open waste burning remained prevalent (Mean=2.90). This widespread phenomenon justifies the application of the Theory of Planned Behavior (TPB), which posits that external factors—mainly Subjective Norms (community perceptions) and Perceived Behavioral Control (the perceived ease or difficulty of segregating)—can override an individual's positive intentions.

To address this, the literature strongly validates the need for multi-pronged interventions that combine informational and community-based tools (Trushna et al., 2024). Qualitative inquiries by Espino et al. (2025) reveal that resident non-compliance is often driven by genuine frustration with irregular collection services, while Carpio et al. (2025) frame this negligence through a green criminology perspective, highlighting the normalization of minor environmental offenses. To counter this, Camarillo and Bellotindos (2021) emphasize the need for participatory governance to build trust. Furthermore, Collado et al. (2024) demonstrate through the SURWEM project that targeted educational interventions can significantly raise awareness, though they note that awareness alone does not guarantee sustained behavioral change without structural support. This evidence directly supports modeling Educational Campaigns as a dynamic LGU expenditure within the ABM, specifically designed to increase the Attitude and Subjective Norms scores of household agents over time.

Furthermore, policy design must account for heterogeneity and equity. Financial penalties, such as fines, are known to disproportionately affect low-income groups, making the policy regressive and unjust (Badua, 2022). Therefore, the Reinforcement Learning agent must be tasked with optimizing not only for cost-efficiency but also for policy equity. To achieve this, the model must simulate heterogeneous agents

whose sensitivity to both positive incentives and negative penalties varies based on their synthesized socio-economic profile.

2.2 | Policy Behavioral Interventions

To enforce waste segregation, Local Government Units (LGUs) worldwide rely on a policy mix of economic incentives, regulatory penalties, and educational campaigns. The critical task for policymakers is to find the optimal combination and intensity of these levers—one that maximizes public compliance and segregation rates without exceeding finite public budgets (He and Fu, 2021; Torkayesh et al., 2021). This presents a complex optimization problem, as these policy levers are not only budget-dependent but also highly interconnected. This research, therefore, models the LGU's strategic choice across three such interconnected, budget-dependent policy levers.

2.2.1 | Economic and Regulatory Levers

Economic instruments, frequently framed as reward-penalty schemes, are among the most powerful direct drivers of compliance because they immediately alter the financial cost-benefit analysis of the household segregation decision (Mu and Zhang, 2021; Zhao et al., 2022). While Cheng et al. (2022) focused on construction waste and Wang et al. (2023) analyzed closed-loop supply chains, both concluded that government-led incentive-punishment mechanisms are essential for rationalizing waste reduction behavior. The literature consistently confirms that a hybrid approach—one combining both incentives and fines—is more effective than relying on either instrument alone (Chen et al., 2023; Mu and Zhang, 2021). Rathore and Sarmah (2021) further argue that identifying these suitable motivational mechanisms is critical for the success of any reverse logistics or collection system. This dual strategy effectively leverages both the psychological gain associated with rewards and the powerful aversion to loss associated with penalties.

A critical complication, however, is that the effectiveness of these financial policies is not uniform. The impact of both incentives and penalties varies significantly based on household heterogeneity (Chen et al., 2023; Zheng et al., 2022a). For instance, low-income households tend to be more sensitive to the disutility of fines, while the perceived benefit of an incentive may be modulated by a household's education level or the perceived complexity of the program (Zheng et al., 2022a). This finding directly justifies the methodological necessity of an Agent-Based Model (ABM), which can model distinct

household agents whose sensitivity to the LGU's financial actions is weighted by their synthetic socio-economic profiles.

Finally, these economic policies must be optimized not only for effectiveness but also for cost and robustness against uncertainty (Gentile et al., 2022). Robust optimization models in waste management explicitly seek to minimize the "price of robustness"—that is, the extra cost incurred to protect the system against uncertain parameters, such as fluctuating waste volumes (Gentile et al., 2022). This concept directly mirrors the LGU's practical constraint: the need to find a policy balance that avoids over-spending on enforcement or incentive schemes that, while effective, may yield diminishing returns (Gentile et al., 2022).

2.2.2 | Educational and Behavioral Levers

Educational strategies represent a critical, non-monetary intervention essential for achieving the long-term sustainability of Solid Waste Management (SWM) programs. Their fundamental value lies in their ability to address the root behavioral challenges that often undermine the success of technical or financial policies alone (Moeini et al., 2023). Complementing traditional education, Loan and Balanay (2023) advocate for the application of Nudge Theory, suggesting that subtle architectural changes and positive reinforcements can be as effective as strict mandates in reinforcing waste separation habits. For a Local Government Unit (LGU), educational campaigns are the primary tool for dynamically influencing household behavior, particularly by targeting the core constructs of the Theory of Planned Behavior (TPB).

For a Local Government Unit (LGU), educational campaigns are the primary tool for dynamically influencing household behavior, particularly by targeting the core constructs of the Theory of Planned Behavior (TPB). These campaigns can cultivate a more positive Attitude toward segregation by clearly conveying its environmental importance. They also enhance Perceived Behavioral Control (PBC) by providing specific, practical knowledge on how to segregate properly, thereby increasing residents' confidence that the action is feasible. Furthermore, education reinforces Subjective Norms (SN) by increasing social awareness and fostering a community-wide expectation of compliance (Vorobeva et al., 2022).

The impact of these educational efforts extends beyond mere awareness, playing a significant role in the adoption of new systems. Studies show that "soft" behavioral factors, such as an established pro-environmental behavior (PEB) and a sense of empowerment, are crucial drivers for household participation. Notably, this influence

persists even when financial incentives are part of the policy mix (Vorobeva et al., 2022). This supports a modeling approach where investment in education—by enhancing these foundational behavioral factors—improves the general willingness of agents to participate in and comply with LGU programs, complementing other interventions.

An integrated Agent-Based Modeling (ABM) framework is particularly well-suited for simulating these complex policy interactions. ABM has been successfully validated in prior research for its ability to simulate community-level behavioral responses and visualize compliance patterns under multiple incentive policies (Ma et al., 2023). This established precedent provides confidence that the model can accurately capture and predict the complex, emergent results of a hybrid policy that combines both educational interventions and financial incentives.

2.3 | Theoretical Foundations of Behavioral Modeling

Understanding household decision-making is the foundational requirement for designing effective and cost-efficient waste segregation policies. The core of this research's Agent-Based Model (ABM) relies on extending established behavioral theory, primarily the Theory of Planned Behavior (TPB), to operate within a complex, stochastic environment.

2.3.1 | The TPB Framework and the Utility Function

The foundational "brain" of each household agent in the model is built upon the Theory of Planned Behavior (TPB), which serves as the dominant psychological framework for explaining and predicting pro-environmental behaviors (PEB), such as waste segregation. Drawing from the study of Ceschi et al. (2021), this theory posits that an individual's intention to perform a behavior—and consequently the likelihood of the behavior itself—is determined by four core cognitive constructs:

- **Attitude (A):** The agent's personal positive or negative evaluation of segregation (e.g., "I believe segregation is important for the environment").
- **Subjective Norms (SN):** The perceived social pressure from the community, family, and neighbors to either perform or not perform the behavior (e.g., "My neighbors are segregating, and I am expected to as well").

- **Perceived Behavioral Control (PBC):** The perceived ease or difficulty of the action, heavily influenced by practical factors such as skills, resources, and infrastructure availability (e.g., adequate LGU collection services).

The validity of utilizing the TPB as the psychological core of the utility function is well-supported in recent literature. A systematic review by Taraghi and Yoder (2025) found that Agent-Based Modeling (ABM) researchers frequently adopt the TPB to simulate pro-environmental behaviors, employing internal and external control variables to operationalize the theory's concepts. This is further supported by Ceschi et al. (2021), who confirmed the validity of operationalizing these constructs—Attitude, Subjective Norms, and PBC—as weighted internal decision drivers.

While Liao (2024) identifies that social determinants and digital social influence are critical predictors of intent, intent does not always translate to action. Meng et al. (2018) addressed this gap using multi-agent simulation, demonstrating that recycling behavior is heavily dependent on neighborhood-level interactions, which validates the necessity of modeling specific 'Subjective Norm' pressures. Furthermore, Ceschi et al. (2021); Ma et al. (2023) demonstrated that combining these weighted TPB factors with objective policy utility components (external levers) is an effective method for analyzing the interaction between internal psychological drivers and policy interventions.

To mathematically represent this decision-making process, the model employs a linear utility function where the agent's utility to segregate ($U_{\text{segregate}}$) is the sum of these weighted psychological factors and a stochastic term:

$$U_{\text{segregate}} = (w_A A + w_{SN} SN + w_{PBC} PBC) + \epsilon \tag{2.1}$$

In this equation, the coefficients (w) represent the relative weight or importance the agent assigns to each psychological factor. Crucially, the ϵ (epsilon) term accounts for the inherent stochasticity (randomness) and unobserved factors present in all human decision-making (Chen et al., 2023; Zheng et al., 2022a). As individuals do not always act with perfect rationality, ϵ represents "noise"—such as haste, forgetfulness, or momentary influences not captured by the primary variables. This stochastic element is essential for model realism, as real-world Solid Waste Management (SWM) systems are characterized by deep uncertainty. Therefore, embracing this randomness is required to produce valid insights into system behavior (Akbarpour et al., 2021; Subedi et al., 2025).

2.3.2 | Extending TPB for Policy and Complexity

To adapt the classic Theory of Planned Behavior (TPB) for dynamic policy simulation, this model extends the framework in three critical dimensions.

First, it integrates economic utility and socio-economic heterogeneity, transcending purely psychological constructs. Policy analysis requires quantifying the trade-off between subjective preferences and objective costs; studies confirm that economic instruments are effective drivers of segregation because they directly modify an agent's final utility calculation (U_{Policy}) (Rathore and Sarmah, 2021). The model addresses heterogeneity by initializing agents with diverse income and education levels, which modulate the weights of this utility term. This reflects real-world observations where, for instance, low-income households exhibit higher sensitivity to punitive fines compared to high-income households (Chen et al., 2023; Zheng et al., 2022a). The inclusion of these external economic factors is validated by Social Cost-Benefit Analysis (SCBA), which advocates for their incorporation into the agent's decision-making process (Medina-Mijangos et al., 2020).

Second, the model captures dynamic social influence by allowing Subjective Norms (SN) to evolve. In contrast to static econometric models, the Agent-Based Model (ABM) structure enables an agent's SN to update based on the compliance rate observed within their immediate neighborhood (Biré et al., 2025). This capacity for adaptive social learning is a distinct advantage of ABM and is vital for understanding community-based Solid Waste Management (SWM) programs in the Philippines (Brugière et al., 2022).

Third, the model translates non-monetary interventions—such as educational campaigns—into direct inputs for psychological constructs. When the Local Government Unit (LGU) agent allocates a budget for awareness, it directly increases the initial values and sensitivities of Attitude (A) and Perceived Behavioral Control (PBC) across the population, explicitly linking budgetary actions to behavioral outcomes.

By grounding agent behavior in TPB and extending it with these dynamic influences, the ABM creates a robust environment necessary for Deep the Reinforcement Learning (DRL) agent to discover optimal, sustainable policies. Contemporary literature validates this integration by framing the simulation as a Markov Decision Process (MDP). In this framework, the ABM functions not merely as a simulator, but as a stochastic environment generating state transitions ($S_t \rightarrow S_{t+1}$) based on agent interactions (Kompella et al., 2020). Studies in urban resource management (Rajesh and Kumar, 2025) and smart city logistics (Ha and Minh, 2025) demonstrate that this approach provides the "experience replay"

data required to train Deep RL agents in the absence of pre-existing datasets. Furthermore, recent applications of Proximal Policy Optimization (PPO) in socio-environmental systems suggest that Deep RL outperforms traditional discrete methods in optimizing continuous control variables, such as specific budget allocations (Jiménez, 2025; Rajesh and Kumar, 2025).

2.4 | ABM in Environmental Management

Agent-Based Modeling (ABM) is a powerful computational method for simulating the actions and interactions of autonomous agents within a defined environment. Serving as a "virtual laboratory" (de Souza et al., 2021), ABM is uniquely suited for modeling complex socio-environmental systems (SES) where macro-level outcomes, such as community compliance, emerge from micro-level behaviors and interactions (Brugière et al., 2022). This capacity is paramount for analyzing municipal solid waste (MSW), where system-wide compliance results directly from the cumulative decisions made at the household level (Fontaine et al., 2024).

The necessity of ABM in this research is rooted in its ability to model heterogeneity and adaptive behavior. While other methodologies like System Dynamics (SD) are effective for analyzing aggregate stocks and flows of plastic waste (Dhanshyam and Srivastava, 2021), and systematic reviews link macro-population growth to generation rates (Eltanal, 2025), these approaches fail to capture individual decision-making. Unlike traditional system dynamics models, ABM captures the diversity of households, representing them as agents with distinct socio-demographic factors and psychological profiles, as defined by the Theory of Planned Behavior (TPB) (Fontaine et al., 2024). This allows the simulation of non-linear and adaptable responses to policy changes—a critical feature since household behaviors are not static. Furthermore, ABM's capacity to integrate advanced computational techniques, such as incorporating machine learning (ML) classifiers into agent decision logic, enhances behavioral realism beyond static heuristics and improves the accuracy of predicted policy outcomes (Jiménez, 2025).

Effective municipal SWM also requires modeling the multi-level complexity of governance structures. ABM facilitates Multi-Level Agent-Based Modeling (ML-ABM), which is essential for capturing the hierarchical relationships between different governing bodies. A comprehensive review by Tian et al. (2024) confirms that while ABM is increasingly utilized in solid waste management to simulate these complexities, existing models largely focus on logistics or technology, often neglecting the dynamic

optimization of policy parameters. This framework can simulate the interactions between the Municipal LGU (as the policy setter), the Barangays (as local implementers), and the Households (as the behavioral units) (Brugière et al., 2022).

2.5 | Deep Reinforcement Learning for Optimization

While the Agent-Based Model (ABM) serves as the simulation environment, Deep Reinforcement Learning (DRL) is the critical methodology required to autonomously discover optimal, budget-constrained policies within that complex system (Zheng et al., 2022b). DRL integrates the decision-making framework of Reinforcement Learning with the representation learning capabilities of Deep Neural Networks (DNNs). In this setup, the Municipal LGU agent utilizes a neural network to approximate the optimal policy, learning to map high-dimensional state inputs—such as the heterogeneous psychological states of thousands of households—to precise adaptive decisions (Hertweck and Dignum, 2023). This integration is essential because traditional tabular RL methods cannot scale to the massive, continuous state spaces generated by complex socio-environmental models (Mousavi and Niazmand, 2021).

To enable this autonomous optimization, the literature supports framing the ABM simulation not merely as a model, but as a stochastic environment formally defined as a Markov Decision Process (MDP). In this hybrid architecture, the ABM functions as a high-fidelity data generator, providing the state representation (S_t)—encapsulating household compliance levels and budget statuses—and processing the policy agent's actions (A_t) to generate the next state (S_{t+1}) and a corresponding reward signal (R_t). Studies in urban resource management (Rajesh and Kumar, 2025) and smart city logistics (Ha and Minh, 2025) demonstrate that this approach provides the "experience replay" data required to train Deep RL agents in the absence of pre-existing datasets (Kompella et al., 2020).

Current applications of DRL in waste management remain predominantly focused on technical, industrial, or hardware-based optimization. For instance, recent advancements have extensively demonstrated the efficacy of DRL in automating waste classification and detection. Duhayyim et al. (2022); Khan et al. (2024) utilized Deep Q-Networks (DQN) and Mask R-CNN to automate the complex visual task of waste object detection, achieving high accuracy in segregating recyclables at the processing stage. Similarly, Udayakumar et al. (2023) integrated Improved Particle Swarm Optimization (IPSO) with MobileNetV2 to enhance the precision of waste

categorization in smart city frameworks. Beyond classification, DRL has been applied to control industrial processes, such as waste biorefining (Gao et al., 2024) and plant machinery optimization (Kumar et al., 2022). In logistics, stochastic optimization has been used for vehicle routing (Akbarpour et al., 2021; Khallaf et al., 2024) and reverse logistics (Karagoz et al., 2022).

However, these existing studies generally prioritize infrastructural efficiency and rely on discrete action spaces (e.g., choose Route A or B). In contrast, this study leverages DRL for governance, using algorithms like Proximal Policy Optimization (PPO) to allow the LGU agent to operate in a continuous action space. This enables the precise modulation of budgetary allocations (e.g., allocating exactly 12.5% of funds to education) rather than selecting from pre-defined, rigid brackets.

The methodological feasibility of using DRL to learn optimal strategies from simulated or fixed data is well-supported by theoretical literature. Agarwal et al. (2020) demonstrated that off-policy DRL algorithms, such as Random Ensemble Mixture (REM) and QR-DQN, can successfully generalize and outperform baseline policies even when trained on fixed, offline datasets—analogous to the constraints of learning from a simulated agent environment. This reliability is further facilitated by the maturation of the field, evidenced by the development of standardized offline RL libraries that validate the use of DRL for extracting strategies from historical or simulated data (Seno and Imai, 2022).

Furthermore, DRL is uniquely adept at handling the stochasticity and uncertainty inherent in SWM systems, which feature unpredictable waste generation rates and heterogeneous household responses (Akbarpour et al., 2021; Zhang et al., 2021). By leveraging deep neural networks as function approximators, the DRL agent can generalize across millions of simulated states, identifying robust patterns amidst noise. This allows for the generation of resilient policies that remain effective even when facing the random fluctuations of agent behavior, a feature proven superior to deterministic planning (Pichardo-Zarate and Román-Martínez, 2025). This robustness is particularly vital when relying on synthesized behavioral parameters derived from literature (Jiménez, 2025).

Finally, DRL facilitates the optimization of complex, multi-objective reward functions. The neural network can be trained to maximize a composite reward signal that integrates conflicting municipal interests: maximizing waste diversion rates, minimizing financial costs, and ensuring social equity through educational spending (Jiménez, 2025). This approach aligns with sustainability-focused Multi-Objective Optimization (MOO)

frameworks, allowing the agent to navigate the trade-offs between economic efficiency and environmental impact to find a Pareto optimal policy (Saif et al., 2022; Torkayesh et al., 2021).

2.6 | Synthesis and Identification of the Research Gap

A comprehensive review of the literature indicates a critical implementation deficit in the Philippine Solid Waste Management (SWM) system. This paralysis, centered on Republic Act 9003, is consistently attributed to weak, inconsistent enforcement and chronic budgetary constraints within Local Government Units (LGUs) (Sagodaquil and John, 2023; Santos, 2025). Furthermore, studies highlight a significant gap between high public awareness of SWM and low actual compliance. This suggests that effective policy must move beyond simple enforcement, requiring a strategic blend of hybrid reward-penalty schemes and investments in non-monetary levers, such as education, to address core behavioral flaws (Catiil and Daud, 2025; Chen et al., 2023).

Addressing this behavioral component is complicated by the highly heterogeneous and non-linear nature of household decision-making. Olawade et al. (2024) identify this integration of Artificial Intelligence into waste management as a necessary "paradigm shift," moving from reactive systems to smart, predictive management. The literature shows that traditional utility models, often focused solely on attitude (A), are insufficient. A more robust model is required, one that integrates the dynamic influence of Subjective Norms (SN) and Perceived Behavioral Control (PBC) (Zheng et al., 2022a). Crucially, such a model must also explicitly account for the moderation effect of socio-economic factors, like income and education, which directly impact a household's financial sensitivity to policy interventions. The sheer complexity of these interacting variables strongly indicates that an agent-based approach is necessary to capture this dynamic behavior accurately.

The computational feasibility of this two-pronged approach is well-established in separate but related fields. First, Agent-Based Modeling (ABM) is consistently identified as the preferred method for simulating complex, multi-level governance structures and capturing the behavioral heterogeneity detailed above (Brugière et al., 2022; de Souza et al., 2021). Second, Deep Reinforcement Learning (DRL) has proven to be the necessary tool for performing stochastic, multi-objective optimization, particularly in discovering robust, cost-minimized solutions within complex systems analogous to SWM, such as supply chain networks (Akbarpour et al., 2021; Torkayesh et al., 2021).

Table 2.1: Thematic Comparison of Related Literature

Theme / Category	ABM?	DRL?	Policy?	Gap / Limitation
Descriptive & Assessment Studies (Philippines) (Abordo and Dalugdog, 2025; Catiil and Daud, 2025; Yazawa et al., 2025)	×	×	×	These studies audit past compliance or describe current habits. They lack a computational tool to predict future outcomes of new policies before implementation.
Traditional Agent-Based Modeling (Social) (Biré et al., 2025; Ceschi et al., 2021; Meng et al., 2018)	✓	×	✓	Uses ABM to test policies, but relies on manual scenarios (e.g., "Test A vs. B"). Lacks an AI agent to automatically "search" for the mathematical optimum.
Supply Chain & Logistics Optimization (Akbarpour et al., 2021; Karagoz et al., 2022; Saif et al., 2022)	×	×	×	Optimizes truck routes, facility locations, or machinery. Ignores the complex, irrational segregation behavior of households (the source).
AI & Reinforcement Learning (Hardware) (Dey, 2025; Gao et al., 2024; Olawade et al., 2024)	×	✓	×	Uses DRL for "Smart Bins" or robotics. High cost and hardware-dependent. The proposed study uses DRL for "Smart Policy" (laws), which is cheaper to implement.
Qualitative, Legal & Theoretical Reviews (Espino et al., 2025; Liao, 2024; Santos, 2025)	×	×	×	Explains "why" people fail to segregate (psychology/law) but offers no quantitative mechanism to translate these insights into specific policy parameters (fines/rewards).

Continued on next page

Table 2.1 – continued from previous page

Theme / Category	ABM?	DRL?	Policy?	Gap / Limitation
Closest Benchmark (National/Equity Focus) (Jiménez, 2025)	✓	✓	✓	While methodologically similar, it is calibrated for national equity. The proposed study is the first calibrated specifically for Philippine LGU compliance.
Proposed Study (Bansao & Lumingkit) (Philippines - Bacolod)	✓	✓	✓	First study to combine ABM and DRL to mathematically optimize local ordinance parameters (fines/rewards) for a Philippine Municipality.

The Critical Research Gap

While the academic literature validates the individual utility of Agent-Based Modeling (ABM) for simulating social systems and Deep Reinforcement Learning (DRL) for optimization, a critical research gap persists at their intersection, specifically within the domain of adaptive public policy. To date, no existing study has developed an integrated framework where a governing agent, such as a Local Government Unit (LGU), operates under a strict municipal budget to autonomously learn the optimal dynamic allocation of funds. This gap is particularly evident in the context of Philippine solid waste management, where the allocation of resources across three distinct strategic instruments—punitive enforcement, monetary incentives, and behavioral education—has not been mathematically optimized to maximize long-term household segregation compliance in a resource-constrained environment.

Current research in this domain remains bifurcated. On one hand, existing ABM studies in waste management primarily engage in static scenario testing. This approach typically involves comparing the outcomes of a few pre-defined policy mixes, such as a "pure fine" versus a "pure incentive" scenario, rather than allowing the governing agent to autonomously discover the optimal, and potentially evolving, combination of interventions. On the other hand, optimization studies using DRL or multi-objective frameworks tend to focus exclusively on technical or logistical networks, such as optimizing vehicle routing or biorefining control to minimize costs. These technical models generally fail to incorporate the dynamic social feedback loops necessary for

understanding behavioral compliance and often neglect the LGU's strategic choice to allocate finite resources toward non-financial levers, such as educational campaigns, which are critical for influencing the complex psychological factors driving behavioral change.

$$U_{\text{segregate}} = (w_A(t)A) + (w_{SN}(t)SN_{\text{local}}) + (w_{PBC}(t)PBC_{\text{infra}}) - C_{\text{Net}} + \epsilon \tag{2.2}$$

This study proposes a structural modification to the conventional Theory of Planned Behavior (TPB) framework, advancing beyond the static behavioral models typified by Ceschi et al. (2021) by introducing a dynamic, time-variant architecture. Central to this design is the integration of an explicit external policy term, C_{Net} (representing the net disutility of compliance), alongside the standard internal psychological constructs of Attitude, Subjective Norms, and Perceived Behavioral Control. Unlike state-of-the-art models that treat government interventions as fixed background variables, this framework renders the utility function dynamic through time-variant weights ($w(t)$). Specifically, the model simulates non-linear behavioral evolution: the weight of Attitude ($w_A(t)$) follows a decay model to simulate "public forgetting" in the absence of reinforcement, requiring continuous IEC investment to maintain. Furthermore, the model incorporates "psychological reactance," where excessive enforcement pressure inversely affects the agent's attitude, acknowledging the resistance to coercion often overlooked in standard waste management simulations.

The novelty of this approach lies in the strategic decoupling of the agent's internal psychological state from external policy levers. By isolating the policy term within the utility equation, this research transforms the TPB from a purely descriptive tool into a computational interface for a Deep Reinforcement Learning (DRL) agent. This modification addresses a critical gap in current literature by modeling the Local Government Unit (LGU) not merely as a static administrator, but as a "strategic learner." Consequently, the RL agent can mathematically manipulate the external utility derived from compliance—balancing incentives (I), enforcement (E), and information & educational campaign (IEC) against budget constraints—without invalidating the agent's internal psychological nature. This coupled ABM-DRL framework moves beyond describing why agents segregate to dynamically optimizing how an LGU can induce segregation, offering a cost-effective decision-support tool for implementing R.A. 9003.

3

Methodology

This chapter details the methodological framework constructed to address the identified research gap. To operationalize the study's objective—optimizing dynamic policy under budgetary constraints—this research employs a coupled Agent-Based Modeling (ABM) and Deep Reinforcement Learning (DRL) framework. This integrated approach is specifically chosen for its unique capacity to simulate a complex social system of household compliance while simultaneously modeling the Local Government Unit (LGU) as an adaptive, learning agent. Unlike traditional static scenario analysis, this framework allows the governing agent to autonomously discover optimal resource allocation strategies over time. This chapter will first present the overall research design, followed by a detailed description of the model's components: the ABM environment and the DRL agent. It will then outline the procedures for model parameterization, validation, and the simulation experiments conducted to generate and evaluate the adaptive policies.

3.1 | Research Design

This study employs a computational simulation research design that integrates Agent-Based Modeling (ABM) with Deep Reinforcement Learning (DRL) optimization. This design creates a virtual laboratory for testing Solid Waste Management (SWM) policies, allowing for the autonomous discovery of the optimal resource allocation strategy without the cost and risk of real-world trials. The research follows three main phases: (1) Model parameterization using literature synthesis, (2) DRL integration and training, and (3) Policy scenario simulation and analysis.

3.2 | Data Synthesis and Parameter Estimation

This study will not collect new, large-scale primary survey data (such as a household-level census). Instead, it will construct a high-fidelity model by synthesizing data from three key secondary and existing sources: (1) academic literature, (2) public government statistics, (3) operational and qualitative data already gathered from LGU records and the key-informant interviews presented in Appendix B.1, and (4) cost parameter estimation.

3.2.1 | Behavioral Parameters from Literature

The foundational psychological parameters for the household agents' Theory of Planned Behavior (TPB) utility function—specifically the behavioral weights for Attitude (w_A), Subjective Norms (w_{SN}), and Perceived Behavioral Control (w_{PBC})—will be derived through a systematic review and meta-synthesis of existing academic studies on Solid Waste Management (SWM) and pro-environmental behavior (Moeini et al., 2023; Taraghi and Yoder, 2025). This approach ensures the model's behavioral core is grounded in empirical evidence.

To ensure the simulation possesses high ecological validity, the initialization of Household Agent behavioral parameters is grounded in empirical Knowledge, Attitude, and Practices (KAP) data derived from the recent study by Paigalan et al. (2025). Although the source study characterizes the KAP profile of riverside barangays in Northern Mindanao, this dataset serves as a robust and high-fidelity proxy for the coastal Municipality of Bacolod due to the shared socio-economic and cultural context of the region.

Crucially, the agents are not instantiated as tabula rasa entities; rather, the initialization logic is rigorously designed to replicate the "Intention-Action Gap" frequently observed in developing economies (Catiil and Daud, 2025; Yazawa et al., 2025). As detailed in Table 3.1, agents are initialized with a relatively high Attitude ($A_0 \approx 0.66$) contrasted with a significantly lower Baseline Compliance ($B_0 \approx 0.58$). This specific parameterization compels the Deep Reinforcement Learning (DRL) agent to discover policy interventions capable of bridging this behavioral dissonance, rather than merely addressing a theoretical lack of awareness (Paigalan et al., 2025).

3.2.2 | Socio-demographic and Operational Parameters

The Agent-Based Model (ABM) will be explicitly contextualized to the seven barangays from which the Local Government Unit (LGU) collects waste: Liangan East, Esperanza,

Table 3.1: Initialization Parameters for Household Agents derived from Paigalan et al. (2025)

ABM Parameter	**Source Variable**	**Mean**(1-5)	**Norm.**(0-1)	**Contextual Justification**
Agent Knowledge (K_0)	Awareness of Programs	3.27	0.65	Residents possess moderate awareness of SWM programs but lack technical depth.
Agent Attitude (A_0)	Attitude on Labeling	3.32	0.66	Agents begin with a generally positive disposition toward segregation rules.
Base Compliance (B_0)	Practice (Open Burning)	2.90	0.58	The prevalence of open burning serves as a proxy for the existing low compliance rate.
Training Sensitivity (S_t)	Need for Training	3.41	0.68	Agents are highly responsive to IEC interventions, as residents explicitly agreed on the need for more training.

Poblacion, Binuni, Demologan, Mati, and Babalaya. A crucial methodological step involves rigorously parameterizing each of these seven local communities as a unique, high-fidelity environment within the model (Brugière et al., 2022; Jiménez, 2025). Data collection for this parameterization will be conducted through key-informant interviews with officials from all seven target barangays, gathering essential operational data that includes local population and household counts, the existing local Solid Waste Management (SWM) budget and resource allocation, local staff levels (such as Barangay Officials and BPATs/Tanods) available for implementation, current compliance estimates, and specific local SWM challenges (Florida et al., 2023; Villanueva et al., 2021).

The data already secured from Barangay Liangan East (refer to Appendix B.2), detailing its 608 households, 32 staff, and ₱30,000 local SWM budget, will serve as the initial prototype for building and calibrating the generic `BarangayAgent` class. Following this prototype development, the model will be expanded as data from the other six planned interviews is collected, with six additional, unique `BarangayAgent` environments instantiated, each loaded with its own precise operational parameters. Furthermore, a socio-demographic baseline, specifically household income profiles and population densities for all seven barangays, will be established using publicly available Philippine Statistics Authority (PSA) data (Abordo and Dalugdog, 2025), which will then be

validated and refined by the qualitative insights and local context gathered from the interview process.

3.2.3 | Policy and Operational Parameters

The LGU-DRL agent's primary constraint is its ₱1,500,000 annual SWM budget (refer to Appendix B.1). The agent's task is to allocate this budget.

- **Decision Timeframe:** The DRL agent will make policy adjustments every quarter. The ₱1.5M annual budget is therefore divided into a quarterly operating budget of ₱375,000.
- **Policy Levers:** The agent allocates this budget across three levers:
  - **Monetary Incentives:** (e.g., eco-brick exchange).
  - **Enforcement:** (Funding MENRO "Eco-warriors" to issue citations).
  - **IEC (Awareness) Campaigns:** (Funding radio ads, IEC materials).

3.2.4 | Cost Parameter Estimation

To operationalize the continuous resource allocation model, the study defines specific cost functions to quantify the depletion of the ₱1,500,000 annual municipal fund. These functions transform abstract policy decisions into concrete financial constraints, addressing the chronic lack of funding often cited as a cause of institutional failure (Ibañez and Jr, 2022; Santos, 2025).

3.2.4.1 | Cost of Enforcement (C_{Enf})

Enforcement expenditure is calculated as a function of the Coverage Ratio. Based on the logistical constraints of the Municipality of Bacolod, which includes dispersed coastal and inland barangays, the model assumes a single enforcement officer can effectively monitor a maximum of 30 households per day. This conservative estimate accounts for travel time between households and the administrative burden of issuing citations (Nishimura, 2022).

$$C_{\text{Enf}} = (N_{\text{Enforcers}} \times W_{\text{Daily}} \times 66) \tag{3.1}$$

Where $N_{\text{Enforcers}}$ is the number of personnel required, W_{Daily} is the regional minimum daily wage for Region X, and 66 represents the working days in a quarter. The Deep

Reinforcement Learning (DRL) agent's budgetary allocation determines $N_{\text{Enforcers}}$, which subsequently defines the Probability of Detection (P_{Detect}) variable in the household utility function (Mu and Zhang, 2021).

3.2.4.2 | Cost of Incentives (C_{Inc})

Incentive costs are modeled as a Variable Success Function, creating a dynamic positive feedback loop where successful behavioral change increases financial liability.

$$C_{\text{Inc}} = (V_{\text{Reward}} \times N_{\text{Compliant}}) \tag{3.2}$$

Where V_{Reward} is the monetary value of the incentive and $N_{\text{Compliant}}$ is the count of compliant households. This structure introduces a critical "Victim of Success" risk; the DRL agent must learn to optimize for a compliance equilibrium that is fiscally sustainable, avoiding scenarios where high compliance rapidly depletes the municipal treasury (World Bank, 2022).

3.2.4.3 | Cost of Information & Educational Campaign (C_{IEC})

Information, Education, and Communication (IEC) costs are modeled as Tiered Fixed Costs, reflecting the discrete nature of media procurement.

$$C_{\text{IEC}} = (N_{\text{Spots}} \times R_{\text{Radio}}) + (N_{\text{Events}} \times C_{\text{Mobilization}}) \tag{3.3}$$

This formulation aligns with the LGU's operational reliance on local radio broadcasting (e.g., 101.3 Grace Covenant FM) as the primary dissemination channel for environmental policy (Collado et al., 2024).

3.3 | Multi-Level Agent-Based Model Development

The model will be developed in an existing Agent-Based Modelling Software or Python library (e.g., Mesa), a methodological choice strongly supported by recent reviews of computational tools in solid waste management (Ma et al., 2023; Tian et al., 2024). Its architecture will consist of one single ABM environment that contains 7 distinct `BarangayAgent` objects, which in turn contain their respective populations of `HouseholdAgent` objects.

The simulation utilizes a single, discrete ABM environment to contain its operational entities and manage its temporal structure. Time progression is segmented into recurring quarterly loops, establishing the fundamental unit of analysis and adaptation for the governance agents. The architecture is strictly hierarchical: it contains seven distinct `BarangayAgent` objects in the upper layer, which encapsulate their respective populations of `HouseholdAgent` objects in the lower layer. This multi-level approach is essential for accurately capturing the flow of mandates and the heterogeneity between different governance units in socio-environmental systems (Brugière et al., 2022).

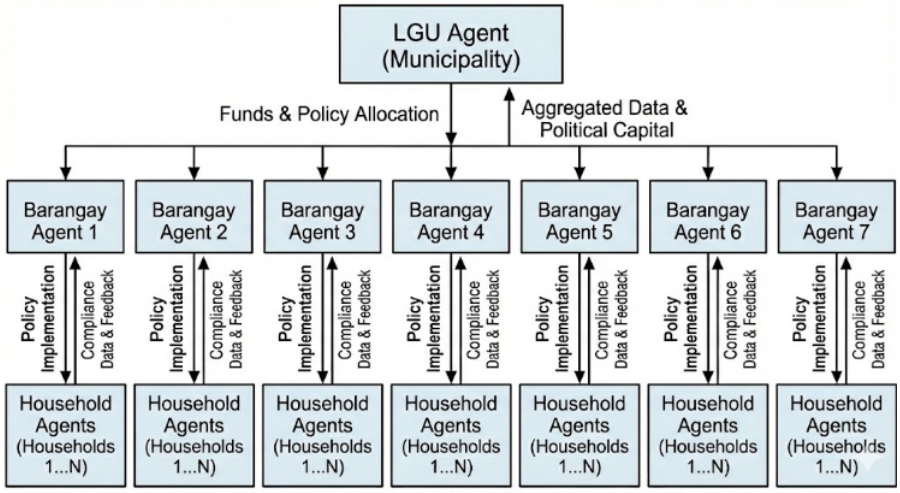

Figure 3.1: Multi-Level Agent-Based Modeling Diagram

The *BarangayAgents* embody the Local Government Unit (LGU) implementation layer, responsible for fiscal management (fund allocation), policy formulation and implementation (e.g., establishing waste segregation mandates), and personnel management (deployment of enforcement staff). This aligns with the decentralized governance structure where local units are the primary implementers of environmental law (Nishimura, 2022). The *BarangayAgents* is the key recipient of the feedback mechanism, utilizing the aggregated compliance rate as an observational State and a prescriptive Reward signal for its internal Deep Reinforcement Learning (DRL) mechanism (Jiménez, 2025).

The *EnforcementAgents* function as the operational execution arm of the LGU, tasked with the stochastic monitoring of compliance. Constrained by the budget allocation determined by the *BarangayAgents*, these agents conduct random inspections to verify waste segregation at the source, effectively operationalizing the "No Segregation, No

Collection" policy (Badua, 2022). Their presence directly manipulates the "perceived intensity of enforcement" variable within the simulation, transforming abstract policy mandates into tangible risks for non-compliant households (Carpio et al., 2025). This agent layer introduces the critical dynamic of detection probability: while higher enforcement density significantly deters non-compliance ("green criminology"), it incurs higher operational costs, forcing the system to balance fiscal sustainability with strict environmental policing (Chen et al., 2023; Ibañez and Jr, 2022).

The *HouseholdAgents* represents the citizenry and is geographically and administratively segregated by its assigned barangay. Household behavior is modeled through a process of rational bounded observation, where agents assess three primary exogenous factors: the clarity and strictness of LGU policies, the perceived intensity of local enforcement (driven by the *EnforcementAgents*), and the compliance behavior of neighboring households (social norms) (Liao, 2024; Meng et al., 2018). This assessment culminates in an independent segregation decision, which dictates the agent's contribution to the collective compliance level. The quarterly feedback loop aggregates these decisions into seven discrete *BarangayComplianceRate* values, which are then transmitted back to the LGU-DRL Agent, closing the adaptive system loop and facilitating the study of policy response to citizen behavior (Ceschi et al., 2021; Fontaine et al., 2024).

3.3.1 | Formalization as a Markov Decision Process (MDP)

To enable the LGU agent to learn optimal strategies without relying on historical datasets, the Agent-Based Model is formalized as a finite-horizon Markov Decision Process (MDP). This formulation transforms the simulation into a stochastic environment where the DRL agent perceives states and executes actions to maximize cumulative utility (Kompella et al., 2020). The MDP is defined by the tuple $\mathcal{M} = \langle S, A, P, R, \gamma \rangle$:

State Space (S): A continuous, multi-dimensional state vector $S_t \in \mathbb{R}^{10}$ representing the macroscopic condition of the municipality at time t. This observation vector includes the local compliance rates of the 7 component barangays, the normalized remaining municipal budget, the simulation time index (quarter), and the LGU's current political capital index (Ha and Minh, 2025).

Action Space (A): A continuous action vector $A_t \in \mathbb{R}^{21}$ representing the allocation of the quarterly budget across three distinct policy levers—Enforcement (E), Incentives (I), and Information Education Campaigns (IEC)—for each of the 7 barangays. The

use of a continuous action space allows for granular resource allocation, enabling the agent to fine-tune spending intensity rather than selecting from coarse, discrete interventions (Rajesh and Kumar, 2025).

Transition Function (P): Formally defined as $P(S_{t+1}|S_t, A_t)$, this function governs the system dynamics. In this framework, the ABM simulation serves as an *implicit* stochastic transition function. Unlike traditional control theory, where P is a known differential equation, the transition here emerges from the complex, non-linear interactions of thousands of heterogeneous household agents updating their internal utility based on the Theory of Planned Behavior (TPB). The ABM acts as a generative model, producing the subsequent state S_{t+1} in response to policy A_t (Jiménez, 2025; Tian et al., 2024).

Reward Function (R): A scalar feedback signal $R_t(S_t, A_t, S_{t+1})$ calculated at each step to guide learning. The reward is a multi-objective function designed to balance competing governance goals: maximizing aggregate compliance, ensuring fiscal sustainability (budget conservation), and minimizing political backlash from excessive enforcement (Dey, 2025).

Discount Factor (γ): Set to $\gamma = 0.99$, this parameter determines the agent's time horizon, ensuring the optimal policy prioritizes long-term sustainable compliance over myopic, short-term improvements (Ha and Minh, 2025).

3.3.2 | Household Agent Design

The decision-making architecture of the `HouseholdAgent` is governed by a Dynamic Utility Function grounded in the Theory of Planned Behavior (TPB) (Ceschi et al., 2021). In contrast to static behavioral models, this framework incorporates time-variant weights ($w(t)$) for psychological constructs, allowing agent behavior to evolve non-linearly in response to LGU interventions (Ma et al., 2023; Taraghi and Yoder, 2025).

$$U_{\text{segregate}} = (w_A(t)A) + (w_{SN}(t)SN_{\text{local}}) + (w_{PBC}(t)PBC_{\text{infra}}) - C_{\text{Net}} + \epsilon \tag{3.4}$$

Where:

$w_A(t)$ **(Dynamic Attitude Weight):** Represents the temporal evolution of the agent's internal valuation of segregation. This weight functions as a decay model: it

increases in response to IEC investment and decays stochastically over time in the absence of reinforcement, simulating the phenomenon of public forgetting (Trushna et al., 2024).

SN_{local} **(Local Subjective Norms):** An endogenous variable derived from the observed compliance rate of the agent's immediate spatial neighborhood (radius r), capturing the effect of social pressure and observational learning (Liao, 2024; Meng et al., 2018).

C_{Net} **(Net Disutility):** The net disutility of performing the segregation behavior, defined as:

$$C_{\text{Net}} = C_{\text{Effort}} + (\gamma C_{\text{Monetary}}) - (\gamma I) - (\gamma F P_{\text{Detection}}) \tag{3.5}$$

Variable Definitions for Equation 3.4:

- C_{Net} **(Net Behavioral Cost):** The total perceived friction to segregate. If this value is high, the agent will not segregate.
- C_{Effort} **(Cost of Effort):** The physical hassle of segregating (washing, sorting, storing).
- C_{Monetary} **(Monetary Cost):** The tangible financial cost of compliance (e.g., purchasing sacks or segregation bins), which interviews identified as a barrier for low-income residents.
- I **(Incentive Value):** The objective value of the reward (e.g., ₱50).
- γ **(Gamma - Income Sensitivity):** A weighting factor based on household income. For poor households $\gamma > 1$ (money matters more); for rich households $\gamma < 1$ (money matters less).
- F **(Fine Magnitude):** The objective penalty amount (e.g., ₱1,000).
- $P_{\text{Detection}}$ **(Probability of Detection):** The likelihood of being caught (0.0 to 1.0), which depends on the number of enforcers.
- ϵ **(Epsilon):** A stochastic "noise" term, representing random factors and inherent uncertainty in human decision-making (Subedi et al., 2025).

The dynamic updates to the internal TPB constructs ensure the `HouseholdAgent` behavior is adaptive and responsive to both policy and social context, as recommended for ABM waste management simulations (Ceschi et al., 2021; Ma et al., 2023).

- **Attitude (A) and Subjective Norm (SN)** are increased by the LGU's investment in IEC Campaigns in that agent's specific barangay, a correlation supported by systematic reviews of household interventions (Trushna et al., 2024).
- **Subjective Norm (SN)** is also updated by the agent observing the compliance rate of its neighbors (social influence). The incorporation of social norms, which influence agent behavior through observation of neighbors, is a critical element supported by research on pro-environmental nudges and multi-agent simulation (Ceschi et al., 2021; Meng et al., 2018).
- **Attitude (A)** is decreased if the perceived enforcement level crosses the "psychological reactance" threshold. This inverse reaction models the tendency of individuals to resist coercive mandates when they perceive a loss of autonomy, a concept central to Nudge Theory applications in waste management (Loan and Balanay, 2023).
- **Perceived Behavioral Control (PBC)** is increased by barangay-level actions (e.g., providing sacks, functional MRF) and decreased by infrastructure failures, acknowledging that technical constraints are primary drivers of non-compliance in developing countries.

3.3.3 | Barangay Agent Design

This agent represents the intermediate implementation layer. The model will initialize 7 unique instances of this agent class (Liangan East, Poblacion, etc.), each with its own parameters from Section 3.2.2. The use of ABM for dynamically modeling the effectiveness of such public policies and the interactions between governance and neighborhood units is well-established (Ceschi et al., 2021). Its function is to:

- **Receive and Spend LGU Funds:** Use the quarterly budget allocated to it by the LGU-RL agent for local incentives, enforcement, and IEC.
- **Manage Local Resources:** Use its own separate, smaller budget (e.g., Liangan East's ₱30,000) for local activities (e.g., "Pulot basura").

- **Mediate Policy:** Implement the "No Segregation, No Collection" rule using its local staff.
- **Report Status:** Track and report its local `BarangayComplianceRate` to the LGU agent at the end of each quarter. The feedback loop based on citizen compliance supports the adaptive policy analysis framework enabled by ABM (Ceschi et al., 2021).

3.4 | Deep Reinforcement Learning Optimization

To address the high-dimensional resource allocation problem inherent in municipal budgeting, this study employs Deep Proximal Policy Optimization (Deep PPO), a policy-gradient algorithm specifically optimized for Continuous Action Spaces (Dey, 2025; Jiménez, 2025).

While traditional tabular methods (e.g., Q-Learning) are limited to small, discrete state spaces, and value-based algorithms like Deep Q-Networks (DQN) are restricted to discrete decisions, Deep PPO utilizes Deep Neural Networks (DNNs) to approximate the optimal policy $\pi_\theta(a|s)$ (Rajesh and Kumar, 2025). This architecture allows the LGU agent to output precise, continuous budgetary fractions (e.g., allocating exactly 12.5% of funds to education) rather than relying on coarse, pre-discretized categories, thereby significantly enhancing the granularity of the optimal policy (Tian et al., 2024).

3.4.1 | Neural Network Architecture

The agent is constructed using an Actor-Critic architecture, which consists of two separate neural networks working in tandem:

Input Layer: Accepts a normalized state vector S_t containing compliance rates, budget status, and political capital.

Hidden Layers: Both the Actor and Critic networks utilize two fully connected (dense) layers with 64 neurons each. These layers employ ReLU (Rectified Linear Unit) activation functions to capture the non-linear and complex relationships between enforcement intensity and household behavioral responses (Dey, 2025).

Output Layer (Actor): A final layer using a Softmax activation function. This outputs a probability distribution over the continuous action space, ensuring that all budget allocations sum exactly to 100% of the available quarterly fund (Jiménez, 2025).

3.4.2 | RL State Representation (S_t)

The "state" (S_t) represents the complete set of observations available to the LGU agent at the start of each quarter t. This context-rich vector allows the agent to link its fiscal actions to subsequent social outcomes, mirroring the complexity of local governance decisions (Jiménez, 2025).

$$S_t = [CB_{1...7}, B_{\text{Rem}}, M_{\text{Index}}, P_{\text{Cap}}] \tag{3.6}$$

Where each component plays a distinct strategic role supported by the literature:

- $CB_{1...7}$ **(Barangay Compliance Vector):** A 7-dimensional sub-vector representing the current segregation compliance rate of each specific barangay. Tracking granular, barangay-level performance allows the agent to identify spatial disparities and target interventions toward underperforming units rather than applying inefficient blanket policies (Villanueva et al., 2021).
- B_{Rem} **(Remaining Budget):** The absolute monetary value remaining in the annual fund. This provides the agent with fiscal context, allowing it to learn "pacing" strategies to solve the multi-objective optimization problem without violating financial constraints (Abdallah et al., 2021; Torkayesh et al., 2021).
- M_{Index} **(Temporal Index):** An integer representing the current quarter (1-4). This establishes the time horizon, ensuring the agent does not engage in aggressive spending when the fiscal year is nearing completion (Akbarpour et al., 2021).
- P_{Cap} **(Political Capital):** A scalar value (0–1) representing the accumulated trust or tolerance of the populace. This constrains the agent from over-utilizing punitive measures, reflecting the reality that effective decentralization requires social acceptability (Nishimura, 2022). To model the erosion and recovery of trust, P_{Cap} updates according to the transition function:

$$P_{\text{Cap}(t+1)} = P_{\text{Cap}(t)} - (\alpha \cdot E_{\text{Intensity}}) + (\beta \cdot T_{\text{Decay}}) \tag{3.7}$$

Where α represents the population's sensitivity to punitive measures (depletion rate due to strict enforcement), $E_{\text{Intensity}}$ is the normalized level of enforcement funding, and β represents the natural recovery of political capital over time (forgiveness rate) in the absence of harsh measures.

3.4.3 | RL Action Space (A_t)

The action space defines the set of all possible decisions the LGU agent can execute. Unlike simpler models that choose from a discrete menu of options, this study employs a Continuous Action Space of dimension $d = 21$. This corresponds to three distinct policy levers applied independently across the seven barangays:

$$A_t = [Alloc_{\text{IEC},B1}, ..., Alloc_{\text{Enf},B1}, ..., Alloc_{\text{Inc},B1}, ..., Alloc_{\text{Inc},B7}] \tag{3.8}$$

To ensure fiscal viability, the raw output of the neural network is processed through a Softmax Normalization Layer and scaled to the Quarterly Budget Cap ($B_{\text{Quarterly}}$). Unlike models that might access the entire annual fund at once, this model enforces a strict quarterly spending limit:

$$A_{\text{final}} = \text{Softmax}(A_{\text{raw}}) \cdot B_{\text{Quarterly}} \tag{3.9}$$

This mathematical guarantee ensures that the sum of all allocations across all 21 channels will never exceed the available funds, effectively embedding the hard budgetary constraint directly into the model architecture:

$$\sum A_t \leq B_{\text{Quarterly}} \tag{3.10}$$

By constraining the action space to $B_{\text{Quarterly}}$ (derived from the ₱1,500,000 annual budget divided by 4 quarters), the model forces the agent to optimize for cost-effectiveness within a sustainable recurring budget (Abdallah et al., 2021).

3.4.4 | The Multi-Objective Reward Function

The Deep RL agent learns the optimal policy by maximizing a Composite Reward Function (R_{total}). This function explicitly incorporates the LGU's competing priorities: maximizing compliance while maintaining fiscal responsibility and political stability.

$$R_{\text{total}} = w_1 R_{\text{Compliance}} + w_2 R_{\text{Sustainability}} - w_3 P_{\text{Backlash}} \tag{3.11}$$

Where:

Compliance Reward ($R_{\text{Compliance}}$): The population-weighted average segregation rate across all seven barangays. This serves as the primary environmental objective function.

Sustainability Reward ($R_{\text{Sustainability}}$): A regularization term designed to enforce fiscal stability. It penalizes the agent for deviating from the ideal burn rate (e.g., spending 50% of annual funds in the first quarter), ensuring program longevity (Medina-Mijangos et al., 2020).

$$R_{\text{Sustainability}} = -\left| \frac{S_{\text{Actual}}}{B_{\text{Total}}} - \frac{1}{12} \right| \tag{3.12}$$

Political Backlash Penalty (P_{Backlash}): A non-linear penalty function triggered when Enforcement Intensity is high while Compliance remains low. This models the insight that "penalizing all households is unfeasible" (refer to Appendix B.1), conditioning the agent to learn that draconian enforcement is only viable as a secondary measure once behavioral norms have shifted (Nishimura, 2022).

The weighting coefficients (w_1, w_2, w_3) are calibrated to reflect the specific operational reality of a 4th Class Municipality, where fiscal survival (w_2) is often as critical as environmental performance (w_1).

3.5 | Simulation and Analysis Framework

This section details the experimental design for the study, outlining the complete process of operationalizing the coupled ABM-RL model to answer the core research questions. This framework is the "experimental" phase of the research, defining how the simulation will be run and how the results will be measured. It is divided into four key stages: (1) the protocol for initializing, calibrating, and training the model; (2) the design of the specific policy scenarios to be tested; (3) the performance metrics that will be used to evaluate and compare the outcomes of each scenario; and (4) the sensitivity analysis to validate the model's robustness.

This diagram illustrates the integrated simulation pipeline designed to optimize waste management policies. The workflow initiates with Input & Parameterization, grounding the model in real-world demographic data from the Philippine Statistics Authority (PSA), waste management records from the Bacolod LGU, and behavioral parameters synthesized from literature. These inputs drive the ABM & DRL Dynamic Loop, a cyclical process where the Reinforcement Learning agent (LGU) iteratively

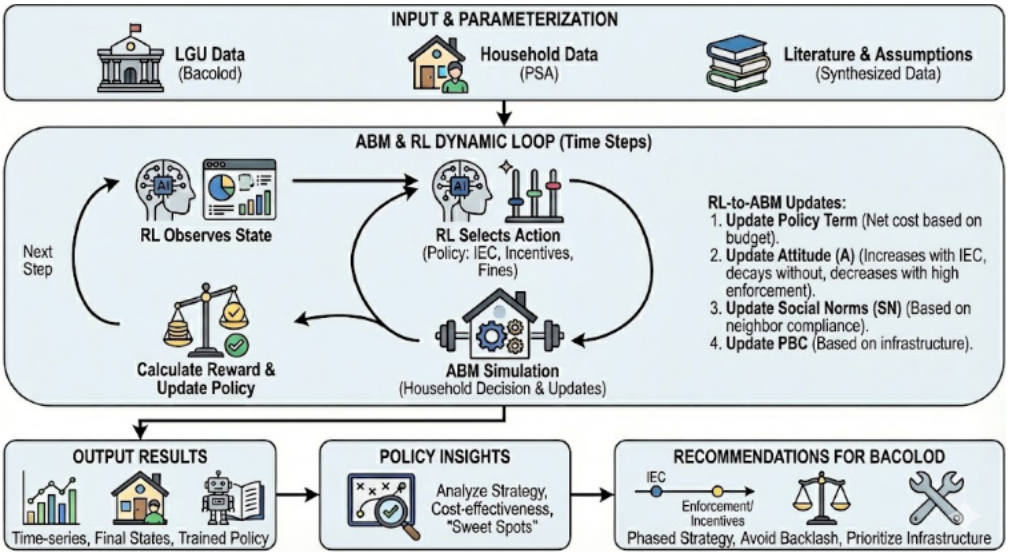

Figure 3.2: Process Flow of Proposed Methodology

adjusts policy levers—specifically IEC intensity, incentives, and enforcement—based on the feedback received from Household Agents. The system generates quantitative Output Results, such as segregation rates and budget utilization, which are finally translated into actionable Policy Suggestions for the Municipality of Bacolod to effectively implement R.A. 9003.

3.5.1 | Training and Validation

The simulation framework will be operationalized through a three-stage process: initialization, calibration, and large-scale training.

First, the model will be initialized using baseline data gathered from key-informant interviews with officials from all 7 barangays, loading in their specific population counts, local budgets, and current compliance rate estimates (Villanueva et al., 2021; Yazawa et al., 2025). This step is critical to ensure the Agent-Based Model (ABM) accurately captures the real-world heterogeneity and specific challenges facing each local unit, providing a relevant starting point for the policy simulation (Camarillo and Bellotindos, 2021).

Second, the model will undergo a rigorous calibration phase where the synthesized behavioral parameters—such as household sensitivity to fines and the strength of social norms—will be systematically adjusted (Ceschi et al., 2021; Taraghi and Yoder, 2025). The objective is to tune these unobservable parameters until the model's baseline

behavior (when run without any new policy interventions) accurately reproduces the current-day, real-world compliance estimates provided by the LGU (e.g., the sim 10% municipal rate) (Jiménez, 2025). This process of matching model outputs to observed real-world outcomes is essential for validating the ABM as a credible representation of the socio-environmental system before proceeding to policy testing (Ma et al., 2023).

Finally, once the ABM is calibrated, the Deep Reinforcement Learning (DRL) agent's training will begin. This involves running over 12 simulated episodes, or "lifetimes" (e.g., 10,000 simulated 3-year periods), a high volume of interaction necessary to learn an optimal policy (Dey, 2025). By serving as the training environment, the ABM allows the LGU agent to thoroughly explore the vast and complex 21-dimensional policy space through trial and error—a process that would be impossible or unethical in the real world—to ultimately converge on a stable and optimal budget allocation strategy that maximizes long-term compliance under fiscal constraints (Tian et al., 2024).

3.5.2 | Policy Scenario Analysis

The approach of testing distinct, constrained policy scenarios is a standard and necessary step in Deep Reinforcement Learning (DRL) studies embedded within Agent-Based Models (ABM), as it allows researchers to isolate the causal impact of different instruments on system outcomes (Jiménez, 2025; Tian et al., 2024). To answer the research questions, three core policy scenarios will be simulated by manipulating the DRL agent's available action space, using its core levers: Information, Education, and Communication (IEC), Incentives, and Enforcement (penalties).

To systematically evaluate the efficacy of the DRL agent, the simulation is structured to compare the *Original*, *Modified*, and *New* policy frameworks:

- **Original Policy (Baseline):** Corresponds to the *Pure Penalty Regime*, representing the current "No Segregation, No Collection" approach with existing budget constraints.
- **Modified Policies (Static Scenarios):** Corresponds to the *Pure Incentive* and fixed *Hybrid Regimes*, representing manual attempts to alter implementation strategies without AI optimization.
- **New Policy (Optimized Output):** Corresponds to the final *Adaptive Strategy* learned by the agent in the Hybrid setting, where the allocation of funds across the three levers dynamically shifts in response to household behavior.

The specific experimental regimes are defined as follows:

- **Pure Incentive Regime:** Simulates a "soft" governance approach by limiting the DRL agent's action space to allocating funds only between IEC and Incentives (with no allocation for enforcement). This scenario tests the efficacy of relying solely on positive rewards, behavioral nudges, and social motivation to drive compliance (Loan and Balanay, 2023). Research strongly supports that an incentive-based strategy can be effective in promoting pro-environmental behavior like waste separation (Chen et al., 2023; Mu and Zhang, 2021; Vorobeva et al., 2022).
- **Pure Penalty Regime:** Simulates a "hard" governance approach by constraining the agent to allocating funds only between IEC and Enforcement. This scenario investigates the performance of a strategy heavily reliant on monitoring, fines, and institutional coercion (Wang et al., 2023). Given the challenges in enforcement highlighted in the context of the Ecological Solid Waste Management Act (R.A. 9003) in the Philippines, this scenario tests if a strictly punitive financial strategy can achieve superior compliance (Dalugdog, 2021).
- **Hybrid Regime:** Grants the agent access to its full action space (IEC, Incentives, and Enforcement). This scenario tasks the agent with finding the optimal, data-driven mix among all three policy levers. Literature suggests that an effective solution often requires this sophisticated combination, using incentives to encourage behavior while employing penalties to deter non-compliance, demonstrating the superiority of a balanced, adaptive strategy over a single-instrument focus (Mu and Zhang, 2021; Zhao et al., 2022). By comparing the compliance rates and cost-efficiency results across these three scenarios, the research can provide a powerful, data-driven recommendation for the LGU's long-term budget strategy (Tian et al., 2024).

3.5.3 | Performance Metrics

To evaluate the outcomes of the simulations and compare the success of each policy regime, four key performance metrics are defined, reflecting the multi-faceted nature of effective local governance.

1. **Maximum Sustainable Compliance:** Defined as the highest population-weighted average compliance rate the LGU agent manages to achieve and maintain over the

long term (Apostol-Jamoralin, 2024; Torkayesh et al., 2021). This establishes the agent's ability to solve the core environmental problem over a sustained period.

2. **Cost-Effectiveness:** Calculated as the average percentage of compliance gained per ₱100,000 spent. By integrating this financial ratio, the metric addresses the need for fiscal discipline and efficiency, ensuring the policy provides the most impact for its cost—a major practical concern for LGUs (Medina-Mijangos et al., 2020; World Bank, 2022).

3. **Policy Equity:** Assessed by measuring the final variance in compliance rates between the 7 barangays (Jiménez, 2025). A lower variance indicates a more equitable and evenly distributed policy outcome, verifying that the DRL agent's resource allocation strategy does not simply concentrate resources on easy-to-manage areas, but rather succeeds in raising compliance across all geographic units (Tian et al., 2024).

4. **Optimal Resource Allocation:** Analyzed for the comprehensive Hybrid regime as a key output. This metric details the final learned budget split, in both percentage (%) and peso (₱) terms, across the three policy levers (IEC, Enforcement, Incentives) and all 7 barangays. This provides the essential prescriptive, actionable intelligence, revealing the data-driven policy mix deemed optimal for the LGU's specific context (Mu and Zhang, 2021; Zhao et al., 2022).

3.5.4 | Sensitivity Analysis

To validate the robustness of the model, a Global Sensitivity Analysis (GSA) using Sobol indices will be conducted. This is particularly critical given that the baseline behavioral parameters (Knowledge, Attitude, Practices) are initialized using proxy data from riverside barangays (Paigalan et al., 2025) rather than primary survey data from the coastal study site. To account for potential contextual differences between riverside and coastal communities, the simulation will explicitly widen the variance of these specific behavioral parameters by 20% during the sensitivity testing phase. This stress-testing ensures that the policy recommendations generated by the DRL agent remain valid even if the specific behavioral profile of Bacolod's population deviates slightly from the synthesized dataset used for initializations (Taraghi and Yoder, 2025; Tian et al., 2024).

3.6 | Ethical Considerations and Limitations

This study ensures the confidentiality of all associated entities by strictly adhering to ethical data use standards and the provisions of the Data Privacy Act of 2012 (Republic Act No. 10173). Consistent with the Act's mandate on the protection of personal information, no private individual or household data will be collected or utilized. The model is predicated upon synthesized socio-demographic data derived exclusively from public aggregates, such as official figures from the Philippine Statistics Authority (Philippine Statistics Authority, 2024), and anonymized operational details obtained from LGU and barangay officials. This approach allows the model to capture the necessary geographic and demographic complexity (Jiménez, 2025) while fully protecting the privacy of citizens and local officials.

This research also acknowledges its inherent limitations. The computational model is an abstraction of reality (Brugière et al., 2022) and, as such, functions only as a simplification. The findings are contingent upon synthesized behavioral parameters—like household sensitivity to fines or incentives—drawn from the extant literature (e.g., Chen et al., 2023; Mu and Zhang, 2021) and key-informant data, not from costly, primary household surveys. Consequently, the framework is intended strictly as a decision-support tool for exploring policy trade-offs, not as an automated-policy-making mechanism. Furthermore, a major real-world constraint is that the model cannot capture the nuanced political or social feasibility of strictly enforcing penalties (Nishimura, 2022). This gap between algorithmic optimality and governance reality, which was specifically identified by the MENRO Head (refer to Appendix B.1), confirms that the DRL-derived optimal policy must be carefully assessed for its implementation viability before adoption (Dalugdog, 2021).

4

Results & Discussion

Should include a reiteration of the experiments, and their outcome. Together with a description (discussion). Preamble should include a reminder of the aims and objectives together with a list of experiments to achieve these. Should include many charts and other visualization with appropriate descriptions.

Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like "Huardest gefburn"? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

This is the second paragraph. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like "Huardest gefburn"? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

And after the second paragraph follows the third paragraph. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information?

Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

After this fourth paragraph, we start a new paragraph sequence. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

4.1 | An Example of a Table Spanning Multiple Pages

The following is an example of a table (Table 4.1) spanning multiple pages.

Table 4.1: Performance of Ligity in HTS mode against the Ligity-compatible DUD-E targets. The mean (and standard deviation in parentheses) values of ROC AUC using Tanimoto is 0.622 ($\pm$0.132), while for Tversky it is 0.671 ($\pm$0.142); the mean $EF_{1\%}$ using Tanimoto is 5.648 ($\pm$8.668), while for $EF_{1\%}$ using Tversky it is 9.047 ($\pm$12.713).

Target	No. of Actives	No. of Decoys	ROC AUC Tanimoto	ROC AUC Tversky	BEDROC Tanimoto	BEDROC Tversky	$EF_{1\%}$ Tanimoto	$EF_{1\%}$ Tversky
ABL1	182	10,750	0.563	0.473	0.077	0.077	1.653	2.204
ACE	281	16,877	0.787	0.787	0.336	0.401	12.425	19.525
ACES	453	26,242	0.634	0.645	0.077	0.155	1.766	5.518

(continued...)

Target	No. of Actives	No. of Decoys	ROC AUC Tanimoto	ROC AUC Tversky	BEDROC Tanimoto	BEDROC Tversky	$EF_{1\%}$ Tanimoto	$EF_{1\%}$ Tversky
ADA	93	5,450	0.724	0.660	0.149	0.147	3.251	3.251
ADA17	532	35,898	0.638	0.728	0.103	0.283	1.317	9.030
ADRB1	247	15,850	0.523	0.647	0.065	0.129	1.619	5.262
ADRB2	231	14,999	0.523	0.589	0.052	0.040	1.735	0.000
AKT1	293	16,450	0.386	0.548	0.039	0.107	2.737	3.080
AKT2	117	6,900	0.511	0.685	0.140	0.194	8.568	8.568
ALDR	159	8,988	0.574	0.610	0.202	0.172	10.747	6.322
AMPC	48	2,845	0.521	0.541	0.049	0.023	0.000	0.000
ANDR	269	14,349	0.722	0.742	0.194	0.354	4.839	24.938
AOFB	121	6,875	0.422	0.464	0.045	0.027	1.652	0.000
BACE1	283	18,100	0.441	0.775	0.017	0.310	0.000	13.062
BRAF	152	9,950	0.612	0.639	0.208	0.165	12.502	5.264
CASP3	199	10,694	0.600	0.734	0.068	0.258	0.502	7.031
CDK2	474	27,838	0.467	0.507	0.021	0.048	0.000	1.055
COMT	41	3,846	0.789	0.889	0.338	0.665	19.447	58.341
CP2C9	120	7,449	0.518	0.634	0.058	0.186	1.660	8.299
CP3A4	170	11,787	0.450	0.493	0.022	0.057	0.000	2.345
CSF1R	166	12,149	0.526	0.542	0.136	0.152	6.031	7.238
CXCR4	40	3,405	0.575	0.722	0.217	0.134	12.665	0.000
DEF	102	5,699	0.732	0.833	0.212	0.379	10.786	15.689
DHI1	330	19,348	0.481	0.595	0.089	0.062	2.422	1.211
DPP4	533	40,941	0.586	0.591	0.154	0.157	4.312	3.937
DRD3	480	34,048	0.484	0.441	0.043	0.046	1.251	0.626
DYR	231	17,196	0.694	0.758	0.210	0.230	6.504	7.371
EGFR	542	35,047	0.593	0.491	0.054	0.037	0.922	0.000
ESR1	383	20,683	0.838	0.861	0.527	0.594	31.281	39.101
ESR2	367	20,199	0.844	0.870	0.563	0.644	20.130	32.644
FA10	537	28,324	0.564	0.674	0.058	0.118	0.930	2.232
FA7	114	6,249	0.762	0.859	0.210	0.332	6.105	8.721
FABP4	47	2,749	0.786	0.744	0.191	0.276	0.000	10.623
FAK1	100	5,350	0.642	0.531	0.111	0.065	2.019	0.000
FGFR1	139	8,698	0.511	0.522	0.036	0.088	0.722	1.445
FKB1A	111	5,799	0.605	0.751	0.162	0.164	8.122	3.610
FNTA	592	51,493	0.411	0.625	0.012	0.132	0.000	4.053
FPPS	85	8,842	0.917	0.985	0.323	0.776	2.360	36.581
GCR	258	14,998	0.805	0.834	0.244	0.324	3.092	8.116
GLCM	54	3,790	0.667	0.685	0.182	0.279	1.873	11.240
GRIA2	158	11,842	0.662	0.684	0.248	0.154	11.392	5.696
GRIK1	101	6,547	0.656	0.668	0.203	0.102	7.978	1.995
HDAC2	185	10,300	0.676	0.734	0.187	0.201	4.318	4.318
HDAC8	170	10,449	0.640	0.819	0.120	0.377	2.946	8.250
HIVINT	100	6,640	0.390	0.554	0.030	0.116	0.000	3.018
HIVPR	535	35,724	0.663	0.872	0.072	0.490	0.187	23.898
HIVRT	338	18,884	0.495	0.475	0.124	0.085	4.443	1.777
HMDH	170	8,750	0.480	0.906	0.068	0.652	2.358	35.963
HS90A	88	4,850	0.635	0.506	0.096	0.083	0.000	3.436
HXK4	92	4,700	0.662	0.803	0.206	0.307	15.192	9.766
IGF1R	148	9,300	0.502	0.575	0.057	0.189	2.037	14.941
INHA	43	2,300	0.493	0.575	0.031	0.045	0.000	0.000
ITAL	138	8,500	0.619	0.465	0.037	0.065	0.000	0.728
JAK2	107	6,500	0.472	0.475	0.073	0.118	2.807	6.549
KIF11	116	6,850	0.755	0.781	0.149	0.219	4.289	2.574
KIT	166	10,449	0.463	0.437	0.045	0.030	0.000	0.000
KITH	57	2,850	0.649	0.838	0.228	0.709	14.069	47.483
KPCB	135	8,699	0.753	0.813	0.220	0.338	8.923	12.641
LCK	419	27,391	0.471	0.437	0.031	0.043	0.000	1.910
LKHA4	171	9,448	0.718	0.694	0.238	0.150	8.203	1.758
MAPK2	101	6,148	0.660	0.670	0.174	0.199	5.988	3.992
MCR	94	5,149	0.816	0.888	0.215	0.454	6.436	19.307
MET	166	11,249	0.566	0.531	0.130	0.065	6.032	0.603
MK01	79	4,550	0.518	0.602	0.121	0.206	5.095	3.821

(continued...)

Target	No. of Actives	No. of Decoys	ROC AUC Tanimoto	ROC AUC Tversky	BEDROC Tanimoto	BEDROC Tversky	$EF_{1\%}$ Tanimoto	$EF_{1\%}$ Tversky
MK10	104	6,600	0.488	0.489	0.020	0.031	0.962	0.962
MK14	578	35,847	0.511	0.589	0.040	0.064	0.173	0.519
MMP13	572	37,199	0.648	0.753	0.134	0.268	2.446	9.957
MP2K1	121	8,146	0.669	0.569	0.187	0.058	3.293	0.823
NOS1	98	8,028	0.483	0.451	0.109	0.041	3.071	0.000
NRAM	98	6,200	0.853	0.859	0.342	0.290	11.221	3.060
PA2GA	99	5,150	0.793	0.756	0.225	0.153	1.020	3.059
PARP1	508	30,029	0.635	0.692	0.215	0.231	11.234	7.884
PGH1	195	10,798	0.645	0.637	0.077	0.100	0.000	2.050
PGH2	435	23,139	0.716	0.780	0.166	0.291	3.444	9.874
PLK1	107	6,800	0.658	0.531	0.123	0.048	1.871	0.000
PNPH	103	6,946	0.575	0.578	0.161	0.181	4.888	8.799
PPARA	373	19,399	0.783	0.778	0.262	0.280	6.693	7.764
PPARD	240	12,250	0.547	0.544	0.078	0.098	1.665	2.498
PPARG	484	25,299	0.515	0.605	0.055	0.118	0.619	4.955
PRGR	293	15,648	0.740	0.793	0.142	0.318	2.053	14.714
PTN1	130	7,249	0.398	0.538	0.055	0.090	0.000	3.068
PUR2	50	2,700	0.851	0.837	0.281	0.255	7.857	1.964
PYGM	77	3,944	0.403	0.492	0.016	0.137	0.000	3.917
PYRD	111	6,449	0.682	0.710	0.462	0.413	34.027	16.118
RENI	104	6,956	0.720	0.789	0.043	0.138	0.000	0.000
ROCK1	100	6,300	0.347	0.449	0.020	0.084	1.000	4.000
RXRA	131	6,950	0.788	0.900	0.219	0.596	6.091	27.407
SAHH	63	3,450	0.874	0.852	0.598	0.542	35.050	27.084
SRC	524	34,500	0.565	0.477	0.065	0.050	0.382	0.573
TGFR1	133	8,499	0.609	0.639	0.147	0.154	10.565	4.528
THB	103	7,450	0.794	0.762	0.238	0.150	10.614	0.965
THRB	461	27,000	0.605	0.706	0.063	0.166	2.166	5.632
TRY1	449	25,975	0.711	0.815	0.147	0.280	2.898	6.688
TRYB1	148	7,650	0.670	0.670	0.153	0.132	3.378	3.378
TYSY	109	6,745	0.594	0.725	0.071	0.226	0.911	5.468
UROK	162	9,850	0.525	0.650	0.036	0.120	0.000	1.854
VGFR2	409	24,948	0.632	0.578	0.083	0.093	1.465	1.465
WEE1	102	6,150	0.934	0.929	0.789	0.797	59.348	61.294
XIAP	100	5,150	0.752	0.974	0.190	0.897	8.077	51.490

4.2 | Some Other Section

This is the second paragraph. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

And after the second paragraph follows the third paragraph. Hello, here is some

text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

After this fourth paragraph, we start a new paragraph sequence. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

This is the second paragraph. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

4.3 | A Landscape Table Example

Next is an example of a wide table on a landscape oriented paper.

m	x	y	z	a	A_m	B	C	x	y	z	a	A_m	B	C
1	16.128	+8.872	16.128	1.402	1.373	-146.6	-137.6	16.128	+8.872	16.128	1.402	1.373	-146.6	-137.6
2	3.442	-2.509	3.442	0.299	0.343	133.2	152.4	3.442	-2.509	3.442	0.299	0.343	133.2	152.4
3	1.826	-0.363	1.826	0.159	0.119	168.5	-161.1	1.826	-0.363	1.826	0.159	0.119	168.5	-161.1
4	0.993	-0.429	0.993	0.086	0.08	25.6	90	1.826	-0.363	1.826	0.159	0.119	168.5	-161.1
5	1.29	+0.099	1.29	0.112	0.097	-175.6	-114.7	1.826	-0.363	1.826	0.159	0.119	168.5	-161.1
6	0.483	-0.183	0.483	0.042	0.063	22.3	122.5	1.826	-0.363	1.826	0.159	0.119	168.5	-161.1
7	0.766	-0.475	0.766	0.067	0.039	141.6	-122	1.826	-0.363	1.826	0.159	0.119	168.5	-161.1
8	0.624	+0.365	0.624	0.054	0.04	-35.7	90	1.826	-0.363	1.826	0.159	0.119	168.5	-161.1
9	0.641	-0.466	0.641	0.056	0.045	133.3	-106.3	1.826	-0.363	1.826	0.159	0.119	168.5	-161.1
10	0.45	+0.421	0.45	0.039	0.034	-69.4	110.9	1.826	-0.363	1.826	0.159	0.119	168.5	-161.1
11	0.598	-0.597	0.598	0.052	0.025	92.3	-109.3	1.826	-0.363	1.826	0.159	0.119	168.5	-161.1

4.4 | Summary

Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like "Huardest gefburn"? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

5

Evaluation

In an ideal world, you should have two kind of evaluations. The first is against some ground truth (perhaps a random model?). The second kind of evaluation is against other people's work (accuracy, speed, etc.). Any dimension which is of interest, should be evaluated. Evaluation should be statistically sound.

And after the second paragraph follows the third paragraph. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like "Huardest gefburn"? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

After this fourth paragraph, we start a new paragraph sequence. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like "Huardest gefburn"? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like

“Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

This is the second paragraph. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

And after the second paragraph follows the third paragraph. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

5.1 | Summary

Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

6

Conclusions

This section should have a summary of the whole project. The original aims and objective and whether these have been met should be discussed. It should include a section with a critique and a list of limitations of your proposed solutions. Future work should be described, and this should not be marginal or silly (e.g. add machine learning models). It is always good to end on a positive note (i.e. 'Final Remarks').

6.1 | Achieved Objectives

Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like "Huardest gefburn"? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

6.2 | Critique and Limitations

Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like "Huardest gefburn"? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text

should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

6.3 | Future Work

Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like "Huardest gefburn"? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

6.4 | Final Remarks

Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like "Huardest gefburn"? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

A

Municipal Ordinances

These municipal ordinances serve as the empirical foundation for this study, grounding the simulation in the specific legal and fiscal realities of the Municipality of Bacolod. Municipal Ordinance No. 2018-05 defines the behavioral rules for the agent-based model, specifically mandating the segregation categories and penalty structures that household agents must follow. Concurrently, the Appropriation Ordinance establishes the financial constraints for the Reinforcement Learning agent, ensuring that any optimized policy remains within the municipality's actual budgetary limits. By encoding these legislative provisions directly into the model's parameters, the resulting system optimizes waste management strategies that are not only theoretically efficient but also legally compliant and practically implementable.

A.1 | Municipal Ordinance No. 2018-05

The Municipal Ordinance No. 2018-05, enacted by the Sangguniang Bayan of Bacolod, Lanao del Norte on August 22, 2018, officially titled the "Ecological Solid Waste Management of 2018". The ordinance establishes a comprehensive framework for local waste management by mandating waste segregation using a color-coded bin system (Green, Black, Blue, and Red) and setting specific collection schedules for biodegradable, residual, recyclable, and toxic waste.

Republic of the Philippines
PROVINCE OF LANAO DEL NORTE
MUNICIPALITY OF BACOLOD

OFFICE OF THE SANGGUNIANG BAYAN

REGULAR SESSION HELD ON AUGUST 22, 2018

Present:

Hon. Efimaco V. Duhaylungsod,	Member
Hon. Atty. Alfons Janssen P. Marcera,	Member/Temporary Presiding Officer
Hon. Roy Arvin T. Antonio,	Member
Hon. Quintin A. Clapano, Jr.,	Member/Pro-Tempore
Hon. Sittie Allyn S. Sanguila,	Member
Hon. Eugenio L. Palangan, Jr.,	Member
Hon. Cresenciano T. Acain, Jr.,	Member
Hon. Valeriano S. Clapano,	ABC Representative
Hon. George Aniano T. Lomoljo,	SK Representative

On Official Business:

Hon. Raymund C. Santos,	Vice Mayor

Absent:

Hon. Joy P. Espinosa,	Member

MUNICIPAL ORDINANCE NO. 2018-05

"AN ORDINANCE ON ECOLOGICAL SOLID WASTE MANAGEMENT IN THE MUNICIPALITY OF BACOLOD AND PROVIDING PENALTIES FOR VIOLATION THEREOF"

(Introduced by Hon. Roy Arvin T. Antonio)

BE IT ENACTED, as it is hereby ENACTED, by the Sangguniang Bayan of Bacolod, Lanao del Norte, in session assembled that:

Section 1. **Short Title.** – This ordinance shall be known as the "**ECOLOGICAL SOLID WASTE MANAGEMENT OF 2018**".

Section 2. **Purpose**

2.1. To operationalize the powers and responsibilities of the units/offices within the Municipal government in the implementation of Municipal 10-year Solid Waste Management Plan;

2.2. To provide guidance to the concerned units/offices in the exercise of their powers and in optimizing the opportunities;

2.3. To protect the fragile ecosystems from the adverse impact of the economic activities/development;

2.4. To institutionalize community-based mechanisms and public consultation in the implementation of the Municipal Solid Waste Management Strategies;

2.5. To establish the necessary mechanism for implementing the provisions of this ordinance.

Section 3. Operative Principles

3.1. The use of environment friendly and appropriate technologies is a basic foundation for a healthy and progressive generation.

3.2. All development activities shall give importance and respect for the indigenous practices, which are protective of the environment and community.

3.3. The sustainable economic development of the Municipality of Bacolod calls for a judicious use of and equitable access to natural resources in accordance with existing laws.

3.4. Source reduction, re-use and recycling are the most preferred practices while safety disposal is the least preferred.

3.5. Solid wastes management is a co-equal as the business management of an enterprise or livelihood system.

3.6. Solid waste is a raw material that can be used for other purposes.

3.7. Pollution prevention is preferred to pollution control practices.

Section 4. Regulatory Provisions

4.1. Utilize environmentally-sound methods that maximize the utilization of valuable resources and encourage resource conservation and recovery;

4.2. Set guidelines and targets for solid waste avoidance and volume reduction through source reduction and waste minimization measures, including composting, recycling, re-use, recovery, green charcoal process, and others, before collection, treatment and disposal in appropriate and environmentally sound solid waste management facilities following the Ecological Solid Waste Management Act of 2000 (RA 9003);

4.3. Ensure the proper segregation, collection, transport, storage, treatment and disposal of solid waste through the formulation and adoption of the best environmental practice in ecological waste management;

4.4. Ensure that incineration and open burning of solid wastes are openly discouraged;

4.5. Encourage greater private sector participation in solid waste management;

4.6. Retain primary enforcement and responsibility of solid waste management of the local government units while establishing a cooperative effort with and among the national government, other local government units, non-government organizations, and the private sector;

4.7. Encourage cooperation and self- regulation among waste generators through the application of market-based instruments.

4.8. Institutionalize public participation in the development and implementation of national and local integrated, comprehensive, and ecological waste management programs; and

4.9. Strengthen the integration of ecological solid waste management and resource conservation and recovery topics into the academic curricula of formal and non-formal education in order to promote environmental awareness and action among the cities.

Section 5. Definition of Terms.

5.1. **Biodegradable Materials -** a waste that can be changed to a harmless natural state by the action of bacteria, and will therefore not damage the environment. It includes waste from kitchen, papers, tissues, some small types of cartons and other plant or tree parts such as leaves and trunks. Some of these materials may be used for producing fertilizers through composting.

5.2. **Segregation-** an act or process of separating one waste from another waste. It involves color coding of waste from green, black, blue and red.

5.3. **Single-use Plastics –** these are non-biodegradable disposable plastic used as container or packaging for grocery items and food products such as sando bags and the likes. It also includes plastics used in food business establishments such as plastic spoon and fork and drinking straw.

5.4. **Styrofoam –** a kind of expanded polystyrene commonly used as food container.

5.5. **Recyclable Materials –** products that are recovered from waste for other useful purposes such as rubber tires, plastic drinking bottles, metals, glass bottles, newspapers, cartons and other recyclable materials that may be sold to junk shops.

5.6 **Residual Waste -** is waste material that doesn't decompose or that can't be recycled. A primary example is most plastics although there are some that actually do break down over time. It also includes diapers, some rubber materials, and old clothing.

5.7. **Special or Toxic Waste-** these are waste that are hazardous to health and requires strict government special handling regulation such as batteries, light bulbs, hospital waste, engine oil, paints.

Section 6. Municipal Solid Waste Management Board

Municipal Solid Waste Management Board (MSWMB) herein referred to as the Board that shall prepare, submit and implement a plan for the safe and sanitary management of solid waste. The Board shall be composed of the Municipal Mayor as chairman, with the Municipal Planning and Development Officer as vice chairman and Municipal Environment and Natural Resources Officer as board secretary.

The following are members of the Board:

a) Municipal Social Welfare and Development Officer
b) Municipal Health Officer
c) Municipal Administrative Officer
d) Municipal Tourism Officer
e) Municipal Disaster Risk Reduction Management Officer
f) Municipal Agriculture Officer
g) Municipal Engineer
h) Municipal Treasurer
i) Municipal Budget Officer
j) Department of Interior and Local Government Officer
k) Municipal Committee on Environment, Sangguniang Bayan Chairman,
l) Representative from Chamber of Commerce
m) Liga ng Barangay
n) Sangguniang Kabataan Federation Chairman
o) Representative from NGOs and PO's whose principal purpose is to promote recycling and the protection of air and water quality;
p) Representative from the market vendors association;
q) Representative from hospital and other medical clinic;
r) Representative from private and public schools;

The Board shall likewise design appropriate mechanisms that will ensure optimum representation of the various stakeholders in the Board.

The Board shall have the following duties and responsibilities:

a) Develops the Municipal Solid Waste Management Plan that shall ensure the long- term management of solid waste, as well as integrate the various solid waste management plans and strategies of the barangays in its area of jurisdiction. In the development of the Solid Waste

Management Plan, it shall conduct consultations with the various sectors of the community;

b) Adopts measures to promote and ensure the viability and effective implementation of solid waste management programs in its component barangays;
c) Monitors the implementation of the Municipal Solid Waste Management Plan through its various political subdivisions and in cooperation with the private sector, NGOs and concerned citizens;
d) Adopts specific revenue-generating measures to promote the viability of its Solid Waste Management Plan;
e) Convenes regular meetings for purposes of planning and coordinating the implementation of the solid waste management plans of the respective component barangays;
f) Oversees the implementation of the Municipal Solid Waste Management Plan;
g) Reviews every two (2) years or as the need arises the Municipal Solid Waste Management Plan for purposes of ensuring its sustainability, viability, effectiveness and relevance in relation to local and international developments in the field of solid waste management;
h) Develops specific mechanics and guidelines for the implementation of the Municipal Solid Waste Management Plan;
i) Recommends appropriate local government authorities specific measures or proposals for franchise or build-operate-transfer agreements with duly recognized institutions to provide either exclusive or non-exclusive authority for the collection, transfer, storage, processing, recycling or disposal of municipal solid waste. The proposals shall take into consideration appropriate government rules and regulations on contracts, franchise and build-operate-transfer agreements;
j) Recommends measures and safeguards against pollution and for the preservation of the natural ecosystem;
k) Coordinates efforts of its component barangays in the implementation of the Municipal Solid Waste Management Plan;
l) Provides necessary logistical and operational support to barangays; and
m) Calls on any concerned agency or sector, as it may deem necessary for support or other appropriate action.

Section 7. Technical Working Committee

The Technical Working Committee (TWC) will continue to formulate plans of the programs and activities to carry out the functions of the Board. The committee shall be composed of the Municipal Administrator as chairman, with the MENRO as secretariat.

The following are members of the TWC:

a) MPDO
b) MHO
c) Sanitary Inspector
d) Municipal Engineer
e) Municipal Disaster Risk Reduction Management Officer
f) Eco Police Officer

There shall be a creation of support committees to assist the TWC in the implementation of SWMP and carry out functions relative to the protection and preservation of the environment particularly but not limited to the Cleaning and Greening programs as follows: a) Enforcement Committee; b) Greening and Reforestation Committee; c) Health and Sanitation Committee; d) Monitoring, Evaluation, and Education Committee; e) Special Operation Team and Engineering Committee; and f) Finance Committee.

Section 8. Mandatory Segregation of Solid Wastes.

Wastes segregation in the Municipal shall be guided by the Implementing Rules and Regulations (IRR) of the Ecological Solid Waste Management Act of 2000 (RA 9003).

All households, business establishments and other institutions shall follow standard waste segregation disposal through waste bins with proper color-coding and labelling. The following shall be the proper disposal of waste, to wit:

a. **GREEN**- for Biodegradable materials (basura na macompose para mahimong fertilizer)
b. **BLACK** – for Residual Waste (Di na mapuslan nga basura)
c. **BLUE** - for Recyclable materials (Pwede pa magamit o mahalin sa Junkshop)
d. **RED** - for Toxic and Hazardous waste (Delikado nga basura)

All barangays shall be responsible for collection of segregated waste on every household in their respective area to the Barangay Material Recovery Facility (MRF). The Barangay MRF shall be color-coded and properly labelled and shall be collected by the Municipal Garbage Collector. Unsegregated waste shall not be collected.

Section 9. Segregated Collection Schedule.

With reference to the preceding section, the following shall be collected through color coding, to wit;

a. **Black** - Mondays and Fridays
b. **Green** - Tuesdays and Saturdays
c. **Blue** - Wednesdays
d. **Red** - Saturdays

Section 10. Garbage Collection Fee.

There shall be collected from every owner or operator of a business establishment an annual garbage fee in accordance with the following schedule:

KINDS OF ESTABLISHMENTS		Amount of Fee Per Annum
Manufacturers, Millers, Assemblers, Processors and Similar Business		
a.	Not more than 100 sq. m.	₱ 1000.00
b.	More than 100 sq. m.	₱ 2000.00
Hotels, Apartments, Motels and Lodging Houses		
a.	Not more than 100 sq. m.	₱ 1000.00
b.	More than 100 sq. m.	₱ 2000.00
Restaurants, Day and Night Clubs, Cafes, and Eateries		
a.	Not more than 50 sq. m.	₱ 1000.00
b.	More than 50 sq. m.	₱ 2000.00
Hospitals, clinics, laboratories and similar business establishments		
Note: Joint DENR-DOH Admin. Order No. 02, S. 2005 dated August 24, 2005 (Policies and Guidelines on effective and proper handling, collection, transport, treatment, storage and disposal of health care wasters.)		
a.	Not more than 10 sq. m.	₱ 1000.00
b.	More than 10 sq. m.	₱ 2000.00
Movie houses and Retailers		

a.	Not more than 10 sq. m.	₱ 1000.00
b.	More than 10 sq. m.	₱ 2000.00
Other business not mentioned above		
a.	Not more than 10 sq. m.	₱ 1000.00
b.	More than 10 sq.m.	₱ 2000.00

10.1. **Time of Payment.** – The fees prescribed in this Article shall be paid to the Municipal Treasurer within the first twenty (20) days of January each year.

10.2. **Administrative Provisions.**

a. For purposes of the imposition, the area of garbage collection shall only be the business area of the town proper and Public Market.

b. The owner or operator of the aforementioned business establishments shall provide for his premises the required garbage bins or receptacles, which shall be placed in front of his establishment before the time of garbage collection.

c. The Municipal Environment and Natural Resources Officer (MENRO) shall conduct regular inspection to monitor strict compliance of this Ordinance.

d. This section shall not apply to business operators or establishments which provides their own system of garbage disposal.

Section 11. Municipal Environmental Compliance Certificate.

A Municipal Environmental Compliance Certificate shall be secured by all business establishments annually, prior to operation of business or during renewal of business permit with corresponding annual fee of Php 100.00 to ensure compliance of this ordinance and in all other environmental laws including the R.A 9003.

Section 12. Incentive Program.

The SWMB may adopt an incentive program/s and maybe granted or awarded to individual/s, business establishments, private or government institutions to ensure compliance and wide participation in all environmental programs in this municipality.

Section 13. Prohibition on the Use of Plastic and Prohibition of Polystyrene Materials for Packaging

The Municipal hereby adopts the following prohibition on the use of plastic and expanded polystyrene or commonly known as Styrofoam for packaging in all business establishments within the Municipality.

13.1. The use of plastic bags as packaging materials for dry goods is prohibited. All private and government institutions, business establishments including but not limited to bakeries, Grocery stores, Sari-Sri Stores, hardware stores, RTW Stores, Pharmacies, Agrivet Supplies, Rice retailers, and other Merchandising Stores shall pack dry good products in biodegradable materials such as carton boxes, sako bags, eco bags or paper bags. Dry goods maybe packed in plastic bags or non-biodegradable packing materials provided that such packing materials were supplied by the costumers.

13.2. The use of plastic bags on wet goods (e.g. fresh fish, meat products) is prohibited.

13.3. The use of plastic as primary containers for liquid food products shall be allowed such as food condiments, ice candies and the likes.

13.4. No business establishment shall offer or sell plastic bags to be used as packaging materials.

13.5. The use of Expanded Polystyrene or commonly known as Styrofoam as packaging materials or as containers for food, fruits and vegetables is prohibited.

13.6. The use of single-use plastics such as drinking straw, plastic cups, and utensils such as spoon and fork in food business establishments is prohibited.

13.7. The use of plastic bottle for water drinks and other soda drinks is highly discouraged.

13.8. The MENRO shall monitor the effective implementation of the banning of plastic after two (2) months of massive information campaign and coordination with affected business establishments.

Section 14. Prohibited and Punishable Acts

14.1. All business establishments and/or individuals are prohibited from selling and providing plastic bags or non-biodegradable bags to customers as packaging material on dry and wet goods;

14.2. Selling and providing to customers with Polystyrene or Styrofoam as containers;

14.3. Providing customers of single-use plastics such as drinking straw, plastic cups, plastic spoon and fork in food business establishments;

14.4. Littering, throwing, dumping of waste materials in public places, such as roads, sidewalks, canals, esteros or parks, and other establishments within the municipality;

14.5. The burning of solid waste in any open areas within the Municipality;

14.6. Improper disposal of biodegradable and non-biodegradable materials;

14.7. Improper waste bins or unlabelled waste bins;

14.8. Dumping of plastic materials, fishing nets and lines, packing bands, straps, synthetic ropes, plastic bags bottle sheets and other containers and even medical equipment in coastal areas;

14.9. Dumping of agricultural waste or animal waste that would cause pollution within the Municipality;

14.10. Illegal disposal of domestic waste into vacant residential or commercial lot;

14.11. Collection of non-segregated or unsorted wastes for both hospital, commercial, industrial and domestic waste in the Municipality;

14.12. Open dumping, burying of biodegradable or non-biodegradable materials in frequently flooded prone areas and public market;

14.13. Unauthorized removal of recyclable materials intended for collection by authorized persons;

14.14. The mixing of source-separated recyclable material with other solid waste in any vehicle, box, container or receptacle used in solid waste collection or disposal;

14.15. Importation of all toxic wastes, with or without the "recyclable" or "with recyclable content";

14.16. Transport and dump log in bulk of collected domestic, industrial, commercial, and institutional wastes in areas other than centers or facilities;

14.17. Squatting in controlled dump site and decommissioned dump site in Barangay is prohibited;

14.18. The construction or operation of landfills or any waste disposal facility in any aquifer, groundwater reservoir or watershed area and/or any portion thereof.

Section 15. Fines and Penalties

Any violation of prohibited and punishable acts under this ordinance shall be penalized as follows:

For Individual violator:

First offense	:	Php 300 fine and re-orientation seminar
Second offense	:	Php 500.00 fine
Third offense and each succeeding offense	:	A fine of Php 1,000.00 fine and Community Service and/or imprisonment of not more than six (6) months upon the discretion of the court.

For Business Establishment:

First offense	:	Php 1,000 fine and re-orientation seminar
Second offense	:	Php 2,000.00 fine
Third offense and each succeeding offense	:	A fine of Php 2,500.00 fine and cancellation of their license to operate and/or closure for a period of one year.

Section 16. Persons and Deputies.

Persons authorize to enforce this ordinance are the PNP, ECO Police, and other persons authorized by the Local Chief Executive.

Section17. Repealing Clause.

Provisions of any ordinance, order, rules and regulations promulgated by the municipal government, which are directly or indirectly in conflict with or inconsistent with any of the provision of this ordinance are hereby repealed or modified accordingly.

Section 18. Separability Clause.

If for any reason or cause, any part or provision of this ordinance shall be held invalid by the proper Court, other parts of provision hereof, which are not affected thereby shall continue to be in full force and effect.

Section 19. Effectivity Clause.

This ordinance will take effect upon publication in a newspaper of local circulation and posting thereof in three conspicuous public places for a period of fifteen (15) days.

APPROVED AND ADOPTED this 22nd day of August, 2018.

CERTIFIED CORRECT:

STENILY M. PACIENTE
Secretary to the Sanggunian

VERIFIED BY:

ROY ARVIN T. ANTONIO
Member-Author

ATTESTED:

ATTY. ALFONS JANSSEN P. MARCERA
SB Member/Temporary Presiding Officer

APPROVED/CONFIRMED:

ENGR. JOSELITO E. MIQUIABAS
Municipal Mayor

CONCURRED:

EFIMACO V. DUHAYLUNGSOD **QUINTIN A. CLAPANO, JR.** **SITTIE ALLYN S. SANGUILA**

EUGENIO L. PALANGAN, JR. **CRESENCIANO T. ACAIN, JR** **VALERIANO S. CLAPANO**

GOERGE ANIANO T. LOMOLJO

A.2 | Appropriation Ordinance No. 2024-01

Appropriation Ordinance No. 2024-01 serves as the primary legislative enactment authorizing the Annual Budget of the Municipality of Bacolod, Lanao del Norte for the fiscal year 2024. This document outlines the projected income and approved expenditures for the operation of the local government, ensuring that financial resources are legally distributed across various sectors such as general administration, social services, and economic development. As the municipality's financial roadmap, it aligns public spending with the priority programs identified by the Sangguniang Bayan, providing the legal authority for the release and utilization of public funds.

In the context of this study, the ordinance establishes the critical financial constraints for the waste management simulation. It specifies the actual budgetary allocations for the Municipal Environment and Natural Resources Office (MENRO) and General Services, covering essential line items such as fuel for collection trucks, salaries for waste collectors, and facility maintenance costs. By defining these hard fiscal limits, the ordinance provides the necessary data to constrain the Reinforcement Learning agent, ensuring that the model optimizes for a policy that is not only logistically efficient but also financially feasible within the municipality's current economic capacity.

PROVINCE OF LANAO DEL NORTE

130TH REGULAR SESSION OF THE 18TH SANGGUNIANG PANLALAWIGAN
HELD ON JUNE 02, 2025 AT THE SANGGUNIANG PANLALAWIGAN SESSION HALL, PROVINCIAL CAPITOL BUILDING, PIGCARANGAN, TUBOD, LANAO DEL NORTE.

PRESENT:	Hon. Allan J. Lim	Vice Governor Presiding Officer
	Hon. Maria Cristina N. Atay	Board Member Majority Floor Leader
	Hon. Superman B. Usop, Jr.	Board Member
	Hon. Abdany C. Buanding	Board Member
	Hon. Grecille I. Matalines	Board Member
	Hon. Sidick M. Dibaratun	Board Member
	Hon. Reinario B. Bihag	Board Member Assistant Majority Floor Leader
	Hon. Eleuterio M. Obial, Jr.	Board Member
	Hon. Marivic D. Ramos	Board Member
	Hon. Lyndon L. Abucay	Board Member PCL-LDN Federated President
	Hon. Joseph A. Neri, Jr.	Board Member LNB-LDN Federated President
	Hon. Rheca Monteza R. Macabangon	Board Member SK-LDN Federated President
ABSENT:	Hon. Haron B. Omar, Jr.	Board Member
ON LEAVE:	Hon. Achmad B. Taha	Board Member

Resolution No. 230-2025

A RESOLUTION DECLARING APPROPRIATION ORDINANCE NO. 1 SERIES OF 2024 OF THE MUNICIPALITY OF BACOLOD, LANAO DEL NORTE, "AN ORDINANCE AUTHORIZING THE ANNUAL BUDGET OF THE LOCAL GOVERNMENT UNIT OF BACOLOD, LANAO DEL NORTE FOR FISCAL YEAR 2025 IN THE TOTAL AMOUNT OF ONE HUNDRED SIXTY-EIGHT MILLION NINE HUNDRED EIGHTY-FIVE THOUSAND THREE HUNDRED FIFTY-SIX PESOS (₱168,985,356.00) COVERING THE VARIOUS EXPENDITURES FOR THE OPERATION OF THE LOCAL GOVERNMENT FOR FISCAL YEAR 2025 AND APPROPRIATING THE NECESSARY FUND FOR THE PURPOSE," AS OPERATIVE IN ITS ENTIRETY, EFFECTIVE JANUARY 1, 2025, PROVIDED THAT THE DISBURSEMENT OF THE ANNUAL APPROPRIATIONS SHALL BE SUBJECT TO EXISTING ACCOUNTING AND AUDITING RULES AND REGULATIONS

WHEREAS, presented to the Sangguniang Panlalawigan was Appropriation Ordinance No. 1 series of 2024 of the Municipality of Bacolod, Lanao del Norte, "An Ordinance Authorizing the Annual Budget of the Local Government Unit of Bacolod, Lanao del Norte for Fiscal Year 2025 in the Total Amount of One Hundred Sixty-Eight Million Nine Hundred Eighty-Five Thousand Three Hundred Fifty-Six Pesos (₱168,985,356.00) Covering the Various Expenditures for the Operation of the Local Government for Fiscal Year 2025 and Appropriating the Necessary Fund for the Purpose;"

WHEREAS, the Sangguniang Panlalawigan, based on the favorable recommendation from the Committee on Finance/Appropriations, hereby approves the Annual Budget of the local government unit (LGU) of Bacolod, Lanao del Norte for Fiscal Year 2025, considering that it has substantially complied with the budgetary requirements as provided under Sections 324 and 325 of the Local Government Code of 1991 and the Memorandum Circulars issued by the Department of Budget and Management.

NOW THEREFORE, after due deliberation, on motion of Hon. Maria Cristina N. Atay, Chairperson, Committee on Finance/Appropriations, duly seconded by Hon. Marivic D. Ramos, and Hon. Sidick M. Dibaratun, and carried by the majority of the members present, it was-

RESOLVED, by the Sangguniang Panlalawigan of Lanao del Norte in session assembled, to declare Appropriation Ordinance No. 1 series of 2024 of the Municipality of Bacolod, Lanao del Norte, "An Ordinance Authorizing the Annual Budget of the Local Government Unit of Bacolod, Lanao del Norte for Fiscal Year 2025 in the Total Amount of One Hundred Sixty-Eight Million Nine Hundred Eighty-Five Thousand Three Hundred Fifty-Six Pesos (₱168,985,356.00) Covering the Various Expenditures for the Operation of the Local Government for Fiscal Year 2025 and Appropriating the Necessary Fund for the Purpose," as operative in its entirety, effective January 1, 2025, provided that the disbursement of the Annual Appropriations shall be subject to existing Accounting and Auditing Rules and Regulations.

RESOLVED FURTHER, that this review does not authorize any item of appropriation that is specifically prohibited by or inconsistent with the provisions of the law. Compliance with all applicable laws, rules and regulations shall be the responsibility of the implementing Local Government Unit.

Let copies of this resolution be furnished to Honorable Judith V. Miquiabas, Municipal Mayor and the Sangguniang Bayan of Bacolod, Lanao del Norte, thru Honorable Alfons Janssen P. Marcera, Vice Mayor and Presiding Officer, for information and appropriate action.

I HEREBY CERTIFY the correctness of the afore-cited resolution.

JOSELITO E. QUIBRANZA
Secretary to the SP

ATTESTED & CERTIFIED TO BE ADOPTED BY THE SP:

ALLAN J. LIM
Vice Governor
Presiding Officer

APPROVED:

IMELDA QUIBRANZA DIMAPORO
Provincial Governor

Republic of the Philippines
Province of Lanao del Norte
MUNICIPALITY OF BACOLOD

OFFICE OF THE SANGGUNIANG BAYAN

EXCERPTS FROM THE MINUTES OF THE REGULAR SESSION OF THE SANGGUNIANG BAYAN OF THE LOCAL GOVERNMENT UNIT OF BACOLOD HELD AT THE SANGGUNIANG BAYAN SESSION HALL, BACOLOD, LANAO DEL NORTE ON DECEMBER 23, 2024.

PRESENT:		
	Hon. Atty. Alfons Janssen P. Marcera,	Municipal Vice Mayor/Presiding Officer
	Hon. Johanna P. Balane,	Member
	Hon. David Alex F. Aranjuez, Jr.,	Member
	Hon. Lorie Ann P. Tario,	Member
	Hon. Mark B. Patiño,	Member
	Hon. Quintin A. Clapano, Jr.,	Member/Acting Pro-Tempore
	Hon. Owen S. Prones,	Member
	Hon. Teodorico E. Miquiabas,	Member
	Hon. Jalilah A. Hadji Manan,	LNB Fed. Pres., Ex-officio Member
	Hon. Noralyn R. Balowa,	SK Fed. Pres., Ex-officio Member
ABSENT:		
	Hon. Nilo M. Quijano,	Member

APPROPRIATION ORDINANCE NO. 01
Series of 2024

"AN ORDINANCE AUTHORIZING THE ANNUAL BUDGET OF THE LOCAL GOVERNMENT UNIT OF BACOLOD, LANAO DEL NORTE FOR FISCAL YEAR 2025 IN THE TOTAL AMOUNT OF *ONE HUNDRED SIXTY-EIGHT MILLION NINE HUNDRED EIGHTY-FIVE THOUSAND THREE HUNDRED FIFTY-SIX PESOS* (₱168,985,356.00) COVERING THE VARIOUS EXPENDITURES FOR THE OPERATION OF THE LOCAL GOVERNMENT FOR FISCAL YEAR 2025, AND APPROPRIATING THE NECESSARY FUND FOR THE PURPOSE"

WHEREAS, pursuant to Section 319 of Republic Act 7160, otherwise known as the Local Government Code of 1991, the Annual Budget of the Municipal Government of Bacolod, Lanao del Norte for Fiscal Year 2025, was presented to the Sangguniang Bayan for legislative authorization;

WHEREAS, the estimated income as certified by the Local Finance Committee under Local Budget Preparation Form No. 1, amounting to ***ONE HUNDRED SIXTY-EIGHT MILLION NINE HUNDRED EIGHTY-FIVE THOUSAND THREE HUNDRED FIFTY-SIX PESOS*** **(₱168,985,356.00)** is appropriated for general services, social and economic services and other purposes designed to ensure sustainable economic development for the general of the constituents;

WHEREAS, pursuant to Local Budget Memorandum No. 90 National Tax Allotment (NTA) for FY 2025 of the Department of Budget and Management (DBM), the National Tax Allotment of Bacolod, Lanao del Norte for CY 2025 is ***ONE HUNDRED FIFTY-SIX MILLION TWO HUNDRED SEVENTY-ONE THOUSAND SIX HUNDRED SIX PESOS*** **(₱156,271,606) and 20% of which is (₱31,254,321);**

WHEREAS, the goals and objectives of the FY 2025 Annual Budget of the Municipal Government of Bacolod, Lanao del Norte is consistent with Disaster Risk Reduction Enhanced Climate Change Action Plan (DRR-ECCAP), Local Development Investment Plan 2023-2025 and the Executive Legislative Agenda 2022-2025.

Be it ordained by the Sangguniang Bayan of Bacolod, Lanao del Norte in session assembled:

Section 1. The Annual Budget of the Municipal Government of Bacolod, Lanao del Norte for Fiscal Year 2025 in the total amount of ***ONE HUNDRED SIXTY-EIGHT MILLION NINE HUNDRED EIGHTY-FIVE THOUSAND THREE HUNDRED FIFTY-SIX PESOS*** **(₱168,985,356.00),** covering the various expenditures for the operation of the Municipal Government for the fiscal year 2025, is hereby approved.

The budget documents consisting of the Plantilla of Personnel are incorporated herein and made Integral Part of this Ordinance.

PLANTILLA OF LGU PERSONNEL FY 2025
Bacolod, Lanao del Norte
PERMANENT EMPLOYEES

OFFICE OF THE MUNICIPAL MAYOR

Item No.		Position Title	Name of Incumbent	Current Year Authorized Rate/Annum		Budget Year Proposed Rate/Annum		Increase/ Decrease
OLD	NEW			SG / Step	Amount	SG / Step	Amount	
-1	-2	-3	-4	-5	-6	-7	-8	-9
1		Municipal Mayor	JUDITH V. MIQUIABAS	27/2	1,199,376.00	27/2	1,199,376.00	0.00
3		Administrative Officer V (HRMO III)	JOCELYN O. BACALA	18/1	420,528.00	18/1	420,528.00	0.00
4		Administrative Officer II (HRMO I)	JEPHUNNE SHEM H. RESABAL	11/1	243,000.00	11/1	243,000.00	0.00
	6	Administrative Aide III (Clerk I)	JETSYMAE S. NIALA	3/1	132,108.00	3/1	132,108.00	0.00
7		Watchman II	ED A. SUGANO	4/1	140,280.00	4/1	140,280.00	0.00
8		Watchman II	ERMELINDA A. CALING	4/1	140,280.00	4/1	140,280.00	0.00
9		Administrative Aide I (Utility Worker I)	RICKY T. PULMONES	1/1	117,000.00	1/1	117,000.00	0.00
10		Administrative Aide I (Utility Worker I)	NATHANIEL B. MARCIAL	1/1	117,000.00	1/1	117,000.00	0.00
11		Administrative Aide I (Utility Worker I)	ARLAN C. PORGATORIO	1/2	117,984.00	1/2	117,984.00	0.00
12		Administrative Aide I (Utility Worker I)	JAYSON P. PEDROSA	1/1	117,000.00	1/1	117,000.00	0.00
	13	Administrative Aide I (Utility Worker I)	JANET N. ACAIN	1/1	117,000.00	1/1	117,000.00	0.00
14		Administrative Aide IV (Driver II)	EDSEL M. MAGHINAY	4/1	140,280.00	4/1	140,280.00	0.00
15		Administrative Assistant I	CHERRY B. BALATERO	7/5	172,788.00	7/5	172,788.00	0.00
18		Administrative Aide IV (Driver II)	AL M. GALENZOGA	4/2	141,360.00	4/2	141,360.00	0.00
19		Administrative Aide IV (Driver II)	JOEL C. VILLALUZ	4/8	147,984.00	4/8	147,984.00	0.00
20		Administrative Aide IV (Driver II)	DINNIS O. MATOOD	4/2	141,360.00	4/2	141,360.00	0.00
21		Day Care Worker I	SANDI KATHY I. PANORIL	6/1	157,980.00	6/1	157,980.00	0.00
	22	Watchman III	REXON L. SANCHEZ	7/1	167,580.00	7/1	167,580.00	0.00
23		Administrative Aide III (Driver I)	NOEL A. LAGUDAS JR.	3/2	133,128.00	3/2	133,128.00	0.00
24		Administrative Aide IV (Driver II)	JUNNIE M. MENSIDOR	4/1	140,280.00	4/1	140,280.00	0.00
25		Administrative Aide I (Utility Worker I)	FRANCISCO B. BORNILLA	1/1	117,000.00	1/1	117,000.00	0.00
27		Administrative Aide I (Utility Worker I)	CRISPINA E. DANDOY	1/5	120,972.00	1/5	120,972.00	0.00
28		Municipal Administrator	JOSELITO E. MIQUIABAS	24/1	810,708.00	24/1	810,708.00	0.00
29		Day Care Worker II	TRENIA P. MAATA	8/1	177,696.00	8/1	177,696.00	0.00
30		Administrative Aide I (Utility Worker I)	LEOBERT A. LUMUSAD	1/2	117,984.00	1/2	117,984.00	0.00
31		Administrative Aide I (Utility Worker I)	MARY JOY D. MORATA	1/3	118,968.00	1/3	118,968.00	0.00
33		Labor and Employment Officer I	MERLE L. DESALES	11/2	245,556.00	11/2	245,556.00	0.00
34		Administrative Aide III (Driver I)	ALTER C. PACULANANG	3/2	133,128.00	3/2	133,128.00	0.00
35		Utility Foreman	LLOYD VOLTAIRE V. LAO	6/2	159,192.00	6/2	159,192.00	0.00
36		Administrative Aide I (Utility Worker I)	ELIZABETH O. MEDIJA	1/2	117,984.00	1/2	117,984.00	0.00
37		Administrative Aide II (Messenger)	GLAIZA S. BAYRON	2/1	124,368.00	2/1	124,368.00	0.00
38		Administrative Aide II (Bookbinder I)	GALE G. BINGAT	2/1	124,368.00	2/1	124,368.00	0.00
39		Administrative Assistant IV (Bookbinder IV)	JAISAN ANNA MARIE P. BELOY	10/1	208,584.00	10/1	208,584.00	0.00
TOTAL					6,780,804.00		6,780,804.00	0.00

OFFICE OF THE SANGGUNIANG BAYAN

Item No.		Position Title	Name of Incumbent	Current Year Authorized Rate/Annum		Budget Year Proposed Rate/Annum		Increase/ Decrease
OLD	NEW			SG / Step	Amount	SG / Step	Amount	
-1	-2	-3	-4	-5	-6	-7	-8	-9
1		Municipal Vice Mayor I	ALFONS JANSSEN P. MARCERA	25/2	939,300.00	25/2	939,300.00	0.00
2		Sangguniang Bayan Member I	MARK B. PATIÑO	24/2	823,932.00	24/2	823,932.00	0.00
3		Sangguniang Bayan Member I	NILO M. QUIJANO	24/2	823,932.00	24/2	823,932.00	0.00
4		Sangguniang Bayan Member I	QUINTIN A. CLAPANO JR.	24/3	837,384.00	24/3	837,384.00	0.00
5		Sangguniang Bayan Member I	DAVID ALEX F. ARANJUEZ	24/2	823,932.00	24/2	823,932.00	0.00
6		Sangguniang Bayan Member I	LORIE ANN P. TARIO	24/2	823,932.00	24/2	823,932.00	0.00
7		Sangguniang Bayan Member I	OWEN S. PRONES	24/2	823,932.00	24/2	823,932.00	0.00
8		Sangguniang Bayan Member I	JOHANNA P. BALANE	24/1	810,708.00	24/1	810,708.00	0.00
9		Sangguniang Bayan Member I	TEODORICO E. MIQUIABAS	24/1	810,708.00	24/1	810,708.00	0.00
10		Sangguniang Bayan Member I (LnB President)	JALILAH A. HADJI MANAN	24/1	810,708.00	24/1	810,708.00	0.00
11		Sangguniang Bayan Member I (SK Fed.)	NORALYN R. BALOWA	24/1	810,708.00	24/1	810,708.00	0.00
TOTAL					9,139,176.00		9,139,176.00	0.00

OFFICE OF THE SECRETARY TO THE SANGGUNIAN

Item No.		Position Title	Name of Incumbent	Current Year Authorized Rate/Annum		Budget Year Proposed Rate/Annum		Increase/ Decrease
OLD	NEW			SG / Step	Amount	SG / Step	Amount	
-1	-2	-3	-4	-5	-6	-7	-8	-9
1		Municipal Government Department Head I (Secretary to the Sanggunian)	JAHZEEL FAITH M. PAGADUAN	24/1	810,708.00	24/1	810,708.00	0.00
2		Administrative Aide III (Clerk I)	MILDRED B. OLAIER	3/5	136,224.00	3/5	136,224.00	0.00
3		Board Secretary I	JONAH FE P. ACUNO	14/2	307,680.00	14/2	307,680.00	0.00
4		Administrative Aide III (Clerk I)	RENEZA B. MERCADO	3/1	132,108.00	3/1	132,108.00	0.00
5		Administrative Aide I (Utility Worker I)	REX BLIER B. DANLAG	1/5	120,972.00	1/5	120,972.00	0.00
6		Administrative Aide I (Utility Worker I)	ENRIQUE M. CALIBO	1/7	123,000.00	1/7	123,000.00	0.00
7		Administrative Aide III (Driver I)	AL R. LAGRADA	3/1	132,108.00	3/1	132,108.00	0.00
8		Administrative Aide II (Bookbinder I)	CHERYL P. LAGRADA	2/2	125,328.00	2/2	125,328.00	0.00
9		Administrative Aide I (Utility Worker I)	UNFUNDED	1/2		1/1		
10		Local Legislative Staff Officer II	VACANT	13/1	281,880.00	13/1	281,880.00	0.00
	11	Local Legislative Staff Employee II	VACANT	4/1	140,280.00	4/1	140,280.00	0.00
	12	Administrative Aide IV (Driver II)	VACANT	4/1	140,280.00	4/1	140,280.00	0.00
TOTAL					2,450,568.00		2,450,568.00	0.00

OFFICE OF THE MUNICIPAL PLANNING AND DEVELOPMENT COORDINATOR

Item No.		Position Title	Name of Incumbent	Current Year Authorized Rate/Annum		Budget Year Proposed Rate/Annum		Increase/ Decrease
OLD	NEW			SG / Step	Amount	SG / Step	Amount	
-1	-2	-3	-4	-5	-6	-7	-8	-9
1		Municipal Government Department Head I (Municipal Planning & Development Coordinator)	BUENAFE P. PANORIL JR.	24/3	837,384.00	24/3	837,384.00	0.00
2		Draftsman I	JOHN PAUL P. BORJIE	6/1	157,980.00	6/1	157,980.00	0.00
3		Statistician Aide	JACKY LOURGENA C. SALCEDO	4/1	140,280.00	4/1	140,280.00	0.00
4		Administrative Aide I (Utility Worker I)	RUDELYN M. DANDOY	1/1	117,000.00	1/1	117,000.00	0.00
TOTAL					1,252,644.00		1,252,644.00	0.00

OFFICE OF THE MUNICIPAL CIVIL REGISTRAR

Item No.		Position Title	Name of Incumbent	Current Year Authorized Rate/Annum		Budget Year Proposed Rate/Annum		Increase/ Decrease
OLD	NEW			SG / Step	Amount	SG / Step	Amount	
-1	-2	-3	-4	-5	-6	-7	-8	-9
1		Municipal Government Department Head I (Municipal Civil Registrar)	EMILY B. CABUG	24/2	823,932.00	24/2	823,932.00	0.00
2		Assistant Registration Officer	CAIRON S. MATANOG	8/2	179,304.00	8/2	179,304.00	0.00
	3	Registration Officer I	JEROME M. EMPUERTO	10/1	208,584.00	10/1	208,584.00	0.00
TOTAL					1,211,820.00		1,211,820.00	0.00

OFFICE OF THE MUNICIPAL BUDGET

Item No.		Position Title	Name of Incumbent	Current Year Authorized Rate/Annum		Budget Year Proposed Rate/Annum		Increase/D ecrease
OLD	NEW			SG / Step	Amount	SG / Step	Amount	
-1	-2	-3	-4	-5	-6	-7	-8	-9
1		Municipal Government Department Head I (Municipal Budget Officer)	GRACE A. UNDAG	24/1	810,708.00	24/1	810,708.00	0.00
2		Administrative Officer II (Budget Officer I)	LINO J. BONGCAWIL	11/1	243,000.00	11/1	243,000.00	0.00
3		Administrative Aide VI (Data Controller I)	KIM L. DELA CRUZ	6/5	162,900.00	6/5	162,900.00	0.00
4		Tourism Operation Assistant	JOSHUA P. HATAGUE	7/1	167,580.00	7/1	167,580.00	0.00
5		Administrative Officer IV (Budget Officer II)	VACANT	15/1	0.00	15/1	329,568.00	329,568.00
TOTAL					1,384,188.00		1,713,756.00	329,568.00

OFFICE OF THE MUNICIPAL TREASURER

Item No.		Position Title	Name of Incumbent	Current Year Authorized Rate/Annum		Budget Year Proposed Rate/Annum		Increase/ Decrease
OLD	NEW			SG / Step	Amount	SG / Step	Amount	
-1	-2	-3	-4	-5	-6	-7	-8	-9
1		Municipal Government Department Head I (Municipal Treasurer)	BENJAMIN R. QUIDLAT JR.	24/1	810,708.00	24/1	810,708.00	0.00
2		Assistant Municipal Treasurer	VACANT	22/1	643,596.00	22/1	643,596.00	0.00
3		Administrative Aide VI (Clerk III)	MARIA LOURDES B. GENON	6/2	159,192.00	6/2	159,192.00	0.00
	5	Revenue Collection Clerk I	MARIELLE JANE HIDLAO	5/1	148,884.00	5/1	148,884.00	0.00
7		Revenue Collection Clerk I	MARY ANN A. NISNISAN	5/1	148,884.00	5/1	148,884.00	0.00
8		Revenue Collection Clerk III	CRISTITA M. FAMA	9/1	190,896.00	9/1	190,896.00	0.00
9		Senior Administrative Assistant I (Data Controller IV)	JULIBETH J. UBAY-UBAY	13/1	281,880.00	13/1	281,880.00	0.00
10		Revenue Collection Clerk I	SHERRY MAE C. RUSIANA	5/1	148,884.00	5/1	148,884.00	0.00
11		Local Revenue Collection Officer II	VERNA P. ALQUILITA	15/2	332,976.00	15/2	332,976.00	0.00
12		Administrative Aide VI (Data Controller I)	MARILUZ G. GRAVADOR	6/1	157,980.00	6/1	157,980.00	0.00
14		Market Inspector	PANTALEON L. GONESTO	6/6	164,148.00	6/6	164,148.00	0.00
15		Administrative Aide II (Messenger)	ALLEN M. ABING	2/1	124,368.00	2/1	124,368.00	0.00
TOTAL					3,312,396.00		3,312,396.00	0.00

OFFICE OF THE MUNICIPAL ASSESSOR

Item No.		Position Title	Name of Incumbent	Current Year Authorized Rate/Annum		Budget Year Proposed Rate/Annum		Increase/ Decrease
OLD	NEW			SG / Step	Amount	SG / Step	Amount	
-1	-2	-3	-4	-5	-6	-7	-8	-9
1		Municipal Government Department Head I (Municipal Assessor)	JESSICA P. MARCERA	24/5	864,948.00	24/5	864,948.00	0.00
2		Local Assessment Operations Officer I	VACANT	11/1	243,000.00	11/1	243,000.00	0.00
3		Assessment Clerk III	GLADY MAE S. ASUNTO	9/1	190,896.00	9/1	190,896.00	0.00
6		Draftsman I	VACANT	6/1	157,980.00	6/1	157,980.00	0.00
TOTAL					1,456,824.00		1,456,824.00	0.00

OFFICE OF THE MUNICIPAL ACCOUNTANT

Item No.		Position Title	Name of Incumbent	Current Year Authorized Rate/Annum		Budget Year Proposed Rate/Annum		Increase/ Decrease
OLD	NEW			SG / Step	Amount	SG / Step	Amount	
-1	-2	-3	-4	-5	-6	-7	-8	-9
1		Municipal Government Department Head I (Municipal Accountant)	CHRIS J. CORTES	24/2	823,932.00	24/2	823,932.00	0.00
2		Administrative Assistant III (Senior Bookkeeper)	VACANT	9/1	190,896.00	9/1	190,896.00	0.00
	3	Administrative Assistant II (Bookkeeper)	MARICAR T. ESPINOSA	8/1	177,696.00	8/1	177,696.00	0.00
4		Administrative Assistant VI (Computer Operator III)	MARIA VITA B. DOLAUTA	12/1	262,488.00	12/1	262,488.00	0.00
TOTAL					1,455,012.00		1,455,012.00	0.00

OFFICE OF THE MUNICIPAL HEALTH

Item No.		Position Title	Name of Incumbent	Current Year Authorized Rate/Annum		Budget Year Proposed Rate/Annum		Increase/ Decrease
OLD	NEW			SG / Step	Amount	SG / Step	Amount	
-1	-2	-3	-4	-5	-6	-7	-8	-9
1		Municipal Government Department Head I (Municipal Health Officer)	TERESA M. REPONTE	24/1	1,080,936.00	24/1	1,080,936.00	0.00
2		Nurse II	FAITH CHARIZA L. PAGDATO	16/1	476,064.00	16/1	476,064.00	0.00
3		Nurse II	FROILAN MAE O. CAHAPON	16/1	476,064.00	16/1	476,064.00	0.00
4		Midwife III	PHEBE A. EXCHAURE	13/1	375,840.00	13/1	375,840.00	0.00
5		Midwife III	MILANY T. BECIETE	13/1	375,840.00	13/1	375,840.00	0.00
8		Midwife II	ARLENE G. DAGOC	11/1	324,000.00	11/1	324,000.00	0.00
9		Midwife II	JAMILA D. MACALANGAN	11/1	324,000.00	11/1	324,000.00	0.00
	10	Midwife I	RICHIE O. JOSOL	9/1	254,532.00	9/1	254,532.00	0.00
	11	Sanitation Inspector I	CATHERINE P. BALANE	6/1	210,636.00	6/1	210,636.00	0.00
12		Midwife I	EDNA M. LUNGAN	9/2	256,656.00	9/2	256,656.00	0.00
13		Midwife I	ELVIE B. LUTCHAVEZ	9/2	256,656.00	9/2	256,656.00	0.00
14		Midwife I	ROSALIE R. PALAHANG	9/1	254,532.00	9/1	254,532.00	0.00
15		Medical Technologist I	JANICA JADE D. TAMINE	11/1	324,000.00	11/1	324,000.00	0.00
16		Midwife I	JUVY B. MICUTUAN	9/1	254,532.00	9/1	254,532.00	0.00
18		Midwife I	MARIA LITA P. CANILLO	9/3	258,804.00	9/3	258,804.00	0.00
20		Nurse IV	RICHARD R. TAN	19/1	616,284.00	19/1	616,284.00	0.00
21		Midwife IV	DINAH T. JUMAMIL	15/1	439,428.00	15/1	439,428.00	0.00
22		Dentist II	DONALD C. ENERIO	17/1	516,360.00	17/1	516,360.00	0.00
23		Nurse II	GISELLE MAE E. MOQUIALA	16/1	476,064.00	16/1	476,064.00	0.00
	24	Medical Technologist II	VACANT	15/1	439,428.00	15/1	439,428.00	0.00
TOTAL					7,990,656.00		7,990,656.00	0.00

OFFICE OF THE MUNICIPAL ENGINEER

Item No.		Position Title	Name of Incumbent	Current Year Authorized Rate/Annum		Budget Year Proposed Rate/Annum		Increase/ Decrease
OLD	NEW			SG / Step	Amount	SG / Step	Amount	
-1	-2	-3	-4	-5	-6	-7	-8	-9
1		Municipal Government Department Head I (Municipal Engineer)	VACANT	24/1	810,708.00	24/1	810,708.00	0.00
2		Construction & Maintenance Man	GEORGE S. BUGAS	2/2	125,328.00	2/2	125,328.00	0.00
3		Administrative Aide III (Plumber I)	TEMOTEO C. EGUAC JR.	3/1	132,108.00	3/1	132,108.00	0.00
4		Draftsman III	REY M. GABRIEL	11/2	245,556.00	11/2	245,556.00	0.00
5		Engineer II	JUN FEL R. SALAUM	16/1	357,048.00	16/1	357,048.00	0.00
8		Construction & Maintenance Foreman	WILSON B. AMAGA	8/2	179,304.00	8/2	179,304.00	0.00
9		Admin Aide IV (Electrician II)	DOMINGO A. PALAHANG	4/5	144,636.00	4/5	144,636.00	0.00
10		Admin Aide VI (Mechanic II)	JOHN T. BORROMEO	6/5	162,900.00	6/5	162,900.00	0.00
11		Heavy Equipment Operator II	ROY B. BASCO	6/3	160,416.00	6/3	160,416.00	0.00
TOTAL					2,318,004.00		2,318,004.00	0.00

OFFICE OF THE MUNICIPAL SOCIAL WELFARE AND DEVELOPMENT

Item No.		Position Title	Name of Incumbent	Current Year Authorized Rate/Annum		Budget Year Proposed Rate/Annum		Increase/ Decrease
OLD	NEW			SG / Step	Amount	SG / Step	Amount	
-1	-2	-3	-4	-5	-6	-7	-8	-9
1		Municipal Government Department Head I (Municipal Social Welfare & Development Officer)	MICHELLE F. COMILLE	24/2	823,932.00	24/2	823,932.00	0.00
3		Administrative Aide VI (Data Controller I)	LUCHIE FE V. VILLANUEVA	6/3	160,416.00	6/3	160,416.00	0.00
4		Youth Development Officer III	ANITA V. BANAAN	18/1	420,528.00	18/1	420,528.00	0.00
TOTAL					1,404,876.00		1,404,876.00	0.00

OFFICE OF THE MUNICIPAL AGRICULTURE

Item No.		Position Title	Name of Incumbent	Current Year Authorized Rate/Annum		Budget Year Proposed Rate/Annum		Increase/ Decrease
OLD	NEW			SG / Step	Amount	SG / Step	Amount	
-1	-2	-3	-4	-5	-6	-7	-8	-9
1		Municipal Government Department Head I (Municipal Agriculturist)	MAISOR P. ABDULLATIF	24/1	810,708.00	24/1	810,708.00	0.00
3		Agricultural Technologist	NAJIMA P. NASSIR	10/1	208,584.00	10/1	208,584.00	0.00
	4	Agricultural Technologist	NOR-ASLEAH T. PERMITES	10/1	208,584.00	10/1	208,584.00	0.00
7		Farm Worker I	ELMER S. LASQUITE	2/1	124,368.00	2/1	124,368.00	0.00
8		Farm Worker II	DANILO S. CABASAGAN	4/1	140,280.00	4/1	140,280.00	0.00
9		Farm Supervisor	CASANA A. MARANDA	8/1	177,696.00	8/1	177,696.00	0.00
TOTAL					1,670,220.00		1,670,220.00	0.00

OFFICE OF THE MUNICIPAL ENVIRONMENT AND NATURAL RESOURCES

Item No.		Position Title	Name of Incumbent	Current Year Authorized Rate/Annum		Budget Year Proposed Rate/Annum		Increase/ Decrease
OLD	NEW			SG / Step	Amount	SG / Step	Amount	
-1	-2	-3	-4	-5	-6	-7	-8	-9
1		Municipal Government Department Head I (Municipal Environment and Natural Resources Officer)	ARHER C. ZAMORA	24/3	837,384.00	24/3	837,384.00	0.00
TOTAL					837,384.00		837,384.00	0.00

OFFICE OF THE MUNICIPAL ECONOMIC ENTERPRISE DEVELOPMENT

Item No.		Position Title	Name of Incumbent	Current Year Authorized Rate/Annum		Budget Year Proposed Rate/Annum		Increase/ Decrease
OLD	NEW			SG / Step	Amount	SG / Step	Amount	
-1	-2	-3	-4	-5	-6	-7	-8	-9
1		Municipal Government Department Head I (Municipal Economic Enterprise Development Officer)	VACANT	24/1	810,708.00	24/1	810,708.00	0.00
TOTAL					810,708.00		810,708.00	0.00

OFFICE OF THE MUNICIPAL DISASTER RISK REDUCTION AND MANAGEMENT

Item No.		Position Title	Name of Incumbent	Current Year Authorized Rate/Annum		Budget Year Proposed Rate/Annum		Increase /Decrease
OLD	NEW			SG / Step	Amount	SG / Step	Amount	
-1	-2	-3	-4	-5	-6	-7	-8	-9
1		Municipal Government Department Head I (Municipal Disaster Risk Reduction and Management Officer)	RICHARD MICHAEL I. UY	24/1	810,708.00	24/1	810,708.00	0.00
2		Lifeguard	AMANCIO M. BAGUIO III	3/1	132,108.00	3/1	132,108.00	0.00
3		Lifeguard	JEROME B. TOMIMBANG	3/1	132,108.00	3/1	132,108.00	0.00
16		LDRRMO I	AARONLE V. LAURENTE	11/1	243,000.00	11/1	243,000.00	0.00
17		LDRRMO I	SHIELA MAY C. CLAPANO	11/1	243,000.00	11/1	243,000.00	0.00
TOTAL					1,074,924.00		1,560,924.00	0.00

Section 2. Receipts Program – The receipt program for General Fund CY 2025 is presented in the Table below

Particulars (1)	Account code (2)	Income Classification (3)	Past Year (4)	Current Year Appropriation			Budget Year (Proposed) (8)
				First Semester (actual) (5)	Second Semester (Estimate) (6)	TOTAL (7)	
I. Beginning Cash Balance							
II. Receipts							
A. Local Sources							
1. Tax Revenue							
a. Real Property Tax (RPT)							
i. Basic RPT	4 01 02 040		3,324,241.15	1,321,211.62		4,075,000.00	4,278,750.00
ii. Special Education Fund	4 01 02 050						
b. Business Tax	4 01 03 030		1,664,069.58	1,672,161.87		2,000,000.00	2,100,000.00
c. Other Local Taxes	4 01 01 050		244,226.89	198,215.67		220,000.00	231,000.00
Total Tax Revenue (less SEF)			5,232,537.62	*3,191,589.16*	*0.00*	6,295,000.00	6,609,750.00
2. Non-Tax Revenue							
a. Regulatory Fees	4 02 01 010		1,396,696.32	1,195,860.36		2,000,000.00	2,100,000.00
b. Service / User Charges	4 02 01 020		3,244,570.93	3,084,142.72		3,000,000.00	3,000,000.00
c. Receipts from Economic Enterprise	4 02 01 040		0.00	0.00		1,000,000.00	1,000,000.00
d. Other Service Income	4 02 01 990		7,034.00	99.00		4,000.00	4,000.00
Total Non-Tax Revenue			4,648,301.25	4,280,102.08	0.00	6,004,000.00	6,104,000.00
Total Local Sources (Less: SEF)			9,880,838.87	7,471,691.24	0.00	12,299,000.00	12,513,750.00
B. External Sources							
1. National Tax Allocation (NTA)	4 01 06 010		123,802,242.96			131,537,856.00	156,271,606.00
2. Share from GOCCs (PAGCOR & PCSO)	4 04 01 020		288,236.07			100,000.00	100,000.00
3. Other Share from National Tax Collection							
a. Share from Ecozone							
b. Share from EVAT							
c. Share from National wealth				102,780.00		100,000.00	100,000.00
d. Share from Tobacco Excise Tax							
4. Inter-Local Transfer							
5. Extraordinary Receipts/ Grants/Donations/Aids							
Total External Sources			124,090,479.03	102,780.00	0.00	131,737,856.00	156,471,606.00
C. Non-Income Receipts							
1. Capital Investment Receipts							
a. Proceeds from Sale of Assets							
b. Proceeds from Sale of Debt Securities of other Entities							
c. Collection of Loans Receivable							
Total Capital Investment Receipts							
2. Receipts from Loans and Borrowings							
a. Acquisition of Loans							
b. Issuance of Bonds							
Total Receipts from Borrowings and Loans							
Total Non-Income Receipts							
Total Receipts			***133,971,317.90***			***144,036,856.00***	***168,985,356.00***

2. Proposed New Appropriations by Object of Expenditures

Object of Expenditures (1)	Account Code (2)	Past Year Actual (3)	Current Year (Estimate)			Budget Year Estimate (7)
			First Semester (Actual) (4)	Second Semester (Actual) (5)	Total (6)	
Personal Services						
Salaries and Wages						
Salaries & Wages- Regular	5 01 01 010	42,198,228.00			45,554,892.00	45,365,772.00
Other Compensation						
Personnel Economic Relief Allowance (PERA)	5 01 02 010	3,096,000.00			3,168,000.00	3,168,000.00
Representation Allowance	5 01 02 020	1,914,000.00			1,912,500.00	2,218,500.00
Transportation Allowance	5 01 02 030	1,914,000.00			1,912,500.00	2,218,500.00
Clothing Allowance	5 01 02 040	774,000.00			792,000.00	924,000.00
Cash Gift	5 01 02 150	645,000.00			660,000.00	660,000.00
Productivity Enhancement Incentives (PEI)	5 01 04 990					660,000.00
Mid-year Benefit	5 01 02 140	3,516,519.00			3,796,241.00	3,780,481.00
Year End Bonus	5 01 02 140	3,516,519.00			3,796,241.00	3,780,481.00
Subsistence Allowance	5 01 02 050	350,000.00			306,600.00	360,000.00
Laundry Allowance	5 01 02 060					36,000.00
Honoraria	5 01 02 100	300,000.00			300,000.00	300,000.00
Hazard Pay	5 01 02 110	250,000.00			331,720.80	399,532.80
Retirement & Life Insurance Premiums	5 01 03 010	5,063,787.36			5,464,973.52	5,443,892.64
PAG-IBIG Contribution	5 01 03 020	150,000.00			158,400.00	316,800.00
PhilHealth Contribution	5 01 03 030	839,550.96			1,138,872.30	1,134,144.30
Employees Compensation /Insurance Premium	5 01 03 040	154,800.00			158,400.00	158,400.00
Other Personnel Benefits (Loyalty)	5 01 04 990	0.00			230,000.00	65,000.00
Other Personnel Benefits (Magna Carta for Social Worker)	5 01 04 990	0.00			60,000.00	60,000.00
Terminal Leave Benefits	5 01 04 030					2,882,305.43
Total		**64,682,404.32**			**69,741,340.62**	**73,931,809.17**
Maintenance & Other Operating Services						
Travelling Expenses	5 02 01 010	4,074,000.00			3,968,500.00	4,220,000.00
Training Expenses	5 02 02 020	146,000.00			146,000.00	550,000.00
Office Supplies Expenses	5 02 03 010	820,000.00			1,062,000.00	1,400,000.00
Accountable Forms	5 02 03 020	50,000.00			50,000.00	50,000.00
Food Supplies Expenses	5 02 03 050	100,000.00			100,000.00	0.00
Drug and Medicine Expenses	5 02 03 070	356,000.00			1,056,000.00	700,000.00
Medical Dental and Laboratory Supplies Expenses	5 02 03 080				0.00	250,000.00
Fuel, Oil & Lubricants Expenses	5 02 03 090	6,100,000.00			4,730,000.00	5,050,000.00
Other Supplies & Materials (Codification & Committee)	5 02 03 990	100,000.00			200,000.00	250,000.00
Water Expenses	5 02 04 010	1,000,000.00			1,000,000.00	1,250,000.00
Electricity Expenses	5 02 04 020	4,500,000.00			4,500,000.00	4,800,000.00
Postage & Courier Services	5 02 05 040	50,000.00			50,500.00	59,500.00
Internet Subscription Expenses	5 02 05 020	901,000.00			1,081,000.00	300,000.00
Awards / Rewards Expenses	5 02 06 010	20,000.00			20,000.00	80,000.00
Prizes	5 02 06 020	20,000.00			20,000.00	90,000.00
Peace & Order Fund Expenses	5 02 10 010	2,848,446.48			2,848,446.48	3,575,000.00
Telephone Expenses	5 02 05 020					714,000.00
Discretionary Expenses		40,737.08			40,737.08	66,484.82

Extra Ordinary & Miscellaneous Expenses	5 02 10 030	300,000.00			300,000.00	300,000.00
Consultancy Services	5 02 11 030	180,000.00			180,000.00	180,000.00
Other General Services	5 02 12 990	7,131,000.00			3,500,000.00	3,776,000.00
Other General Services (BHW etc)	5 02 13 020	100,000.00			100,000.00	100,000.00
Repair & Maintenance- Building & Other Structure	5 02 13 040	250,000.00			250,000.00	500,000.00
Repair & Maintenance- Machinery and Equipment	5 02 13 050	460,000.00			508,000.00	640,000.00
Repair & Maintenance of Transportation Equipment	5 02 13 060	300,000.00			300,000.00	420,000.00
Repair & Maintenance- Furniture & Fixture	5 02 13 070				0.00	20,000.00
Subsidy to National Government (NGAs)	5 02 14 020	800,000.00			800,000.00	500,000.00
Fidelity Bond Premiums	5 02 16 020	86,000.00			116,000.00	116,000.00
Insurance Expenses	5 02 16 030	100,000.00			100,000.00	100,000.00
Advertising Expenses	5 02 99 010	360,000.00			360,000.00	360,000.00
Annual Subscription Fee (ECPAC)	5 02 99 050	44,000.00			44,000.00	302,400.00
Annual Subscription Fee (E-TRACS)	5 02 99 990	0.00			75,000.00	37,500.00
Membership Dues Contribution to Organization	5 02 99 060	214,000.00			155,000.00	444,000.00
Subscription Expenses	5 02 99 070	30,000.00			30,000.00	30,000.00
Donations	5 02 99 080	300,000.00			700,000.00	1,000,000.00
Other Maintenance & Operating Expenses (Meals)	5 02 99 990	240,000.00			100,000.00	300,000.00
Printing & Publication Expenses	5 02 99 020	0.00			100,000.00	150,000.00
Enhancement Civil Registry Records						50,000.00
File Mgt. & Codification Expenses	5 02 03 990	0.00			50,000.00	0.00
Other Supplies and Materials Expenses (Isolation)	5 02 03 990	648,555.00			70,000.00	0.00
Other Professional Expenses	5 02 03 990					30,000.00
Other Maintenance & Operating Expenses- DOH Program)	5 02 99 990					600,000.00
Health & Wellness Program		0.00			500,000.00	0.00
Tourism Expenses	5 02 99 990	300,000.00			300,000.00	300,000.00
Tourism Month Celebration	5 02 99 990					1,460,589.15
Financial Assistance- Cash Subsidy for Solo Parents	5 02 99 080	0.00			252,000.00	252,000.00
Araw ng Lanao del Norte Celebration Expenses		0.00			300,000.00	500,000.00
Election Expenses						500,000.00
Aid to NMYL						500,000.00
Total		**33,369,738.56**			**30,363,183.56**	**36,934,973.97**
Financial Expenses						
Capital Outlay						
Investment Property						
Land and Buildings						
Office Equipment	1 07 05 020	**492,889.52**			**1,250,000.00**	**1,850,000.00**
Land						
Land Improvements						
Biological Assets						
Intangible Assets						
Special Purpose Appropriations (SPA)						
Appropriation for Development Programs/Projects (20%) Development Fund		**24,774,464.80**			26,307,571.20	31,254,321.20

Appropriation for Local Disaster Risk Reduction and Management		7,122,216.20			7,201,842.80	8,449,267.80
Prior Year Obligation		1,000,000.00			2,021,600.00	1,593,000.00
Appropriation for Debt Service		2,998,663.54			3,235,757.06	4,600,000.00
MCPC		1,238,723.24			1,315,378.56	1,562,716.06
CAF		755,323.82			150,182.20	150,000.00
LS Appropriation (Support to Katarungang Pambarangay)		50,000.00			50,000.00	50,000.00
Aid to Barangay		160,000.00			160,000.00	160,000.00
GAD		2,000,000.00			1,000,000.00	8,449,267.80
Total Expenditures		**40,099,391.60**			**41,442,331.82**	**56,268,572.86**
IV. Ending Balance		**138,644,424.00**			**144,036,856.00**	**168,985,356.00**

Special Provision: *The amounts herein appropriated for the functions of the office shall be used specifically for the activities and purposes in the amounts and condition indicated*

Section 3. Expenditure Program.

OFFICE: OFFICE OF THE MUNICIPAL MAYOR

Mandate: Exercise the general supervision and control over all programs, projects, services and activities of the Municipal government.
Enforce all laws and ordinance relative to the governance of the LGU and the exercise of the appropriate corporate powers
Ensure the delivery of basic services and the provision of adequate facilities

Vision: To provide effective, efficient and dedicated public service for good governance.

Mission: To uphold integrity, loyalty and efficiency in public service.

Organizational Outcome: Basic Services delivered for the good of the people.

AIP Reference Code	Program/Project/Activity Description	Major Final Output	Performance/Output Indicator	Target for the Budget Year	Proposed Budget				
					PS	MOOE	FE	CO	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1000-000-3-1-01-001	General Administration	Administered Management	Properly managed	Management administered	11,178,309.80	27,662,073.97		400,000.00	39,240,383.77
8000-001-3-1-01-001-013	LGU Greening Program		A balance & healthy environment	A greener Bacolod					
8000-001-3-1-01-001-014	Solid Waste Management		Community empowered in the proper disposal of waste	Strengthening Environmental laws					
1000-001-3-1-01-001-003-001	Regular Coordination meetings, ADACs, PLEB and other Special Bodies meetings	Achieve the desired peace and order situation that will help to elevate the economic opportunity of the municipality.	Functional ADACs, PLEB and Special Bodies	Functional ADACs, PLEB and other Special Bodies		220,000.00			220,000.00
1000-001-3-1-01-001-003-002	Weekly Visitation in every Barangay		Barangays are visited weekly			200,000.00			200,000.00
1000-001-3-1-01-001-003-003	Periodic visit to Brgy. Tanod outpost and Civilian Security Unit (CSU)		CSU Outpost are visited	CSU Outpost are visited		200,000.00			200,000.00

Membership Dues and Contributions to Organizations	5 02 99 060	50,000.00	0.00	50,000.00	50,000.00	70,000.00
Consultancy Services	5 02 11 030	180,000.00	0.00	180,000.00	180,000.00	180,000.00
Advertising Expenses	5 02 99 010	360,000.00	210,000.00	150,000.00	360,000.00	360,000.00
Rent Expenses	5 02 99 050	44,000.00	41,370.00	2,630.00	44,000.00	24,000.00
Subscription Expenses	5 02 99 070	30,000.00	0.00	30,000.00	30,000.00	30,000.00
Printing & Publication						50,000.00
Peace and Order Fund	5 02 10 010	2,848,446.48	546,040.76	2,302,405.72	2,848,446.48	3,575,000.00
Extraordinary & Miscellaneous Expenses	5 02 10 030	300,000.00	296,837.07	3,162.93	300,000.00	300,000.00
Fidelity Bond Premium	5 02 16 020	56,000.00	0.00	56,000.00	56,000.00	56,000.00
Insurance Expenses	5 02 14 030	100,000.00	60,074.51	39,925.49	100,000.00	100,000.00
Subsidy to National Government (NGAs)	5 02 14 020	800,000.00	0.00	800,000.00	800,000.00	500,000.00
Repair & Maintenance - Building & Other Structure	5 02 13 040	250,000.00	247,564.50	2,435.50	250,000.00	480,000.00
Repair & Maintenance - Machinery & Equipment	5 02 13 050	250,000.00	235,015.30	14,984.70	250,000.00	250,000.00
Repair and Maintenance of Transportation Equipment	5 02 13 060	300,000.00	282,442.94	17,557.06	300,000.00	400,000.00
Other General Services	5 02 11 990	7,111,000.00	2,922,743.04	577,256.96	3,500,000.00	3,776,000.00
Donations	5 02 99 080	200,000.00	499,340.00	660.00	500,000.00	800,000.00
Discretionary Expenses	5 02 99 110	40,737.08	3,000.00	37,737.08	40,737.08	66,484.82
Other Maintenance & Operating Expenses (Meals)	5 02 99 990	100,000.00	95,651.75	4,348.25	100,000.00	300,000.00
Araw ng Lanao Del Norte Celebration Expenses			63,200.00	236,800.00	300,000.00	500,000.00
Tourism Month Celebration						1,460,589.15
Tourism Expenses						300,000.00
Election Expenses						500,000.00
Total		**26,013,183.56**	**12,772,663.86**	**8,469,519.70**	**21,242,183.56**	**27,662,073.97**
Capital Outlay						
Office Equipment	1 07 05 020	**492,889.52**	**221,118.70**	0.00	**500,000.00**	**400,000.00**
Sub -Total		**37,540,332.52**	**15,976,856.88**	**16,838,983.32**	**33,094,721.50**	**39,240,383.77**

Special Provision: *The amounts herein appropriated for the functions of the office shall be used specifically for the activities and purposes in the amounts and condition Indicated.*

OFFICE: OFFICE OF THE SANGGUNIANG BAYAN

Mandate: Provide Legislation on relation of Executive Action.
Enact ordinances, approved resolutions and appropriate funds for the welfare of the LGU and its inhabitants.
Approved ordinances and pass resolutions necessary for an efficient and effective local governance
Approve Annual and Supplemental Budgets of the LGU

Vision: Sangguniang Bayan Members equipped, knowledgeable, skilled, trained leaders

Mission: To have empowered, efficient and effective local legislators.

Organizational Outcome: Enacted and Effective Legislative Services.

AIP Reference Code	Program/Project /Activity Description	Major Final Output	Performance/ Output Indicator	Target for the Budget Year	Proposed Budget for the Budget Year				
					PS	MOOE	FE	CO	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	General Administration								
1000-001-3-1-01-002-001	Provision of much needed facilities of the Sangguniang Bayan for	Legislation is Paperless communica	Paperless, hassle free correction of minutes during	Minutes & Resolution properly managed	14,926,508.78	2,864,000.00		400,000.00	18,190,508.78

	Electronic Legislation.	tion thru Electronic and digital devices.	sessions.	and prepared from January to December 2025					
1000-001-3-1-01-002-001-010	Attend lectures on Parliamentary Procedures and Effective Local Legislation.	Strengthen the capacities of the local officials.	Equipped in legislative process.	Strengthened Legislative Capacities.					

Office of the Sangguniang Bayan

Object of Expenditures	Account	Past Year	Current Year (Estimate)			Budget Year
			First Semester	Second Semester	TOTAL	
(1)	Code	Actual	(Actual)	(Estimate)		Estimate
	(2)	(3)	(4)	(5)	(6)	(7)
Personal Services						
Salaries and Wages						
Salaries & Wages- Regular	5 01 01 010	8,890.020,00	4,569.588,00	4,569.588,00	9,139.176,00	9,139,176,00
Other Compensation						
Personnel Economic Relief Allowance (PERA)	5 01 02 010	264,000.00	132,000.00	132,000.00	264,000.00	264,000.00
Representation Allowance	5 01 02 020	751,500.00	375,750.00	375,750.00	751,500.00	850,500.00
Transportation Allowance	5 01 02 030	751,500.00	375,750.00	375,750.00	751,500.00	850,500.00
Clothing Allowance	5 01 02 040	66,000.00	66,000.00	0.00	66,000.00	77,000.00
Cash Gift	5 01 02 150	55,000.00	0.00	55.000,00	55,000.00	55,000.00
Productivity Enhancement Incentives (PEI)	5 01 04 990					55,000,00
Mid-Year Benefit	5 01 02 990	740,835.00	0.00	761,598.00	761,598.00	795,793.00
Year End Bonus	5 01 02 140	740,835.00	0.00	761,598.00	761,598.00	795,793.00
Retirement & Life Insurance Premiums	5 01 03 010	1,066,802.40	548,350.56	548,350.56	1,096,701.12	1,145,941.92
PAG-IBIG Contribution	5 01 03 020	13,200.00	11,000.00	2.200,00	13,200.00	26,400.00
PhilHealth Contribution	5 01 03 030	177,800.40	114,240.00	114,239.40	228,479.40	238,737.90
Employees Compensation / Insurance Premium	5 01 03 040	13,200.00	6,600.00	6,600.00	13,200.00	13,200.00
Other Personnel Benefits (Loyalty)	5 01 04 990					7,500.00
Total		**13,530,692.80**	**6,199,278.56**	**7,702,673.96**	**13,901,952.52**	**14,926,508.78**
Maintenance & Other Operating Services						
Traveling Expenses (Vice Mayor's Office)	5 02 01 010	300,000.00	183,460.00	166,540.00	350,000.00	350,000.00
Travelling Expenses (SB Members)	5 02 01 010	700,000.00	749,300.00	250,700,00	1,000,000.00	1,000,000.00
Office Supplies Expenses	5 02 03 010	15,000.00	12,673.41	17,326.59	30,000.00	0.00
Other Supplies & Material (Committee Expenses)	5 02 03 990	100,000.00	29,714.00	170,286.00	200,000.00	200,000.00
Membership Dues Contribution to Organization	5 02 99 060	34,000.00	0.00	50,000.00	50,000.00	300,000.00
Repair & Maintenance-Machinery & Equipment	5 02 13 050	10,000.00	8,000.00	42,000.00	50,000.00	50,000.00
Donations	5 02 99 080	0,00	0,00	100,000.00	100,000.00	200,000.00
Telephone Expenses	5 02 05 020	222,000.00	217,290.00	184,710.00	402,000.00	264,000.00
Aid to NMYL						500,000.00
Total		**1,381,000,00**	**1,200,437.41**	**981,562.59**	**2,182,000,00**	**2,864.000.00**
Capital Outlay						

Office Equipment	1 07 05 020	0.00	0.00	0.00	0.00	400,000.00
Sub-Total		15,011,692.80	7,467,737.25	6,988,019.27	16,183,952.52	18,190,508.78

Special Provision: The amounts herein appropriated for the functions of the office shall be used specifically for the activities and purposes in the amounts and condition Indicated.

OFFICE: OFFICE OF THE SECRETARY TO SANGGUNIAN

Mandate: Responsible for the faithful and proper performance of the official duties of the Personnel of the Sanggunian as prescribed by law.

Vision: Secretary to the Sanggunian: Effective, Efficient and Result-Oriented Legislative Secretariat

Mission: To provide the lawmaking activities in the Sangguniang Bayan (SB) with adequate and capable staff support.

Organizational Outcome: Attendance to all council meetings and properly recorded SB actions as codified.

AIP Reference Code	Program/Project /Activity Description	Major Final Output	Performance/ Output Indicator	Target for the Budget Year	Proposed Budget for the Budget Year				
					PS	MOOE	FE	CO	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1000-001-3-1-01-004-001	Codification of Ordinances	Systematic, arrange and easy retrieval of documents in form of soft and hard copy as needed.	Codified documents in form of soft and hard copy as needed.	Codified documents	3,958,833.30	384,000.00		70,000.00	4,412,833.30

Office of the Secretary to Sanggunian

Object of Expenditures	Account	Past Year	Current Year (Estimate)			Budget Year
			First Semester	Second Semester	TOTAL	
(1)	Code	Actual	(Actual)	(Estimate)		Estimate
	(2)	(3)	(4)	(5)	(6)	(7)
Personal Services						
Salaries and Wages						
Salaries & Wages- Regular	5 01 01 010	2,230,668.00	584,310.00	1,702,698.00	2,287,008.00	2,450,568.00
Other Compensation						
Personnel Economic Relief Allowance (PERA)	5 01 02 010	240,000.00	96,000.00	144,000.00	240,000.00	264,000.00
Representation Allowance	5 01 02 020	67,500.00	28,125.00	39,375.00	67,500.00	76,500.00
Transportation Allowance	5 01 02 030	67,500.00	28,125.00	39,375.00	67,500.00	76,500.00
Clothing Allowance	5 01 02 040	60,000.00	48,000.00	12,000.00	60,000.00	77,000.00
Cash Gift	5 01 02 150	50,000.00	0.00	50,000.00	50,000.00	55,000.00
Productivity Enchancement Incentives (PEI)	5 01 04 990					55,000.00
Mid-year Benefits	5 01 02 990	185,889.00	0.00	190,584.00	190,584.00	204,214.00
Year End Bonus	5 01 02 140	185,889.00	0.00	190,584.00	190,584.00	204,214.00
Retirement & Life Insurance Premiums	5 01 03 010	267,680.16	70,117.20	203,323.76	274,440.96	294,068.16
PAG-IBIG Contribution	5 01 03 020	12,000.00	7,980.00	4,020.00	12,000.00	26,400.00
PhilHealth Contribution	5 01 03 030	44,906.16	14,588.44	42,586.76	57,175.20	61,264.20
Employees Compensation Insurance Premium	5 01 03 040	12,000.00	4,785.00	7,215.00	12,000.00	13,200.00
Other Personnel Benefits (Loyalty)	5 01 04 990		15,000.00	5,000.00	20,000.00	10,000.00

Terminal Leave Benefits	5 01 04 030					90,904.94
Total		3,424,032.32	897,030.64	2,630,761.52	3,528,792.16	3,958,833.30
Maintenance & Other Operating Services						
Travelling Expenses	5 02 01 010	130,000.00	82,300.00	17,700.00	100,000.00	150,000.00
Office Supplies Expenses	5 02 03 010	25,000.00	0.00	25,000.00	25,000.00	0.00
Postage & Courier Services	5 02 05 010	10,000.00	0.00	10,000.00	10,000.00	20,000.00
Membership Dues Contribution to Organization	5 02 99 060	10,000.00	0.00	10,000.00	10,000.00	20,000.00
Repair & Maintenance- Machinery & Equipment	5 02 13 050	10,000.00	0.00	10,000.00	10,000.00	20,000.00
Telephone Expenses	5 02 05 020	36,000.00	9,000.00	27,000.00	36,000.00	24,000.00
Printing & Publication Expenses	5 02 99 020		0.00	100,000.00	100,000.00	100,000.00
File Mgt. & Codification Expenses	5 02 03 990		0.00	50,000.00	50,000.00	50,000.00
Total		221,000.00	91,300.00	249,700.00	341,000.00	384,000.00
Capital Outlay						
Office Equipment	1 07 05 020	0.00	0.00	0.00	20,000.00	70,000.00
Sub-Total		*3,645,032.32*	988,330.64	*2,880,461.52*	*3,869,792.16*	*4,412,833.30*

Special Provision: The amounts herein appropriated for the functions of the office shall be used specifically for the activities and purposes in the amounts and condition Indicated.

OFFICE: OFFICE OF THE MUNICIPAL TREASURER

Mandate: To assure financial integrity in the collection, safekeeping and disbursement of funds
Take charge of the treasury office, perform the duties provided for under Book II of the Local Government Code.
Take custody and exercise proper management of the funds of the LGU
Submit to the LCE certified statement of income and expenditures for budget preparation purposes.

Vision: An Efficient organization for fiscal administration in the collection, custody and disbursement of funds with utmost service in achieving financial goals and objectives.

Mission: To generate revenues thru effective collection of taxes, fees and charges in accordance with the laws and ordinances, and to take custody and proper management of funds of the municipality.

Organizational Outcome: Sustain and maintain the financial needs of the municipality and its development as well.

AIP Reference Code	Program/Project/ Activity Description	Major Final Output	Performance/ Output Indicator	Target for the Budget Year	Proposed Budget for the Budget Year				
					PS	MOOE	FE	CO	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1000-001-3-1-01-005-001	Software for Fund Disbursement Transactions	Electronically assisted Disbursement of Fund Transactions	Number of disbursement transaction served		5,145,959.42	403,500.00		70,000.00	5,619,459.42
1000-001-3-1-01-005-001-012	Installation of Queuing System on all Natures of Collections	Systematic and easy viewing of natures of collections	All Natures of collections viewed by taxpayers/ clients						
1000-001-3-1-01-005-001-014	"One Stop Shop" processing of Business Permit	Short time period and hassle free of business permits processing to business operators.	Number of business Permits processed during the activity.						

Office of the Municipal Treasurer

Object of Expenditures	Account	Past Year	Current Year (Estimate)			Budget Year
			First Semester	Second Semester	TOTAL	
(1)	Code	Actual	(Actual)	(Estimate)		Estimate
	(2)	(3)	(4)	(5)	(6)	(7)
Personal Services						
Salaries and Wages						
Salaries & Wages- Regular	5 01 01 010	2,576,496.00	890,920.00	2,425,436.00	3,316,356.00	3,312,396.00
Other Compensation						
Personnel Economic Relief Allowance (PERA)	5 01 02 010	264,000.00	88,000.00	200,000.00	288,000.00	288,000.00
Representation Allowance	5 01 02 020	67,500.00	22,500.00	45,000.00	67,500.00	130,500.00
Transportation Allowance	5 01 02 030	67,500.00	22,500.00	45,000.00	67,500.00	130,500.00
Clothing Allowance	5 01 02 040	66,000.00	66,000.00	6,000.00	72,000.00	84,000.00
Cash Gift	5 01 02 150	55,000.00	0.00	60,000.00	60,000.00	60,000.00
Productivity Enhancement Incentives (PEI)	5 01 04 990					60,000.00
Mid-year Benefits	5 01 02 990	214,708.00	0.00	276,363.00	276,363.00	276,033.00
Year End Bonus	5 01 02 140	214,708.00	0.00	276,363.00	276,363.00	276,033.00
Retirement & Life Insurance Premiums	5 01 03 010	309,179.52	106,910.40	291,052.32	397,962.72	397,487.52
PAG-IBIG Contribution	5 01 03 020	10,800.00	6,600.00	7,800.00	14,400.00	28,800.00
PhilHealth Contribution	5 01 03 030	51,534.96	22,273.12	60,635.78	82,908.90	82,809.90
Employees Compensation / Insurance Premium	5 01 03 040	13,200.00	4,400.00	10,000.00	14,400.00	14,400.00
Other Personnel Benefits (Loyalty)	5 01 04 990		47,500.00	0.00	47,500.00	5,000.00
Total		**3,910,626.48**	**1,277,603.52**	**3,703,650.10**	**4,981,253.62**	**5,145,959.42**
Maintenance & Other Operating Services						
Travelling Expenses	5 02 01 010	232,000.00	9,440.00	190,560.00	200,000.00	150,000.00
Training Expenses	5 02 02 010		0.00	0.00	0.00	50,000.00
Office Supplies Expenses	5 02 03 010	40,000.00	0.00	40,000.00	40,000.00	0.00
Accountable Forms Expenses	5 02 03 020	50,000.00	0.00	50,000.00	50,000.00	50,000.00
Postage & Courier Services	5 02 05 010	2,000.00	0.00	2,000.00	2,000.00	2,000.00
Telephone Expenses	5 02 05 020	36,000.00	18,000.00	18,000.00	36,000.00	24,000.00
Repair & Maintenance-Machinery & Equipment	5 02 13 050	15,000.00	0.00	15,000.00	15,000.00	20,000.00
Fidelity Bond Premium	5 02 16 020	30,000.00	0.00	60,000.00	60,000.00	60,000.00
Membership Dues Contribution to Organization	5 02 99 060	10,000.00	0.00	10,000.00	10,000.00	10,000.00
Subscription Expenses (e-tracs - Annual)	5 02 99 070		37,500.00	0.00	37,500.00	37,500.00
Total		**415,000.00**	**64,940.00**	**385,560.00**	**450,500.00**	**403,500.00**
Capital Outlay						
Office Equipment	1 07 05 020	0.00	48,940.00	0,00	**70,000.00**	**70,000.00**
Sub-Total		***4,325,626.48***	**1,391,483.52**	**4,089,210.10**	***5,501,753.62***	***5,619,459.42***

Special Provision: *The amounts herein appropriated for the functions of the office shall be used specifically for the activities and purposes in the amounts and condition Indicated.*

OFFICE: OFFICE OF THE MUNICIPAL ASSESSOR

Mandate: Shall take charge of the discovery, classification, appraisal, assessment and valuation of all Real Properties within the territorial jurisdiction which shall be used as the basis for taxation.
Ensure all laws and policies governing the appraisal and assessment of real properties for taxation purposes are properly executed.
Exercise the functions of appraisal and assessment primarily for taxation purposes of all real properties in the LGU
Issue upon request of any interested party, certified copies of assessment records of real property and all other records relative to its assessment.

Vision: An accurate, prompt and systematic delivery of services at all times to our clientele.

Mission: Provide a friendly, prompt, efficient and courteous assessment service.

Organizational Outcome: Clear appraisal and assessment of real property

AIP Reference Code	Program/Project/Activity Description	Major Final Output	Performance/Output Indicator	Target for the Budget Year	Proposed Budget for the Budget Year				
					PS	MOOE	FE	CO	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1000-001-3-1-01-006-001	Assessment of Real Property Services	New Program (LIFT)	Easy Preparation of Reports		2,242,267.48	343,000.00		70,000.00	2,655,267.48
	Seminars/Training for LIFT/BLGF	New Program	Monitoring and submission of LGU's Statement of Receipts & Expenditures Report..						

Office of the Municipal Assessor

Object of Expenditures	Account	Past Year	Current Year (Estimate)			Budget Year
			First Semester	Second Semester	TOTAL	
(1)	Code	Actual	(Actual)	(Estimate)		Estimate
	(2)	(3)	(4)	(5)	(6)	(7)
Personal Services						
Salaries and Wages						
Salaries & Wages- Regular	5 01 01 010	1,180,212.00	310,918.73	1,145,905.27	1,456,824.00	1,456,824.00
Other Compensation						
Personnel Economic Relief Allowance (PERA)	5 01 02 010	72,000.00	10,000.00	86,000.00	96,000.00	96,000.00
Representation Allowance	5 01 02 020	67,500.00	22,500.00	45,000.00	67,500.00	76,500.00
Transportation Allowance	5 01 02 030	67,500.00	22,500.00	45,000.00	67,500.00	76,500.00
Clothing Allowance	5 01 02 040	18,000.00	12,000.00	12,000.00	24,000.00	28,000.00
Productivity Enhancement Incentives (PEI)	5 01 02 150	15,000.00	0.00	20,000.00	20,000.00	20,000.00
Cash Gift	5 01 04 990					20,000.00
Mid-year Benefits	5 01 02 990	98,351.00	0.00	121,402.00	121,402.00	121,402.00
Year End Bonus	5 01 02 140	98,351.00	0.00	121,402.00	121,402.00	121,402.00
Retirement & Life Insurance Premiums	5 01 03 010	141,625.44	36,506.88	138,312.00	174,818.88	174,818.88
PAG-IBIG Contribution	5 01 03 020	3,600.00	800.00	4,000.00	4,800.00	9,600.00
PhilHealth Contribution	5 01 03 030	23,604.24	7,605.62	28,814.98	36,420.60	36,420.60
Employees Compensation / Insurance Premium	5 01 03 040	3,600.00	500.00	4,300.00	4,800.00	4,800.00
Other Personnel Benefits (Loyalty)	5 01 04 990		20,000.00	0.00	20,000.00	0.00
Total		**1,789,343.68**	**443,331.23**	**1,772,136.25**	**2,215,467.48**	**2,242,267.48**
Maintenance & Other Operating Services						
Travelling Expenses	5 02 01 010	151,000.00	24,800.00	143,700.00	168,500.00	200,000.00
Office Supplies Expenses	5 02 03 010	15,000.00	0.00	15,000.00	15,000.00	0.00
Postage & Courier Services	5 02 05 010	1,500.00	0.00	1,500.00	1,500.00	1,500.00
Telephone Expenses	5 02 05 020	36,000.00	18,000.00	18,000.00	36,000.00	24,000.00
Repair & Maintenance- Machinery &	5 02 13 050	15,000.00	2,905.00	12,095.00	15,000.00	80,000.00

Equipment						
Subscription Expenses (e-tracs - Annual)	5 02 99 060	75,000.00	37,500.00	0.00	37,500.00	37,500.00
Total		293,500.00	83,205.00	190,295.00	273,500.00	343,000.00
Capital Outlay						
Office Equipment	1 07 05 020	0.00	1,800.00	28,200.00	30,000.00	50,000.00
Furniture & Fixtures	1 07 07 010					20,000.00
Sub-Total		2,082,843.68	528,336.23	1,990,631.25	2,518,967.48	2,655,267.48

Special Provision: The amounts herein appropriated for the functions of the office shall be used specifically for the activities and purposes in the amounts and condition Indicated.

OFFICE: OFFICE OF THE MUNICIPAL ACCOUNTANT

Mandate: Take charge of both the accounting and Internal Audit Services of the LGU.
Review supporting documents before preparation of vouchers to determine completeness of requirements
Prepare and submit financial statements to the LCE and the Sangguniang Bayan

Vision: To have an effective and efficient financial transaction in the LGU.

Mission: To ensure LGU financial transactions properly authorized, recorded and reported.

Organizational Outcome: Good Financial Housekeeping

AIP Reference Code	Program/Project/ Activity Description	Major Final Output	Performance/ Output Indicator	Target for the Budget Year	Proposed Budget for the Budget Year				
					PS	MOOE	FE	CO	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1000-001-3-1-01-007-001	**General Administration**		Policy Formulated	End of Month	2,721,556.22	412,600.00		140,000.00	3,274,156.22
	Journalizing & Posting of		Monthly Financial	End of Month					
	disbursement Vouchers to CKDJ, and CDJ & general subsidiary ledger.		Statement As Necessary	End of Month					
	Postage and Deliveries		Monthly Financial Statement	End of Month					
	Journalizing and Posting of deposits and collection to CRJ, general subsidiary ledger.		Meeting Attended Payment of Obligation	End of Year					
	Attend meetings conducted by COA, BIR, other Government agency		Reconciled Agency & Bank Account						
	Preparation of Monthly Trial Balance, Year End Trial		Remittance of Trust Liabilities						
	Balance of all funds LGU								
	Prepares check advice for disbursement								
	Prepares Monthly Reconcile								
	Attend Regional, Provincial & National Conventions								
	Prepares of JEV for Disbursement and Collection								
	Repair and								

	Maintenance of office equipment						
	Preparation of Monthly Remittance to GSIS, BIR, PAG-IBIG and Phil Health.						

Office of the Municipal Accountant

Object of Expenditures	Account	Past Year	Current Year (Estimate)			Budget Year
			First Semester	Second Semester	TOTAL	
(1)	Code	Actual	(Actual)	(Estimate)		Estimate
	(2)	(3)	(4)	(5)	(6)	(7)
Personal Services						
Salaries and Wages						
Salaries & Wages- Regular	5 01 01 010	1,227,792.00	425,772.00	1,029,240.00	1,455,012.00	1,455,012.00
Other Compensation						
Personnel Economic Relief Allowance (PERA)	5 01 02 010	72,000.00	24,000.00	72,000.00	96,000.00	96,000.00
Representation Allowance	5 01 02 020	67,500.00	22,500.00	45,000.00	67,500.00	76,500.00
Transportation Allowance	5 01 02 030	67,500.00	22,500.00	45,000.00	67,500.00	76,500.00
Clothing Allowance	5 01 02 040	18,000.00	18,000.00	6,000.00	24,000.00	28,000.00
Cash Gift	5 01 02 150	15,000.00	0.00	20,000.00	20,000.00	20,000.00
Productivity Enhancement Incentives (PEI)	5 01 04 990					20,000.00
Mid-Year Benefits	5 01 02 990	102,316.00	0.00	121,251.00	121,251.00	121,251.00
Year End Bonus	5 01 02 140	102,316.00	0.00	121,251.00	121,251.00	121,251.00
Retirement & Life Insurance Premiums	5 01 03 010	147,335.04	51,092.64	123,508.80	174,601.44	174,601.44
PAG-IBIG Contribution	5 01 03 020	3,600.00	1,800.00	3,000.00	4,800.00	9,600.00
PhilHealth Contribution	5 01 03 030	24,555.84	10,644.32	25,730.98	36,375.30	36,375.30
Employees Compensation / Insurance Premium	5 01 03 040	3,600.00	1,200.00	3,600.00	4,800.00	4,800.00
Other Personnel Benefits (Loyalty)	5 01 04 990		12,500.00	0.00	12,500.00	0.00
Terminal Leave Benefits	5 01 04 030					481,665.48
Total		**1,851,514.88**	**590,008.96**	**1,615,581.78**	**2,205,590.74**	**2,721,556.22**
Maintenance & Other Operating Services						
Travelling Expenses	5 02 01 010	150,000.00	62,770.00	87,230.00	150,000.00	100,000.00
Training Expenses	5 02 02 010	0.00	0.00	0.00	0.00	50,000.00
Office Supplies Expenses	5 02 03 010	30,000.00	23,532.00	6,468.00	30,000.00	0.00
Postage & Courier Services	5 02 05 010	2,000.00	0.00	0.00	2,000.00	2,000.00
Telephone Expenses	5 02 05 020	36,000.00	18,000.00	18,000.00	36,000.00	24,000.00
Repair & Maintenance--Machinery and Equipment	5 02 13 050	10,000.00	0.00	10,000.00	10,000.00	10,000.00
Repair & Maintenance--Furniture and Fixture	5 02 13 070		0.00	0.00	0.00	20,000.00
Rent Expenses (ECPAC)	5 02 99 070	240,000.00	112,778.57	127,221.43	240,000.00	201,600.00
Membership Due to Organization	5 02 99 060	5,000.00	0.00	5,000.00	5,000.00	5,000.00
Total		**473,000.00**	**217,080.57**	**253,919.43**	**473,000.00**	**412,600.00**
Capital Outlay						
Office Equipment	1 07 05 020	0.00	0.00	0.00	**0.00**	**140,000.00**
Sub-total		**2,324,514.88**	**807,089.53**	**1,869,501.21**	**2,678,590.74**	**3,274,156.22**

Special Provision:

The amounts herein appropriated for the functions of the office shall be used specifically for the activities and purposes in the amounts and condition indicated.

Office: Office of the Municipal Budget

Mandate: To promote sound, efficient and effective management and utilization of LGU's Resources for the achievement of its vision.
Review and consolidate budget proposals of different departments and offices of the LGU
Assist the LCE in the preparation of the annual and supplemental budgets
Study and evaluate budgetary implications of proposed legislations and submit comments and recommendations thereon
Acts as member of the Local Finance Committee.

Vision: Sound, Smooth and Achievable Budget

Mission: To effectively manage the utilization of the LGU's Resources for the achievement of the LGU's Vision

Organizational Outcome: Achievable annual budget.

AIP Reference Code	Program/Project/Activity Description	Major Final Output	Performance/Output Indicator	Target for the Budget Year	Proposed Budget for the Budget Year				
					PS	MOOE	FE	CO	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1000-001-3-1-01-008-001	General Administration	Policy	Policy Formulated		2,626,376.62	339,800.00		70,000.00	3,036,176.62
	Provide Circulars embodying instruction on budgetary appropriation.	Circulars	New Issuance of Circulars	1					
	Coordinate members of the Local Finance Committee for planning and certifying income for budget year as reliable to be collected.	Collection Income	Income to be collected	Target Collection					
1000-001-3-1-01-008-001	Conduct Meeting &Seminar Barangay Municipal	Minutes of Meeting	Meeting conducted	As required					
	Budget Preparation and Production	Budget Prepared	Budget Supporting Documents	As required					
	General Administration	Policy	Policy Formulated						

Office of the Municipal Budget

Object of Expenditures	Account	Past Year	Current Year (Estimate)			Budget Year
			First Semester	Second Semester	TOTAL	
(1)	Code	Actual	(Actual)	(Estimate)		Estimate
	(2)	(3)	(4)	(5)	(6)	(7)
Personal Services						
Salaries and Wages						
Salaries & Wages- Regular	5 01 01 010	1,367,340.00	346,047.00	1,038,141.00	1,384,188.00	1,713,756.00
Other Compensation						
Personnel Economic Relief Allowance (PERA)	5 01 02 010	96,000.00	24,000.00	72,000.00	96,000.00	120,000.00
Representation Allowance	5 01 02 020	67,500.00	16,875.00	50,625.00	67,500.00	76,500.00
Transportation Allowance	5 01 02 030	67,500.00	16,875.00	50,625.00	67,500.00	76,500.00
Clothing/Uniform Allowance	5 01 02 040	24,000.00	24,000.00	0.00	24,000.00	35,000.00
Cash Gift	5 01 02 150	20,000.00	0.00	20,000.00	20,000.00	25,000.00
Productivity Enhancement Incentives (PEI)	5 01 04 990					25,000.00
Mid-Year Benefits	5 01 02 990	113,945.00	0.00	115,349.00	115,349.00	142,813.00
Year End Bonus	5 01 02 140	113,945.00	0.00	115,349.00	115,349.00	142,813.00
Retirement & Life Insurance Premiums	5 01 03 010	164,080.80	41,525.64	124,576.92	166,102.56	205,650.72

PAG-IBIG Contribution	5 01 03 020	4,800.00	1,600.00	3,200.00	4,800.00	12,000.00
PhilHealth Contribution	5 01 03 030	27,346.80	8,651.22	25,953.48	34,604.70	42,843.90
Employees Compensation / Insurance Premium	5 01 03 040	4,800.00	1,200.00	3,600.00	4,800.00	6,000.00
Other Personnel Benefits (Loyalty)			17,500.00	2,500.00	20,000.00	2,500.00
Total		**2,071,257.60**	**498,273.86**	**1,621,919.40**	**2,120,193.26**	**2,626,376.62**
Maintenance & Other Operating Services						
Travelling Expenses	5 02 01 010	150,000.00	51,957.00	78,043.00	130,000.00	130,000.00
Training Expenses	5 02 02 010	50,000.00	41,100.00	8,900.00	50,000.00	50,000.00
Office Supplies Expenses	5 02 03 010	30,000.00	1,100.00	28,900.00	30,000.00	0.00
Postage & Courier Services	5 02 05 010	2,000.00	0.00	2,000.00	2,000.00	2,000.00
Telephone Expenses	5 02 05 020	36,000.00	18,000.00	18,000.00	36,000.00	24,000.00
Repairs & Maintenance-Machinery & Equipment	5 02 13 050	15,000.00	0.00	15,000.00	15,000.00	20,000.00
Membership Dues and Contributions to Organizations	5 02 99 060	10,000.00	10,000.00	0.00	10,000.00	13,000.00
Rent Expenses (ECPAC)		0.00	0.00	0.00	0.00	100,800.00
Tourism Expenses		300,000.00	207,393.00	92,607.00	300,000.00	0.00
Total		**593,000.00**	**329,550.00**	**243,450.00**	**573,000.00**	**339,800.00**
Capital Outlay						
Office Equipment	1 07 05 020	0.00	58,621.70	0.00	**70,000.00**	**70,000.00**
Sub-Total		**2,664,257.60**	**886,445.56**	**1,865,369.40**	**2,763,193.26**	**3,036,176.62**

Special Provision:

The amounts herein appropriated for the functions of the office shall be used specifically for the activities and purposes in the amounts and condition Indicated.

Office: **Office of the Municipal Planning & Development Coordinator**

Mandate: Formulate integrated economic, social, physical and other development plans and policies for consideration of the local development council
Monitor and evaluate the implementation of the different programs, activities, and projects in the LGU in accordance with the approved development plan.

Vision: Community based development planning

Mission: Promote people participation in development planning

Organizational Outcome: Comprehensive Development Plan

AIP Reference Code	Program/Project/Activity Description	Major Final Output	Performance/ Output Indicator	Target for the Budget Year	Proposed Budget for the Budget Year				
					PS	MOOE	FE	CO	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1000-001-3-1-01-009-001-001 1000-001-3-1-01-009-001-012	**General Administration** 1. Attend training and seminar Local, Provincial, Regional & National Agencies in Development Plans. 2. Monitor and evaluate the implementation of different development program, project, & activities of the LGU. 3. Attend monthly meeting of the MPDC of Lanao			January to December 2025 January to December 2025 January to December	1,974,451.38	201,000.00		70,000.00	2,245,451.38

	del Norte. 4. Perform Task as may be assigned by the Local Chief Executive 5. Supplies Acquisition 6. Repair and Maintenance of Office Equipment 7. Submission of needed reports.			2025 January to December 2025 January to December 2025 January to December 2025					

Office of the Municipal Planning & Development Coordinator

Object of Expenditures	Account	Past Year	Current Year (Estimate)			Budget Year
			First Semester	Second Semester	TOTAL	
(1)	Code	Actual	(Actual)	(Estimate)		Estimate
	(2)	(3)	(4)	(5)	(6)	(7)
Personal Services						
Salaries and Wages						
Salaries & Wages- Regular	5 01 01 010	1,208,172.00	417,548.00	835,096.00	1,252,644.00	1,252,644.00
Other Compensation						
Personnel Economic Relief Allowance (PERA)	5 01 02 010	96,000.00	32,000.00	64,000.00	96,000.00	96,000.00
Representation Allowance	5 01 02 020	67,500.00	22,500.00	45,000.00	67,500.00	76,500.00
Transportation Allowance	5 01 02 030	67,500.00	22,500.00	45,000.00	67,500.00	76,500.00
Clothing Allowance	5 01 02 040	24,000.00	24,000.00	0.00	24,000.00	28,000.00
Cash Gift	5 01 02 150	20,000.00	0.00	20,000.00	20,000.00	20,000.00
Productivity Enhancement Incentives (PEI)	5 01 04 990					20,000.00
Mid-Year Benefits	5 01 02 990	100,681.00	0.00	104,387.00	104,387.00	104,387.00
Year End Bonus	5 01 02 140	100,681.00	0.00	104,387.00	104,387.00	104,387.00
Retirement & Life Insurance Premiums	5 01 03 010	144,980.64	50,105.76	100,212.24	150,318.00	150,317.28
PAG-IBIG Contribution	5 01 03 020	4,800.00	2,400.00	2,400.00	4,800.00	9,600.00
PhilHealth Contribution	5 01 03 030	24,310.32	10,451.22	20,864.88	31,316.10	31,316.10
Employees Compensation / Insurance Premium	5 01 03 040	4,800.00	1,590.00	3,210.00	4,800.00	4,800.00
Other Personnel Benefits (Loyalty)	5 01 04 990		5,000.00	0.00	5,000.00	0.00
Total		**1,863,424.96**	**588,094.98**	**1,344,557.12**	**1,932,652.10**	**1,974,451.38**
Maintenance & Other Operating Services						
Travelling Expenses	5 02 01 010	150,000.00	14,900.00	105,100.00	120,000.00	100,000.00
Training Expenses	5 02 02 010	26,000.00	0.00	26,000.00	26,000.00	50,000.00
Office Supplies Expenses	5 02 03 010	25,000.00	0.00	25,000.00	25,000.00	0.00
Postage & Courier Services	5 02 05 010	2,000.00	0.00	2,000.00	2,000.00	2,000.00
Repair & Maintenance-Machinery & Equipment	5 02 13 050	10,000.00	0.00	10,000.00	10,000.00	15,000.00
Membership Dues Contribution to organization	5 02 99 060	10,000.00	0.00	10,000.00	10,000.00	10,000.00
Telephone Expenses	5 02 02 010	36,000.00	18,000.00	18,000.00	36,000.00	24,000.00
Total		**259,000.00**	**32,900.00**	**196,100.00**	**229,000.00**	**201,000.00**
Capital Outlay						
Office Equipment	1 07 05 020	0.00	0.00	0.00	70,000.00	70,000.00

Sub-Total		2,122,424.96	620,994.98	1,540,657.12	2,231,652.10	2,245,451.38

Special Provision:
The amounts herein appropriated for the functions of the office shall be used specifically for the activities and purposes in the amounts and condition Indicated.

Office: Office of the Municipal Engineering

Mandate: Administer, coordinate, supervise and control the construction, maintenance, improvement and repair of roads, bridges and other engineering and public works projects of the LGU.
Provide engineering services to the LGU including investigation and survey, engineering designs, feasibility studies and project management.
Regulate and ensure compliance with existing policies in infrastructure development and public works

Vision: Envisioned to be competent and equipped with advance engineering technology to provide quality services to the people.

Mission: To implement infrastructure projects in accordance with design standards & specifications.
To conduct maintenance operations to ensure its safety and operationality.

Organizational Outcome: Efficient technical support and engineering services.

AIP Reference Code	Program/Project/ Activity Description	Major Final Output	Performance/ Output Indicator	Target for the Budget Year	Proposed Budget for the Budget Year				
					PS	MOOE	FE	CO	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
8000-001-3-1-01-010-001	General Administration Conduct pre-engineering surveys, inspections, investigations of projects in all barangay. Conduct inspections, campaigns, Evaluation and Assessment of Building structures, National Building Code and Municipal Zoning Ordinance. Acquisition of office supplies Attend Regular and Special meetings of League of Municipal Engineers. Follow-up Projects and attend such official business at DPWH and other agencies. Mobilization /implementation Projects Repair and Maintenance of office and working tools and equipment. Reproduction of plans and other project documents Attend Provincial, Regional & National Convention		Policy Formulated Plans and Progress of work Prepared and issued Complied the National Building Code and Municipal Zoning Ordinance Office supplies delivered Meeting/ Conferences attended As Necessary Project supervised & implemented As Needed Plans & Projects documents reproduced	20 projects 30 Building As Needed Monthly Tools & Equipment As Needed	3,896,091.01	181,000.00		70,000.00	4,147,091.01

Object of Expenditures	Account	Past Year	Current Year (Estimate)			Budget Year
			First Semester	Second Semester	TOTAL	
(1)	Code	Actual	(Actual)	(Estimate)		Estimate
	(2)	(3)	(4)	(5)	(6)	(7)
Personal Services						
Salaries and Wages						
Salaries & Wages- Regular	5 01 01 010	2,232,420.00	502,432.00	1,815,572.00	2,318,004.00	2,318,004.00
Other Compensation						
Personnel Economic Relief Allowance (PERA)	5 01 02 010	216,000.00	64,000.00	152,000.00	216,000.00	216,000.00
Representation Allowance	5 01 02 020	67,500.00	22,500.00	45,000.00	67,500.00	76,500.00
Transportation Allowance	5 01 02 030	67,500.00	22,500.00	45,000.00	67,500.00	76,500.00
Clothing /Uniform Allowance	5 01 02 040	54,000.00	48,000.00	6,000.00	54,000.00	63,000.00
Cash Gift	5 01 02 150	45,000.00	0.00	45,000.00	45,000.00	45,000.00
Productivity Enhancement Incentives (PEI)	5 01 04 990					45,000.00
Other Bonus (Mid-year)	5 01 02 990	186,035.00	0.00	193,167.00	193,167.00	193,167.00
Year End Bonus	5 01 02 140	186,035.00	0.00	193,167.00	193,167.00	193,167.00
Retirement & Life Insurance Premiums	5 01 03 010	267,890.40	60,291.84	217,868.64	278,160.48	278,160.48
PAG-IBIG Contribution	5 01 03 020	10,800.00	4,800.00	6,000.00	10,800.00	21,600.00
PhilHealth Contribution	5 01 03 030	44,653.44	12,560.88	45,389.22	57,950.10	57,950.10
Employees Compensation / Insurance Premium	5 01 03 040	10,800.00	3,200.00	7,600.00	10,800.00	10,800.00
Other Personnel Benefits (Loyalty)	5 01 04 990		25,000.00	5,000.00	30,000.00	15,000.00
Terminal Leave Benefits	5 01 04 030					286,242.43
Total		**3,388,633.84**	**765,284.72**	**2,776,763.86**	**3,542,048.58**	**3,896,091.01**
Maintenance & Other Operating Services						
Travelling Expenses	5 02 01 010	100,000.00	4,500.00	95,500.00	100,000.00	120,000.00
Office Supplies Expenses	5 02 03 010	56,000.00	0.00	40,000.00	40,000.00	0.00
Postage & Courier Services	5 02 05 010	2,000.00	0.00	2,000.00	2,000.00	2,000.00
Telephone Expenses	5 02 05 020	36,000.00	18,000.00	18,000.00	36,000.00	24,000.00
Repair & Maintenance-Machinery & Equipment	5 02 13 050	10,000.00	0.00	10,000.00	10,000.00	15,000.00
Fuel, Oil & Lubricants Expenses	5 02 02 090	10,000.00	0.00	20,000.00	20,000.00	20,000.00
Total		**214,000.00**	**22,500.00**	**185,500.00**	**208,000.00**	**181,000.00**
Capital Outlay						
Office Equipment	1 07 05 020	0.00	0.00	0.00	**70,000.00**	**70,000.00**
Sub-Total		**3,602,633.84**	**787,784.72**	**2,591,263.86**	**3,820,048.58**	**4,147,091.01**

Special Provision: The amounts herein appropriated for the functions of the office shall be used specifically for the activities and purposes in the amounts and condition Indicated.

Office: **Office of the Municipal Health**

Mandate: To provide health services in the Local Government Unit
Information campaign and render health intelligence services

Vision: Healthy, empowered communities in the Local Government Unit

Mission: Formulate and implement policies, plans, programs and projects that promote health activities in the LGU

Organizational Outcome: Healthy and energetic community people.

AIP Reference Code	Program/Project/Activity Description	Major Final Output	Performance /Output Indicator	Target for the Budget Year	Proposed Budget for the Budget Year				
					PS	MOOE	FE	CO	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
3000-001-3-1-01-011-001	**General Administration** 1. Expanded Program on Immunization 2. Nutritional Tuberculosis 3. Maternal & child health Nursing 4. Nutrition 5. Family Planning 6. Acute Respiratory 7. Control of diarrhea 8. Leprosy Control Program 9. Malaria control Program 10. Trainings/ Seminars Special Activities 11. Metigation of the present pandemic		Healthy children 90% of + cases seen after treatment Safe delivery Increased of weight to malnourished children Population decreased Proper mgt. done		12,336,609.92	2,379,000.00		70,000.00	14,785,609.92

Office of the Municipal Health

Object of Expenditures	Account	Past Year	Current Year (Estimate)			Budget Year
			First Semester	Second Semester	TOTAL	
(1)	Code	Actual	(Actual)	(Estimate)		Estimate
	(2)	(3)	(4)	(5)	(6)	(7)
Personal Services						
Salaries and Wages						
Salaries & Wages- Regular	5 01 01 010	6,626,004.00	2,411,659.79	5,398,372.21	7,810,032.00	7,990,656.00
Other Compensation						
Personnel Economic Relief Allowance (PERA)	5 01 02 010	432,000.00	146,606.00	333,394.00	480,000.00	480,000.00
Representation Allowance	5 01 02 020	67,500.00	22,500.00	45,000.00	67,500.00	76,500.00
Transportation Allowance	5 01 02 030	67,500.00	22,500.00	45,000.00	67,500.00	76,500.00
Clothing /Uniform Allowance	5 01 02 040	108,000.00	114,000.00	6,000.00	120,000.00	140,000.00
Cash Gift	5 01 02 150	90,000.00	0.00	100,000.00	100,000.00	100,000.00
Productivity Enhancement Incentives (PEI)	5 01 04 990					100,000.00
Other Bonus (Mid-year)	5 01 02 990	552,167.00	0.00	650,836.00	650,836.00	665,888.00
Year End Bonus	5 01 02 140	552,167.00	0.00	650,836.00	650,836.00	665,888.00
Subsistence Allowance	5 01 02 050	0.00	120,450.00	0.00	0.00	360,000.00
Laundry Allowance	5 01 02 050	350,000.00	0.00	306,600.00		36,000.00
Hazard Pay	5 01 02 110	250,000.00	120,201.04	211,519.76	331,720.80	399,532.80
Retirement & Life Insurance Premiums	5 01 03 010	795,120.48	288,402.32	648,801.52	937,203.84	958,878.72
PAG-IBIG Contribution	5 01 03 020	21,600.00	11,400.00	12,600.00	24,000.00	48,000.00
PhilHealth Contribution	5 01 03 030	130,501.68	60,585.21	134,665.59	195,250.80	199,766.40
Employees Compensation / Insurance Premium	5 01 03 040	21,600.00	7,387.76	16,612.24	24,000.00	24,000.00
Other Personnel Benefits (Loyalty)	5 01 04 990		30,000.00	0.00	30,000.00	15,000.00
Total		**10,084,160.16**	**3,355,692.12**	**8,560,237.32**	**11,488,879.44**	**12,336,609.92**

Maintenance & Other Operating Services						
Travelling Expenses	5 02 01 010	250,000.00	217,566.44	152,433.56	370,000.00	320,000.00
Training Expenses	5 02 02 010	0.00	0.00	0.00	0.00	100,000.00
Office Supplies Expenses	5 02 03 010	0.00	0.00	0.00	0.00	0.00
Medical Dental & Laboratory Supplies Expenses	5 02 03 080	80,000.00	18,800.00	261,200.00	280,000.00	250,000.00
Fuel, Oil & Lubricants Expenses	5 02 03 090	5,000.00	0.00	5,000.00	5,000.00	120,000.00
Awards and Rewards Expenses	5 02 06 010	100,000.00	44,200.00	55,800.00	100,000.00	30,000.00
Prizes	5 02 06 020	50,000.00	26,115.00	53,885.00	80,000.00	40,000.00
Other Supplies & Materials Expenses	5 02 03 990	10,000.00	0.00	10,000.00	10,000.00	0.00
Postage & Courier Services	5 02 05 010	100,000.00	58,935.00	41,065.00	100,000.00	5,000.00
Telephone Expenses	5 02 05 020					24,000.00
Other Professional Expenses	5 02 11 990					30,000.00
Drugs and Medicines Expenses	5 02 03 070	356,000.00	271,544.00	784,456.00	1,056,000.00	700,000.00
Repair & Maintenance-Machinery & Equipment	5 02 13 050					20,000.00
Repair & Maintenance- Buildings & Other Structures	5 02 13 040					20,000.00
Repair & Maintenance-Transportation Equipment	5 02 13 060					20,000.00
Other General Services (BHWs)	5 02 12 990					100,000.00
Other Maintenance & Operating Expenses (Nutrition, Immunization & Other DOH Program)						600,000.00
Total		**951,000.00**	**637,160.44**	**1,363,839.56**	**2,001,000.00**	**2,379,000.00**
Capital Outlay			**5,800.00**			
Office Equipment	1 07 05 020	**0.00**	**0.00**	0.00	**70,000.00**	**70,000.00**
Sub-Total		***10,064,160.16***	**4,292,325.56**	**10,236,403.88**	***13,559,879.44***	***14,785,609.92***

Special Provision: The amounts herein appropriated for the functions of the office shall be used specifically for the activities and purposes in the amounts and condition Indicated.

Office: Office of the Municipal Civil Registrar

Mandate: Responsible for Civil Registration Program in the LGU

Vision: Easy access to civil Registry Recorded item needed.

Mission: Develop plan and strategies in civil registration in keeping up with National and local laws in civil registration

Organizational Outcome: Smooth processing in civil registry documents.

AIP Reference Code	Program/Project/Activity Description	Major Final Output	Performance/ Output Indicator	Target for the Budget Year	Proposed Budget for the Budget Year				
					PS	MOOE	FE	CO	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1000-001-3-1-01-012-001	**General Administration** 1. Attend Mobile Meetings at selected LGU of Lanao del Norte. 2. Submit monthly reports at NSO & Provincial office 3. Attend Regional & National Convention 4. Attend Annual Planning Workshop 5.Conduct Free Registration of Birth, Marriage and Mass Wedding 6. Acquisition of Printed		Policy Formulated Attended meeting Reports submitted As scheduled Workshop attended Purchase of Forms & other expenses Purchase of office supplies	January – December 2025	1,881,303.90	245,000.00		70,000.00	2,196,303.90

	Forms & other supplies		As necessary					
	7. Repair and maintenance of office equipment							
	8. Other Operation Expenses							

Office of the Municipal Civil Registrar

Object of Expenditures	Account	Past Year	Current Year (Estimate)			Budget Year
			First Semester	Second Semester	TOTAL	Estimate
(1)	Code	Actual	(Actual)	(Estimate)		
	(2)	(3)	(4)	(5)	(6)	(7)
Personal Services						
Salaries and Wages						
Salaries & Wages- Regular	5 01 01 010	1,180,932.00	395,249.00	816,571.00	1,211,820.00	1,211,820.00
Other Compensation						
Personnel Economic Relief Allowance (PERA)	5 01 02 010	72,000.00	23,000.00	49,000.00	72,000.00	72,000.00
Representation Allowance	5 01 02 020	67,500.00	22,500.00	45,000.00	67,500.00	76,500.00
Transportation Allowance	5 01 02 030	67,500.00	22,500.00	45,000.00	67,500.00	76,500.00
Clothing Allowance	5 01 02 040	18,000.00	18,000.00	0.00	18,000.00	21,000.00
Cash Gift	5 01 02 150	15,000.00	0.00	15,000.00	15,000.00	15,000.00
Productivity Enhancement Incentives (PEI)	5 01 02 990					15,000.00
Mid-Year Benefits	5 01 02 990	98,411.00	0.00	100,985.00	100,985.00	100,985.00
Year End Bonus	5 01 02 140	98,411.00	0.00	100,985.00	100,985.00	100,985.00
Retirement & Life Insurance Premiums	5 01 03 010	141,711.84	47,429.88	97,988.52	145,418.40	145,418.40
PAG-IBIG Contribution	5 01 03 020	3,600.00	1,800.00	1,800.00	3,600.00	7,200.00
PhilHealth Contribution	5 01 03 030	23,618.64	9,663.97	20,631.53	30,295.50	30,295.50
Employees Compensation / Insurance Premium	5 01 03 040	3,600.00	1,186.91	2,413.09	3,600.00	3,600.00
Other Personnel Benefits (Loyalty)	5 01 04 990		5,000.00	0.00	5,000.00	5,000.00
Total		**1,790,284.48**	**546,329.76**	**1,295,374.14**	**1,841,703.90**	**1,881,303.90**
Maintenance & Other Operating Services						
Travelling Expenses	5 02 01 010	96,000.00	0.00	100,000.00	100,000.00	100,000.00
Training Expenses	5 02 02 010					50,000.00
Office Supplies Expenses	5 02 03 010	50,000.00	0.00	30,000.00	30,000.00	0.00
Postage & Courier Services	5 02 05 010	2,500.00	0.00	3,000.00	3,000.00	5,000.00
Repair & Maintenance- Machinery & Equipment	5 02 13 050	10,000.00	0.00	10,000.00	10,000.00	10,000.00
Membership Due to Organization	5 02 99 060		0.00	0.00	0.00	6,000.00
Telephone Expenses	5 02 05 020	36,000.00	18,000.00	18,000.00	36,000.00	24,000.00
Other Operating Expenses						
Enhancement of Civil Registry Records	5-02-99-990					50,000.00
Total		**194,500.00**	**18,000.00**	**161,000.00**	**179,000.00**	**245,000.00**
Capital Outlay						
Office Equipment	1 07 05 020	0.00	60,990.00	9,010.00	70,000.00	50,000.00
Furniture and Fixtures	1 07 07 010					20,000.00
Sub-Total		***0.00***	**60,990.00**	**9,010.00**	**70,000.00**	**70,000.00**
TOTAL						**2,196,303.90**

Special Provision: The amounts herein appropriated for the functions of the office shall be used specifically for the activities and purposes in the amounts and condition Indicated.

Office: Office of the Municipal Agriculture

Mandate: Ensure maximum assistance and access to agricultural resources
Delivery of basic agricultural and support services

Vision: To have food in every family's table.

Mission: To develop plans and strategies for agricultural developments

Organizational Outcome: Sound agriculture.

AIP Reference Code	Program/Project/Activity Description	Major Final Output	Performance /Output Indicator	Target for the Budget Year	Proposed Budget for the Budget Year				
					PS	MOOE	FE	CO	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
8000-001-3-2-02-003-002	Municipal Agriculture Program and Services			January to December 2025	3,227,792.08	239,000.00		70,000.00	3,536,792.08

Office of the Municipal Agriculture

Object of Expenditures	Account	Past Year	Current Year (Estimate)			Budget Year
			First Semester	Second Semester	TOTAL	
(1)	Code	Actual	(Actual)	(Estimate)		Estimate
	(2)	(3)	(4)	(5)	(6)	(7)
Personal Services						
Salaries and Wages						
Salaries & Wages- Regular	5 01 01 010	2,122,992.00	381,994.55	1,817,569.45	2,199,564.00	1,670,220.00
Other Compensation						
Personnel Economic Relief Allowance (PERA)	5 01 02 010	168,000.00	25,428.45	142,571.55	168,000.00	144,000.00
Representation Allowance	5 01 02 020	67,500.00	20,892.82	46,607.18	67,500.00	76,500.00
Transportation Allowance	5 01 02 030	67,500.00	20,892.82	46,607.18	67,500.00	76,500.00
Clothing Allowance	5 01 02 040	42,000.00	36,000.00	6,000.00	42,000.00	42,000.00
Cash Gift	5 01 02 150	35,000.00	0.00	35,000.00	35,000.00	30,000.00
Productivity Enhancement Incentives (PEI)	5 01 02 990					30,000.00
Mid-year Benefits	5 01 02 990	176,916.00	0.00	183,297.00	183,297.00	139,185.00
Year End Bonus	5 01 02 140	176,916.00	0.00	183,297.00	183,297.00	139,185.00
Retirement & Life Insurance Premiums	5 01 03 010	254,759.04	45,839.35	218,108.33	263,947.68	200,426.40
PAG-IBIG Contribution	5 01 03 020	8,400.00	2,500.00	5,900.00	8,400.00	14,400.00
PhilHealth Contribution	5 01 03 030	42,464.88	10,040.31	44,948.79	54,989.10	41,755.50
Employees Compensation / Insurance Premium	5 01 03 040	8,400.00	1,300.00	7,100.00	8,400.00	7,200.00
Other Personnel Benefits (Loyalty)	5 01 04 990		5,000.00	0.00	5,000.00	0.00
Terminal Leave Benefits	5 01 04 030					616,420.18
Total		**3,170,847.92**	**549,888.30**	**2,737,006.48**	**3,286,894.78**	**3,227,792.08**
Maintenance & Other Operating Services						
Travelling Expenses	5 02 01 010	132,000.00	23,840.00	76,140.00	100,000.00	150,000.00
Training Expenses	5 02 02 010	20,000.00	8,500.00	11,500.00	20,000.00	50,000.00
Office Supplies	5 02 03 010	10,000.00	0.00	10,000.00	10,000.00	0.00
Postage & Courier Services	5 02 05 010	1,000.00	0.00	1,000.00	1,000.00	5,000.00
Telephone Expenses	5 02 05 020	36,000.00	18,000.00	18,000.00	36,000.00	24,000.00
Repair & Maintenance-Machinery & Equipment	5 02 13 050	5,000.00	0.00	5,000.00	5,000.00	10,000.00
Total		**204,000.00**	**50,340.00**	**121,640.00**	**172,000.00**	**239,000.00**
Capital Outlay						

Office Equipment	1 07 05 020	0.00	0.00	70,000.00	70,000.00	70,000.00
Sub-Total		3,374,847.92	600,276.30	2,928,646.48	3,528,894.78	3,538,792.08

Special Provision: The amounts herein appropriated for the functions of the office shall be used specifically for the activities and purposes in the amounts and condition indicated.

Office: Office of the Municipal Environment and Natural Resources

Mandate: Provision of plans and programs for environmental development

Vision: To provide healthy, clean and stable natural resources and bio-diversity.

Mission: To uphold the law to protect our environment.

Organizational Outcome: Environment protected.

AIP Reference Code	Program/Project/Activity Description	Major Final Output	Performance/Output Indicator	Target for the Budget Year	Proposed Budget for the Budget Year				
					PS	MOOE	FE	CO	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
8000-001-3-2-02-004-001	Municipal Environment Programs and Services Take Charge of Environment Protection, Preservation and conservation				1,295,968.68	184,000.00		70,000.00	1,549,968.68

Office of the Municipal Environment and Natural Resources

Object of Expenditures	Account	Past Year	Current Year (Estimate)			Budget Year
			First Semester	Second Semester	TOTAL	
(1)	Code	Actual	(Actual)	(Estimate)		Estimate
	(2)	(3)	(4)	(5)	(6)	(7)
Personal Services						
Salaries and Wages						
Salaries & Wages- Regular	5 01 01 010	808,680.00	279,128.00	558,256.00	837,384.00	837,384.00
Other Compensation						
Personnel Economic Relief Allowance (PERA)	5 01 02 010	24,000.00	8,000.00	16,000.00	24,000.00	24,000.00
Representation Allowance	5 01 02 020	67,500.00	22,500.00	45,000.00	67,500.00	76,500.00
Transportation Allowance	5 01 02 030	67,500.00	22,500.00	45,000.00	67,500.00	76,500.00
Clothing / Uniform Allowance	5 01 02 040	6,000.00	6,000.00	0.00	6,000.00	7,000.00
Cash Gift	5 01 02 150	5,000.00	0.00	5,000.00	5,000.00	5,000.00
Productivity Enhancement Incentives (PEI)	5 01 04 990					5,000.00
Other Bonus (Mid-Year)	5 01 02 990	67,390.00	0.00	69,782.00	69,782.00	69,782.00
Year End Bonus	5 01 02 140	67,390.00	0.00	69,782.00	69,782.00	69,782.00
Retirement & Life Insurance Premiums	5 01 03 010	97,041.60	33,495.36	65,376.48	98,871.84	100,486.08
PAG-IBIG Contribution	5 01 03 020	1,200.00	600.00	600.00	1,200.00	2,400.00
PhilHealth Contribution	5 01 03 030	16,173.60	6,978.20	13,966.40	20,934.60	20,934.60
Employees Compensation / Insurance Premium	5 01 03 040	1,200.00	400.00	800.00	1,200.00	1,200.00
Total		1,229,075.20	379,601.56	889,552.88	1,269,154.44	1,295,968.68
Maintenance & Other Operating Services						
Travelling Expenses	5 02 01 010	110,000.00	33,620.00	46,380.00	80,000.00	150,000.00
Office Supplies Expenses	5 02 03 010	10,000.00	13,645.00	0.00	0.00	0.00
Repair & Maintenance- Machinery & Equipment	5 02 13 050	2,000.00	6,000.00	4,000.00	10,000.00	10,000.00
Telephone Expenses	5 02 05 020	36,000.00	18,000.00	18,000.00	36,000.00	24,000.00
Total		158,000.00	71,265.00	68,380.00	126,000.00	184,000.00
Capital Outlay						
Office Equipment	1 07 05 020	0.00	0,535.00	0.00	20,000.00	35,000.00

Furniture & Fixtures						35,000.00
Sub-Total		*1,387,075.20*	*460,401.56*	*1,017,932.88*	*1,415,154.44*	*1,549,968.68*

Special Provision: The amounts herein appropriated for the functions of the office shall be used specifically for the activities and purposes in the amounts and condition indicated

Office: **Office of Social Welfare and Development**

Mandate: A society where poor, vulnerable, and disadvantage families and communities are empowered for/and improved quality of life. Formulate and implement social welfare measures, plans and strategies. Be in the frontline of service delivery, particularly those which have to do with immediate relief during and assistance in the aftermath of man-made and natural disasters and calamities.

Vision: To provide social protection and promote the rights and welfare of the poor, vulnerable and disadvantaged individual, family and community.

Mission: To contribute poverty alleviation and empowerment through SWD policies, programs projects and services, implemented with or through LGUs, NGOs, POs other GOs and other member of society.

Organizational Outcome: Poverty Alleviated

AIP Reference Code	Program/Project/Activity Description	Major Final Output	Performance/Output Indicator	Target for the Budget Year	Proposed Budget for the Budget Year				
					PS	MOOE	FE	CO	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
3000-001-3-2-02-005-003	Salaries & Wages/other Compensation		Personnel Training/Seminar		2,835,389.94	433,000.00		70,000.00	3,338,389.94

Office of the Municipal Social Welfare & Development

Object of Expenditures	Account	Past Year	Current Year (Estimate)			Budget Year
			First Semester	Second Semester	TOTAL	
(1)	Code	Actual	(Actual)	(Estimate)		Estimate
	(2)	(3)	(4)	(5)	(6)	(7)
Personal Services						
Salaries and Wages						
Salaries & Wages- Regular	5 01 01 010	1,374,276.00	468,292.00	936,584.00	1,404,876.00	1,404,876.00
Other Compensation						
Personnel Economic Relief Allowance (PERA)	5 01 02 010	72,000.00	24,000.00	48,000.00	72,000.00	72,000.00
Representation Allowance	5 01 02 020	67,500.00	22,500.00	45,000.00	67,500.00	76,500.00
Transportation Allowance	5 01 02 030	67,500.00	22,500.00	45,000.00	67,500.00	76,500.00
Clothing Allowance	5 01 02 040	18,000.00	18,000.00	0.00	18,000.00	21,000.00
Cash Gift	5 01 02 150	15,000.00	0.00	15,000.00	15,000.00	15,000.00
Productivity Enhancement Incentives (PEI)	5 01 04 990					15,000.00
Other Bonus (Mid-Year)	5 01 02 990	114,523.00	0.00	117,073.00	117,073.00	117,073.00
Year End Bonus	5 01 02 140	114,523.00	0.00	117,073.00	117,073.00	117,073.00
Retirement & Life Insurance Premiums	5 01 03 010	164,913.12	56,195.04	112,390.08	168,585.12	168,585.12
PAG-IBIG Contribution	5 01 03 020	3,600.00	1,800.00	1,800.00	3,600.00	7,200.00
PhilHealth Contribution	5 01 03 030	27,485.52	11,707.32	23,414.58	35,121.90	35,121.90
Employees Compensation / Insurance Premium	5 01 03 040	3,600.00	1,200.00	2,400.00	3,600.00	3,600.00
Other Personnel Benefits (Loyalty)	5 01 04 990		12,500.00	0.00	12,500.00	0.00

Magna Carta for SW			5,000.00	55,000.00	60,000.00	60,000.00
Terminal Leave Benefits	5 01 04 030					645,860.92
Total		2,042,920.64	643,694.36	1,518,734.66	2,162,429.02	2,835,389.94
Maintenance & Other Operating Services						
Travelling Expenses	5 02 01 010	170,000.00	44,560.00	55,440.00	100,000.00	150,000.00
Office Supplies Expenses	5 02 03 010	9,000.00	0.00	20,000.00	20,000.00	0.00
Postage & Courier Services	5 02 05 010	1,000.00	0.00	1,000.00	1,000.00	2,000.00
Telephone Expenses	5 02 05 020	36,000.00	18,000.00	18,000.00	36,000.00	24,000.00
Repair & Maintenance- Machinery & Equipment	5 02 13 050	1,000.00	0.00	1,000.00	1,000.00	5,000.00
Financial Assistance-Cash Subsidy for Solo Parent	5 02 99 080		0.00	252,000.00	252,000.00	252,000.00
Total		**217,000.00**	**62,560.00**	**347,440.00**	**410,000.00**	**433,000.00**
Capital Outlay						
Office Equipment	1 07 05 020	0.00	7,835.00	0.00	**70,000.00**	**70,000.00**
Sub-Total		**2,259,920.64**	**755,092.36**	**2,125,171.66**	**2,642,429.02**	**3,338,389.94**

Special Provision: The amounts herein appropriated for the functions of the office shall be used specifically for the activities and purposes in the amounts and condition Indicated.

Office: Office of the Municipal Economic Enterprises & Development Office

Mandate: Take charge of the Municipal Economic Enterprises and its smooth operation

Vision: To increase revenues collection of the LGU to help its operation of providing basic services to its constituents.

Mission: To enhance revenue collected by improving economic enterprises.

Organizational Outcome: Gaining economic enterprises operation.

AIP Reference Code	Program/Project/ Activity Description	Major Final Output	Performance/Output Indicator	Target for the Budget Year	Proposed Budget for the Budget Year				
					PS	MOOE	FE	CO	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
8000-001-3-2-03-001-001	Economic Enterprise Program and Administration Services			January – December 2025	1,260,978.66	130,000.00		70,000.00	1,460,978.66

Office of the Municipal Economic Enterprise Development

Object of Expenditures	Account	Past Year	Current Year (Estimate)			Budget Year
			First Semester	Second Semester	TOTAL	
(1)	Code	Actual	(Actual)	(Estimate)		Estimate
	(2)	(3)	(4)	(5)	(6)	(7)
Personal Services						
Salaries and Wages						
Salaries & Wages- Regular	5 01 01 010	808,680.00	102,560.00	708,148.00	810,708.00	810,708.00
Other Compensation						
Personnel Economic Relief Allowance (PERA)	5 01 02 010	24,000.00	8,000.00	16,000.00	24,000.00	24,000.00
Representation Allowance	5 01 02 020	67,500.00	22,500.00	45,000.00	67,500.00	76,500.00
Transportation Allowance	5 01 02 030	67,500.00	22,500.00	45,000.00	67,500.00	76,500.00
Clothing Allowance	5 01 02 040	6,000.00	6,000.00	0.00	6,000.00	7,000.00
Cash Gift	5 01 02 150	5,000.00	0.00	5,000.00	5,000.00	5,000.00

Productivity Enhancement Incentive (PEI)	5 01 04 990					5,000.00
Mid-Year Benefits	5 01 02 990	67,390.00	0.00	67,559.00	67,559.00	67,559.00
Year End Bonus	5 01 02 140	67,390.00	0.00	67,559.00	67,559.00	67,559.00
Retirement & Life Insurance Premiums	5 01 03 010	97,041.60	12,307.20	84,977.76	97,284.96	97,284.96
PAG-IBIG Contribution	5 01 03 020	1,200.00	600.00	600.00	1,200.00	2,400.00
PhilHealth Contribution	5 01 03 030	16,173.60	2,564.00	17,703.70	20,267.70	20,267.70
Employees Compensation / Insurance Premium	5 01 03 040	1,200.00	400.00	800.00	1,200.00	1,200.00
Total		**1,229,075.20**	**177,431.20**	**1,058,347.46**	**1,235,778.66**	**1,260,978.66**
Maintenance & Other Operating Services						
Travelling Expenses	5 02 01 010	103,000.00	32,500.00	67,500.00	100,000.00	100,000.00
Office Supplies Expenses	5 02 03 010	7,000.00	0.00	7,000.00	7,000.00	0.00
Postage & Courier Services	5 02 05 010	1,000.00	0.00	1,000.00	1,000.00	1,000.00
Repair & Maintenance-Machinery & Equipment	5 02 13 050	5,000.00	0.00	5,000.00	5,000.00	5,000.00
Telephone Expenses	5 02 05 020	36,000.00	18,000.00	18,000.00	36,000.00	24,000.00
Total		**152,000.00**	**50,500.00**	**98,500.00**	**149,000.00**	**130,000.00**
Capital Outlay						
Office Equipment	1 07 05 020	**0.00**	**0.00**	**0.00**	**70,000.00**	**70,000.00**
Sub-Total		**1,381,075.20**	**227,931.20**	**1,156,847.46**	**1,454,778.66**	**1,460,978.66**

Special Provision: The amounts herein appropriated for the functions of the office shall be used specifically for the activities and purposes in the amounts and condition Indicated

Office of the Municipal Disaster Risk Reduction Management

Mandate: Take charge of the monitoring and reduction of Risk and Hazardous incident that will affect the community.

Vision: Disaster Free and Resilient Community.

Mission: To mitigate and reduce whatever incidents happens in the community

Organizational Outcome: Disaster Resilient Community.

AIP Reference Code	Program/Project/Activity Description	Major Final Output	Performance/Output Indicator	Target for the Budget Year	Proposed Budget for the Budget Year				
					PS	MOOE	FE	CO	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
3000-001-3-2-03-001-001	Disaster Risk Reduction Management and Administration Services	Disaster resilient municipality		January – December 2025	2,423,411.98	534,000.00		70,000.00	3,027,411.98

Office of the Disaster Risk Reduction and Management

Object of Expenditures	Account	Past Year	Current Year (Estimate)			Budget Year
			First Semester	Second Semester	TOTAL	
(1)	Code	Actual	(Actual)	(Estimate)		Estimate
	(2)	(3)	(4)	(5)	(6)	(7)
Personal Services						
Salaries and Wages						
Salaries & Wages-Regular	5 01 01 010	1,507,848.00	520,308.00	1,040,616.00	1,560,924.00	1,560,924.00
Other Compensation						

Personnel Economic Relief Allowance (PERA)	5 01 02 010	120,000.00	40,000.00	80,000.00	120,000.00	120,000.00
Representation Allowance	5 01 02 020	67,500.00	22,500.00	45,000.00	67,500.00	76,500.00
Transportation Allowance	5 01 02 030	67,500.00	22,500.00	45,000.00	67,500.00	76,500.00
Clothing Allowance	5 01 02 040	30,000.00	30,000.00	0.00	30,000.00	35,000.00
Cash Gift	5 01 02 150	25,000.00	0.00	25,000.00	25,000.00	25,000.00
Productivity Enhancement Incentives (PEI)	5 01 04 990					25,000.00
Mid-Year Benefit	5 01 02 990	125,654.00	0.00	**130,077.00**	**130,077.00**	**130,077.00**
Year End Bonus	5 01 02 140	125,654.00	0.00	**130,077.00**	**130,077.00**	**130,077.00**
Retirement & Life Insurance Premiums	5 01 03 010	180,941.76	62,436.96	124,873.92	187,310.88	187,310.88
PAG-IBIG Contribution	5 01 03 020	6,000.00	3,000.00	3,000.00	6,000.00	12,000.00
PhilHealth Contribution	5 01 03 030	30,156.96	13,007.76	26,015.34	39,023.10	39,023.10
Employees Compensation / Insurance Premium	5 01 03 040	6,000.00	2,000.00	4,000.00	6,000.00	6,000.00
Total		**2,292,254.72**	**715,752.72**	**1,653,659.26**	**2,369,411.98**	**2,423,411.98**
Maintenance & Other Operating Services						
Travelling Expenses	5 02 01 010	150,000.00	38,922.00	111,078.00	150,000.00	150,000.00
Office Supplies	5 02 03 010	70,000.00	66,049.70	3,950.30	70,000.00	0.00
Fuel, Oil, Lubricants Expenses/Committee Expenses	5 02 03 090	180,000.00	32,910.00	147,090.00	180,000.00	250,000.00
Membership Dues Contribution to Organization	5 02 99 060	10,000.00	0.00	10,000.00	10,000.00	10,000.00
Repair & Maintenance-Machinery & Equipment	5 02 13 050	82,000.00	35,928.40	46,071.60	82,000.00	100,000.00
Telephone Expenses	5 02 05 020	36,000.00	18,000.00	18,000.00	36,000.00	24,000.00
Total		**528,000.00**	**191,810.10**	**336,189.90**	**528,000.00**	**534,000.00**
CAPITAL OUTLAY						
Office Equipment	1 07 05 020		**67,472.00**	**2,528.00**	**70,000.00**	**70,000.00**
Sub-Total		***2,820,254.72***	***975,034.82***	***1,694,695.16***	***2,967,411.98***	***3,027,411.98***

Special Provision: The amounts herein appropriated for the functions of the office shall be used specifically for the activities and purposes in the amounts and condition Indicated

LOCAL GOVERNMENT UNIT: BACOLOD LANAO DEL NORTE
LOCAL DEVELOPMENT FUND (20%)
BUDGET YEAR: 2025

AIP REFERENCE CODE	SECTOR	P/A/P	IMPLEMENTING OFFICE/DEPARTMENT	TARGET OUTPUT		ESTIMATED COST		IMPLEMENTATION SCHEDULE
				AIP	AB	AIP	AB	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
8000-001-3-1-01-001-001	Economic Development	Concreting of Binuni Access Road	MEO,MO, MPDC	Binuni Access Road Concreted	Binuni Access Road Concreted	1,500,000	1,500,000	January 2025 to December 2025
8000-001-3-2-01-001-002	Economic Development	Concreting of Alegria Access Road	MEO,MO, MPDC	Alegria Access Road Concreted	Alegria Access Road Concreted	1,000,000	1,000,000	January 2025 to December 2025
8000-001-3-2-01-001-003	Economic Development	Concreting of Esperanza Access Road	MEO,MO, MPDC	Esperanza Access Road Concreted	Esperanza Access Road Concreted	1,500,000	1,500,000	January 2025 to December 2025
8000-001-3-1-01-001-004	Economic Development	Concreting of Demologan Access Road	MEO,MO, MPDC	Demologan Access Road Concreted	Demologan Access Road Concreted	1,500,000	1,500,000	January 2025 to December 2025
8000-001-3-1-01-001-005	Economic Development	Concreting of Poblacion Access Road	MEO,MO, MPDC	Poblacion Access Road Concreted	Poblacion Access Road Concreted	1,500,000	1,500,000	January 2025 to December 2025
8000-001-3-1-01-001-006	Economic Development	Concreting of Rupagan Access Road	MEO,MO, MPDC	Rupagan Access Road Concreted	Rupagan Access Road Concreted	1,000,000	1,000,000	January 2025 to December 2025
8000-001-3-1-01-001-007	Economic Development	Counterpart to National Funded Projects	MEO,MO, MPDC	National Funded Projects Implemented	National Funded Projects Implemented	2,000,000	2,000,000	January 2025 to December 2025
8000-001-3-1-01-001-008	Economic Development	Landbank Amortization on Loan (Procurement of Lot for Economic Center)	MEO,MO, MPDC	Debt Paid	Debt Paid	1,700,000	1,700,000	January 2025 to December 2025
8000-001-3-1-01-001-09	Economic Development	Agricultural Development Programs	MEO,MO, MPDC	Agricultural Development Programs Implemented	Agricultural Development Programs Implemented	507,571.20	507,571.20	January 2025 to December 2025
8000-001-3-1-01-001-010	Economic Development	Installation of Transformer ay Binuni Economic Center	MEO,MO, MPDC	Transformer at Binuni Economic Center Installed	Transformer at Binuni Economic Center Installed	1,000,000	1,000,000	January 2025 to December 2025
8000-001-3-1-01-001-011	Economic Development	Construction of BAMODAI Terminal at the back of Bacolod Transport Terminal	MEO,MO, MPDC	BAMODAI Terminal Constructed	BAMODAI Terminal Constructed	1,000,000	1,000,000	January 2025 to December 2025
8000-001-3-1-01-001-012	Economic Development	Construction of Multipurpose Building Phase I	MEO,MO, MPDC	Multipurpose Building Phase I constructed	Multipurpose Building Phase I constructed	2,000,000	2,000,000	January 2025 to December 2025
8000-001-3-1-01-001-013	Economic Development	Rehabilitation of Old Public Market	MEO,MO, MPDC	Public Market Rehabilitated	Public Market Rehabilitated	1,000,000	1,000,000	January 2025 to December 2025
8000-001-3-1-01-001-014	Environmental Development	Municipal Greening and Bio-Diversity Program	MENRO, MAO,MO	Balance and Healthy Environment Achieved	Balance and Healthy Environment Achieved	400,000	400,000	January 2025 to December 2025

8000-001-3-1-01-001-015	Environmental Development	Solid Waste Management Program	MENRO, MAO,MO	Communities are Empowered in the Proper Disposal of Waster	Communities are Empowered in the Proper Disposal of Waster	400,000	400,000	January 2025 to December 2025
8000-001-3-1-01-001-016	Environmental Development	Municipal Sanitation Program	MENRO, MAO,MO	Municipal Sanitation Program Implemented	Municipal Sanitation Program Implemented	200,000	200,000	January 2025 to December 2025
3000-001-3-1-01-001-017	Social Services	Rehabilitation of Laboratory Building (Municipal Health Office)	MEO,MO, MPDC	Laboratory Building (Municipal Health Office) rehabilitated	Laboratory Building (Municipal Health Office) rehabilitated	1,000,000	1,000,000	January 2025 to December 2025
3000-001-3-1-01-001-018	Social Services	Construction of Municipal Hemodialysis Clinic	MEO,MO, MPDC	Municipal Hemodialysis Clinic constructed	Municipal Hemodialysis Clinic constructed	4,046,750	4,046,750	January 2025 to December 2025
3000-001-3-1-01-001-019	Social Services	Upgrading of Potable Water System at Brgy. Mati, Bacolod, Lanao del Norte	MEO,MO, MPDC	Potable Water System Upgraded	Potable Water System Upgraded	500,000	500,000	January 2025 to December 2025
3000-001-3-1-01-001-020	Social Services	Installation of Solar Street Lights at Barangay Delabayan West, Bacolod, Lanao del Norte	MEO,MO, MPDC	Street Lights Installed	Street Lights Installed	500,000	500,000	January 2025 to December 2025
3000-001-3-1-01-001-21	Social Services	Installation of Solar Street Lights at Barangay Punod, Bacolod, Lanao del Norte	MEO,MO, MPDC	Street Lights Installed	Street Lights Installed	500,000	500,000	January 2025 to December 2025
3000-001-3-1-01-001-22	Social Services	Installation of Solar Street Lights at Barangay Dimarao, Bacolod, Lanao del Norte	MEO,MO, MPDC	Street Lights Installed	Street Lights Installed	500,000	500,000	January 2025 to December 2025
3000-001-3-1-01-001-23	Social Services	Installation of Solar Street Lights at Barangay Babalayan Townsite, Bacolod, Lanao del Norte	MEO,MO, MPDC	Street Lights Installed	Street Lights Installed	500,000	500,000	January 2025 to December 2025
3000-001-3-1-01-001-24	Social Services	Installation of Solar Street Lights at Barangay Pagayawan, Bacolod, Lanao del Norte	MEO,MO, MPDC	Street Lights Installed	Street Lights Installed	500,000	500,000	January 2025 to December 2025
3000-001-3-1-01-001-25	Social Services	Installation of Solar Street Lights at Barangay Kahayag, Bacolod, Lanao del Norte	MEO,MO, MPDC	Street Lights Installed	Street Lights Installed	500,000	500,000	January 2025 to December 2025
3000-001-3-1-01-001-26	Social Services	Installation of Solar Street Lights at Barangay Alegria, Bacolod, Lanao del Norte	MEO,MO, MPDC	Street Lights Installed	Street Lights Installed	500,000	500,000	January 2025 to December 2025
3000-001-3-1-01-001-27	Social Services	Installation of Solar Street Lights at Barangay Babalaya, Bacolod, Lanao del Norte	MEO,MO, MPDC	Street Lights Installed	Street Lights Installed	500,000	500,000	January 2025 to December 2025
3000-001-3-1-01-001-28	Social Services	Installation of Solar Street Lights at Barangay Liangan East, Bacolod, Lanao del Norte	MEO,MO, MPDC	Street Lights Installed	Street Lights Installed	500,000	500,000	January 2025 to December 2025
3000-001-3-1-01-001-29	Social Services	Installation of Solar Street Lights at	MEO,MO, MPDC	Street Lights Installed	Street Lights Installed	500,000	500,000	January 2025 to

		Barangay Esperanza, Bacolod, Lanao del Norte						December 2025
3000-001-3-1-01-001-30	Social Services	Installation of Solar Street Lights at Barangay Poblacion, Bacolod, Lanao del Norte	MEO,MO, MPDC	Street Lights Installed	Street Lights Installed	500,000	500,000	January 2025 to December 2025
3000-001-3-1-01-001-31	Social Services	Installation of Solar Street Lights at Barangay Binuni, Bacolod, Lanao del Norte	MEO,MO, MPDC	Street Lights Installed	Street Lights Installed	500,000	500,000	January 2025 to December 2025
3000-001-3-1-01-001-32	Social Services	Installation of Solar Street Lights at Barangay Demologan, Bacolod, Lanao del Norte	MEO,MO, MPDC	Street Lights Installed	Street Lights Installed	500,000	500,000	January 2025 to December 2025
3000-001-3-1-01-001-33	Social Services	Installation of Solar Street Lights at Barangay Minaulon, Bacolod, Lanao del Norte	MEO,MO, MPDC	Street Lights Installed	Street Lights Installed	500,000	500,000	January 2025 to December 2025
3000-001-3-1-01-001-34	Social Services	Installation of Solar Street Lights at Barangay Rupagan, Bacolod, Lanao del Norte	MEO,MO, MPDC	Street Lights Installed	Street Lights Installed	500,000	500,000	January 2025 to December 2025
					TOTAL	**31,254,321.20**	**31,254,321.20**	

Special Provision

The amount herein appropriated for the functions of the office shall be used specifically for the activities and purposes in the amount and condition indicated

LOCAL GOVERNMENT UNIT: BACOLOD, LANAO DEL NORTE
GAD PLAN AND BUDGET
BUDGET YEAR: 2025

AIP REFERENCE CODE	SECTOR	P/A/P	IMPLEMENTING OFFICE/DEPARTMENT	TARGET OUTPUT		ESTIMATED COST		IMPLEMENTATION SCHEDULE
				AIP	AB	AIP	AB	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
3000-001-3-1-01-011-001-024	Social Services	Women's Month Celebration	MCR, MSWDO	Women's Man Celebrated	Women's Man Celebrated	500,000.00	500,000.00	January 2025 to December 2025
3000-001-3-1-01-011-001-025	Social Services	Kasalang Bayan	MCR, MSWDO	Mass Wedding Ceremony Performed	Mass Wedding Ceremony Performed	120,000.00	120,000.00	January 2025 to December 2025
3000-001-3-1-01-011-001-026	Social Services	Agricultural Promotion Programs through Organic Farming Producting	MAO, MO	Annual Municipal Agri-Fishery Fair and Campaign Drive Conducted	Annual Municipal Agri-Fishery Fair and Campaign Drive Conducted	705,267.80	705,267.80	January 2025 to December 2025
3000-001-3-1-01-011-001-023	Social Services	Health Priority Program on Blood Letting Campaign	MO/MHO	Conducted Blood Donation Drive Conducted Blood Donation Drive	Conducted Blood Donation Drive Conducted Blood Donation Drive	900,000.00	900,000.00	January 2025 to December 2025
8000-001-3-1-01-001-012	Social Services	Elderly Filipino Week Celebration	MO, MSWDO	Elderly Filipino Week Celebrated	Elderly Filipino Week Celebrated	524,000.00	524,000.00	January 2025 to December 2025
3000-001-3-1-01-011-001-015	Social Services	GAD Analysis (Health & Wellness)	MHO	LGU Health and Wellness Program Implemented	LGU Health and Wellness Program Implemented	300,000.00	300,000.00	January 2025 to December 2025
3000-001-3-1-01-011-001-015	Social Services	Youth Participation on Gender and Development	MO, MPDC	Youth Programs, Projects and Activities Relevant to GAD is conducted	Youth Programs, Projects and Activities Relevant to GAD is conducted	700,000.00	700,000.00	January 2025 to December 2025
3000-001-3-2-02-005-002-004	Social Services	Strengthen GAD Implementation at LGU level	MSWO, MO, GFPS	Conducted Capability Building Training	Conducted Capability Building Training	2,000,000.00	2,000,000.00	January 2025 to December 2025
3000-001-3-1-01-011-001-015	Social Services	Capacity Development on GAD for GFPS	MO	Gender Sensitivity Training; Gender Analysis, Gender Responsive Planning and Budgeting Conducted	Gender Sensitivity Training; Gender Analysis, Gender Responsive Planning and Budgeting Conducted	1,000,000.00	1,000,000.00	January 2025 to December 2025
3000-001-3-1-01-011-001-015	Social Services	Construction Expenses for Gender Responsive Facility (4th Floor New Municipal Hall) Phase 1	MO, MPDC,	Gender Responsive Facility Established and Constructed	Gender Responsive Facility Established and Constructed	1,200,00.00	1,200,00.00	January 2025 to December 2025
3000-001-3-2-02-005-002-004	Social Services	Integrate GAD on Executive and Legislative Agenda	MSWDO,MO, GFPS	Mainstream GAD on ELA	Mainstream GAD on ELA	500,000.00	500,000.00	January 2025 to December 2025
					TOTAL	8,449,267.80	8,449,267.80	

a. Proposed New Appropriations

LOCAL GOVERNMENT UNIT: BACOLOD LANAO DEL NORTE
LOCAL DISASTER RISK REDUCTION AND MANAGEMENT PLAN
BUDGET YEAR: 2025

AIP REFERENCE CODE	SECTOR	P/A/P	IMPLEMENTING OFFICE/DEPARTMENT	TARGET OUTPUT		ESTIMATED COST		IMPLEMENTATION SCHEDULE
				AIP	AB	AIP	AB	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
3000-001-3-1-001-018-001	Social Services	Reproduction of tarpaulins and installation in designated locations	MDRRMC	20 Tarpaulins are printed and installed in designated areas within AOR	20 Tarpaulins are printed and installed in designated areas within AOR	50,000	50,000	January 2025 to December 2025
3000-001-3-1-001-018-002	Social Services	Early Warning System (Operation, Monitoring, and Maintenance)	MDRRMC	Early Warning System Implemented	Early Warning System Implemented	50,000	50,000	January 2025 to December 2025
3000-001-3-1-001-018-003	Social Services	Procurement of 1 unit DRONE	MDRRMC	To monitor the area affected efficiently	To monitor the area affected efficiently	200,000	200,000	January 2025 to December 2025
3000-001-3-1-001-018-004	Social Services	Emergency Responders Insurance	MDRRMC	All emergency Responders are insured	All emergency Responders are insured	41,289.96	41,289.96	January 2025 to December 2025
3000-001-3-1-001-018-005	Social Services	Government Facilities Insurance	MDRRMC	All government facilities are insured	All government facilities are insured	50,000	50,000	January 2025 to December 2025
3000-001-3-1-001-018-006	Social Services	Procurement and Installation of EWS for 7 Barangays	MDRRMC	Procured and Installed EWS for 7 Barangays	Procured and Installed EWS for 7 Barangays	500,000	500,000	January 2025 to December 2025
3000-001-3-1-001-018-007	Social Services	Procurement of Siren for the Municipal Building	MDRRMC	Emergency Siren Procured	Emergency Siren Procured	100,000	100,000	January 2025 to December 2025
3000-001-3-1-001-018-008	Social Services	Procurement of CBMS Database Monitoring Equipment	MDRRMC	Database of CBMS monitored	Database of CBMS monitored	50,000	50,000	January 2025 to December 2025
3000-001-3-1-001-018-009	Social Services	Sidlak Kinaiyahan (Clean-up Drive and Nurturing Activities)	MDRRMC	Clean-up drive and nurturing conducted	Clean-up drive and nurturing conducted	50,000	50,000	January 2025 to December 2025
3000-001-3-1-001-018-010	Social Services	OpCen Operating Expenses and Maintenance	MDRRMC	All search and rescue equipment properly maintained and effectively managed 24/7	All search and rescue equipment properly maintained and effectively managed 24/7	300,000	300,000	January 2025 to December 2025
3000-001-3-1-001-018-011	Social Services	Development of IEC and Drills on Disaster Preparedness	MDRRMC	Standard operation procedure is installed through	Standard operation procedure is installed through	200,000	200,000	January 2025 to December 2025

				effective IEC thus operations center is strengthen	effective IEC thus operations center is strengthen			
3000-001-3-1-001-018-012	Social Services	Stockpiling of Food and Non Food Items	MDRRMC	Stockpiles updated	Stockpiles updated	300,000	300,000	January 2025 to December 2025
3000-001-3-1-001-018-013	Social Services	Stockpiling of Medicine, Hygiene Kits and First Aid	MDRRMC	Stockpiles updated	Stockpiles updated	150,000	150,000	January 2025 to December 2025
3000-001-3-1-001-018-014	Social Services	Repair of Rescue Vehicle, Generator Set, Chainsaw, Rescue Boat, Ambulance and Light and Heavy Equipment and Office Equipment	MDRRMC	Emergency Vehicles and Equipment Repaired	Emergency Vehicles and Equipment Repaired	300,000	300,000	January 2025 to December 2025
3000-001-3-1-001-018-015	Social Services	Formulation and Updating of DRRM-CCA related plans	MDRRMC	DRRM-CCA plans formulated and updated	DRRM-CCA plans formulated and updated	100,000	100,000	January 2025 to December 2025
3000-001-3-1-001-018-016	Social Services	Response Team Capacity Development and Supplies	MDRRMC	Response Team Capacitated	Response Team Capacitated	500,000	500,000	January 2025 to December 2025
3000-001-3-1-001-018-017	Social Services	Technical Disaster Preparedness Training	MDRRMC	Attended technical disaster preparedness training	Attended technical disaster preparedness training	450,000	450,000	January 2025 to December 2025
3000-001-3-1-001-018-018	Social Services	Conduct of Simulation Exercises, Drills	MDRRMC	NSED and other DRRM Exercises conducted	NSED and other DRRM Exercises conducted	100,000	100,000	January 2025 to December 2025
3000-001-3-1-001-018-019	Social Services	National Disaster Resilience Month Celebration	MDRRMC	Resilience-building activities conducted	Resilience-building activities conducted	150,000	150,000	January 2025 to December 2025
3000-001-3-1-001-018-020	Social Services	Effective Communication System	MDRRMC	Communication equipment procured	Communication equipment procured	100,000	100,000	January 2025 to December 2025
3000-001-3-1-001-018-021	Social Services	Data Gathering and Database Management	MDRRMC	Data gathered and database filed	Data gathered and database filed	100,000	100,000	January 2025 to December 2025
3000-001-3-1-001-018-022	Social Services	Policy Support for DRRM Initiatives	MDRRMC	Policy supported and implemented	Policy supported and implemented	100,000	100,000	January 2025 to December 2025
3000-001-3-1-001-018-023	Social Services	Petroleum Oil and Lubricant Products	MDRRMC	Stockpiled POL products used during emergencies response action	Stockpiled POL products used during emergencies response action	150,000	150,000	January 2025 to December 2025
3000-001-3-1-001-018-024	Social Services	Compliance to LDRRM Office Performance Based Assessment	MDRRMC	Participated and complied SGLG and GK seal	Participated and complied SGLG and GK seal	100,000	100,000	January 2025 to December 2025
3000-001-3-1-001-018-025	Social Services	Procurement of Climbing Gear (MOSAR Equipment)	MDRRMC	Procured and responder are capacitated in MOSAR	Procured and responder are capacitated in MOSAR	200,000	200,000	January 2025 to December 2025
3000-001-3-1-001-	Social	Procurement of	MDRRMC	Medical rescue	Medical rescue	100,000	100,000	January

018-026	Services	Medical Rescue Equipment		equipment procured	equipment procured			2025 to December 2025
3000-001-3-1-001-018-027	Social Services	Procurement of Clearing Operation Equipment	MDRRMC	Clearing operation equipment procured	Clearing operation equipment procured	123,197.50	123,197.50	January 2025 to December 2025
3000-001-3-1-001-018-028	Social Services	Procurement of one (1) unit of Motorcycle for response, monitoring, and communication	MDRRMC	Motorcycle procured	Motorcycle procured	100,000	100,000	January 2025 to December 2025
3000-001-3-1-001-018-029	Social Services	Activate ICS & EOC	MDRRMC	Activated EOC during emergencies and MLGU activities	Activated EOC during emergencies and MLGU activities	50,000	50,000	January 2025 to December 2025
3000-001-3-1-001-018-30	Social Services	Response Operation and Services	MDRRMC	Response Operation is served and operational	Response Operation is served and operational	50,000	50,000	January 2025 to December 2025
3000-001-3-1-001-018-031	Social Services	Conduct of PDRA	MDRRMC	Assessment of possible impacts of hazards conducted	Assessment of possible impacts of hazards conducted	50,000	50,000	January 2025 to December 2025
3000-001-3-1-001-018-032	Social Services	Financial Assistance and support to families, cooperatives and communities affected	MDRRMC	Financial assistance are granted to families, cooperative and communities affected in any form of disaster	Financial assistance are granted to families, cooperative and communities affected in any form of disaster	100,000	100,000	January 2025 to December 2025
3000-001-3-1-001-018-033	Social Services	Nutrition and Medicines in Emergencies	MDRRMC	Nutritional food and medicine served during emergencies	Nutritional food and medicine served during emergencies	100,000	100,000	January 2025 to December 2025
3000-001-3-1-001-018-034	Social Services	Clearing Operation of damaged of roads and facilities	MDRRMC	Damaged of roads and facilities are cleared	Damaged of roads and facilities are cleared	100,000	100,000	January 2025 to December 2025
3000-001-3-1-001-018-035	Social Services	Conduct of PDNA	MDRRMC	Post assessment conducted	Post assessment conducted	50,000	50,000	January 2025 to December 2025
3000-001-3-1-001-018-036	Social Services	Repair Lifeline facilities by any form of disaster	MDRRMC	Lifeline facilities repaired/restored	Lifeline facilities repaired/restored	200,000	200,000	January 2025 to December 2025
3000-001-3-1-001-018-037	Social Services	Rehabilitation of Evacuation Center	MDRRMC	Evacuation Center is rehabilitated	Evacuation Center is rehabilitated	500,000	500,000	January 2025 to December 2025
					SUB TOTAL	**5,914,487.46**	**5,914,487.46**	
3000-001-3-1-001-018-038	Social Services	30% QUICK RESPONSE FUND	MDRRMC			**2,534,780.34**	**2,534,780.34**	January 2025 to December 2025
					GRAND TOTAL	**8,449,267.80**	**8,449,267.80**	

b. Special Provisions

1. Use and Release of Funds. The amount herein appropriated shall be used in accordance with RA No. 10121, "The Philippine Disaster Risk Reduction and Management Act of 2010", which shall include relief, rehabilitation, reconstruction, and other works or services, including pre-disaster activities, in connection with the occurrence of natural calamities, epidemics as declared by DOH, and other catastrophes, PROVIDED, that the projects and activities are incorporated in the Local Disaster Risk Reduction and Management Plan (LDRRMP), and integrated in the approved Annual Investment Program. PROVIDED FURTHER, that the utilization of the Fund shall be in accordance with the provisions of NDRRMC-DBM-DILG Joint Memorandum Circular No. 2013-1 dated March 25, 2013.
2. Quick Response Fund. Of the amount appropriated for LDRRM Fund, Thirty percent (30%) shall be allocated as Quick Response Fund (QRF) of stand-by fund for relief, recovery programs in order that the situation and living conditions of people in the communities or areas stricken by disaster, calamity and epidemics may be normalized as quickly as possible. The release and use of QRF shall be supported by a resolution of the Sanggunian declaring the LGU under state of calamity or a Presidential declaration of state of calamity.
3. In no case shall the QRF be used for pre-disaster, nor be re-aligned for any other purpose.

APPROPRIATIONS FOR DEVELOPMENT PROGRAMS AND PROJECTS

a. Proposed New Appropriations

Object of Expenditure	Account Code	Budget Year (Estimate)
MOOE		36,934,973.97
CAPITAL OUTLAYS		1,850,000.00
TOTAL APPROPRIATIONS		38,784,973.97

b. Special Provisions: The amounts herein appropriated shall be used specifically for the activities and purposes in the amounts and condition indicated.

OTHER SPECIAL PURPOSE APPROPRIATIONS

a. Proposed New Appropriations

Object of Expenditure	Account Code	Budget Year (Estimate)
Gender and Development (GAD)		8,449,267.80
Aid to Barangay		160,000.00
Debt Services		4,600,000.00
LS Appropriation (Support to Katarungang Barangay)		50,000.00
CAF		150,000.00
MCPC		1,562,716.06
Prior Years Obligation		1,593,000.00
Total		**16,564,983.86**

Special Provisions: The amounts herein appropriated shall be used specifically for the activities and purposes in the amounts and condition indicated

PART 3. GENERAL PROVISIONS

The Revenue source, National Tax Allocation is based on Local Budget Memorandum No. 90 dated June 13, 2024 issued by the Department of Budget and Management, Manila and the Local Revenue sources based on the existing Local Tax Ordinance.

On the expenditure programs, salaries of officials and employees is based on Local Budget Circular No. 149 dated January 10, 2023 of the Department of Budget and Management as mandated under RA No. 11466 s. 2019 entitled "An Act Modifying the Salary Schedule for Civilian Government Personnel and Authorizing the Grant of Additional Benefits and for Other Purposes" issued by the President of the Republic, prescribes the Fourth Tranche Compensation Adjustment for Local Government Personnel. The new rates of granting the Representation and Transportation Allowance (RATA) are based on LBC No. 157 dated May 3, 2024 of the DBM; Budget Circular # 2024-1 dated April 4, 2024 or the Updated Rules and Regulation on the grant of the Uniform/Clothing Allowance to Civilian Government Personnel; Budget Circular 2024-02 or the Guidelines on the Payment of Communication Expenses of Certain Government Personnel and Phil Health Circular # 011, S 2012 Re-Premium Contribution schedule of the Formal sector employees and their employers effective January 1, 2019.

The following authorized positions are unfunded and unfilled in the Plantilla of Personnel FY 2025. These unfunded vacant positions are deleted since these are not covered by funds for salaries and associated compensation costs in the Annual Budget 2025 of the Municipality of Bacolod, Lanao del Norte.

OFFICE	PLANTILLA POSITIONS	ITEM NO.	SALARY GRADE
Municipal Mayor's Office	Senior Administrative Assistant III (Private Secretary II)	2	15
	Administrative Assistant II (Clerk IV)	5	8
	Administrative Officer V	26	18
Secretary to the Sangguniang Bayan Office	Administrative Aide I (Utility Worker I)	9	1
Municipal Treasurer's Office	Administrative Aide IV (Cash Clerk)	4	4
	Revenue Collection Clerk I	6	5
	Administrative Aide VI (Data Controller I)	13	6
Municipal Assessor's Office	Local Assessment Operations Officer II	4	15
	Administrative Aide VI (Date Controller I)	7	6
Municipal Accountant Office	Administrative Aide IV (Accounting Clerk I)	5	4
Municipal Health Office	Midwife III	6	13
	Midwife II	7	11
	Midwife I	17	9
	Nurse IV	19	19
Municipal Social Welfare and Development Office	Youth Development Officer II	2	14
Municipal Agriculture Office	Municipal Agriculture Officer	2	20
	Agricultural Technologist	5	10
	Agricultural Technologist	6	10
Municipal Disaster Risk Reduction Management Office	LDRRMO II	32	15
Municipal Human Resource Management & Development Office	Municipal Government Department Head I (Municipal Human Resource Management Officer)	1	24

Proposed New Appropriations, by OFFICE

OFFICE	Personal Services	MOOE	Capital Outlay	TOTAL
Office of the Municipal Mayor	11,178,309.80	27,662,073.97	400,000.00	**39,240,383.77**
Office of the Sangguniang Bayan	14,926,508.78	2,864,000.00	400,000.00	**18,190,508.78**
Office of the Secretary to the Sanggunian	3,958,833.30	384,000.00	70,000.00	**4,412,833.30**
Office of the Municipal Treasurer	5,145,959.42	403,500.00	70,000.00	**5,619,459.42**
Office of the Municipal Assessor	2,242,267.48	343,000.00	70,000.00	**2,655,267.48**
Office of the Municipal Accountant	2,721,556.22	412,600.00	140,000.00	**3,274,156.22**

Office of the Municipal Budget	2,626,376.62	339,800.00	70,000.00	3,036,176.62
Office of the Municipal Planning & Development Coordinator	1,974,451.38	201,000.00	70,000.00	2,245,451.38
Office of the Municipal Engineer	3,896,091.01	181,000.00	70,000.00	4,147,091.01
Office of the Municipal Health	12,336,609.92	2,379,000.00	70,000.00	14,785,609.92
Office of the Municipal Civil Registrar	1,881,303.90	245,000.00	70,000.00	2,196,303.90
Office of the Municipal Agriculture	3,227,792.08	239,000,00	70,000.00	3,536,792.08
Office of the Municipal Environment & Natural Resources	1,295,968.68	184,000.00	70,000.00	1,549,968.68
Office of the Municipal Social Welfare & Development	2,835,389.94	433,000.00	70,000.00	3,338,389.94
Office of the Municipal Economic Enterprise & Development	1,260,978.66	130,000.00	70,000.00	1,460,978.66
Office of the Municipal Disaster Risk Reduction Management	2,423,411.98	534,000.00	70,000.00	3,027,411.98
Sub-Total	**73,931,809.17**	**36,934,973.97**	**1,850,000.00**	**112,716,783.14**
Special Purpose Appropriation				
Appropriation for Development Programs/Project (20%) DF				31,254,321.20
Appropriation for Local Risk Reduction Management (LDRRM)				8,449,267.80
GAD				8,449,267.80
Prior Year Obligation				1,593,000.00
Appropriation for Debt Services				4,600,00.00
MCPC				1,562,716.06
CAF				150,000.00
LS Appropriation (Support to Katarungang Pambarangay)				50,000.00
Aid to Barangays				160,000.00
Total Expenditures				**56,268,572.86**
GRAND TOTAL				**168,985,356.00**

Section 4. General Provision:

1. **Availability of Appropriations**. Appropriation for CO under this Ordinance shall be Available for release and obligation for the purpose specified for a period extending to one fiscal year after the end of the year in which such items were appropriated.

2. **Limitation on Cash Advance**. Notwithstanding any provision of law to contrary cash advances shall not be granted until such time that the earlier cash advances availed of by the officials or employees concerned shall been liquidated pursuant to pertinent accounting and auditing rules and regulations.

3. **Meaning of Savings**. Savings refer to portions of balances of any released appropriations in this Ordinance which have not been obligated as a result of the following:
   a. Final discontinuance or abandonment of an on-going program, activity or project by the Head of the Agency concerned due to causes not attributable to the fault or negligence of the agency which would not render it possible for the agency to implement the said P/A/P during the validity of the appropriation.

   b. Non-commencement of the P/A/P for which the appropriation is released. For this purpose, non-commencement shall refer to the inability of the agency or its duly authorized procurement agent to obligate the released allotment and implement the P/A/P due to natural or man- made calamities or other causes not attributable to the fault or negligence of the agency concerned during the validity of the appropriations.

   c. Decrease cost resulting from improved efficiency during the implementation or until the completion by agencies of their P/A/Ps; provided, that the agencies will still be able to deliver the targets and services as approved in this Ordinance.

   d. Difference between the approved budget for the contract and the contract award price.

   e. Unused personal services cost pertaining to (a) unfilled, vacant or abolished positions; (b) non-entitlement to allowance and benefits; (c) leaves of absence without pay; and (d) unutilized pensions and retirement benefits arising from death or pensioners, decrease in the number of retirees or other related causes.

4. **Priority in the Use of Savings;** In the use of savings, priority shall be given to the augmentation of the amounts set aside for the payment of compensation, year-end bonus and cash gift, retirement gratuity, terminal leave benefits, old-age

pension of veterans and other personnel benefits authorized by law and in this Ordinance as well as the implementation of priority programs, activities or projects covered in this Ordinance.

Section 5. Implementing Budget Circular. The Annual Budget 2025 is implementing Local Budget Circular No. 149 dated January 10, 2023, the Implementation of the Fourth Tranche of the Modified Salary Schedule for Local Government Personnel Pursuant to Republic Act (RA) No. 11466is

Section 6. Separability Clause. If, for any reason, any Section or provision of this Appropriation Ordinance is disallowed in Budget Review or declared invalid by proper authorities, other Sections or provisions hereof that are not affected thereby shall continue to be in full force and effect

Section 7. Effectivity. The provisions of this Appropriation Ordinance shall take effect on January One, Two Thousand Twenty-Five.

APPROVED: December 23, 2024

CARRIED unanimously by all the members present.

I HEREBY CERTIFY to the correctness of the afore-cited resolution:

JAHZEEL FAITH M. PAGADUAN
Secretary to the Sanggunian

ATTESTED & CERTIFIED TO BE ADOPTED BY THE SB:

ATTY. ALFONS JANSSEN P. MARCERA
Municipal Vice Mayor/Presiding Officer

APPROVED:

JUDITH V. MIQUIABAS
Municipal Mayor

B

Interview Transciptions

Presented in this chapter are the full transcripts of semi-structured interviews conducted with key stakeholders in the Municipality of Bacolod, including the Municipal Environment and Natural Resources Officer (MENRO) and Barangay officials. These discussions provided the essential ground-truth data required to contextualize the study's investigation into local solid waste management policies.

B.1 | Municipal Environment and Natural Resources Officer (MENRO)

Resource Person: Engr. Archer M. Zamora
Position: MENRO Head, LGU-Bacolod
Topic: SWM Policy Implementation, Budget, and Challenges

Policy and Roles

Q: What are the primary laws and ordinances guiding your solid waste management (SWM) implementation?
A: We are focused on implementing Republic Act 9003 (The Ecological Solid Waste Management Act). This includes enforcing local ordinances for the segregation of waste and the prohibition of single-use plastics.

Q: How are SWM responsibilities divided between the LGU and the Barangays?
A: The Barangay is the frontline of implementation. Their primary role is the collection of garbage at their level and the operation of their local Materials Recovery Facility

(MRF). The LGU (Municipal) level is then responsible for collecting the waste from the Barangays, but we only collect waste that has already been properly segregated.

Incentives and Penalties (The "Carrot and Stick")

Q: What incentives, or "carrot" approaches, do you use to encourage Barangays and households to comply?
A: We use several "carrot-style" incentives. This includes:

- Recognition for the best-implementing Barangays.
- Programs like Ecobrick exchange for goods.
- Before the pandemic, we held competitions, but this was stopped due to budget constraints.

Q: What penalties, or "stick" approaches, are used for enforcement?
A: For enforcement, the MENRO has an inspection team. We issue citation tickets for penalties to violators. We also utilize CSU (Civil Security Unit) or "Eco-warrior" enforcers to monitor compliance.

Budget and Manpower

Q: What is the budget for your SWM programs?
A: Our program budget is approximately 1.5 million pesos. This budget has to cover collection, biodiversity projects, and all Solid Waste Management activities.

Q: What are the main challenges you face with enforcement and resources?
A: Our main challenges are budget and manpower.

- **Manpower:** We have a significant lack of staff for enforcement.
- **Budget:** We cannot employ more enforcers because of budget constraints. Frankly, the budget is *kulang* (insufficient). Many of our plans are on a "wishlist" because of these limited funds.

Awareness and Behavioral Challenges

Q: How do you handle Information, Education, and Communication (IEC) campaigns?
A: We run continuous sanitation and IEC campaigns. Our most effective tool is the local radio station (101.3 Grace Covenant FM), and we consistently provide reminders during every assembly. This requires a specific budget for radio advertising.

Q: What is the biggest obstacle to successful waste segregation?
A: The biggest obstacles are behavioral and cultural. We produce waste every day. Even if we have a complete ordinance, it will not be successful if we don't get cooperation from the people. The main problems are social norms, acceptance, and behavioral constraints.

Q: What is the current rate of segregation at the source?
A: We estimate the segregation rate at the household source is only about 10%. However, establishments (businesses) are generally compliant and do segregate their waste.

Q: If compliance is low, why not strictly penalize all non-compliant households?
A: The problem is acceptance. If we were to be extremely strict right now, all households would be penalized, which isn't feasible. We must balance enforcement with continuous awareness.

Accountability and Logistics

Q: How are Barangay officials held accountable for implementing SWM?
A: Accountability is handled in several ways:

- **Monitoring:** The DENR (Department of Environment and Natural Resources) monitors compliance.
- **Council Meetings:** We hold mandatory quarterly meetings with the Solid Waste Management Council (SWMC), which includes Barangay Officials and the LGU.
- **Sanctions:** As provided by law, Barangay officials may be suspended for failure to comply. However, we prefer to focus on awareness and reminders because we view them as partners.

Q: What is the long-term strategy for improving these numbers?
A: We are following our 10-year Solid Waste Management plan, which focuses on consistent reminders and awareness campaigns.

Q: How do you manage collection for inland Barangays that are hard to reach?
A: The inland Barangays have their own MRF and segregation facilities. Collection is a major issue due to accessibility—they are *layo na kaayo* (very far). They often have to use their own initiative, such as using a multipurpose vehicle, to deliver their segregated garbage to the collection points.

Q: Which specific Barangays does the LGU collect segregated waste from?
A: The LGU currently collects from 7 Barangays, these are:

1. Liangan East
2. Esperanza
3. Poblacion
4. Binuni
5. Demologan
6. Mati
7. Babalaya

B.2 | Barangay Liangan East

Resource Persons:
1. Hon. Rufo Palangan Lumacad (Barangay Captain)
2. Ms. Analyn J. Eltagon (Barangay Secretary)
Location: Brgy. Liangan East, Bacolod, Lanao del Norte

Part 1: Demographics and Profile

Q: (To Secretary) What is the total population and number of households in Barangay Liangan East?
A: We have a total population of 2,198 individuals and a total of 608 households.

Q: What would you say is the average household size?
A: The average household size is about 4 members.

Q: How would you describe the general income level of the residents?
A: The general income level is middle class.

Q: How many barangay officials and BPAT members do you have?
A: We have 22 Barangay Officials and 10 Barangay Peacekeeping Action Team (BPAT) members.

Part 2: Policies and Information Campaigns

Q: What official policies does the barangay have for solid waste management?
A: We follow the Executive Order and the Municipal Ordinance.

Q: How do you communicate these policies to the residents?
A: We use Information Communication Campaigns and the Barangay Assembly. We also hold meetings by Purok, led by the Captain and Kagawad.

Q: What is your single most important rule regarding household garbage collection?
A: "No Segregation, No Collection" policy.

Part 3: Enforcement and Community Compliance

Q: Who is responsible for enforcing the "No Segregation, No Collection" policy on the ground?
A: The BPAT and Barangay Officials are responsible for enforcement.

Q: What is the process when a household is non-compliant? Does the barangay issue a ticket?
A: The Barangay does not issue tickets directly. We only report the violators. The MENRO is the one handling the citation tickets. The penalty comes from a summon by the MENRO and LGU based on our reports.

Q: What is the current compliance rate for waste segregation among the households?
A: It is around 60-70% compliance.

Q: Have you noticed this compliance changing over time?
A: *Maylang sa permiro* (It was only good at the start). After about 1 month of implementation, citizens are now starting to segregate again.

Q: In your opinion, what is the biggest challenge regarding resident behavior?
A: They are aware but non-compliant. They need constant reminders and encouragement.

Q: Does a resident's education level or income seem to affect their willingness to segregate?
A: Education does not matter. Sometimes, the educated residents are actually the worst offenders.

Part 4: Challenges and Barriers

Q: What specific challenges do low-income households face in complying with segregation?
A: Low-income households often have no money to buy segregation bins. Even a sack (*sako*) is considered expensive for them.

Q: Does the barangay provide any assistance, like free sacks, to these households?
A: We have issued sacks to low-income households from the barangay, but it is not constant due to budget constraints.

Q: Have you received reports of collectors accepting extra payments to bypass the "no segregation" rule?
A: Yes, there are instances where money added for non-segregated waste gets accepted.

Q: What other challenges do you face in managing the barangay's solid waste?
A: Security of facilities is an issue; at night, the MRF (Materials Recovery Facility) has been desecrated/vandalized.

Part 5: Logistics, Budget, and Incentives

Q: What is the garbage collection schedule for the LGU truck?
A: The LGU collects every Tuesday morning.

Q: Does the barangay have its own vehicle for collection?
A: We have a MultiCab but it is currently damaged. We have low maintenance capability for garbage collection vehicles. There are plans to acquire a new one.

Q: What is your total budget for the solid waste management program for 2025?

A: Our budget for 2025 is 30,000 Pesos.

Q: Have you ever used incentives to encourage segregation?
A: Yes, back in 2020, we had an SK (Sangguniang Kabataan) initiative where residents could exchange 3 eco-bricks for 1 kilo of rice, or 1 bottle for oil.

Q: Are there plans to reintroduce an incentive program?
A: Yes, we plan to bring back eco-brick incentives with a budget of 20,000 Pesos.

Q: Besides collection, what other activities does the barangay conduct?
A: We conduct "Pulot Basura" (waste picking), weekly *pahina* (community cleanup), and monthly road clearing operations.

C

User Manual

After this fourth paragraph, we start a new paragraph sequence. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

This is the second paragraph. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

And after the second paragraph follows the third paragraph. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

After this fourth paragraph, we start a new paragraph sequence. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

References

M. Abdallah, S. Hamdan, and A. Shabib. A multi-objective optimization model for strategic waste management master plans. *Journal of Cleaner Production*, 284:124714, 2021. doi: 10.1016/j.jclepro.2020.124714.

J. Abordo and W. D. Dalugdog. Solid waste management practices of the community households in the province of Leyte, Philippines. *Science of Law*, 2025(3):33–41, 2025. doi: 10.55284/bg8afz65.

R. Agarwal, D. Schuurmans, and M. Norouzi. An optimistic perspective on offline reinforcement learning. In *Proceedings of the 37th International Conference on Machine Learning, PMLR 119*, 2020.

N. Akbarpour, A. Salehi-Amiri, M. Hajiaghaei-Keshteli, and D. Oliva. An innovative waste management system in a smart city under stochastic optimization using vehicle routing problem. *Soft Computing*, 25(5), 2021. doi: 10.1007/s00500-021-05669-6.

S. M. Apostol-Jamoralin. Assessing the implementation of Republic Act 9003: Ecological solid waste management in Sorsogon City. *Sorsogon Multidisciplinary Research Journal*, 3(1):15–29, 2024. doi: 10.71343/20hc8547.

R. Badua. Effectiveness of the implementation on "No Segregation, No Collection" measures (Bacnotan MO No. 481 s. 2014 CII S7): The case of DMMMSU adjacent barangays. *DMMMSU Research and Extension Journal*, 6(6):21–38, 2022. doi: 10.62960/dmmmsu.v6i.29.

L. Biré, Q. N. Phung, P. Taillandier, D. A. Phung, N. D. Nguyen, and A. Drogoul. RÁC: A serious agent-based simulation game to drive discussion on waste management in Vietnamese irrigation systems. *Journal of Artificial Societies and Social Simulation*, 28(2), 2025. doi: 10.18564/jasss.5617.

A. Brugière, N. Doanh, and A. Drogoul. Handling multiple levels in agent-based models of complex socio-environmental systems: A comprehensive review. *Frontiers in Applied Mathematics and Statistics*, 8, 2022. doi: 10.3389/fams.2022.1020353.

M. E. C. Camarillo and L. M. Bellotindos. A study of policy implementation and community participation in the municipal solid waste management in the Philippines. *Applied Environmental Research*, 43(2):1–26,

2021. doi: 10.35762/aer.2021.43.2.3.

N. O. Carpio, J. E. Angsinco, R. B. P. Pineda, and A. M. B. Donaire. Environmental awareness and practices in waste management: A green criminological perspective. *European Journal of Social Sciences Studies*, 11 (3), 2025. doi: 10.46827/ejsss.v11i3.2021.

M. A. A. Catiil and Y. P. Daud. Solid waste management practices in Gingoog City: An assessment of compliance with the Republic Act 9003. *Journal of Exceptional Multidisciplinary Research*, 2(1):63–70, 2025. doi: 10.69739/jemr.v2i1.558.

A. Ceschi, R. Sartori, S. Dickert, A. Scalco, E. M. Tur, F. Tommasi, and K. Delfini. Testing a norm-based policy for waste management: An agent-based modeling simulation on nudging recycling behavior. *Journal of Environmental Management*, 294:112938, 2021. doi: 10.1016/j.jenvman.2021.112938.

S.-W. Chen, S.-W. Huang, J. Chen, K.-Y. Huang, and Y.-X. He. Effects of incentives and penalties on farmers' willingness and behavior to separate domestic waste—analysis of farm household heterogeneity based on chain multiple intermediary effects. *Sustainability*, 15(7):5958, 2023. doi: 10.3390/su15075958.

B. Cheng, J. Huang, J. Li, S. Chen, and H. Chen. Improving contractors' participation of resource utilization in construction and demolition waste through government incentives and punishments. *Environmental Management*, 70(4):666–680, 2022. doi: 10.1007/s00267-022-01617-8.

V. F. Collado, A. M. Badua, J. L. Aban, and R. F. Deleña. Serve, understand, respect waste education management (SURWEM): An extension project to strengthen solid waste management in a service Barangay (Arosip) in northern Philippines. *International Journal of Biosciences (IJB)*, 25(2):218–229, 2024. doi: 10.12692/ijb/25.2.218-229.

E. Coracero. A long-standing problem: A review on the solid waste management in the Philippines. *Indonesian Journal of Social and Environmental Issues (IJSEI)*, 2(3), 2021.

W. D. Dalugdog. Level of compliance of the Local Government Units (LGUs) in the implementation and enforcement of R.A. 9003 (known as Ecological Solid Waste Management Act of 2000) in CALABARZON. *Asian Journal of Multidisciplinary Studies*, 4(1):25–38, 2021.

V. M. de Souza, J. Bloemhof, and M. Borsato. Assessing the eco-effectiveness of a solid waste management plan using agent-based modelling. *Waste Management*, 125:235–248, 2021. doi: 10.1016/j.wasman.2021.02.019.

M. Del Rosario. Assessing the compliance of a coastal municipality to the Ecological Solid Waste Management Act of 2000 (RA 9003). *Applied Environmental Research*, 45(4), 2023. doi: 10.35762/aer.2023021.

K. D. Deleña, E. Niesas, and L. Saguban. Practical leadership in governance: Examining the effectiveness of barangay officials with practical experience. *Journal of Interdisciplinary Perspectives*, 3(7):843–856, 2025. doi: 10.69569/jip.2025.355.

G. Dey. AI-driven community-centric waste management: Leveraging reinforcement learning for dynamic waste sorting and public engagement, 2025. URL `https://www.researchgate.net/publication/`

392726834. ResearchGate.

M. Dhanshyam and S. K. Srivastava. Effective policy mix for plastic waste mitigation in India using system dynamics. *Resources, Conservation and Recycling*, 168:105455, 2021. doi: 10.1016/j.resconrec.2021.105455.

M. A. Duhayyim, T. A. E. Eisa, F. N. Al-Wesabi, A. Abdelmaboud, M. A. Hamza, A. S. Zamani, M. Rizwanullah, and R. Marzouk. Deep reinforcement learning enabled smart city recycling waste object classification. *Computers, Materials & Continua*, 71(3):5699–5715, 2022. doi: 10.32604/cmc.2022.024431.

R. M. Eltanal. Systematic review on solid waste collection strategies and their link to population and solid waste generation. *International Journal for Research in Applied Science and Engineering Technology*, 13(5): 4138–4145, 2025. doi: 10.22214/ijraset.2025.70911.

L. C. Espino, J. I. T. Sinangote, G. M. Sun, and F. T. B. Caraso. Assessing the impact of local government policies on community-based solid waste management initiative: A phenomenological inquiry. *International Journal of Research and Innovation in Social Science*, 9(9):5343–5364, 2025. doi: 10.47772/ijriss.2025.909000433.

M. Florida, J. A. Alquisar, J. Gasang, F. Vigonte, and M. V. Abante. Performance of barangays in the Municipality of Santa Maria, Province of Romblon. *SSRN Electronic Journal*, 2023. doi: 10.2139/ssrn.4617416.

L. Fontaine, R. Legros, and J.-M. Frayret. Sustainability and environmental performance in selective collection of residual materials: Impact of modulating citizen participation through policy and incentive implementation. *Resources*, 13(11):151, 2024. doi: 10.3390/resources13110151.

J. Gao, A. Wahlen, C. Ju, Y. Chen, G. Lan, and Z. Tong. Reinforcement learning-based control for waste biorefining processes under uncertainty. *Communications Engineering*, 3(1), 2024. doi: 10.1038/s44172-024-00183-7.

C. Gentile, D. M. Pinto, and G. Stecca. Price of robustness optimization through demand forecasting with an application to waste management. *Soft Computing*, 33(1), 2022. doi: 10.1007/s00500-022-07148-y.

V. T. Ha and N. Q. Minh. Intelligent route planning for waste collection in smart cities via reinforcement learning. *Journal of Information Systems Engineering and Management*, 10(51s):434–445, 2025.

C. He and Y. Fu. Why does waste separation policy vary across different Chinese cities? a configurational analysis of the pilot scheme. *Journal of Cleaner Production*, 283:124613, 2021. doi: 10.1016/j.jclepro.2020.124613.

C. Hertweck and V. Dignum. Graduated punishment in a deep reinforcement learning agent-based model of common-pool resources. In *Multi-Agent-Based Simulation XXIII*, volume 13833, pages 109–122. Springer, 2023. doi: 10.1007/978-3-031-25599-1_8.

E. P. Ibañez and M. C. T. Jr. Problems and recommendations to improve the solid waste management initiatives of the Local Government Unit of Tanauan, Leyte, Philippines. *European Journal of Development Studies*, 2(4):1–3, 2022. doi: 10.24018/ejdevelop.2022.2.4.114.

A. N. Jiménez. Agent-based modeling and reinforcement learning for equitable waste transitions in Costa Rica: A national policy stress-test. *Journal of Cleaner Production*, 535:147103, 2025. doi: 10.1016/j.jclepro.2025.147103.

S. Karagoz, N. Aydin, and V. Simic. A novel stochastic optimization model for reverse logistics network design of end-of-life vehicles: A case study of Istanbul. *Environmental Modeling & Assessment*, 27(4): 599–619, 2022. doi: 10.1007/s10666-022-09834-5.

S. Kaza, S. Shrikanth, and S. Chaudhary. *More growth, less garbage*. Urban Development Series. World Bank, 2021. URL `http://hdl.handle.net/10986/35998`.

N. M. Khallaf, O. Abdel-Raouf, and K. Ahmed. Reinforcement learning-driven enhancement of medical waste collection within capacity-homogeneous vehicle routing. *International Journal of Computers and Information*, 11(2):79–94, 2024. doi: 10.21608/ijci.2024.288957.1163.

N. Khan, K. Kulkarni, Y. Mahale, S. Kolhar, and S. Mahajan. Waste objects segregation using deep reinforcement learning with deep Q networks. *Ingénierie des Systèmes d'Information*, 29(6):2219–2229, 2024. doi: 10.18280/isi.290612.

V. Kompella, R. Capobianco, S. Jong, K. Browne, S. Fox, L. Meyers, P. Wurman, and P. Stone. Agent-based Markov modeling for improved COVID-19 mitigation policies. *Journal of Artificial Intelligence Research*, 69: 1–13, 2020.

N. Kumar, D. Sinwar, M. Saini, D. K. Saini, A. Kumar, M. Kaur, D. Singh, and H.-N. Lee. Efficient computational stochastic framework for performance optimization of E-waste management plant. *Journal of King Saud University - Computer and Information Sciences*, 34(8):4712–4728, 2022. doi: 10.1016/j.jksuci.2022.05.018.

C.-H. Liao. Exploring social media determinants in fostering pro-environmental behavior: Insights from social impact theory and the theory of planned behavior. *Frontiers in Psychology*, 15, 2024. doi: 10.3389/fpsyg.2024.1445549.

L. T. T. Loan and R. M. Balanay. Towards reinforcing the waste separation at source for Vietnam's waste management: Insights from the Nudge Theory. *Environmental Challenges*, 10:100660, 2023. doi: 10.1016/j.envc.2022.100660.

H. Ma, M. Li, X. Tong, and P. Dong. Community-level household waste disposal behavior simulation and visualization under multiple incentive policies—an agent-based modelling approach. *Sustainability*, 15 (13):10427, 2023. doi: 10.3390/su151310427.

R. Medina-Mijangos, A. De Andrés, H. Guerrero-Garcia-Rojas, and L. Seguí-Amórtegui. A methodology for the technical-economic analysis of municipal solid waste systems based on social cost-benefit analysis with a valuation of externalities. *Environmental Science and Pollution Research*, 28(15):18807–18825, 2020. doi: 10.1007/s11356-020-09606-2.

X. Meng, Z. Wen, and Y. Qian. Multi-agent based simulation for household solid waste recycling behavior. *Resources, Conservation and Recycling*, 128:535–545, 2018. doi: 10.1016/j.resconrec.2016.09.033.

B. Moeini, E. Ayubi, M. Barati, S. Bashirian, L. Tapak, K. Ezzati-Rastgar, and M. Hashemian. Effect of household interventions on promoting waste segregation behavior at source: A systematic review. *Sustainability*, 15(24):16546, 2023. doi: 10.3390/su152416546.

M. R. Mousavi and K. Niazmand. A deep reinforcement learning approach for creating diverse and adaptive agents in agent-based simulations. *SIMULATION*, 97(6):375–389, 2021. doi: 10.1177/0037549720959146.

D. Mu and S. Zhang. The impact of reward–penalty policy on different recycling modes of recyclable resources in residential waste. *Sustainability*, 13(14):7883, 2021. doi: 10.3390/su13147883.

K. Nishimura. How does decentralization affect the performance of municipalities in urban environmental management in the Philippines? *Lex Localis - Journal of Local Self-Government*, 20(4):715–738, 2022. doi: 10.4335/20.4.715-738(2022).

D. B. Olawade, O. Fapohunda, O. Z. Wada, S. O. Usman, A. O. Ige, O. Ajisafe, and B. I. Oladapo. Smart waste management: A paradigm shift enabled by artificial intelligence. *Waste Management Bulletin*, 2(2), 2024. doi: 10.1016/j.wmb.2024.05.001.

S. J. L. Paigalan, D. M. Paigalan, and J. M. R. Zoleta. Knowledge, attitude, and practices on solid waste management among residents of a riverside barangay: Basis for sustainable policies and programs. *Scientia. Technology, Science and Society*, 2(5):3–14, 2025. doi: 10.59324/stss.2025.2(5).01.

Philippine Statistics Authority. Environmental accounts: Solid waste disposal facilities and generated hazardous waste, 2024. Technical report, 2024.

L. Pichardo-Zarate and A. Román-Martínez. Deterministic vs. stochastic optimization in municipal wastewater treatment plants: A comparative analysis. *SSRN Electronic Journal*, 2025. doi: 10.2139/ssrn.5227315.

K. Rajesh and S. R. Kumar. Deep reinforcement learning for urban air quality management: Multi-objective optimization of pollution mitigation booth placement. *IEEE Access*, 13:146504, 2025.

P. Rathore and S. P. Sarmah. Modeling and identification of suitable motivational mechanism in the collection system of municipal solid waste supply chain. *Waste Management*, 129(1):76–84, 2021. doi: 10.1016/j.wasman.2021.05.011.

Republic of the Philippines. Ecological Solid Waste Management Act of 2000, rep. act no. 9003, January 2001. URL `https://www.officialgazette.gov.ph/2001/01/26/republic-act-no-9003-s-2001/`. Philippines.

A. T. Sagodaquil and K. John. Implementation of ecological solid waste management city ordinance: The case of a component city in Southern Negros. *Asian Journal of Education and Social Studies*, 44(1):45–59, 2023. doi: 10.9734/ajess/2023/v44i1955.

Y. Saif, S. Griffiths, and A. Almansoori. Municipal solid waste supply chain management under an integrated optimization of sustainability targets. *Computers & Chemical Engineering*, 160(1):107725, 2022. doi: 10.1016/j.compchemeng.2022.107725.

L. Salsabila, E. P. Purnomo, and H. D. Jovita. The importance of public participation in sustainable solid waste management. *Journal of Governance and Public Policy*, 8(2), 2021. doi: 10.18196/jgpp.v8i2.11519.

R. Santos. A critical analysis of Republic Act No. 9003 Ecological Solid Waste Management Act of 2000. *SSRN Electronic Journal*, 2025. doi: 10.2139/ssrn.5427196.

T. Seno and M. Imai. d3rlpy: An offline deep reinforcement learning library. *Journal of Machine Learning Research*, 23:1–20, 2022.

A. Subedi, S. Shrestha, A. Ghimire, and S. R. Paudel. Leveraging machine learning for sustainable solid waste management: A global perspective. *Sustainable Futures*, 10:101098, 2025. doi: 10.1016/j.sftr.2025.101098.

M. Taraghi and L. Yoder. Integrating the theory of planned behavior in agent-based models: A systematic review of applications of pro-environmental behaviors. *Ecological Modelling*, 508:111231, 2025. doi: 10.1016/j.ecolmodel.2025.111231.

X. Tian, F. Peng, G. Wei, C. Xiao, Q. Ma, Z. Hu, and Y. Liu. Agent-based modeling in solid waste management: Advantages, progress, challenges and prospects. *Environmental Impact Assessment Review*, 110:107723, 2024. doi: 10.1016/j.eiar.2024.107723.

A. E. Torkayesh, H. R. Vandchali, and E. B. Tirkolaee. Multi-objective optimization for healthcare waste management network design with sustainability perspective. *Sustainability*, 13(15):8279, 2021. doi: 10.3390/su13158279.

T. Trushna, K. Krishnan, R. Soni, S. Singh, M. Kalyanasundaram, K. S. Annerstedt, A. Pathak, M. Purohit, C. S. Lundbog, Y. Sabde, S. Atkins, K. C. Sahoo, K. Rousta, and V. Diwan. Interventions to promote household waste segregation: A systematic review. *Heliyon*, 10(2):e24332, 2024. doi: 10.1016/j.heliyon.2024.e24332.

R. Udayakumar, R. Elankavi, V. R. Vimal, and R. Sugumar. Improved particle swarm optimization with deep learning-based municipal solid waste management in smart cities. *Revista de Gestão Social e Ambiental*, 17 (4):e03561, 2023. doi: 10.24857/rgsa.v17n4-022.

United Nations Environment Programme. Global waste management outlook 2024. Technical report, 2024.

J. Villanueva, A. Magsino, F. Hernandez, and A. M. Hernandez. Solid waste management (SWM) conditions, practices, and challenges of select barangays in Lipa City, 2021. URL `https://www.researchgate.net/publication/360176307`. Philippine Association of Institutions for Research, Inc.

D. Vorobeva, I. J. Scott, T. Oliveira, and M. Neto. Adoption of new household waste management technologies: The role of financial incentives and pro-environmental behavior. *Journal of Cleaner Production*, 362(1):132328, 2022. doi: 10.1016/j.jclepro.2022.132328.

X. Wang, Z. Li, and P. Liu. Recycling/production and incentive-penalty strategies in closed-loop supply chains under remanufacturing policies. *Sustainability*, 15(12):9750, 2023. doi: 10.3390/su15129750.

World Bank. *More growth, less garbage*. 2021.

World Bank. Philippines solid waste and plastics roadmap: Accelerating investment and policy reforms.

Technical report, 2022.

World Bank. Clean cities, bright futures: Accelerating investment and reforms in solid waste management in developing countries. Technical report, 2025.

World Health Organization. Compendium on health and environment: Solid waste. Technical report, 2024.

T. Yazawa, K. N. Tablada, K. M. Baring, K. L. Alojipan, and M. Watanabe. Act and reality of the ecological solid waste management act on barangay-level waste management in Barbaza, the Philippines. *Discover Sustainability*, 6(1), 2025. doi: 10.1007/s43621-025-01965-5.

S. Zhang, J. Zhang, Z. Zhao, and C. Xin. Robust optimization of municipal solid waste collection and transportation with uncertain waste output: A case study. *Journal of Systems Science and Systems Engineering*, 31(2), 2021. doi: 10.1007/s11518-021-5510-8.

A. Zhao, L. Zhang, X. Ma, F. Gao, and H. Zhu. Effectiveness of extrinsic incentives for promoting rural waste sorting in developing countries: Evidence from China. *The Developing Economies*, 60(3), 2022. doi: 10.1111/deve.12310.

R. Zheng, M. Qiu, Y. Wang, D. Zhang, Z. Wang, and Y. Cheng. Identifying the influencing factors and constructing incentive pattern of residents' waste classification behavior using PCA-logistic regression. *Environmental Science and Pollution Research*, 30(7):17149–17165, 2022a. doi: 10.1007/s11356-022-23363-4.

S. Zheng, A. Trott, S. Srinivasan, N. Naik, M. Gruesbeck, D. C. Parkes, and R. Socher. The AI Economist: Taxation policy design via two-level deep multiagent reinforcement learning. *Science Advances*, 8(18): eabk2607, 2022b. doi: 10.1126/sciadv.abk2607.