Implementing Ecological Solid Waste Management Under Republic Act No. 9003 in Maramag, Bukidnon

Joseph M. Jatulan*, Dr. Glenne B. Lagura

Professional Schools, University of Mindanao, Davao City, Philippines

***Corresponding Author**

DOI: https://doi.org/10.47772/IJRISS.2026.101100328

Received: 09 November 2026; Accepted: 14 November 2026; Published: 26 November 2026

ABSTRACT

This qualitative case study examined the implementation of Republic Act No. 9003, the Ecological Solid Waste Management Act of 2000, in Maramag, Bukidnon. It described local implementation arrangements, identified barriers to sustained implementation, and examined practices and partnerships that supported service delivery. Guided by Edwards' policy implementation model, the study used semi-structured key informant interviews with barangay officials involved in solid waste management. Thematic analysis compared accounts from participating barangays within the municipal case. Participants identified household segregation as the starting point for scheduled collection, materials recovery, composting, and recycling. Barangay leadership, environmental education, community participation, and coordination with the Municipal Environment and Natural Resources Office and other partners supported these practices. Dologon emphasized monitoring during collection, South Poblacion described an incentive for households to turn in bottles packed with plastic waste, and San Roque emphasized fostering shared responsibility for waste management. Officials consistently reported cleaner surroundings, greater environmental awareness, and increased community participation. Some also reported reduced illegal dumping and perceived improvements in public health. Inconsistent household segregation, limited funding, insufficient equipment and personnel, and collection disruptions during heavy rains or in hard-to-reach areas hindered implementation. The findings indicate that maintaining household segregation depends on regular follow-up and reliable collection and recovery services. The study recommends prioritizing collection and recovery resources, preparing alternate collection arrangements for service interruptions, and tracking segregation compliance, collection interruptions, and quantities recovered. These records would help assess whether the reported practices can be sustained and adapted in other Philippine municipalities with comparable service conditions.

Keywords: barangay governance, ecological solid waste management, policy implementation, qualitative case study, Republic Act No. 9003

Sustainable Development Goals: SDG 11 (Sustainable Cities and Communities) and SDG 12 (Responsible Consumption and Production).

INTRODUCTION

Republic Act No. 9003 requires Philippine local government units to implement ecological solid waste management through segregation, collection, recovery, and appropriate disposal. Section 10 assigns local implementation responsibilities, while Sections 21, 22, and 32 establish requirements for source segregation, separate storage, and materials recovery facilities (Republic Act No. 9003, 2001). These requirements depend on coordination between households, barangays, and municipal services.

Philippine studies describe how implementation varies across local settings. Premakumara et al. (2014) examined how Cebu City implemented the law, including the role of political commitment and public participation. Domingo and Manejar (2021) documented differences in service arrangements and partnerships across local governments. In Maramag, Bukidnon, examining how barangay officials describe implementation

can clarify how local practices connect household sorting to collection and recovery and where these arrangements face recurring constraints.

The study examined three questions. How was RA 9003 implemented in Maramag? What constraints affected continuity? What practices and partnerships supported implementation? Edwards' (1980) policy implementation model guided interpretation through communication, resources, implementer disposition, and bureaucratic structure.

METHODS

Study design and setting

The study used a descriptive qualitative single-case design. The bounded case was the municipal ecological solid waste management system in Maramag, Bukidnon. Barangay accounts provided perspectives within that municipal case.

Participants and data collection

Barangay officials directly involved in solid waste management provided information through semi-structured key informant interviews. The interview guide covered operational practices, governance and coordination, implementation barriers, and practices viewed as effective. Participation was voluntary and the manuscript reports that informed consent was obtained.

Data analysis

The interview accounts were analyzed thematically by grouping related codes and comparing patterns and differences across barangay accounts. Seven records appear in the revised analytical matrix. Two entries list identical Base Camp profiles, so this record total cannot establish the number of distinct informants. The analysis treats reported changes as participant accounts and interprets them within the municipal setting.

RESULTS

Quoted excerpts reproduce the wording in the available English interview records. Respondent codes follow the interview profiles.

The analysis identified seven themes. Table 1 summarizes the practices, outcomes, and constraints described across the case records.

Table 1. Themes in the implementation of RA 9003 in Maramag

Theme	Subthemes	Representative practices or observations
Waste Segregation as Foundation	Segregation, Monitoring, Waste Reduction	Source segregation, compliance monitoring, recycling, composting, MRF
Community Participation	Engagement, Environmental Activities, Sustainability	Participation, cooperation, clean-up drives, recycling, stewardship
Leadership and Governance	Leadership Roles, Program Management, Mobilization	Policy implementation, monitoring, coordination, community support
Environmental Education	Awareness Programs, School-Based Education, Behavioral Change	IEC campaigns, orientations, environmental awareness, habit change
Multi-Stakeholder Collaboration	Partnerships, Sectoral Involvement, Program Support	MENRO, schools, youth groups, volunteers, technical assistance

Theme	Subthemes	Representative practices or observations
Positive Outcomes	Environmental, Social, Health Outcomes	Cleanliness, awareness, participation, reduced dumping, public health
Persistent Challenges	Behavioral, Resource, Environmental Constraints	Non-compliance, funding shortages, manpower limitations, flooding

Waste segregation and recovery

Participants described sorting waste at source before collection. Dologon emphasized checks and reminders during collection, while South Poblacion described inspections, penalties, and an exchange of groceries for bottles filled with compacted plastic waste. The accounts linked sorting with materials recovery facilities, composting, and recycling.

“Barangay officials monitor compliance during collection days and provide reminders to households needing improvement.” (Respondent 1)

Community participation

Officials described household sorting, composting, and recycling alongside public clean-up activities. In San Miguel, these activities illustrated how routine household tasks and collective activities supported the same program.

“Barangay tanods and volunteers assist in inspections and clean-up drives.” (Respondent 2)

Leadership and governance

Barangay officials organized activities, monitored compliance, and coordinated with municipal personnel. San Roque emphasized building shared environmental responsibility. Colambugon described coordination through meetings, training, monitoring, technical assistance, and reporting.

“It is about building a culture of environmental responsibility.” (Respondent 6)

Environmental education

Barangay assemblies, school activities, household visits, orientations, and reminders were used to reinforce sorting practices. Officials continued to report inconsistent segregation despite these efforts.

“Residents are encouraged through barangay assemblies, school activities, information campaigns, house-to-house awareness activities, and regular reminders from barangay officials.” (Respondent 7)

Multi-stakeholder collaboration

The Municipal Environment and Natural Resources Office (MENRO) provided technical support and coordination. Schools, youth groups, and volunteers supported outreach and clean-up activities. Junk shops provided an outlet for some recoverable materials.

“Coordination is done through meetings, trainings, monitoring activities, technical assistance, and submission of reports.” (Respondent 7)

Reported environmental and social outcomes

Officials consistently reported cleaner surroundings, greater environmental awareness, and increased participation. Some accounts also described reduced illegal dumping, cleaner drainage, and perceived health improvements. The records did not include baseline or health indicators to estimate these changes.

"Compared to previous years, fewer incidents of illegal dumping and open burning are observed in our barangay." (Respondent 2)

Persistent implementation challenges

Inconsistent sorting, limited funding, inadequate equipment and staffing, heavy rainfall, and access to remote areas affected service continuity. Officials reported that disruptions could interfere with collection even where residents had established sorting routines.

"Limited budget, manpower, and equipment also affect the efficiency of monitoring, collection, and enforcement activities across puroks." (Respondent 2)

DISCUSSION

In a Manila barangay, Bernardo (2008) found that interviewed households separated PET and glass bottles while leaving other materials mixed. The households interviewed reported no composting. This provides a comparison for Maramag, where officials described sorting across more waste categories and reported composting. The studies drew on different informants, so the comparison illustrates the difference between describing a barangay program and documenting sorting at the household level. In Dologon, collection-day checks offered one way to see whether households separated the waste streams intended for recovery.

Using a system dynamics model for Malolos City, Tinio et al. (2019) projected that combining public participation with an operational materials recovery and composting facility would reduce disposal more than facility operation alone. The model helps explain why the San Miguel account links participation to sorting, composting, and recycling as well as clean-up drives. The projected reduction applies to the modeled Malolos scenarios. The Maramag interviews describe how households contribute to recovery, with the magnitude of their contribution still undetermined.

Domingo and Manejar (2021) documented different local approaches to implementing RA 9003. Teresa, Rizal used clustered services, while San Fernando, Pampanga drew on strong partnerships between local government and civil society. Their analysis identified a need for greater coordination between levels of government alongside local investment in facilities. In Maramag, the San Roque and Colambugon accounts show how this coordination operated through community mobilization, technical assistance, monitoring, and reporting. These activities give concrete meaning to the leadership theme beyond the formal designation of a barangay official.

Trushna et al. (2024) reviewed 82 household waste segregation interventions and found that information and communication were the most common approaches. Differences in intervention design and outcome measurement limited comparisons across settings. In Barangay Calicanto, Treyes et al. (2023) used trials of improved practices to examine how households put waste-management commitments into practice and identified education, household circumstances, and service infrastructure as relevant to behavior change. Together, these findings help interpret Maramag's assemblies, school activities, and household reminders as opportunities to teach practical sorting routines. The continuing accounts of improper sorting leave open whether households could apply those routines consistently.

Wilson et al. (2006) reviewed informal recycling in developing countries and documented its economic contribution alongside occupational and social risks. Bueta et al. (2024) likewise identified informal-sector participation and the division of responsibilities among institutions as unresolved issues in the Philippines' transition toward a circular economy. This literature helps distinguish the role of MENRO, which supports implementation through training and coordination, from that of junk shops, which link recoverable materials to buyers. Their involvement can extend the reach of barangay programs, while the case accounts provide limited detail on the volumes recovered or the conditions under which partners handled materials.

Vinti et al. (2021) reviewed epidemiological research on adverse health outcomes associated with municipal waste management sites and practices. The review identified evidence gaps and limitations in the studies available for several exposures and outcomes. It provides context for treating cleaner surroundings and reduced

dumping as environmental observations relevant to health. The Maramag accounts record officials' perceptions of improved conditions, with no exposure or disease data available to estimate a health effect. Similarly, Tinio et al.'s (2019) projected reductions in disposal and emissions illustrate environmental outcomes that can be assessed quantitatively when appropriate waste-flow data are available.

Bueta et al. (2024) identified continuing gaps in local environmental offices, facilities, and resources despite the national policy framework. Their findings support interpreting Maramag's equipment, staffing, and funding difficulties as constraints on the ability to sustain collection and enforcement. In Butuan City, Burdeos and Amarille (2023) found that awareness of collection schedules and household income were associated with stated willingness to pay for improved waste services. That study assessed willingness to pay, while the Maramag interviews describe operational disruptions. Read together, they show why households' circumstances and the availability of predictable services both matter when interpreting uneven participation.

The findings reflect the four dimensions of Edwards' (1980) model. Education and feedback supported communication. Vehicles, staff, and facilities shaped resources. Leadership and follow-through reflected implementer disposition. Reporting and coordination between barangays and MENRO illustrated bureaucratic structure. The accounts suggest that each dimension influences whether household sorting leads to regular collection and recovery.

Limitations

The study reflects officials' accounts within one municipality. The analytical matrix contains unresolved case-profile and outcome coding discrepancies, including repeated Base Camp details and a San Miguel segregation entry that differs from the reconstructed interview account. The available evidence supports qualitative interpretation of the reported practices. Estimates of diversion, health effects, and sustained performance would require service records, direct observations, or other outcome measures.

CONCLUSIONS AND RECOMMENDATIONS

Source segregation was the common starting point for implementing RA 9003 across the Maramag case records. Participants described scheduled collection, materials recovery facilities, composting, and recycling as ways to put household sorting into practice. Collection-day monitoring in Dologon and the combination of enforcement and incentives in South Poblacion illustrate how barangays applied the same requirement through different local practices.

Barangay leadership, continuing environmental education, and stakeholder collaboration supported implementation. Officials described working with residents, the Municipal Environment and Natural Resources Office (MENRO), schools, volunteers, and recycling partners to organize activities, reinforce sorting routines, and recover materials. Cleaner surroundings, greater awareness, and increased participation were the most consistently reported improvements. The interviews also recorded perceived improvements in public health, with no baseline or health indicators available to estimate their extent.

The continuity of these practices depended on household cooperation and the ability of barangays and the municipality to maintain services. Inconsistent sorting, limited funding, inadequate equipment and staffing, and collection disruptions during heavy rains or in hard-to-reach areas remained barriers. Other barangays could adapt the practices described in Maramag where collection arrangements, recovery capacity, and community participation can support them.

Municipal Government and MENRO. Prioritize funding for collection vehicles, materials recovery facilities, and operating personnel based on barangay service gaps. Work with barangays to identify hard-to-reach sitios, establish alternate collection arrangements during heavy rains, and notify households of schedule changes.

Barangay Councils and Solid Waste Management Committees. Use collection-day checks to identify recurring sorting problems. Give households specific feedback on how to separate waste and follow up on repeated

violations under applicable ordinances. Assign personnel to maintain the materials recovery facility and record materials sent for composting, recycling, and residual disposal.

Schools, Community Groups, and Recovery Partners. Coordinate practical demonstrations on household sorting and composting. Use assemblies, school activities, and clean-up drives to reinforce the same instructions. Agree with junk shops and other recovery partners on the materials they accept and record where those materials are sent.

MENRO and Barangay Monitoring Teams. Use a common reporting form to track collection interruptions, households meeting segregation requirements during checks, quantities recovered, and reported illegal dumping incidents. Review these indicators across collection periods to identify where education, equipment, or route adjustments are needed. Record environmental observations and any public health indicators separately.

Future Researchers. Reconcile participant identifiers and outcome entries with the original interview records before using the case counts in further analysis. Include household perspectives and compare interviews with collection logs, facility records, and direct observations to assess how consistently the reported practices are implemented.

Ethical Considerations

The thesis reports voluntary informed consent and restricted access to interview records. The University of Mindanao Ethics Review Committee (UMERC) approved the study.

Conflict Of Interest

The author declares no conflict of interest.

REFERENCES

1. Bernardo, E. C. (2008). Solid-waste management practices of households in Manila, Philippines. Annals of the New York Academy of Sciences, 1140, 420–424. https://doi.org/10.1196/annals.1454.016
2. Bueta, G. R. P., Domingo, S. N., & Manejar, A. J. A. (2024). Study on circular economy pathways for waste management in the Philippines (Discussion Paper No. 2023-46). Philippine Institute for Development Studies. https://doi.org/10.62986/dp2023.46
3. Burdeos, K., & Amarille, M. (2023). Estimating households' willingness-to-pay for an improved solid waste management in Butuan City, Philippines. Journal of Ecosystem Science and Eco-Governance, 5(1), 24–34. https://doi.org/10.54610/jeseg/5.1.2023.003
4. Domingo, S. N., & Manejar, A. J. A. (2021). An analysis of regulatory policies on solid waste management in the Philippines: Ways forward (Discussion Paper No. 2021-02). Philippine Institute for Development Studies. https://doi.org/10.62986/dp2021.02
5. Edwards, G. C., III. (1980). Implementing public policy. Congressional Quarterly Press.
6. Premakumara, D. G. J., Canete, A. M. L., Nagaishi, M., & Kurniawan, T. A. (2014). Policy implementation of the Republic Act (RA) No. 9003 in the Philippines: A case study of Cebu city. Waste Management, 34(6), 971–979. https://doi.org/10.1016/j.wasman.2013.10.040
7. Republic Act No. 9003, Ecological Solid Waste Management Act of 2000 (2001) (Phil.). https://lawphil.net/statutes/repacts/ra2001/ra_9003_2001.html
8. Tinio, M. M. R., Rollon, A. P., & Moya, T. B. (2019). Synergy in the urban solid waste management system in Malolos City, Philippines. Philippine Journal of Science, 148(1), 73–97. https://philjournalsci.dost.gov.ph/images/pdf/pjs_pdf/vol148no1/synergy_in_the_urban_solid_waste_management_with_APPENDIX.pdf
9. Treyes, A. C., Osorio, E., Tanchuling, M. A., Andal, M. D., Requejo, B., Inocencio, B., & Panopio, C. (2023). Socio-behavioral assessment of household solid waste management: The case of Barangay Calicanto, Philippines. IOP Conference Series: Earth and Environmental Science, 1257(1), Article 012008. https://doi.org/10.1088/1755-1315/1257/1/012008

10. Trushna, T., Krishnan, K., Soni, R., Singh, S., Kalyanasundaram, M., Annerstedt, K. S., Pathak, A., Purohit, M., Lundborg, C. S., Sabde, Y., Atkins, S., Sahoo, K. C., Rousta, K., & Diwan, V. (2024). Interventions to promote household waste segregation: A systematic review. Heliyon, 10(2), Article e24332. https://doi.org/10.1016/j.heliyon.2024.e24332
11. Vinti, G., Bauza, V., Clasen, T., Medlicott, K., Tudor, T., Zurbrügg, C., & Vaccari, M. (2021). Municipal solid waste management and adverse health outcomes: A systematic review. International Journal of Environmental Research and Public Health, 18(8), Article 4331. https://doi.org/10.3390/ijerph18084331
12. Wilson, D. C., Velis, C., & Cheeseman, C. (2006). Role of informal sector recycling in waste management in developing countries. Habitat International, 30(4), 797–808. https://doi.org/10.1016/j.habitatint.2005.09.005
13. World Bank. (2021). Market study for the Philippines: Plastics circularity opportunities and barriers. https://www.worldbank.org/en/country/philippines/publication/market-study-for-philippines-plastics-circularity-opportunities-and-barriers-report-landing-page