

ANALYSIS OF ENVIRONMENT-BASED WASTE MANAGEMENT POLICY (CASE STUDY: KALIBOBO URBAN VILLAGE, NABIRE DISTRICT, NABIRE REGENCY)

Isak O. Tebai¹, Lazarus Ramandei², Rasi Kasim Samosir³

¹ Department of Urban and Regional Planning, Faculty of Engineering, Universitas Cenderawasih, Jayapura, Indonesia

² Department of Urban and Regional Planning, Faculty of Engineering, Universitas Cenderawasih, Jayapura, Indonesia

³ Department of Urban and Regional Planning, Faculty of Engineering, Universitas Cenderawasih, Jayapura, Indonesia

Email: chakyte@gmail.com

E-ISSN : 3109-9777

Received: April 2026

Accepted: April 2026

Published: April 2026

Abstract:

Waste management remains a critical challenge in developing regions of Eastern Indonesia, particularly in Kalibobo Urban Village, Nabire District, Central Papua Province. This study analyzes the availability of waste management facilities and the implementation of environment-based waste management policy in Kalibobo. A qualitative descriptive approach was employed through field observations, interviews, and secondary data from BPS and the Environmental Agency (DLH) of Nabire Regency. Findings reveal that Kalibobo serves a population of 15,185 residents (3,796 households) with only one waste container far below the SNI 3242:2008 standard requiring 8–19 units. Service coverage is estimated at less than 20% of the village area. The 3R (Reduce, Reuse, Recycle) implementation rate is critically low at approximately 6%, and no TPS3R or waste bank exists. A significant policy-implementation gap is identified between national targets (30% waste reduction, 70% waste handling by 2025) and on-the-ground realities. The study recommends urgent infrastructure expansion, institutionalization of community-based 3R programs, and acceleration of the 2025–2026 DLH Roadmap to achieve sustainable and environment-based waste management.

Keywords: waste management policy, 3R principles, SNI 3242:2008, environment-based management, Nabire

INTRODUCTION

Solid waste management has become one of the most pressing challenges for cities and developing regions across Indonesia, particularly in Eastern Indonesia where infrastructure and institutional capacity remain limited. Kalibobo Urban Village in Nabire District, Central Papua Province, exemplifies a community grappling with an inadequate waste management system despite the existence of a comprehensive national regulatory framework. Accumulated waste at residential areas, markets, and main roads signals that existing policies have not translated into effective local practice.

Initial observations and community reports confirm the absence of adequate Temporary Waste Collection Points (TPS), rampant illegal dumping, and low community participation in waste sorting or management. Furthermore, the Environmental Agency (DLH) fleet and operational personnel are insufficient to ensure routine collection to the Final Disposal Site (TPA



Karadiri), posing risks of environmental pollution and public health hazards (Hoornweg & Bhada-Tata, 2012).

National policy mandates a holistic approach. Law No. 18 of 2008 on Waste Management requires integrated management from source reduction through safe final disposal. Presidential Regulation No. 97 of 2017 (Jakstranas) sets ambitious national targets: 30% waste reduction and 70% waste handling by 2025. Government Regulation No. 27 of 2020 adds provisions for specific waste types. Despite these regulatory instruments, their operationalization at the sub-district and urban village level remains largely aspirational in Kalibobo.

As Dunn (2018) argues, policy analysis is not merely descriptive but evaluative examining the actual impact of policies on communities and their alignment with sustainability and environmental justice values. Drawing on Grindle's (1980) implementation theory and Mazmanian and Sabatier's (1983) framework, this study evaluates both structural and social determinants of policy success in a remote Eastern Indonesian context.

Existing research from comparable Indonesian settings highlights the importance of local actor involvement and physical facility availability (Wonda, 2021; Tambunan, 2023; Yulianto & Fauzi, 2022), yet studies specifically addressing environment-based waste policy implementation in Central Papua remain absent. This study fills that gap by: (1) assessing the availability of waste management facilities in Kalibobo against SNI 3242:2008 standards; and (2) analyzing the implementation of environment-based waste management policies and their implications for local governance.

RESEARCH METHOD

This study employs a qualitative descriptive approach (Sugiyono, 2017; Creswell, 2013), appropriate for examining real-world policy contexts in depth. The research was conducted from December 2025 to April 2026 in Kalibobo Urban Village, covering all 11 sub-districts of Nabire District: Klaso, Makbon, Klayili, Maudus, Sayosa, Sayosa Timur, Sunook, Klasafet, Saengkeduk, Moraid, and Selemkai.

Primary data were gathered through: (1) direct field observation of TPS locations, waste collection flows, and illegal dumping sites; (2) semi-structured interviews with key informants including the Head of DLH Nabire, the Chief of the Waste Management Division, sub-district heads, and six community members; and (3) photographic documentation. Secondary data were obtained from BPS Nabire Regency (population data, facility inventory), the DLH 2025–2026 Roadmap, and RTRW Nabire 2023–2042.

Data analysis followed the Miles, Huberman, and Saldana (2014) model data reduction, display, and conclusion-drawing. Findings were evaluated against two analytical frameworks: (1) SNI 3242:2008 technical standards for residential waste management; and (2) the 3R implementation matrix assessing Reduce, Reuse, and Recycle dimensions. Policy-implementation gaps were assessed using Dunn's (2018) five-stage policy analysis model.

FINDINGS AND DISCUSSION

Availability of Waste Management Facilities

Kalibobo Urban Village has a total population of 15,185 residents (3,796 households), yet only one waste container is available for the entire village. Based on SNI 3242:2008, one TPS should serve a maximum of 200–500 households; the village therefore requires a minimum of 8–19 units. Current service coverage is estimated below 20% of the village area, leaving the majority of residents without accessible waste disposal facilities.

Table 1. Inventory of Waste Management Facilities in Kalibobo Urban Village

No	Facility Type	Available	SNI Standard	Status
1	Waste Container / TPS	1 unit	8–19 units (1 per 200–500 HH)	Non-Compliant – critical shortage
2	Collection frequency	2×/week	Min. 2×/week	Compliant – but insufficient given volume
3	Distance to nearest TPS	>1 km (most residents)	Max. 500 m	Non-Compliant
4	Waste sorting / segregation	Not available	Mandatory at source	Non-Compliant
5	TPS3R / Waste Bank	None	Required	Non-Compliant
6	Final Disposal Site (TPA)	Open dumping (Karadiri)	Sanitary landfill	Non-Compliant

Source: Researcher evaluation, 2025; SNI 3242:2008

The single container, located in front of Kalibobo Market, is chronically overflowing. During field observation, waste was found blocking adjacent roads for extended periods occasionally months due to infrequent collection. In 2024, two containers operated at two different sites; by 2025 only one remained, representing a regression rather than improvement. Community interviews confirmed that residents resort to burning household waste in their yards or depositing it along roadsides, raising concerns about air pollution and drainage obstruction (Informant 3, July 18, 2025).

Comparison with other urban villages in Nabire District reveals that Kalibobo has the lowest TPS availability despite being among the most densely populated areas. This finding aligns with Wonda (2021), who documented similar facility deficits in Jayapura, attributing them to budget constraints and weak spatial planning integration.

Waste Management System

The waste management system in Kalibobo follows a centralized, single-point collection model. Residents carry waste to the sole container at Kalibobo Market; the DLH truck collects when the container is full, without a fixed

schedule aligned to population density. No sorting, composting, or 3R processing occurs prior to disposal.

Table 2. Waste Collection and Transportation Schedule, Kalibobo Urban Village

Collection Point	Frequency	Transportation Mode	Destination
Kalibobo Market container	2×/week (when full)	DLH dump truck	TPA Karadiri (open dump)
Roadside informal points	Irregular	Same truck, extra trips	TPA Karadiri

Source: Field survey and DLH interviews, 2025

The Hotel-Restaurant-Café (HoReCa) sector generates a significant share of organic waste estimated at 57% of total waste composition in Nabire. Were this fraction processed through composting or Black Soldier Fly (BSF maggot) cultivation, it would yield monthly economic value estimated between IDR 15–20 million per month for Kalibobo alone. Currently, this potential is entirely untapped.

Environment-Based Waste Management Policy

The national regulatory framework is relatively comprehensive, spanning from Law No. 18/2008 through SNI 3242:2008. However, a substantial gap persists between policy intent and local realization.

Table 3. Policy-Implementation Gap Analysis, Kalibobo Urban Village

Policy / Regulation	National Target	Kalibobo Reality	Gap
Perpres 97/2017 - Jakstranas	30% waste reduction by 2025	<5% reduction achieved	Critical - 25%+ shortfall
Perpres 97/2017 - Jakstranas	70% waste handling by 2025	<20% handling coverage	Critical - 50%+ shortfall
SNI 3242:2008	1 TPS per 200–500 HH	1 TPS for 3,796 HH	Non-compliant - ~8× deficit
UU 18/2008 - 3R mandate	Systematic 3R from source	~6% 3R implementation	Extremely low - near zero

Source: Researcher analysis, 2025

The DLH Nabire has developed a 2025–2026 Roadmap for TPA Karadiri optimization, including road access improvement (Phase 1, 2025) and installation of leachate treatment, methane gas handling, and heavy equipment (Phase 2, 2026). An education and outreach program targeting schools, PKK groups, and micro-enterprises is also planned. These commitments signal political will; however, their implementation within the study period has yet to materialize meaningfully in Kalibobo.

SNI 3242:2008 Compliance and 3R Implementation

Evaluation against SNI 3242:2008 across nine parameters shows that only collection frequency meets the standard (approximately 80% compliance). All

other parameters waste container availability, service distance, waste sorting, processing facility quality, public waste bins, and TPA type are non-compliant.

The 3R implementation matrix assessment yields an overall score of approximately 6 out of 100, categorized as Very Low. No structured Reduce campaigns, Reuse programs, waste banks, TPS3R facilities, or composting initiatives exist. Only sporadic informal reuse (e.g., used bottle repurposing, second-hand clothing exchange) and informal recycling via waste collectors were documented. This figure is dramatically below the national 30% target and far behind best-practice benchmarks: Rawajati (Jakarta) at 65%, Sukunan (Yogyakarta) at 72%, and Tanjungsari (Surabaya) at 68%.

Table 4. Comparison with Waste Management Best Practices

Location	3R Rate	Waste Bank	TPS3R	Community Participation	Population
Kalibobo, Nabire	6%	None	None	None	15,185
National Target	30%	Required	Required	Required	-
Rawajati, Jakarta	65%	5 active	Yes	Active	45,000
Sukunan, Yogyakarta	72%	8 active	Yes	Very Active	12,500

Source: Compilation from various sources, 2024–2025

Enabling and Constraining Factors

Several enabling factors provide a foundation for improvement: (1) a comprehensive regulatory framework from national to local level; (2) documented government commitment through the 2025–2026 Roadmap; (3) high organic waste potential (57% of total waste composition) amenable to composting and BSF maggot processing; and (4) an emerging environmental awareness among a subset of the community.

Constraining factors include: (1) severe infrastructure deficit (single TPS, open-dump TPA, no sorting facilities); (2) very limited DLH operational budget; (3) low community knowledge, attitude, and practice (KAP) regarding waste sorting and 3R; and (4) weak enforcement of local regulations. The KAP analysis reveals that community knowledge of waste impacts and management techniques is low, attitudes are predominantly apathetic or permissive, and current practices involve illegal dumping and open burning.

Table 5. Policy Recommendation Matrix Based on Existing Conditions and SNI Standards

No	Existing Condition	SNI Standard	Policy Recommendation
1	Very few public waste bins	Available in public areas	Add adequate public waste bins at key public locations
2	1 container for 3,796 HH	3–5 containers per TPS (m ³)	Add minimum 7–8 TPS units; ensure SNI-compliant container sizes

3	Irregular collection schedule	Min. 2×/week	Enforce regular schedule; increase to 3–4×/week in dense areas
4	Open dumping (TPA Karadiri)	Sanitary landfill	Accelerate Phase 1 and 2 Roadmap to convert to controlled/sanitary landfill
5	No TPS3R or waste bank	TPS3R / waste bank required	Establish at least 1 TPS3R unit and 1 community waste bank with economic incentives
6	No waste sorting	Mandatory sorting at source	Pilot household sorting program; distribute two-bin sets (organic/inorganic) per RT

Source: Researcher analysis, 2025

The interaction between enabling and constraining factors creates a complex dynamic. Strong regulation, when paired with severe infrastructure deficits and weak institutional capacity, yields a compliance paradox: policies are legally sound yet operationally inert. This mirrors findings by Yulianto and Fauzi (2022) in Malang and Sembiring and Nitivattananon (2010) in Bandung, reinforcing the argument that policy outcomes in Eastern Indonesian contexts require context-specific, adaptive implementation strategies rather than uniform top-down directives.

CONCLUSION

This study demonstrates that waste management in Kalibobo Urban Village is in a critical state, characterized by a profound gap between national policy mandates and local implementation realities. Kalibobo serves 15,185 residents with a single waste container representing an approximately eight-fold deficit against SNI 3242:2008 requirements and service coverage below 20%. The 3R implementation rate of approximately 6% stands in stark contrast to the 30% national reduction target. Eight of nine SNI parameters are non-compliant, with only collection frequency meeting minimum standards.

Despite a comprehensive national regulatory framework and the government's 2025–2026 DLH Roadmap reflecting genuine political will, progress is constrained by infrastructure limitations, budget shortfalls, weak community KAP, and inadequate law enforcement. The untapped potential of organic waste (57% of total composition) represents both a challenge and an opportunity for community-based economic empowerment through composting and BSF maggot programs.

This study recommends: (1) immediate addition of 7–8 TPS units and enforcement of a regular collection schedule; (2) establishment of at least one TPS3R unit and one community waste bank with economic incentives; (3) accelerated implementation of TPA Karadiri's Phase 1–2 Roadmap toward controlled/sanitary landfill; (4) structured monthly community education campaigns integrated with existing social programs; and (5) a participatory study on sub-district readiness within the broader waste management

governance structure. Future research should conduct detailed economic valuation of each leading waste sub-sector to strengthen the evidence base for resource allocation.

REFERENCES

- Brundtland Commission. (1987). *Our Common Future: Report of the World Commission on Environment and Development*. Oxford: Oxford University Press.
- Creswell, J. W. (2013). *Qualitative Inquiry & Research Design: Choosing Among Five Approaches* (3rd ed.). Thousand Oaks, CA: SAGE Publications.
- Dunn, W. N. (2018). *Public Policy Analysis: An Integrated Approach* (6th ed.). New York: Routledge.
- Geng, Y., & Doberstein, B. (2008). Developing the circular economy in China: Challenges and opportunities for achieving 'leapfrog development'. *International Journal of Sustainable Development & World Ecology*, 15(3), 231-239.
- Government of Indonesia. (2008). Law No. 18 of 2008 on Waste Management. Jakarta.
- Government of Indonesia. (2017). Presidential Regulation No. 97 of 2017 on the National Policy and Strategy for Household and Similar Waste Management (Jakstranas). Jakarta.
- Government of Indonesia. (2020). Government Regulation No. 27 of 2020 on Specific Waste Management. Jakarta.
- Grindle, M. S. (1980). *Politics and Policy Implementation in the Third World*. Princeton, NJ: Princeton University Press.
- Hoorweg, D., & Bhada-Tata, P. (2012). *What a Waste: A Global Review of Solid Waste Management* (Urban Development Series, Knowledge Papers No. 15). Washington, DC: World Bank.
- Mazmanian, D. A., & Sabatier, P. A. (1983). *Implementation and Public Policy*. Glenview, IL: Scott Foresman.
- Miles, M. B., Huberman, A. M., & Saldana, J. (2014). *Qualitative Data Analysis: A Methods Sourcebook* (3rd ed.). Thousand Oaks, CA: SAGE Publications.
- Odum, E. P. (1996). *Ecology: A Bridge Between Science and Society*. Sunderland, MA: Sinauer Associates.
- Rhodes, R. A. W. (1996). The new governance: Governing without government. *Political Studies*, 44(4), 652-667.
- Sembiring, E., & Nitivattananon, V. (2010). Sustainable solid waste management toward an inclusive society: Integration of the informal sector. *Resources, Conservation and Recycling*, 54(11), 802-809.
- SNI 3242:2008. National Standard for Residential Solid Waste Management. National Standardization Agency of Indonesia (BSN).
- Sugiyono. (2017). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Bandung: Alfabeta.
- Suharto, E. (2006). *Analisis Kebijakan Publik: Panduan Praktis Mengkaji Masalah dan Kebijakan Sosial*. Bandung: Alfabeta.

- Tambunan, E. (2023). Community collaboration with village government in waste management: A case study in Kupang City. *Jurnal Kebijakan Publik dan Pembangunan*, 11(2), 45-62.
- Wonda, A. (2021). Analysis of urban waste management in Jayapura: Education and infrastructure challenges. *Papua Journal of Environmental Studies*, 5(3), 112-130.
- Yulianto, B., & Fauzi, A. (2022). Factors influencing waste management policy implementation at urban village level: A case study in Malang. *Jurnal Administrasi Publik*, 20(1), 87-104.