

## ORIGINAL ARTICLE

# The Existence of Waste Management Policies on the Attitudes and Behaviors of Coastal Communities in the Jember Regency, Indonesia

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## ABSTRACT

**Introduction:** Marine pollution caused by rubbish has become a global issue. To address it, the collaboration of all segments of society, including economic actors and the government, as well as comprehensive management, is required. Waste management policies serve as guidelines and control instruments that ensure efficient and effective waste management strategies. Community participation is integral to the implementation of these policies. The objective of this research is to analyze the implementation of waste management policies in the coastal areas of Jember Regency, Indonesia. **Materials and methods:** The study employed both quantitative and qualitative approaches. Primary information on the community's knowledge, attitudes, and behaviors in relation to waste management, as well as the implementation of waste management policies, was gathered from the community in the research area. The research involved the coastal community of Puger Kulon Village in Jember Regency. **Results:** Over 75% of the community demonstrated good knowledge and attitudes toward waste management. However, less than 65% exhibited proper waste management behavior. The waste management policy implementation was less than optimal, which was attributed to limited funds, insufficient assistance, and inadequacies in regulatory enforcement. **Conclusion:** The implementation of waste management policies in Puger Kulon Village was suboptimal, as evidenced by the community demonstrating no positive behavior toward waste management. Optimal policy execution requires well-defined regulations, government support, and continuous supervision and monitoring.

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## INTRODUCTION

Indonesia boasts extensive coastal areas, along with their significant economic potential, providing ample opportunities for coastal communities to earn prosperity. Marine commodities and their processed products

become economically valuable when multiple parties, such as the community, government, and industry, show an interest. Issues, on the other hand, arise when coastal areas are not properly managed, leading to various adverse consequences, including marine pollution. In the long run, mismanagement of coastal resources leads to the depletion of marine commodities and marine biota, impacting the strength, food resilience, and, ultimately, well-being of coastal communities.

Marine pollution, particularly when it involves hazardous

microplastics, affects both humans and marine biota in coastal areas. Coastal area management policies play a considerable part in its occurrence, where a lack of coordination in coastal area management leads to an increase in the marine pollution level. However, the government has been insufficient in running its policy-making function in addressing this issue. The transfer of authority over coastal area management from district to provincial governments, as outlined in Law No. 23 of 2014 on Regional Governments, has intensified policy conflicts. Future coastal area management is expected to provide the necessary platform for participatory engagement to minimize these conflicts (1), keeping in mind that coastal area management is an important government strategy to enhance community well-being. The government in its capacity as a policymaker serves as a reference in resolving the marine pollution issue. However, the community still faces confusion regarding the policy implementation. This lack of understanding on the community's part results in problems related to permit arrangements, overlaps in the management of different fish auction places, and misinformation on public services related to marine and coastal management (2). In Jember Regency, the absence of targeted government policies addressing the issue of marine pollution in coastal areas raises concerns to many.

Waste pollution is a serious issue both nationally and globally, with plastic being the most prevalent type of accumulated waste. Plastic waste, which does not readily decompose in the short term, ends up being accumulated in landfills, coastal areas, and wherever it is found. To address this issue, plastic is often burned or buried. Recent reports have revealed that uncontrolled plastic burning on the Indonesian island of Java has resulted in a new form of pollution, contaminating the environment with the formation of a mixture of sedimentary particles and plastic known as plastiglomerate, stored in river and sea waters along the coast of Java (3). Various plastic pollutants classified by size and form, including megaplastics, macroplastics, mesoplastics, and microplastics, are distributed across ecosystems. The most widely dispersed primary and secondary forms of plastic in water, sediments, and various aquatic organisms are microplastics, with concentrations ranging from 0.001 to 140 particles/m<sup>3</sup> in water and from 0.2 to 8766 particles/m<sup>3</sup> in sediment in various aquatic environments worldwide. The accumulation rate in coastal and marine organisms ranges from 0.1 to 15,033 counts (4). This aligns with our research findings regarding the detection of microplastics in the digestive systems of fish and clams caught in the waters of Puger District, Jember Regency, East Java (5). Coastal waste not only affects marine ecosystems but also human life in terms of health, economics, and long-term environmental consequences, with plastic being a major hazardous pollutant (6).

Plastic pollution primarily originates from land-based sources, while others result from maritime activities, such as fishing and cruise ship operations. Land-based waste typically comes from indiscriminate waste disposal, poorly managed landfill sites, wastewater overflow, agricultural runoff, and industrial discharge entering rivers (7). Plastic waste in the sea from land-based origins, such as port operational activities, fish auctions, residential activities, tourism, and various economic endeavors, accounts for over 75% of all plastic waste accumulated in the sea (4). This issue of plastic pollution needs to be comprehensively addressed through multi-stakeholder collaboration. Strategies to reduce plastic waste should be implemented in an integrated manner, covering the entire process from source to disposal. Indonesia has set national targets for the management of waste, including plastic, aiming to reduce waste at its source by 30%, effectively manage 70% of waste, and decrease marine plastic waste by 70% by the year 2025 (8). Classification of plastic waste constitutes a crucial step to waste reduction, essential to ensuring efficient management.

Efficient waste management strategies and environmentally friendly waste practices can enhance the government's image, minimize environmental impacts (by considering waste collection and transportation), reduce costs (by avoiding special orders from suppliers), improve stakeholder relations, lessen environmental responsibilities and risks, and provide health and other safety benefits. Therefore, it is crucial to establish public policies that can be implemented as guidance in waste management. Clear definitions of waste and its various types have been outlined in Law Number 18 of 2008 on Waste Management. However, waste management in coastal areas still falls into a gray area, with a lack of clear regulations regarding the roles and responsibilities of coastal waste management, resulting in ineffective waste management. The interconnectedness of terrestrial, coastal, and marine environments, as recognized in source-to-sea approaches, is crucial to achieving successful waste management, where issues with waste management on land can lead to problems in coastal and marine waste management due to the interdependence of these ecosystems (6).

The waste pollution occurring in the coastal areas of Jember Regency compromises marine commodities and marine biota, thus harming the food security of the local communities living in these areas. This further impacts the well-being of these communities, both directly and indirectly. This study seeks to analyze the waste management policy implementation in the coastal areas of Jember Regency. To be precise, it attempts to identify relevant policies essential to proper waste management control and supervision, emphasizing important policy recommendations based on findings in the form of a policy model, supported by a relevant policy brief

tailored to the reality of the study areas, to improve community welfare.

## MATERIALS AND METHODS

### Study Design

Qualitative and quantitative methods were used in this field research.

### Location and Population

This research was conducted in Puger Kulon Village, Puger District, Jember Regency, East Java, Indonesia. Primary data were collected through a series of interviews with key informants who were involved in the waste management in Puger Kulon Village, including those from the Jember Regency government, Puger Kulon Village government, private companies, village-owned enterprises (BUMDes), and community tourism groups (Pokdarwis), as well as several community leaders and other relevant community members.

### Sample Size

The purposive sampling technique was used to collect data qualitatively and quantitatively. Because the population used in this study was specific (i.e., the population in Puger Kulon Village who lived near the coast and fish auction places), this sampling technique was considered effective. The sample size was calculated using the Slovin formula, following several criteria. Based on the calculation result, a sample size of 30 was used.

### Data Collection

In this study, primary data were collected through a series of interviews and a questionnaire survey involving several stakeholders, including prominent figures and community members. A questionnaire with a Likert's scale was employed to measure respondents' attitudes toward the issue under study. The data obtained were used to answer the research problems.

### Data Analysis

This research focused on policy implementation and policy evaluation. Public policy analysis was carried out to address fundamental social problems. Recommendations based on the findings of this research are expected to provide a practical guide for decision makers in solving problems.

### Ethical Clearance

This research has been approved by the Medical Research Ethics Committee of the Faculty of Dentistry of the University of Jember, with ethical approval No. 2805/UN25.8/KEPK/DL/2024.

## RESULTS

The research was conducted in the coastal areas of Jember Regency involving 60 respondents, as detailed

below:

### Characteristics of Respondents

**Table I: Respondent identity**

Respondent identity	Percentage (%)
Age Category	
20 – 29 years old	11.8
30 – 39 years old	30.7
40 – 49 years old	40.25
50 – 59 years old	4.5
Gender	
Male	53.4
Female	46.6
Total	100

Based on Table I, the 40–49 years age group had the highest number of respondents participating in this research, and males outnumbered females. Age and gender were positively correlated with the generation of waste in certain areas, with those of productive age and the female gender being the largest contributors to waste generation. Lifestyle and varying levels of needs also contributed to differences in the levels of waste generation.

### Knowledge about Waste Issues

**Table II: Percentage of the community providing correct answers regarding waste management knowledge**

Variabel	Percentage (%)
<b>waste management knowledge</b>	
Definition of Waste	90
Types of Waste	97.5
Characteristics of Waste	88.4
Waterproof Waste Bin	87.5
Covered Waste Bin	95
Waste Bin Separation	95
Separation of Waste by Type	97.5
Temporary Waste Storage	87.95
Waste Incineration	82.5
Reduce	92.5
Reuse	97.5
Recycle	97.5
Replace	85
Impact of Foul Odor from Waste	100
Waste as a Source of Diseases	100
Waste as a Breeding Ground for Vectors	100
Positive Impacts of Waste Management	85.6
Waste Management into Compost	100
Economic Value of Waste	90
Separation of Waste Types in Landfills	95
Negative Impacts of Waste Management on Landfills	95
Importance of Recycling Training Activities for Residents	100

Based on Table II, the respondents had very good knowledge about the management of waste in coastal areas, with an average respondent providing over 70% correct answers. From the questionnaire responses,

it is evident that the community possessed a strong understanding of waste management. This solid knowledge is expected to serve as a catalyst in promoting proper waste management behavior. The study suggests that increased knowledge can alter attitudes, but the steps to improve behaviors and practices depend on a complex set of social and psychological factors.

### Attitudes and Behaviors of the Community toward Waste Management

**Table III: Community attitudes towards and behaviour waste management**

Variabel	Percentage (%)
<b>Community attitudes towards waste management</b>	
Disposal of Garbage in Waste Bins	82
Separation of Waste	73.5
Collection of Waste by Type	94.5
Efforts to Reduce Waste	89.5
Efforts to Reuse Waste	97
Efforts to Recycle Waste	97.5
Combination of Types of Waste	62.5
Advising Others when Littering	97.5
Not Littering	97.5
No Littering at Home	92.5
The Importance of Education on Waste Management	99.5
Critical Attitude Towards Waste Issues in the Surrounding Environment	100
Negative Impacts of Waste on Residents	90
<b>Community behavior in waste management at the household level</b>	
Environment around the Respondent's Home has a Waste Bin	92.5
Environment around the Respondent's Home has a Covered Waste Bin	68.4
Environment around the Respondent's Home has a Waterproof Waste Bin	61.15
Number of Waste Bins > 1	70.7
Environment around the Respondent's Home has Separate Waste Bins (Organic and Inorganic)	55.7
Respondent Engages in Waste Separation	63.2
Family Members of the Respondent Engage in Waste Separation	51.15
Family Members of the Respondent Remind Others to Separate Waste	65.7
Respondent Collects Garbage in its Designated Area	87.95
Family Members of the Respondent Always Clean the Home Yard	100
Respondent Engages in Reusing Waste	49.55
Forms of Reusing Waste: Composting, Creating Souvenirs	32.7
Burning	67.3

Based on Table III, the community seems to have a very positive attitude toward waste management. All responses to the questionnaire exceeded 50%, indicating

support for proper waste disposal, waste sorting, waste collection by type, and waste recycle and reuse, and even the willingness to reprimand those who littered. This positive attitude toward waste management is expected to have an impact on waste management behavior. It is evident that the community had been attentive to waste management. This was apparent in the provision of waste bins at homes, the collection of garbage in designated areas, and family members reminding each other to dispose of waste properly.

### Behaviors in Managing Tourist Destinations

**Table IV: Behavior in managing tourist destinations**

Variable	Percentage (%)
<b>Behavior in managing tourist destinations</b>	
Availability of Waste Bins	62.5
Waste Bins Can Accommodate All Types of Waste	67.95
Availability of Waste Sorting	18.85
Waste Sorted into Wet and Dry Categories	63.35
Organic and Inorganic Waste	36.65
Waste Bins Proximity to Waste Generators	58.2
Waste Bins Provided at Every Facility	66.15
Waste Bins Equipped with Covers	63.85

Based on Table IV, waste management in tourist areas along the coast of Jember Regency was adequate, as evident in the availability of properly and sufficiently functioning waste bins.

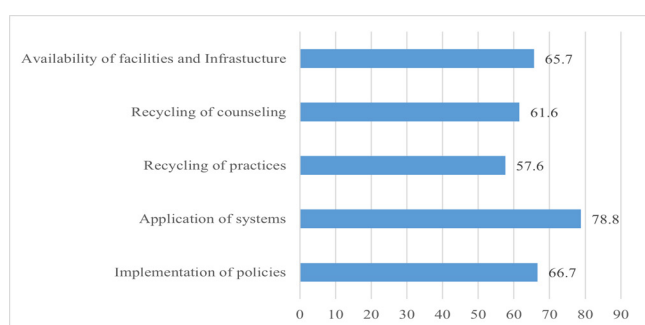
### Policies Supporting Waste Management

**Table V: Policies supporting waste management and Policy implementation**

Variabel	Percentage (%)
<b>Policies supporting waste management</b>	
Infrastructure provision	12.8
Large-scale funding	36.8
Government commitment	30
Units in the cleanliness sector	15
Human resources	74.1
Institutionalization	60.45
Legislative regulations (laws)	46.35
Technology utilization	71.8
Landfill location	72
<b>Policy implementation</b>	
Existence of waste management technology	41.8
Village as a regulatory center	61.5
Prospective waste recycling business	46.35
Waste management assistance	43.85
Investors	21.1
Community participation	65.5
Existence of waste management technology	41.8

As shown in Table V, waste management policies were demonstrating a positive and progressive development. It was evident in the availability of waste management human resources, the involvement of government and non-government institutions in waste management, the application of advanced technologies, and the support for the placement of final disposal sites. The involvement of

policy makers is expected to have an impact on the overall waste management. Indicates positive development of waste management policies. Concrete steps were taken to support waste management, including community engagement in waste management, making the village the policy center, and providing technological and other assistance for waste management. The participation of various parties in policy implementation is key to creating sustainability in environmental management. Successful implementation of policies is reliant on the active participation of the community. To achieve success in policy implementation, the implementation of various waste management programs should be accompanied by adequate facilities, mentoring, and legal enforcement in case of violations, to name just a few. The community's perceptions on policy implementation is illustrated in Figure 1.



**Figure 1: Public Perception of Policy Implementation**

Based on Figure 1, 66.7% of the community agreed with the involvement of the community in the implementation of waste management policies. However, the implementation of waste management was perceived to be poor, with 78.8% of the community pointing out inadequate waste disposal. It can also be seen in the figure above that 57.6% of the community had yet to engage in plastic waste recycling. However, activities aimed at raising public awareness of waste were still considered essential, as seen in 61.6% of the community emphasizing the importance of periodic waste awareness campaigns. Additionally, 65.7% of the community supported the provision of suitable and adequate waste disposal facilities and infrastructure.

#### **Evaluation of waste management policies based on communication, coordination, and collaboration indicators**

Evaluation of waste management policy implementation identified some problems due to deviations in the implementation of the policies, as shown in a few indicators. First, ineffective policy communication not only limits the knowledge of village government staff as policy implementers about what and how policies are implemented but also leads to gaps in team skills and knowledge. Communication between stakeholders is not well-established, which hinders smooth implementation of the policies. Second, there is conflict in the implementation of waste management policies

between the policy implementers and the policymaker (i.e., the village government). Third, ineffective policy communication results in a negative attitude among the stakeholders toward the policies that have been made by the village government, hampering the collaboration between the government, community, and private sector in waste management. Fourth, low abilities, knowledge, and skills in relation to waste management in terms of how it is carried out are responsible for ineffective communication, coordination, and collaboration.

## **DISCUSSION**

### **Characteristics of respondents**

Waste management is influenced by gender and age. Several studies have shown that women are more concerned about waste management, especially at the household level. This is because household responsibilities related to waste and waste disposal are directly linked to women, who often lack sufficient funds to allocate for waste management. Meanwhile, men may view domestic waste and its disposal as women's responsibility, making waste management not their priority. In addition, women's heavier workload indicates that they have less leisure time. While men may think that one centralized waste disposal site is sufficient, women may prefer several smaller ones that are more easily accessible. Women are more involved in waste management at the household level, while men are more likely to have access to institutions authorized with setting priorities and making decisions about city infrastructure. Due to these differences, gender, in addition to age, influenced how respondents responded to the research questionnaire.

### **Knowledge about waste issues**

Essentially, waste is the byproduct of human activities or natural processes that is not economically valuable and may even generate a negative economic value if mishandled or relocated, resulting in substantial costs. Waste management is a phased activity aimed at transforming waste into other forms that are more useful and environmentally safe. How it is implemented is outlined in various government regulations, including Government Regulation No. 81 of 2012 on the Management of Household Waste and Its Likes. Waste management includes waste reduction, which encompasses limiting waste accumulation, recycling, and reusing waste, and waste handling, which involves sorting and grouping waste by type, disposing of waste in temporary landfill sites, and transporting it to final processing facilities. Waste management is not solely the responsibility of the government; the community and businesses, as waste generators, must also take responsibility for protecting and maintaining a clean and healthy environment. Addressing waste issues requires good collaboration between these parties.

One aspect of waste management is to manage the

transformation of environmental attitudes, behaviors, and ethics of the community. Behavior refers to all activities that can be observed directly or indirectly, representing responses or reactions to external stimuli. It is divided into three domains for ease of measurement: knowledge, attitudes, and actions (13).

Environmental knowledge is considered a crucial predictor of waste management behavior. Therefore, the understanding and knowledge of the public regarding waste sorting and recycling are seen as essential to waste management, beginning with independent waste sorting and rational resource usage (14). Some researchers state that household waste sorting behavior is a consequence of residents' active waste management, influenced by internal individual characteristics, such as attitudes, responsibility, and behavioral control (15). Behaviors, opinions, and attitudes that are valued and reinforced are more likely to be repeated and eventually incorporated into personal values and routine behaviors.

Knowledge plays a significant role in an individual's daily activities, especially in accepting various things through the media or directly from others. If the adoption of new behaviors is based on knowledge, awareness, and positive attitudes, then those behaviors are likely to endure. Conversely, if behaviors are not based on knowledge and awareness, they are less likely to persist. Thus, the educational level of the community is assumed to reflect the influence of attitudes and behaviors on overall personal development and community participation in daily activities. Knowledge is a cognitive component of behavior. Therefore, the goodness or badness of a behavior must start from basic motivation (13).

#### **Attitudes and behaviors of the community toward waste management**

Community involvement in waste management is crucial. As approximately 80% of the total urban waste is generated by households, each household plays a significant role in reducing the amount of waste that accumulates at landfills. Community involvement in waste sorting programs is a form of ecocentric behavior. This behavior stems from humans' inability to live without other living beings and non-living entities, positioning humans not only as members of a social community but also members of an ecological community (16). Their waste disposal behavior is an important factor of environmental pollution. Littering dirties the environment. On the other hand, proper waste management will not only keep the environment clean but also ease the financial burden of the government in handling waste.

Attitude is an individual's reaction or response to stimuli or objects. It has three main components: evaluation, the object of attitude, and the tendency to act on the object. Habits emerge due to the decrease in the response

process to repeated stimuli (17). This process gives rise to new patterns of behavior that are relatively permanent and automatic. In other words, attitude influences an individual's behavior, as demonstrated by numerous studies, although some others provide evidence of a less clear relationship between both (13). However, attitude is not necessarily manifested in action. This is because several supporting factors, such as facilities, support from others, experience, environment, and motivation, are necessary for its manifestation (18). In the context of community life, the level of community attitudes is suspected to be influenced by the level of community knowledge, mirroring Otto's notion of the relationship between attitudes and knowledge level (19). Attitudes, knowledge, thoughts, beliefs, and emotions all play a crucial role. Attitude is defined as an evaluative response, which can only emerge when an individual faces a stimulus that generates a reaction. Put otherwise, it refers to the emergence of a reaction caused by the individual's evaluation process.

"The community's attitude toward waste management is a key component in shaping community behavior. The community can positively accept waste management by accommodating proposals from local governments, even if they have not been implemented. The government and community leaders play a crucial role in encouraging others to understand the importance of waste management practices in riverbank areas. Attitude is a tendency to provide positive or negative responses to an object through persuasive approaches, role models, or social group influences (20)."

Behavior is a component in the structure of attitudes, meaning that an individual's behavior or behavioral tendency is associated with the object of attitudes. Behavioral beliefs shape the way the community acts on waste management practices (21). These beliefs become stronger in line with attitudes that are grounded in the perception that waste management will result in a clean and healthy environment. The community's beliefs regarding facilities that support waste management behavior, such as temporary disposal sites (TPS) as well as sanitation workers in charge of daily waste disposal, are instrumental to motivation or intention regarding waste management.

Research findings indicate that the community's perceptions on waste management significantly influence the environment. People with a positive perception on waste management will avoid causing environmental pollution. Conversely, those who perceive waste management negatively will be indifferent about their behavior and pollute the environment without remorse. The community's participation in waste management is influenced by its characteristics in terms of education, income, attitudes toward the environment, perception, understanding, and willingness, as well as the characteristics of its residential environment, such as the

yard size and other environmental conditions (22).

The community's behavior toward waste management is reflected in household waste management practices. Household waste control strategies are essential to optimizing the waste management measures taken by the government. Households are the most significant source of waste generation and a primary target for waste reduction efforts (23). At the household level, understanding the sources and types of waste, along with data on the quantity and composition of waste generation, forms the basis for formulating strategies for managing waste (22).

In general, household waste is predominantly composed of organic waste, accounting for around 60%. Household organic waste can be utilized to generate economic value from its processing into organic fertilizers (24), while household inorganic waste generates economic value through recycling and submission to waste banks (25). Effective management of both organic and inorganic waste can reduce the need for disposal in landfills (22). Proper waste management behavior at the household level can significantly reduce the generation of waste, particularly inorganic one like plastic.

#### **Behaviors in managing tourist destinations**

The design of garbage bins is associated with waste disposal behavior. The design of waste disposal signs also influences the assessment of waste classification, where the use of icons or images enhances waste sorting performance. Visual messages also have an impact on waste sorting. In addition, the design of waste disposal slots improves waste separation efficiency (26). Every visitor to a tourist destination should have awareness about garbage. Disposing waste in garbage bins provided by the tourist destination manager will certainly impact the environment around the tourist destination in a positive way, allowing other visitors to feel comfortable at the tourist destination.

Waste bin preferences were investigated, focusing on various types (for wrappers, plastic, aluminum, glass, glass bottles, and paper) and designs (by color, shape, slot position, and arrangement style) of waste bins. The most preferred design is colorful, rectangular multi-bins with front positioning for accommodating wrappers, plastic, and paper (27). Using more than one waste bin increases waste separation efficiency by 1.80 times compared to using a single waste bin (28). Additionally, the way the waste bins are arranged also influences waste disposal behavior (29).

The formation and change of attitudes are interrelated. Society continually adopts, modifies, and demonstrates attitudes to align with evolving needs and interests. Attitudes cannot be easily altered through simple education. Thoughtful rewards and reinforcement increase the likelihood of individuals repeating desired

attitudes and can serve as an incentive for others to adopt such attitudes. Often, our attitudes toward the environment or politics stem from persuasive information and communication (30).

#### **Policies supporting waste management**

Recommendations and infrastructure provision related to waste management in Jember Regency are regulated under Jember Regency Regulation Number 9 of 2021. The government, as the primary stakeholder, is obligated to provide and maintain cleaning facilities and infrastructure. In addition, Government Regulation Number 81 of 2012 requires that local governments, including the Jember Regency government, provide guidance on waste management. Local governments should collaborate with businesses and the community in providing facilities and infrastructure for waste management. They should also provide technical assistance concerning the use and development of waste management infrastructure and facilities. Meanwhile, the funding for waste management is regulated under Presidential Regulation Number 97 of 2017 on the National Policy and Strategy for the Management of Household Waste and Its Likes. The funds are allocated from the State Budget (APBN), Regional Budget (APBD), and other funding sources.

The issuance of policies regarding waste management implies a form of commitment and responsibility on the part of the government. The stipulations on technical implementations in these policies serve as the primary references for the implementation of waste management. These policies also address the management of cleanliness units on the regency or city scale, including the application and development of incentive and disincentive systems in waste reduction, the construction and revitalization of regency or city landfill sites, and the development of models for sorting household waste and other waste similar to it, with specific targets in each sector unit.

Human resource development related to waste management is regulated under Presidential Regulation Number 97 of 2017, which concerns the strategy for reducing and handling household waste and other waste similar to it. The development of human resources, according to this regulation, is carried out through the enhancement of leadership capacity, institutional strengthening, and other human resource development initiatives. These programs should involve the advocacy for waste reduction and management, including processes such as sorting, collection, transportation, processing, and final disposal. The involvement of both governmental and non-governmental institutions, as well as other civil elements, reflects a decentralized governance pattern that considers the interests of multiple actors.

According to Government Regulation Number 81 of

2012, the purpose of waste management policies is to preserve the functions of the environment and public health and to transform waste into renewable resources. It supports the goal of environmental management and protection stipulated in Law Number 32 of 2009, that is, to ensure human safety, the continuity of life, and the attainment of environmental harmony. Government Regulation Number 81 of 2021 further outlines the use and development of waste management technology. Developments in waste management should involve research and the application of technology in line with national and regional policies.

Government Regulation Number 81 of 2012 states that waste management from waste generation to disposal at landfill sites is the responsibility of all parties. Local governments, as the main stakeholders, function as facilitators. Additionally, this regulation provides technical guidelines regarding landfill site locations, landfill operations, and other aspects of waste management at landfill sites. Presidential Regulation Number 97 of 2017 emphasizes that on-the-ground implementation of landfill development, management, and revitalization requires synergy between the central government and local governments.

### **Policy implementation**

The implementation and enforcement of waste regulations and conventions are significantly hindered by a lack of good governance, poor transparency, and prevalent corruption. Low community awareness, participation, and appreciation for environmentally conscious waste management practices also set major obstacles.

In both villages under study, designated final waste disposal sites were nowhere to be found. Waste, primarily from the market or fish auction places, was disposed of at the beach, somewhat distant from residential areas. Residents disposed of their waste either on their own property or at waste collection points near the beach.

### **Public perceptions on policy implementation**

Based on Figure 1, people disposed of waste indiscriminately wherever they might be without any legal consequences. They did not adhere to proper waste disposal regulations, despite the instalment of warning signs. This implies the government's leniency or, in some cases, lack of action against improper waste disposal among the community.

According to Lauwo (2005), community-based organizations (CBOs) are crucial tools for the improvement of waste management, and effective law enforcement is the most effective way to integrate these organizations to realize strong waste management. This indicates that full community involvement and participation in waste management, coupled with rigorous law enforcement, are key to the success of waste management. Improving

community satisfaction with waste management will lead to everyone making efforts and demonstrating ownership in waste management (31).

This research observed that the village government was inadequate in implementing the waste management system, resulting in the disposal of waste in household yards or other open areas. Waste from the market and fish auction places was dumped on the beach, far from residential areas. The recycling system, particularly for plastic, had yet to be effectively established, leading to indiscriminate disposal of various types of waste, although some residents voluntarily scavenged plastic waste such as water bottles and shampoo containers for sale.

Waste education, which covers the 4Rs (reusing, reducing usage, recycling, and replacing), is crucial as it can drive community awareness and sustainably prevent the accumulation of waste, especially plastic. Additionally, the government's commitment to implementing waste management must involve providing facilities and infrastructure for waste management, which will considerably benefit the reduction of waste disposal at random locations.

Kalwani's study on community participation in municipal solid waste management in informal settlements in Morogoro Municipality, Tanzania, revealed that effective community participation was hindered by a lack of organization, mobilization, and coordination within the local community, including in managing community empowerment resources (32). Lindi Municipality may also share this situation if it lacks proper organization, mobilization, and coordination in addressing waste management (31).

### **Drawbacks and limitations of this study**

Problems with data mining arose from conflicts between stakeholders, causing the information obtained to be biased and reducing the data's suitability for the study. In addition, the use of a small sample prevented the conduct of in-depth interviews to enrich the research results.

### **CONCLUSION**

The waste management policy implementation in Puger Kulon Village was still poor, with the community showing no positive behavior toward waste management. Optimal policy implementation requires enforcement and support from the government, accompanied by continuous supervision and monitoring. Policy recommendations for waste management in Puger Kulon Village include the need for a comprehensive evaluation to build sustained coordination for effective communication, minimize conflicts within the waste management team, achieve effective and coordinated decision-making. A clear division of tasks and authority

will be beneficial for teamwork. A commitment to work together and a positive attitude among team members will improve coordination and collaboration, resulting in the establishment of productive and solid relationships and ultimately effective policy implementation.

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