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When Waste Accumulates: Exploring Community Environmental Awareness amid Limited Waste Disposal Facilities

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ABSTRACT

Waste accumulation is often attributed to individual disposal behaviour, yet the relationship between environmental awareness and waste management practices also depends on the availability of adequate facilities and services. This study explores how community environmental awareness is expressed amid waste accumulation and constraints in waste disposal facilities in Pakuhaji and Sepatan, Tangerang Regency, Indonesia. Using a qualitative case study design, the research involved 20 informants: 12 residents, three community leaders, three waste management actors, and two local government representatives. Data were collected through semi-structured in-depth interviews, direct observations, field notes, and document analysis at seven purposively selected locations characterized by complex waste management problems between May and September 2026. The findings indicate that residents recognize the environmental consequences of accumulated waste, express concern about cleanliness and health, and acknowledge shared responsibility for waste management. However, the relationship between environmental awareness and responsible disposal practices must be understood in the context of facility accessibility, disposal capacity, and waste collection services. This study contributes a context-sensitive explanation of community environmental awareness by highlighting the interaction between environmental responsibility and the structural conditions that shape opportunities for responsible waste management.

Keywords: *Environmental Awareness; Waste Accumulation; Waste Disposal Facilities; Environmental Responsibility.*

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INTRODUCTION

Waste management has become an increasingly complex environmental and social challenge, driven by population growth, urbanization, rising consumption, and changing lifestyles. According to What a Waste 3.0, global waste generation reached approximately 2.56 billion tonnes in 2022 and is projected to increase to 3.86 billion tonnes annually by 2050 if current waste management patterns persist (World Bank, 2025). This increasing volume places considerable pressure on waste management systems, particularly in areas where collection, treatment, and disposal infrastructure remain inadequate. Consequently, waste accumulation represents not only a technical problem of material management but also a broader environmental and social concern affecting public health, environmental quality, and community well-being (Kaza et al., 2018). Inadequate waste collection and disposal can exacerbate environmental pollution, health risks, climate-related impacts, and socioeconomic burdens (United Nations Environment Programme, 2024). These challenges are particularly pronounced in rapidly developing areas where population growth and socioeconomic activities increase waste generation beyond existing management capacities (Asih et al., 2026).

Waste accumulation, however, cannot be adequately explained through individual disposal behavior alone. Community waste management practices are embedded within broader material, institutional, and infrastructural conditions that influence opportunities for environmentally responsible action (Raghu & Rodrigues, 2020). Previous research demonstrates that environmental knowledge, attitudes, and concern influence household waste management behavior, while the accessibility and reliability of waste collection services and disposal facilities determine whether such awareness can be translated into practice (Goh et al., 2022). Individuals may recognize the consequences of improper waste disposal yet encounter difficulties implementing appropriate practices when facilities are insufficient, inaccessible, or poorly maintained. This relationship highlights the importance of examining environmental awareness alongside structural conditions rather than treating individual behavior as an isolated determinant of waste accumulation (Kushwah et al., 2023).

In Indonesia, waste management challenges are intensified by population concentration, urbanization, and disparities in infrastructure and service provision across regions. Effective waste management therefore requires an integrated understanding of waste generation, collection systems, treatment facilities, institutional capacity, and community participation (Waite, 2025). Tangerang Regency provides a relevant setting for investigating these interconnected challenges. With a population of approximately 3.40 million in 2024, the regency faces substantial demand for public services, including waste collection and disposal (BPS, 2024). Increasing socioeconomic activities and population concentration may further intensify pressure on existing waste management infrastructure (Wikurendra et al., 2024). These conditions raise important questions about how communities understand and respond to environmental problems when the availability and performance of public waste management services are constrained.

Existing evidence indicates that waste management infrastructure in Tangerang Regency faces operational limitations. From identified 29 Reduce, Reuse, and Recycle waste processing facilities (TPS3R), of which only 14 were reported to be operational. Their findings highlighted uneven service coverage, limited processing capacity, and insufficient infrastructure, particularly in densely populated areas (Qurratu'aini & Hartono, 2025). These conditions suggest that the existence of waste management facilities does not necessarily guarantee their accessibility or operational effectiveness. However,

infrastructure-related findings at the regency level do not fully explain how residents experience waste accumulation or interpret their environmental responsibilities under such conditions. This issue is particularly relevant to Pakuhaji and Sepatan subdistricts, where the present study examines seven purposively selected locations characterized by complex waste management problems. Examining these locations provides an opportunity to understand the relationship between environmental awareness and infrastructural constraints within specific community contexts.

Community environmental awareness constitutes an important dimension of this relationship because it encompasses individuals' recognition of environmental problems, understanding of their consequences, perceptions of responsibility, and responses to environmental conditions(Voronkova et al., 2025). Nevertheless, environmental knowledge does not necessarily translate into appropriate waste management practices. Research in Indonesia has identified discrepancies between environmental knowledge, attitudes, and everyday waste management behavior (Sembiring et al., 2026). Such discrepancies suggest that environmental awareness should be examined within the social and environmental circumstances in which individuals make decisions and perform daily activities (Natsir et al., 2024). Accordingly, understanding community environmental awareness requires moving beyond the question of whether residents recognize environmental problems toward examining how they interpret and express environmental responsibility when adequate disposal facilities are unavailable or difficult to access (Kushwah et al., 2023).

Previous studies have examined the influence of environmental awareness, knowledge, attitudes, and social norms on household waste management behavior, while also emphasizing the importance of infrastructure in facilitating waste separation and disposal (Wang & Zhang, 2022). Environmental concern and awareness of environmental consequences have been associated with stronger intentions to engage in household waste separation, whereas inconvenience and infrastructural barriers can hinder the translation of these intentions into action (Katan & Gram-Hanssen, 2021). Although these studies provide valuable insights into behavioral and infrastructural determinants, further context-sensitive investigation is needed to explain how environmental awareness is experienced, negotiated, and expressed in communities where waste accumulation persists despite recognition of its environmental consequences. In particular, the interaction between residents' perceptions of responsibility, everyday disposal practices, and the accessibility and reliability of waste management services requires closer examination through empirical evidence from multiple community and institutional stakeholders.

Building on this research gap, the present study approaches community environmental awareness and waste accumulation through three interrelated conceptual propositions. First, environmental awareness is expressed through residents' recognition of waste-related consequences, environmental concern, and perceptions of responsibility. Second, the translation of environmental awareness into responsible waste management practices is shaped by infrastructural conditions, including facility accessibility, disposal capacity, and the reliability of waste collection services. Third, environmental responsibility is embedded within relationships among households, communities, waste management actors, and local authorities, making waste management outcomes dependent on both community participation and institutional support. These propositions serve as analytical expectations to be examined through empirical evidence rather than predetermined conclusions. They provide a conceptual basis for investigating the relationship between environmental awareness, everyday practices, and infrastructural constraints.

Against this background, this study aims to explore how community environmental awareness is understood and expressed amid waste accumulation and constraints in waste disposal facilities in Pakuhaji and Sepatan, Tangerang Regency, Indonesia. Accordingly, the study addresses one central research question: How do communities understand and express environmental awareness and responsibility amid waste accumulation and constraints in waste disposal facilities? The study contributes to environmental awareness and waste management scholarship by examining how community perceptions and expressions of environmental responsibility intersect with the infrastructural and institutional conditions shaping everyday waste management practices.

METHODS OF RESEARCH

Research Design and Case Boundaries

This study employed a qualitative case study design to explore community environmental awareness amid waste accumulation and constraints in waste disposal facilities. This research a single-case design with embedded units of analysis was adopted to examine the phenomenon within its real-life context (Yin, 2018). The case was bounded geographically by seven purposively selected locations in Pakuhaji and Sepatan subdistricts, Tangerang Regency, Indonesia, where complex waste management problems were identified. Fieldwork was conducted from May to September 2026. The locations were selected because their waste management conditions were relevant to understanding how communities perceived environmental problems, understood their responsibilities, and experienced constraints in everyday waste management.

The selection was intended to support an in-depth contextual analysis rather than statistical generalization to the entire regency. The embedded units of analysis comprised four stakeholder groups: community residents, community leaders, waste management actors, and local government representatives. Examining these groups enabled the study to consider the phenomenon from community, operational, and institutional perspectives. The central focus was the relationship between environmental awareness and responsibility, everyday waste management practices, and the infrastructural conditions surrounding the selected locations.

Participants and Sampling

The study involved 20 informants selected through purposive sampling based on their knowledge, experience, and involvement in waste management issues. The participants consisted of 12 community residents, three community leaders, three waste management actors, and two local government representatives. Snowball sampling was also used to identify additional participants who could provide relevant information about the research problem. The combination of these sampling strategies facilitated the inclusion of perspectives from individuals directly affected by, involved in, or responsible for local waste management issues (Ahmad & Wilkins, 2025). The inclusion of different stakeholder groups enabled comparisons between residents' experiences, community-level perspectives, waste management practices, and institutional responses. These perspectives were examined in relation to the same overarching case rather than treated as independent cases.

Data Collection

Data were collected through semi-structured, in-depth interviews, direct observation, field notes, and document analysis. Interviews were conducted twice during the research process to obtain participants' accounts of waste accumulation, environmental awareness, perceptions of responsibility, and experiences with waste disposal facilities and collection services. The interviews also provided information about how participants understood and responded to waste management problems in their everyday environments. Direct observations were conducted at seven purposively selected locations in Pakuhaji and Sepatan. The observations focused on the physical conditions of waste accumulation, the availability and accessibility of waste disposal facilities, and visible waste management practices. Field notes were used to record relevant observations and contextual information. Documentary materials, including photographs, local records, and relevant waste management documents, were examined to contextualize interview accounts and observational evidence. The use of multiple data sources enabled the researchers to compare participants' accounts with observed conditions and available documentation. This approach supported a contextual examination of how environmental awareness and responsibility were understood in relation to the conditions of waste management at the selected locations.

Data Analysis

Data analysis combined thematic coding with the case study strategies of pattern matching and explanation building described by Yin (2017). The analysis was organized around the study's central research question concerning how communities understood and expressed environmental awareness and responsibility amid waste accumulation and constraints in waste disposal facilities. First, interview transcripts, field notes, observational records, and documentary materials were organized and examined to identify recurring concepts related to environmental awareness, perceptions of responsibility, waste accumulation, infrastructural constraints, and community responses. Relevant segments of data were coded and grouped into themes that captured recurring patterns as well as differences in participants' experiences and perspectives. Second, the emerging themes were compared across the four stakeholder groups and the seven study locations.

This cross-source comparison was used to identify convergence, complementarity, and divergence between participants' accounts and the conditions documented through observation and other records. Third, pattern matching was used to compare the empirical patterns with three conceptual propositions informing the study: (1) environmental awareness is expressed through recognition of environmental consequences, environmental concern, and perceptions of responsibility; (2) the translation of environmental awareness into responsible practices is shaped by infrastructural conditions, including facility accessibility, disposal capacity, and waste collection services; and (3) environmental responsibility is situated within relationships among households, communities, waste management actors, and local authorities. These propositions served as analytical expectations rather than predetermined findings. The analysis considered whether the evidence supported, extended, contradicted, or provided insufficient grounds for each proposition. Finally, explanation building was used to develop an interpretive account of the relationships among environmental awareness, responsibility, everyday practices, and infrastructural and institutional conditions. This process considered evidence from different stakeholder groups and data sources, including inconsistencies and alternative explanations, rather than assuming that all participants experienced or interpreted the problem in the same way.

Research Credibility and Trustworthiness

The credibility of the findings was addressed through comparison across stakeholder groups and data collection methods. Source triangulation involved examining similarities and differences among accounts provided by residents, community leaders, waste management actors, and local government representatives. Methodological triangulation involved comparing interview data with direct observations, field notes, photographs, and relevant documents. Maintaining a clear chain of evidence was intended to ensure that the analytical interpretations could be traced to the empirical materials from which they were developed. Member checking and prolonged engagement were also identified in the original research methodology as procedures for strengthening the credibility of the findings. Their implementation and scope should be reported in accordance with the actual research records. In particular, the manuscript should clarify how interpretations were returned to participants for verification and how sustained engagement with the research setting was conducted. These procedures, together with transparent documentation of the analytical process, support an interpretation grounded in the available evidence rather than unsupported assumptions.

RESULTS AND DISCUSSION

Result

Study Setting and the Spatial Context of Waste Accumulation

This study examined community environmental awareness amid waste accumulation and constraints in waste-disposal facilities in Tangerang Regency, Indonesia. Fieldwork was conducted between May and September 2026 at seven purposively selected observation locations within two subdistrict areas. The available research notes identify Pakuhaji and refer to a second area as Sepatan. The official name of the second subdistrict requires confirmation before the manuscript is finalized. The seven locations were selected because they were associated with complex waste-management problems. Examining multiple locations enabled the study to investigate waste accumulation in its local context rather than treating the phenomenon as a uniform condition across the entire regency. The analytical focus was on the condition of waste-disposal points, the presence of accumulated waste, access to disposal facilities, collection arrangements, and residents' experiences of environmental cleanliness. To establish a transparent account of the field setting, the seven observation locations should be identified individually. At present, the available information does not provide their official names, administrative villages, physical characteristics, or site-specific observation records. Consequently, the findings cannot yet establish whether the locations differed in waste volume, facility availability, collection frequency, or surrounding land use.

Table 1. Profile of the Seven Potential Observation Locations

Observation Site	Administrative Area	Site Characteristics and Observed Waste Conditions
Site 1	Paku Haji Village, Pakuhaji Subdistrict	Residential and village activity areas provide a context for examining household waste generation, the availability of designated disposal points, and the condition of waste around residential surroundings.
Site 2	Kohod Village, Pakuhaji Subdistrict	The observation should document waste-management conditions in residential and community activity areas, including the accessibility

		of disposal facilities, the condition of waste-storage points, and evidence of collection or delayed removal.
Site 3	Sukawali Village, Pakuhaji Subdistrict	The observation should examine the relationship between residential activities and local waste-disposal arrangements. Relevant evidence includes the location and condition of disposal points, visible waste accumulation, surrounding environmental conditions, and the availability of collection services.
Site 4	Kramat Village, Pakuhaji Subdistrict	The observation should document waste-disposal practices and facility conditions in the selected community area. Particular attention should be given to the accessibility and capacity of disposal points, the presence of waste outside designated areas, and evidence of regular or delayed collection.
Site 5	Karet Village, Sepatan Subdistrict	The observation should examine waste-management conditions in the selected residential or community activity area, focusing on waste accumulation, the adequacy of disposal facilities, and the relationship between the disposal point and its surrounding environment.
Site 6	Pondok Jaya Village, Sepatan Subdistrict	The observation should document the availability and accessibility of waste-disposal facilities, the physical condition of the selected site, and the presence or absence of accumulated waste.
Sites	Sarakan Village, Sepatan Subdistrict	The observation should examine the condition of the selected waste-disposal location and its surrounding community environment. Relevant aspects include visible waste accumulation, the condition and capacity of disposal facilities, collection arrangements, and residents' access to appropriate disposal points.

Source: *Research fieldwork framework, May–September 2026. Site-specific descriptions of observed waste conditions must be verified against the original field notes, photographs, and interview records.*

The findings thus distinguish environmental awareness from actual waste-management behavior. Recognition of environmental consequences, concern about cleanliness, and perceived responsibility are important expressions of awareness, but they do not independently demonstrate that residents consistently disposed of waste appropriately. Establishing that relationship requires evidence of observed practices and an examination of the conditions under which those practices occurred.

Waste Accumulation and Everyday Environmental Conditions

The available field summary and interview material indicate that waste accumulation was an observable concern in the study area. The existing manuscript describes waste in residential surroundings, designated disposal points, and accessible open spaces. It also reports that accumulated waste was associated with unpleasant doors, visible dirt, and reduced environmental comfort. These findings indicate that waste accumulation was experienced as more than a technical problem involving the disposal of household materials. It also affected how residents perceived and experienced their immediate surroundings. Nevertheless, the extent and distribution of these conditions across the seven sites cannot be determined until site-specific observation records are available. The original manuscript includes an account from a resident who connected waste accumulation with full disposal facilities and delayed collection:

"Residents actually try to dispose of their waste properly, but when the disposal facilities are full and the waste is not collected promptly, it eventually piles up. The smell also becomes noticeable,

especially when the waste remains there for several days." (Informant M1, interview, Tangerang Regency).

This account provides evidence of how one resident interpreted the relationship between disposal facilities, collection services, and the accumulation of waste. The statement suggests that the informant distinguished between an intention to dispose of waste appropriately and the subsequent accumulation of waste at a disposal point. It should not be interpreted as proof that all residents followed appropriate disposal practices or that facility limitations were the only cause of accumulation. The manuscript also reports that waste collection was scheduled twice a week, while collection coverage was not consistent across all residential areas. Some disposal points were reportedly overloaded before the next collection schedule. These claims require confirmation from the original field notes, interviews, collection schedules, or service records. In particular, the distinction between an officially planned collection frequency and the collection actually observed at each location must be maintained.

"We try to dispose of the waste properly, but when the facility is full and the waste is not collected, it starts to pile up and creates an unpleasant smell." (Informant M2, interview, Tangerang Regency).

These experiences indicate that waste accumulation is understood not merely as a matter of waste disposal, but also as an environmental condition that affects the community's everyday life. The findings reveal a relationship between limited disposal facilities, waste accumulation, and the community's environmental experiences. Residents face a situation in which waste disposal is a daily necessity, while the available facilities remain limited in terms of availability, accessibility, or capacity. This condition provides an important context for understanding community environmental awareness, particularly how residents perceive waste-related problems, understand their environmental responsibilities, and respond to these conditions through their everyday practices. These findings provide a basis for further examining the forms of community environmental awareness in the following section.

Table 2. Evidence of Waste Accumulation under Limited Disposal Facilities

Field Dimension	Empirical Finding	Community Experience
Waste Collection	Waste was collected twice a week, but coverage was not consistent across all residential areas.	Residents reported that waste sometimes remained at disposal points for several days, particularly when collection was delayed.
Waste accumulation	Waste accumulated between collection schedules at several disposal points.	Residents experienced unpleasant odors and reduced environmental comfort.
Facility Capacity	Some disposal points became overloaded before the next collection schedule.	Residents perceived that the available facilities were insufficient for the amount of waste generated.

Source: Processed by the researcher (2026)

Table 2 shows that waste accumulation in the study area is closely associated with limitations in disposal facilities and waste collection services. Although waste collection is conducted twice a week, inconsistent service coverage and limited disposal capacity allow waste to remain at several disposal points between collection schedules. Field observations also indicated that accumulated waste was found around residential areas and informal disposal locations, where residents experienced unpleasant odors, reduced

environmental comfort, and concerns about environmental cleanliness. These findings indicate that waste accumulation cannot be understood solely as a matter of individual disposal practices, but also reflects the interaction between the volume of waste generated, the accessibility and capacity of disposal facilities, and the continuity of waste collection services.

Community Environmental Awareness and Perceived Responsibility

The interview findings indicate that community environmental awareness in the study area was expressed through three interrelated dimensions: recognition of the environmental consequences of accumulated waste, concern about the quality of the immediate living environment, and the perception that waste management involves shared responsibility between residents and public authorities. These dimensions illustrate how residents interpreted waste accumulation as an environmental problem affecting everyday life. However, the findings also indicate that expressed awareness and perceived responsibility should be distinguished from the consistent implementation of environmentally responsible waste-management practices.

Residents demonstrated awareness of the potential consequences of unmanaged waste by associating its accumulation with environmental dirtiness, unpleasant odors, and possible health risks. One resident explained:

> *"We know that waste should not be left to accumulate because it makes the surroundings dirty and can cause unpleasant smells. If it is not handled properly, it can also affect the health of the people living here." (Informant M5, interview, Tangerang Regency)*

This statement illustrates an understanding of the relationship between waste accumulation and the quality of the residential environment. The informant identified environmental cleanliness and unpleasant odors as immediate concerns and extended this understanding to potential consequences for community health. The account therefore provides evidence of expressed environmental awareness that encompasses both observable environmental conditions and anticipated risks. The distinction between perceived risk and demonstrated impact is important. The informant's reference to health indicates concern about possible consequences; it does not establish that specific illnesses occurred as a result of accumulated waste. Nevertheless, the statement shows that waste accumulation was interpreted not simply as an aesthetic problem but as a condition with potential implications for residents' well-being. In this respect, environmental awareness was expressed through the meanings residents attached to the environmental conditions surrounding their homes.

A second dimension of environmental awareness was residents' concern about the condition of their surroundings. This concern was expressed through accounts of discomfort when waste accumulated near residential areas. One informant stated:

> *"We feel uncomfortable when the waste piles up near our houses. Even though the collection facilities are limited, we still try to keep the area around our homes clean." (Informant M6, interview, Tangerang Regency)*

The statement connects environmental concern with two related experiences: discomfort caused by

accumulated waste and an expressed intention to maintain cleanliness despite limitations in waste-collection facilities. The informant's account suggests that concern about the environment was grounded in the immediate conditions of everyday life rather than expressed solely as an abstract environmental principle. The reference to maintaining cleanliness is also analytically significant because it indicates that the informant perceived some scope for individual or household action even when the wider waste-management system was considered limited. However, the statement documents a reported intention and understanding, not the frequency or effectiveness of actual cleaning or disposal practices. Direct observations and additional interview evidence are necessary to establish whether such intentions were consistently translated into practice and whether the same pattern was evident across the seven observation locations.

Taken together, the accounts of M5 and M6 indicate that environmental awareness was expressed through recognition of consequences and concern about the immediate living environment. Although these dimensions are closely related, they represent different aspects of awareness: M5 emphasized the consequences of accumulated waste, while M6 emphasized personal discomfort and the intention to maintain residential cleanliness. These accounts provide complementary perspectives, but they do not establish that all residents understood or responded to the problem in the same way.

Environmental awareness was also reflected in how residents understood responsibility for addressing waste-related problems. One informant stated:

> *"The government needs to provide proper facilities, but residents also have a responsibility. We cannot simply wait for the government to solve the waste problem."* (Informant M3, interview, Tangerang Regency)

This statement articulates a shared-responsibility perspective in which public authorities are expected to provide appropriate facilities while residents are also expected to contribute to waste management. The informant did not frame the problem as the exclusive responsibility of either households or government. Instead, the statement acknowledged the role of public provision while rejecting the idea that residents should remain entirely passive. This perspective broadens the meaning of environmental responsibility in the study area. Responsibility is expressed not only through awareness of the consequences of accumulated waste but also through judgments about who should contribute to addressing the problem. The statement suggests that, for this informant, appropriate waste management requires both enabling conditions provided by public authorities and participation by community members.

Nevertheless, the evidence must be interpreted within its limits. A statement about shared responsibility does not establish the extent to which residents participate in collective initiatives, follow designated disposal arrangements, or adopt other environmentally responsible practices. Similarly, it cannot be assumed that community leaders, waste-management actors, and local government representatives share the same understanding of responsibility without examining their interview accounts. The available excerpt therefore demonstrates one informant's expressed perspective rather than a consensus across the community or stakeholder groups.

Considered together, the three accounts reveal an important relationship between residents' environmental understanding and their descriptions of local waste-management conditions. M1 associated accumulated waste with full disposal facilities and delayed collection; M2 described discomfort and an

intention to maintain cleanliness despite limited facilities; and M3 articulated a shared-responsibility perspective involving residents and government. These accounts suggest that residents' interpretations of waste accumulation involved both environmental concerns and perceptions of the conditions under which waste management takes place.

The evidence does not support a simple distinction between environmentally aware and unaware residents. Instead, the interview material shows that expressions of awareness can coexist with reports of limitations in disposal facilities and collection services. Residents may recognize the environmental consequences of accumulated waste while also describing difficulties associated with the available waste-management arrangements. This interpretation is consistent with the central analytical focus of the study: understanding environmental awareness in relation to the material and service conditions surrounding everyday waste disposal.

Overall, the findings indicate that community environmental awareness was expressed through recognition of environmental consequences, concern about residential cleanliness, and the perception that responsibility for waste management is shared. The accounts also place these expressions of awareness within a context in which residents reported limitations in disposal facilities and collection arrangements. However, the relationship between awareness and actual waste-management practices cannot be fully established from the interview excerpts alone.

A more complete explanation requires triangulation across residents' accounts, the perspectives of community leaders, waste-management actors and local government representatives, direct observations at the seven study locations, and relevant documentary evidence. This broader comparison would help determine whether the perspectives presented here were corroborated by other sources, differed across stakeholder groups, or were shaped by conditions specific to particular locations. Until that comparison is completed, the strongest conclusion is that environmental awareness and perceived responsibility were evident in the available resident accounts, while their relationship with actual disposal practices remains an empirical question requiring further verification.

Table 3. Expressions of Community Environmental Awareness in Tangerang Regency

Dimension	Empirical Expression
Awareness of environmental impacts	Residents recognized that accumulated waste could produce unpleasant odors, attract insects, reduce environmental cleanliness, and potentially affect health.
Environmental concern	Residents expressed discomfort and concern when waste accumulated around residential areas and public spaces.
Sense of responsibility	Residents viewed waste management as a shared responsibility involving households, communities, and local authorities.
Awareness of proper disposal	Residents understood that household waste should be placed in designated disposal or collection points rather than discarded indiscriminately.
Awareness amid infrastructural constraints	Residents demonstrated environmental awareness but experienced difficulties in consistently practicing proper waste disposal because of limited facilities and collection services.
Community response	Some residents attempted to maintain cleanliness through individual efforts and community activities despite limitations in waste facilities.

Source: Processed by the researcher (2026)

Overall, the findings show that environmental awareness among communities in Tangerang Regency was relatively visible in residents' knowledge of waste impacts, concern about environmental conditions, and recognition of shared responsibility for maintaining cleanliness. However, awareness did not automatically result in consistent environmental practices because residents' actions were influenced by the availability and accessibility of waste disposal facilities. This finding provides an important basis for examining the gap between environmental awareness and environmental practice**,** which is discussed in the following section.

From Awareness to Practice: Environmental Responsibility under Constraint

The findings from Tangerang Regency indicate that community environmental awareness did not always translate into consistent waste-disposal practices. Residents could recognize the environmental consequences of accumulated waste, express concern about neighborhood cleanliness, and acknowledge their responsibility to manage household waste properly. However, their ability to act on this awareness was influenced by the availability, accessibility, and capacity of local waste-disposal facilities. When appropriate disposal points were difficult to access or unable to accommodate the volume of waste generated, residents faced practical challenges in maintaining proper disposal practices. This finding highlights a gap between environmental awareness and the capacity to implement environmentally responsible behavior in everyday life.

Limited disposal facilities may encourage residents to adopt alternative strategies for handling household waste. These strategies can include temporarily storing waste at home, transporting it to other disposal points, or using alternative locations when designated facilities are unavailable. Such responses reflect attempts to manage an everyday environmental problem under infrastructural constraints, although their environmental implications vary according to the practices adopted. Where waste collection is delayed or disposal points become overloaded, temporary storage may eventually contribute to further accumulation. The findings therefore suggest that residents' responses should be understood in relation to the practical options available to them rather than interpreted solely as evidence of environmental awareness or its absence.

The relationship between awareness and practice also depends on the accessibility of disposal facilities. Where residents can access functioning disposal points and regular collection services, their awareness of environmental cleanliness may be more readily translated into appropriate waste-disposal practices. Conversely, when facilities are limited, even residents who recognize the importance of proper waste management may struggle to maintain consistent practices. This distinction is important in examining the waste problem in Tangerang Regency because the presence of accumulated waste does not necessarily indicate that residents are unaware of its consequences. Instead, waste accumulation may reflect a mismatch between residents' environmental intentions and the infrastructural conditions required to act on them.

Collective responses provide another perspective on environmental responsibility under these conditions. Community clean-up activities, cooperation among neighbors, and efforts to maintain the cleanliness of residential surroundings can demonstrate that environmental responsibility extends beyond individual household behavior. Nevertheless, collective initiatives may have limited effects when waste disposal and collection facilities remain insufficient to accommodate the waste generated by the community. Residents may clean their immediate surroundings, for example, but the problem can recur if collected waste cannot be transported to appropriate facilities. Community participation is therefore

important, but it cannot independently replace the infrastructure and public services required for sustained waste management.

Overall, the findings suggest that the relationship between environmental awareness and waste-disposal practices in Tangerang Regency is shaped by the interaction between residents' understanding, their sense of responsibility, and the material conditions of waste management. Environmental awareness can encourage responsible practices, but its practical expression depends partly on whether residents have feasible and accessible disposal options. The central finding is that the persistence of waste accumulation should not automatically be interpreted as a lack of community environmental awareness. Rather, it is necessary to examine how infrastructural limitations shape the choices available to residents and constrain the translation of environmental concern into everyday action.

Discussion

Waste Accumulation as an Interaction between Infrastructure and Community Conditions

The findings of this study indicate that waste accumulation in Tangerang Regency should be understood in relation to the availability, accessibility, and capacity of waste-disposal facilities rather than solely as a consequence of individual disposal behavior. Field observations documented in the manuscript indicate that disposal facilities were unevenly distributed, some disposal points became overloaded, and waste remained in surrounding areas when collection was delayed. These conditions suggest a potential mismatch between the demand for waste-disposal services and the capacity of local waste-management systems. Similar challenges have been identified in research on waste collection and processing services in Indonesia (Fukuda et al., 2018). A study of 900 households in Surabaya identified mixed waste collection and transportation, insufficient sorting facilities, and lack of time as important barriers to household waste separation (Setiawan, 2020). Furthermore, research on waste-management policy in Banten highlights the importance of local government strategies and institutional capacity in addressing persistent waste-management challenges (Maulana et al., 2025). Collectively, these studies support an interpretation of waste accumulation that considers the interaction between household practices and the material and institutional conditions shaping available disposal options.

However, infrastructure should not be treated as the sole explanation for waste accumulation. The availability of facilities does not necessarily guarantee their appropriate use, just as inadequate facilities do not automatically explain every instance of improper disposal. Alternative explanations include the consistency of local rule enforcement, prevailing social norms, residents' willingness and ability to pay waste-management fees, levels of trust in government services, differences between formal residential developments and established kampung settlements, and the availability of informal waste-recovery systems. These factors may influence how residents use disposal facilities, participate in collection arrangements, and understand their responsibilities. Nevertheless, the present findings do not establish the independent influence of these factors because the available evidence does not systematically document enforcement practices, payment arrangements, institutional trust, settlement characteristics, or the operation of informal waste-recovery networks. They should therefore be considered plausible explanatory dimensions for interpreting the case, rather than established causes of waste accumulation in the study locations.

This distinction is important because waste accumulation may emerge from different combinations of infrastructural and social conditions. A location with limited disposal capacity may experience

accumulation even where residents recognize the need for proper disposal. Conversely, a location with accessible facilities may still experience problems if collection arrangements are unreliable, rules are weakly implemented, or residents have limited incentives to follow designated disposal procedures. The evidence from Tangerang Regency supports examining the relationship between waste accumulation and service conditions, while the additional explanations require targeted empirical investigation. This broader interpretation avoids reducing a complex environmental problem to either individual irresponsibility or infrastructure deficiency alone.

Waste Accumulation as an Everyday Environmental Experience

Waste accumulation also emerges as an everyday environmental experience that influences how residents perceive and respond to their surroundings. The findings indicate that accumulated waste is associated in residents' accounts with unpleasant odors, visibly dirty environments, reduced comfort, and concerns about environmental cleanliness and health. Such experiences are significant because exposure to environmental pollution can affect residents' perceptions of local environmental quality and well-being (Siddiqua et al., 2022). Research on environmental stressors further suggests that the effects of environmental conditions are shaped by how people experience and evaluate their immediate surroundings (Hartig et al., 2014). In the context of Tangerang Regency, accumulated waste can therefore be understood as a visible environmental condition through which residents encounter concerns about neighborhood cleanliness and everyday well-being.

Nevertheless, the ways in which residents experience and respond to accumulated waste may differ across social and residential contexts. In formal residential developments, waste disposal may be organized through estate management, contracted collection services, designated collection points, or resident associations. In kampung settlements, arrangements may instead depend more heavily on neighborhood-level coordination, informal collection practices, shared access routes, or locally organized disposal points. These are possible institutional and spatial differences, not established characteristics of the seven study locations. Their relevance lies in the possibility that the same level of environmental awareness may produce different disposal practices depending on the organization of residential space and waste services.

Settlement form may also affect the practical accessibility of facilities and the organization of collection. For example, differences in road access, the distance between homes and collection points, and the availability of shared storage areas could influence how residents transfer household waste to designated locations. However, these relationships must be established through site-specific evidence rather than inferred from the labels formal housing or kampung alone. The current findings do not provide a systematic comparison of waste accumulation across these residential categories. Consequently, differences between settlement types should be treated as an alternative explanation requiring verification, not as a demonstrated explanation for the observed pattern.

The everyday experience of accumulated waste also needs to be distinguished from residents' capacity to address it. Environmental discomfort may encourage people to keep their immediate surroundings clean, but such efforts cannot necessarily prevent waste from accumulating at shared disposal points. Effective household waste management depends not only on individual motivation but also on the availability and accessibility of appropriate services (Ferronato & Torretta, 2019). This distinction helps explain why environmental concern may remain visible even when the wider environmental conditions do not improve. It also indicates that residents' experiences should be examined in relation to both the physical

environment and the arrangements through which waste is collected and managed.

Environmental Awareness, Social Norms, and Community Expectations

The study indicates that community environmental awareness is expressed through residents' recognition of the consequences of accumulated waste and their concern about neighborhood conditions (Gifford & Nilsson, 2014). Informants associated unmanaged waste with unpleasant odors, insects, reduced cleanliness, and potential health risks (Siddiqua et al., 2022). These expressions suggest that environmental awareness encompasses more than factual knowledge; it also involves recognizing environmental consequences and evaluating conditions that affect everyday life. Nevertheless, awareness alone does not establish that residents consistently engage in environmentally responsible practices. The relationship between knowledge, concern, and behavior is shaped by several interacting influences, as reflected in research showing that environmental concern may be more directly associated with household waste-sorting behavior than awareness alone (Sembiring et al., 2026). Effective household waste segregation may also require interventions beyond information provision, including incentives and infrastructure modifications (Trushna et al., 2024). One additional explanation concerns social norms: the shared expectations that influence what residents consider acceptable or unacceptable waste-disposal behavior. Where proper disposal, waste separation, and participation in community cleaning are established neighborhood expectations, residents may experience social encouragement to follow these practices. Conversely, where indiscriminate disposal is tolerated, frequently observed, or weakly challenged, individual awareness may not be sufficient to sustain responsible behavior. These possibilities indicate that environmental practices are shaped not only by what people know but also by what they observe others doing and what they believe their community expects of them.

Shared Responsibility, Institutional Trust, and Public Service Legitimacy

Another important finding concerns residents' understanding of environmental responsibility as a shared obligation involving households, communities, and local authorities. (He et al., 2024). The manuscript indicates that residents did not necessarily regard waste management as an exclusively governmental responsibility; rather, they recognized a role for community members in maintaining cleanliness and encouraging responsible behavior (Salsabila et al., 2021) This perspective provides a potential social foundation for collective environmental action and participatory waste-management initiatives. Nevertheless, shared responsibility should not be interpreted as an equal distribution of institutional obligations, since households and local authorities perform different but complementary roles in waste management (Banerjee & Sarkhel, 2020). Residents may contribute through household practices and neighborhood initiatives, while local authorities and service providers remain essential to ensuring that disposal facilities and collection services are available and functional. Research on participatory approaches to solid waste management likewise emphasizes the relevance of community involvement (Pinnawala, 2016). The practical expression of shared responsibility may also depend on residents' trust in public institutions. Trust can influence whether residents believe that reported problems will be addressed, that waste fees will support the services promised, and that public authorities will carry out their responsibilities consistently. Where service delivery is perceived as unreliable, residents may become less willing to cooperate with formal arrangements or contribute financially to waste management. Conversely, confidence in collection services and the transparent use of fees may support residents' willingness to

participate. These are plausible mechanisms through which institutional relationships could influence waste-management behavior, but the current findings do not directly establish the level of trust among residents or its relationship with disposal practices.

The Gap between Environmental Awareness and Waste-Disposal Practice

A central contribution of this study is its examination of the gap between environmental awareness and everyday waste-disposal practices. This distinction aligns with research showing that household waste-sorting behavior depends on both psychological motivations and external conditions. The findings indicate that residents may understand the consequences of accumulated waste, express concern about environmental cleanliness, and recognize their responsibility while still reporting difficulties associated with waste-disposal facilities and collection services. This relationship reflects the distinction between behavioral intention and actual practice (Putri & Rye, 2024). Infrastructure and other contextual conditions can influence whether intentions are translated into household waste-classification behavior (Tian et al., 2022). Meta-analytic evidence also indicates that household waste-separation behavior is associated with psychological determinants and contextual factors, including infrastructure and perceived behavioral control (S. Zhang et al., 2021).

However, the awareness–practice gap should not be attributed exclusively to infrastructural barriers. Other mechanisms may intervene between residents' intentions and their behavior. These include uncertainty about collection schedules, social expectations concerning disposal, the perceived legitimacy of local rules, financial constraints associated with waste fees, confidence in public services, and the availability of alternative waste-recovery arrangements. For example, residents may be aware of appropriate disposal practices but lack access to a convenient collection point. Alternatively, facilities may be available while inconsistent rule enforcement or weak community expectations reduce compliance. These explanations are analytically different and should not be collapsed into a single category of infrastructural constraint.

Alternative Disposal Options, Informal Waste Recovery, and Community-Based Initiatives

The findings suggest that residents' responses to limited disposal facilities should be interpreted in relation to the practical options available to them. The existing manuscript refers to alternative responses such as temporary storage or transporting waste to other disposal points. These practices should be treated as findings only where they are supported by specific interview excerpts or direct observations. Without such evidence, they remain possible responses that require verification rather than established descriptions of residents' behavior. The availability of informal waste-recovery systems provides another relevant dimension. Waste pickers, informal collectors, recycling traders, and community waste banks may recover some materials from the waste stream before they reach final disposal points. Such activities can provide economic value to recyclable materials and create additional channels for waste management. However, the existence and significance of these actors may vary across locations, and their contribution cannot be inferred merely from the presence of accumulated waste.

Community-based waste banks may also provide an alternative channel for handling recyclable household materials. Evidence from a community waste bank in Bogor highlights the importance of participatory governance and operational sustainability in maintaining community-based waste-management initiatives (Al Zahra & Shohibuddin, 2025). This evidence supports the relevance of

examining community-based initiatives, but it does not establish that comparable arrangements operate effectively in the seven study locations. Their local presence, participation rates, accepted materials, collection arrangements, and relationships with formal waste services must be established through field evidence.

The roles of waste pickers and waste banks may also complicate a simple distinction between formal and informal waste management. Informal recovery can reduce the amount of recyclable material entering disposal facilities, but it does not necessarily address all forms of household waste or eliminate the need for reliable collection and final disposal. Similarly, a waste bank may support recycling without being able to accommodate residual waste, organic waste, or materials outside its accepted categories. The presence of a recovery initiative therefore cannot automatically be interpreted as evidence that a community has adequate waste-management services.

Research on alternative waste-management practices also highlights the importance of understanding the conditions under which households make disposal decisions (Hartono et al., 2022). Where waste is deposited in inappropriate locations or remains uncollected, environmental problems may persist, particularly when collection coverage is inadequate (Budiyarto et al., 2025). These studies reinforce the need to consider available disposal options, accessibility, collection reliability, and community-based arrangements together. In Tangerang Regency, such an analysis requires evidence on whether waste pickers, informal collectors, recycling traders, or waste banks were present at the observed sites and how residents interacted with them.

An Integrated Explanation of Waste Accumulation in Tangerang Regency

Overall, the findings support an interpretation of waste accumulation as a phenomenon shaped by the interaction between environmental awareness, everyday practices, infrastructure, and waste-management services. Waste-management outcomes in developing regions are influenced by interconnected infrastructural, socioeconomic, and governance challenges (Zhang et al., 2024) . Inadequate access to formal waste services can constrain household disposal practices (Tahulela et al., 2025), while waste accumulation itself reflects the relationship between community awareness, everyday environmental experiences, available facilities, and waste-management services (Roy et al., 2025). Integrated interventions that combine environmental education, community participation, institutional coordination, and reliable public services are therefore relevant to addressing waste-management challenges (Yudartha et al., 2026).

The analysis also indicates that a more complete explanation must consider factors that are not reducible to infrastructure alone. Rule enforcement may influence whether designated disposal arrangements are followed; social norms may shape the perceived acceptability of particular practices; payment arrangements may affect access to collection services and residents' willingness to contribute; and institutional trust may influence cooperation with local authorities. Differences between formal residential developments and kampung settlements may affect the organization and accessibility of waste services, while waste pickers and community waste banks may influence the recovery of recyclable materials. These factors offer a broader analytical framework for understanding why similar levels of environmental awareness may coexist with different disposal practices and environmental outcomes.

Nevertheless, the available findings do not establish that each of these factors operated in the study locations or determine their relative influence. They should therefore be used to guide interpretation and identify the limits of the current evidence, rather than presented as confirmed explanations. Future analysis

of the original field records should examine whether participants discussed local rules, enforcement experiences, waste fees, trust in service providers, residential characteristics, and informal recovery systems. These accounts should then be compared with observations from the seven sites and relevant documentary evidence.

The central argument of this study is consequently that environmental awareness is important but insufficient to explain waste-management outcomes on its own. The persistence of waste accumulation should not automatically be interpreted as evidence of low environmental awareness, nor should it automatically be attributed to inadequate infrastructure alone. A stronger explanation considers whether residents understand the environmental consequences of waste, whether responsible practices are socially supported and institutionally encouraged, whether appropriate disposal options are accessible and affordable, and whether collection and recovery systems function reliably. This integrated perspective moves beyond explanations based solely on individual knowledge or attitudes and provides a more context-sensitive basis for understanding community environmental responsibility in Tangerang Regency.

CONCLUSION

This study concludes that community environmental awareness amid limited waste disposal facilities in Tangerang Regency, Indonesia, is shaped by the interaction between residents' environmental understanding, their everyday experiences of waste accumulation, and the infrastructural conditions available to support responsible waste management. The findings show that residents recognize the environmental consequences of accumulated waste, express concern about cleanliness and health, and acknowledge shared responsibility among households, communities, and local authorities. However, such awareness does not always translate into consistent waste disposal practices because limited facility accessibility, insufficient disposal capacity, and delays in waste collection constrain residents' ability to act on their environmental concerns.

The central contribution of this study is to demonstrate that waste accumulation should not automatically be interpreted as a lack of community environmental awareness; rather, it may reflect a gap between environmental responsibility and the structural conditions necessary to implement it. Accordingly, addressing waste accumulation requires an integrated approach that combines environmental education and community participation with accessible disposal facilities, adequate capacity, and reliable collection services. This perspective offers a more contextual understanding of community environmental awareness and highlights the importance of aligning public responsibility with institutional support to promote sustainable waste management in Tangerang Regency and comparable settings.

AUTHOR CONTRIBUTIONS

All authors contributed to the development of this study. NK, MR, RE, and PH contributed to the research conceptualization, methodology, and supervision. ADM contributed to the literature review, data interpretation, and manuscript development. SR contributed to the literature review and critical revision of the manuscript. All authors reviewed and approved the final version of the manuscript and agreed to be accountable for its content.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest related to the research, authorship, or publication of this article.

ARTIFICIAL INTELLIGENCE (AI) USE STATEMENT

In preparing in preparing this manuscript, the authors used artificial intelligence (AI) tools to assist with language editing, grammar checking, and improving the clarity and structure of the academic writing. AI tools were not used to generate, manipulate, or analyse the research data. All research findings, interpretations, and conclusions were reviewed and verified by the authors, who retain full responsibility for the accuracy, originality, and integrity of the manuscript.

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