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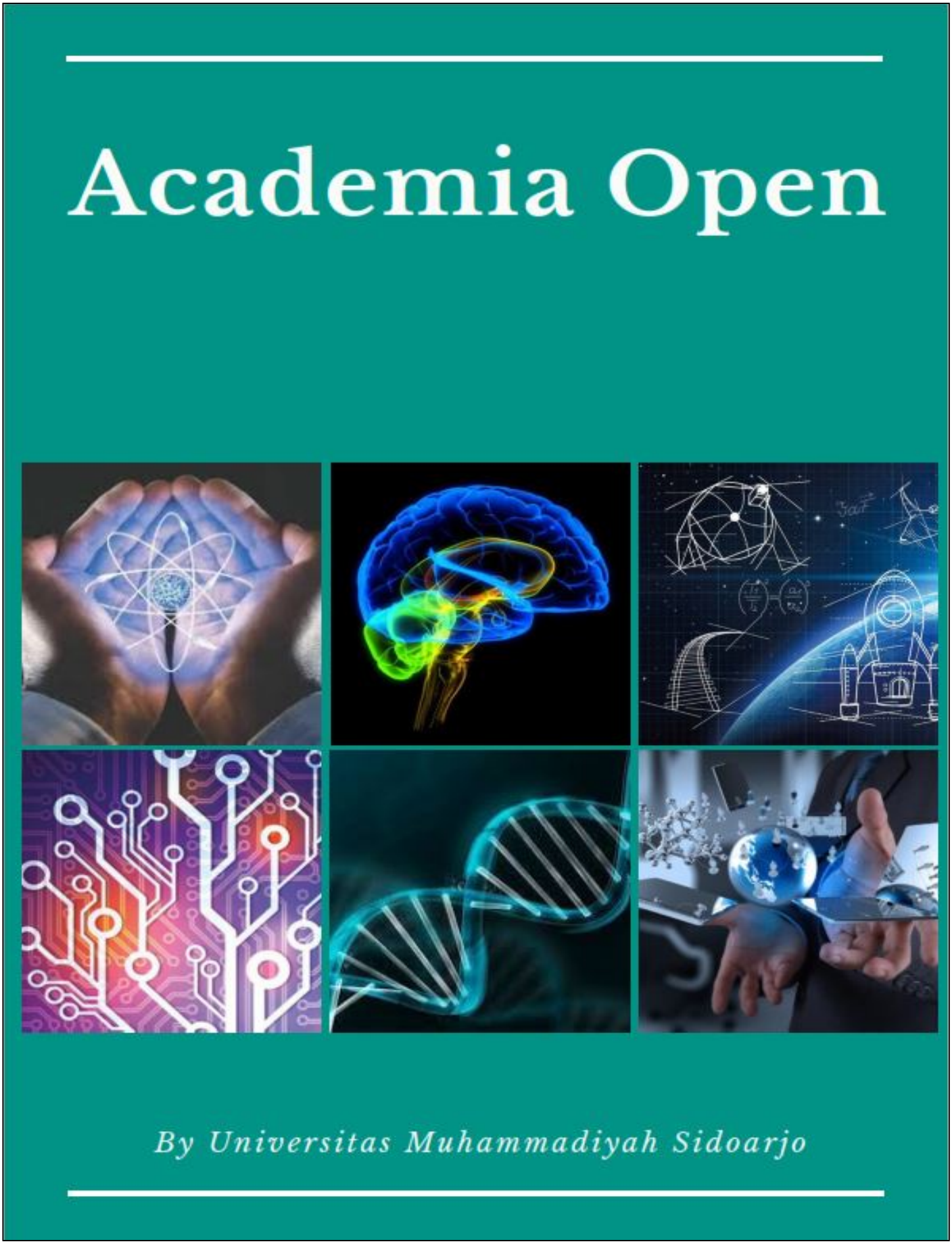

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Optimizing Waste Management Through Multilevel Community Participation

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Abstract

General Background: Waste management is a growing urban challenge, particularly in areas experiencing continuous population growth. **Specific Background:** Sungailiat City faces escalating waste-related issues exacerbated by limited community engagement. **Knowledge Gap:** Although government programs rely heavily on public participation, there is limited understanding of how effectively communities engage across the different stages of waste policy implementation. **Aims:** This study aims to analyze the current state of waste management in Sungailiat City and assess the level of community participation in implementing relevant policies. **Results:** Using a qualitative descriptive approach, the research identifies four levels of participation—decision-making, program implementation, utilization of results, and evaluation—occurring inconsistently across Bangka Regency. **Novelty:** The study reveals the fragmented and unsystematic nature of participation, evaluated using Cohen and Uphoff's framework, highlighting a lack of integration across stages. **Implications:** To promote sustainable waste management, it is essential to institutionalize participatory mechanisms throughout policy cycles, enhance public awareness, and provide robust institutional support through improved infrastructure and regulatory frameworks that foster inclusive community involvement.

Highlights:

- Community participation is crucial for effective waste policy execution.
- Engagement remains fragmented across different policy stages.

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- Strong institutional support enhances sustainable waste solutions.

Keywords: WasteManagement,CommunityParticipation,PolicyImplementation,Sustainable Development, Sungailiat City

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Introduction

Waste has emerged as a critical environmental issue affecting nearly all urban areas worldwide. Most human activities inherently generate waste, a condition that has persisted since prehistoric times [1]. In earlier periods, waste management was not a pressing concern due to low population densities and the abundance of open land, which allowed natural decomposition processes to occur with minimal human intervention. However, with the rapid growth of urban populations and consumption patterns, the volume and complexity of waste have increased significantly, posing new challenges for both developed and developing countries.

Projections of solid waste generation in Asia between 2000 and 2050 [2] indicate that waste volumes in low-income cities across Africa and Asia could double by 2030, driven by population growth, urbanization, and rising consumption [3]. Despite policy efforts and technical advancements, many developing nations continue to face substantial challenges in implementing effective waste management systems.

The issue is particularly acute in small island regions, where unique geographic and socio-economic conditions exacerbate the problem. Small islands in developing countries face disproportionately high per capita infrastructure costs, limited resource bases, remote locations, and heavy reliance on tourism. These constraints are further compounded by logistical challenges, limited landfill space, and high waste transportation costs. As a result, waste management in such regions remains inefficient and underdeveloped [4].

If left unaddressed, poor waste management on small islands can result in severe environmental degradation, particularly marine pollution. Improper disposal of waste into the ocean contributes to the destruction of coral reefs, threatens marine biodiversity, and undermines the sustainability of the local tourism economy. The influx of tourists, while economically beneficial, often leads to increased waste generation, placing additional pressure on the already limited infrastructure. Without adequate interventions, waste accumulation could severely impact the environmental quality and long-term economic viability of these regions.

A similar situation can be observed in Bangka Regency, part of Indonesia's Bangka Belitung Islands Province. The region continues to experience a year-on-year increase in waste volume, which corresponds with its growing population. Although various local waste management policies have been introduced, the effectiveness of their implementation remains limited, and tangible outcomes are still lacking. As presented in Table 1, there was an increase in population from 2021 to 2024.

Year	Population
2024	96.369
2023	95.427
2022	94.190
2021	92.885

Table 1. Population of Sungailiat City (2021-2024)

In accordance with Law No. 18 of 2008 on Waste Management, waste is defined as the residue of daily human activities and/or natural processes in solid form. Based on data from Statistics Indonesia, the country generates approximately 65.2 million tons of waste annually, with projections indicating an increase of around 6 million tons by 2025. During the 2016–2017 period, 188 of 355 monitored districts/cities had ceased using open dumping landfill methods. Nevertheless, Indonesia continues to face significant hurdles in promoting waste reduction and recycling. A national survey conducted in 2017 reported that only 8.7% of households consistently used reusable shopping bags, 1.2% engaged in recycling practices, and approximately 66.8% still managed waste by burning it [5]. Likewise, the volume of waste in Bangka Regency has shown a consistent increase each year, as presented in Table 2:

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Year	Waste Volume (m^3/day)
2021	112,59
2022	115,37
2023	117,68
2024	120,03

Table 2. Waste Volume in Sungailiat City (2021-2024)

The escalating waste problem in Bangka Regency highlights the limitations of the traditional waste management paradigm, which focuses heavily on final disposal (landfilling). There is an urgent need to transition toward a more sustainable and circular approach, where waste is viewed not as an end product but as a resource with economic and environmental value. Environmentally sound waste management strategies, such as converting waste into renewable energy, industrial raw materials, or organic fertilizer, offer promising pathways for improving waste outcomes.

At the national level, the Indonesian government has taken legislative steps to support this transition. Law No. 18 of 2008 establishes legal clarity on the roles and responsibilities of central and local governments, as well as the participation of private and community stakeholders. The law is grounded in the 3R framework—Reduce, Reuse, and Recycle—aimed at minimizing waste generation, promoting the reuse of materials, and recycling waste into valuable resources. However, the prevailing public perception still largely treats waste as worthless, and many communities continue to rely on the conventional "collect-transport-dispose" model. As such, behavioral change remains a critical component in achieving the goals of sustainable waste management.

To institutionalize this paradigm shift, the government has issued several supporting regulations. Government Regulation No. 81 of 2012 promotes source reduction and the treatment of household and household-like waste through practical and localized efforts. Additionally, the Ministry of Environment Regulation No. 13 of 2012 outlines operational guidelines for the implementation of the 3R concept through community-based initiatives such as waste banks. These waste banks serve as social platforms to encourage residents to sort, recycle, and repurpose waste, thereby reinforcing the notion of waste as a valuable economic asset and fostering community-driven environmental stewardship.To support the implementation of waste management initiatives led by the government, efforts have also been made to involve community participation at the grassroots level in Indonesia. Community involvement plays a vital role in waste management, as households are the primary producers of waste. Without active community engagement, government-led waste management efforts tend to be less effective. Public participation—through waste separation, waste reduction, and engagement in programs such as waste banks and recycling activities—can significantly reduce the burden on the overall waste management system. Furthermore, such involvement fosters greater environmental awareness and contributes to sustainable behavioral change. By participating, communities are not merely the object of policy but become active agents in the planning, implementation, and evaluation of waste management programs. This participatory approach is essential to build a system that is not only top-down, but also inclusive, adaptive, and responsive to local needs. Hence, community participation serves as a key pillar in realizing effective, efficient, and sustainable waste management.

In accordance with existing regulations, the national government has encouraged a fundamental paradigm shift in waste management—from the traditional approach of "collect-transport-dispose" to a more integrated system focusing on waste reduction and recycling. Waste reduction activities are expected to involve all stakeholders, including government, private sector, and the public, in implementing the 3R (Reduce, Reuse, Recycle) principle through smart, efficient, and systematic efforts. However, the enforcement of such legal frameworks has not yet resulted in significant impact, as waste continues to pose a serious environmental challenge in many areas.

At the regional level, Bangka Regency Regulation No. 43 of 2018 on the Regional Policy and Strategy for Household Waste and Household-Like Waste Management (2018–2025) outlines a strategic direction

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focusing on waste reduction and handling. The regulation aims to reduce household and household-like waste by 30% by 2025, relative to the baseline volume prior to the implementation of the national waste reduction strategy. This target is expected to be achieved through community-based initiatives, including waste limitation (e.g., in schools, markets, and hospitals), recycling (e.g., small-scale composting, unit-based waste banks), and reuse practices (e.g., in residential areas, markets, and schools). Furthermore, the regulation sets a target of 70% for waste handling, to be undertaken by the government, also based on the baseline figures prior to 2025. These strategies are aligned with the 3R principles: Reduce, Reuse, and Recycle.

In implementing these policies, the Bangka Regency Government has made efforts to engage the public in Sungailiat City through socialization campaigns, posters, and the use of social media platforms. However, these approaches have not yet succeeded in significantly increasing public awareness or encouraging broader participation in programs and policies aimed at reducing waste generation in Sungailiat City.

Literature Review

The theory of community participation has been elaborated by Midgley et al. [6] who identified its historical antecedents as rooted in Western ideological legacies, the influence of community development, and the contributions of social work and grassroots radicalism. Communities within a participatory development framework are perceived as naturally cohesive social units, guided by shared values and manifested through organized structures [7].

Participation define as “the mental and emotional involvement of a person in a group situation which encourages him to contribute to group goals and share responsibility in them [8]. This definition highlights participation as a psychological and emotional engagement that motivates individuals to actively support collective objectives and take ownership of the outcomes.

Participation, in its essence, is an active and initiative-driven process that originates from within the community itself. It becomes tangible when three enabling factors are present: willingness, capacity, and opportunity. The willingness and capacity to participate stem from the individuals or community groups themselves, while the opportunity must be facilitated by external actors—typically the government or related institutions.

Participation is unlikely to occur if there is willingness but no capacity, even if the opportunity is provided. Similarly, if willingness and capacity exist but no space or mechanism is made available by governing bodies, participation also remains unattainable. Hence, genuine participation requires the synergy of internal motivation and external facilitation.

In general, participation refers to the involvement or engagement of individuals or groups in a given activity. Conyers emphasized that public participation involves the direct involvement of the community in development processes [9]. To achieve optimal outcomes, participatory approach should harness and synergize local potential through deliberate planning that encourages active community engagement [10].

Cohen and Uphoff proposed a typology of participation that categorizes community involvement into four distinct forms based on specific systems and mechanisms: (a) participation in decision-making; (b) participation in implementation; (c) participation in benefit-sharing; and (d) participation in evaluation [11].

Participation in decision-making refers to the involvement of community members in the formulation of organizational decisions and policies. This form of participation allows individuals to voice their opinions, assess planned programs, and evaluate existing decisions. Through this process, communities not only contribute to the selection and prioritization of development initiatives that reflect their needs and interests but also gain experience in democratic self-governance and future planning.

Participation in implementation involves the active engagement of community members in executing development activities based on pre-established plans or programs. The extent of community participation can be measured through various indicators such as the number of individuals actively involved, the type of contributions provided (e.g., labor, materials, or financial resources), whether the participation is direct or indirect, and the frequency of involvement.

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Participation in benefit-sharing encompasses the community's access to and enjoyment of the outcomes of development efforts. This includes equitable access to welfare improvements, public infrastructure, economic opportunities, and social facilities such as roads, bridges, buildings, clean water, and other public services. Moreover, development benefits may also be experienced by administrative staff in the form of improved well-being and enhanced creative potential. The value of this participation is not only observed in immediate gains but also in its broader impact on community livelihoods, the momentum it builds for subsequent development, and the community's involvement in maintaining and preserving public assets.

Participation in evaluation relates to the role of the community in assessing and monitoring the implementation and outcomes of development activities. This may occur directly—through observation and formal evaluation—or indirectly, through the provision of suggestions, feedback, criticisms, or even protests. Such participation reinforces accountability and helps ensure that development remains responsive to local needs.

Method

This study was conducted in Sungailiat City, Bangka Regency, located in the Bangka Belitung Islands Province, Indonesia. The primary focus of data collection was directed at the Environmental Agency of Bangka Regency, situated on Jl. Jend. A. Yani (Jalur II), Sungailiat, which served as the central institution for field inquiry.

The study employed a descriptive qualitative research design. Qualitative research is characterized by its flexibility and openness to field dynamics, positioning the researcher as the principal instrument in data collection and interpretation [12]. In this approach, the research problem, focus, procedures, and even hypotheses are not rigidly predefined. Instead, they evolve during the research process, requiring the researcher to continually adapt and refine all aspects of the investigation based on field conditions. This dynamic nature reinforces the critical role of the researcher in exploring and interpreting the phenomena under study.

The descriptive-qualitative method facilitated the identification, description, and analysis of community participation in the implementation of waste management policies, particularly in relation to the application of the 3R principles (Reduce, Reuse, Recycle) and the Integrated Waste Management (IWM) concept in Sungailiat City.

Qualitative research as an interpretive process that examines phenomena within their natural contexts to uncover the meanings individuals assign to their environment [13]. This methodological framework enabled the researchers to obtain a deep and contextual understanding of the dynamics surrounding public participation in waste management policy implementation.

1. Data Sources

Etymologically, the term data is derived from the Latin word datum, which means "something given." In the context of research, data are understood as fundamental units of information that serve as the foundation for measurement and further analysis [14]. This study employs two primary sources of data:

a. Primary Data

Primary data were collected directly from informants through in-depth interviews and field observations. These data encompass verbal expressions, behaviors, and non-verbal cues exhibited by individuals or groups involved in the study, including direct observations of physical conditions, events, activities, and testing outcomes. The main techniques employed in gathering primary data were interviews and participant observation.

b. Secondary Data

Secondary data were obtained from written documents such as government archives, official institutional reports, and scholarly articles relevant to the research topic. These sources served as complementary materials to support and strengthen findings derived from primary data.

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2. Data Collection Techniques

Data collection is a crucial step in the research process, as the ultimate goal of research is to obtain reliable and relevant data. Without a clear understanding of appropriate data collection techniques, researchers may fail to collect data that meet the necessary standards. This study utilized four primary techniques:

a. Interviews

Interviews involve verbal interaction in which the interviewer asks questions and the interviewee responds. In this study, semi-structured interviews were conducted to allow flexible yet focused discussions. Informants included local government officials, political representatives, and relevant private sector actors engaged in environmental management. This approach allowed for in-depth exploration of perspectives regarding waste management policies and community participation.

b. Documentation / Literature Review

The documentation method involves the systematic recording and review of existing information. This technique was used to collect supporting data from various written sources, including reports and other relevant documents. Findings obtained through interviews and observation were cross-validated using these materials to enhance credibility and triangulation.

c. Observation

Observation is a technique that relies on the researcher's capacity for direct visual engagement and memory [15]. In this study, researchers conducted on-site observations of waste management practices carried out by the local government. Field notes were taken to record relevant activities, behaviors, and interactions, with the aim of complementing interview and documentation data, thereby enriching the empirical findings.

d. Focus Group Discussions (FGDs)

To assess stakeholder roles and gather input for identifying best practices in waste management, FGDs were conducted. FGDs are qualitative data collection tools designed to explore participants' needs, perceptions, beliefs, and experiences regarding a specific topic [16]. In this study, several FGDs were held in selected urban villages (kelurahan) in Sungailiat, involving community members. The purpose was to assess the extent of public participation in Bangka Regency and to identify key factors that influence citizens' willingness to engage in waste management initiatives.

Results and Discussion

A. Waste Flow and Technical Aspects

Domestic waste in the solid waste sub-sector in Bangka Regency is managed by the Environmental Office, specifically through the Department of Sanitation and Landscaping. In Sungailiat City, the waste management process typically begins at the household level. Residents either place their household waste in front of their homes for collection by sanitation workers or directly dispose of it at designated Temporary Disposal Sites), which are strategically located across various points in Sungailiat.

Currently, there is no systematic segregation of organic and inorganic waste at the source, either by the community or by waste collectors. This is despite the recognized importance of source separation in effective waste management. Although the local government has issued official advisories encouraging households to separate their waste, compliance remains low. The lack of initial waste sorting complicates the downstream processing and utilization of waste, particularly for recycling and composting.

Once collected, the waste is transported using municipal waste trucks to the Final Disposal Site located in Kenanga, which is equipped with a leachate pond for managing liquid waste. In addition to the TPA, there are 3R Waste Processing Sites (TPS 3R – Reduce, Reuse, Recycle) operating in Karya Makmur Village and Sri Menanti Sub-district. These facilities include waste banks that process organic waste into compost. Plans are underway to develop a centralized recycling facility to process inorganic waste into higher-value products.

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Despite these initiatives, the volume of waste processed through TPS 3R and waste banks remains significantly lower than the total volume of waste generated. Most of the waste remains unsorted at TPS sites, and the waste containers and transport vehicles have yet to adopt a system for separating organic and inorganic waste streams. Waste collection is generally conducted on a fixed schedule, either in the morning or evening, and is considered adequate in terms of frequency.

Sungailiat City generates approximately 60 m^3 of waste per day, comprising both organic and inorganic materials. This waste is disposed of at the Kenanga TPA, which currently spans 6.1 hectares with future plans to expand the area to 13 hectares. The waste originates from a variety of domestic sources, including government housing complexes, low-income housing areas and neighborhoods such as Kampung Jawa and Nangnung. The landfill at Kenanga operates under a controlled landfill system, with waste compacted and buried on a weekly basis.

B. Waste Management Infrastructure and Occupational Safety

The waste management operations at the Kenanga Final Disposal Site (TPA Kenanga) are supported by several key facilities and equipment, including five bulldozer units, groundwater monitoring wells, a composting facility, an administrative office, a waste recording board, landfill gas pipes, and a site plan display board. The Bangka Regency Government has set a target for the TPA to achieve zero waste status by 2035, aligning with the national zero waste agenda. The facilities available at the Kenanga Landfill include a liner system that prevents leachate from seeping into the groundwater and causing soil contamination, as shown in Figure 1:

Figure 1. Kenanga Final Disposal Site

The waste management equipment currently available in Bangka Regency includes hand-pulled carts, waste collection motorcycles, pickup trucks, garbage trucks, and arm roll trucks. At the disposal site, heavy equipment such as bulldozers, excavators, and waste trucks are utilized for operational efficiency. However, incinerator facilities are not yet available in the region, limiting certain waste treatment capabilities, particularly for hazardous or non-recyclable waste.

In terms of occupational safety, waste collection workers are included in a health and social security program, and efforts are made to ensure that collection and transport activities are conducted in compliance with the established Standard Operating Procedures (SOPs). These procedures include the use of personal protective equipment (PPE) such as helmets, masks, and other safety gear. Nevertheless, actual implementation of these protocols remains inconsistent, as a number of workers continue to neglect SOP adherence, largely due to low personal awareness and behavioral habits.

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C. Legal and Policy Framework

At the national level, the Government of Indonesia has established the National Waste Management Policy and Strategy (JAKSTRANAS), as outlined in Regulation No. 97 of 2017, which mandates its implementation at both provincial and municipal/regency levels. In response, the Bangka Regency Government, under the Province of the Bangka Belitung Islands, formulated its Regional Waste Management Policy and Strategy (JAKSTRADA), in accordance with national directives, as stipulated in Regulation No. 43 of 2018 on Waste Management Strategies in Bangka Regency.

The targets set in JAKSTRADA clearly indicate a shift in focus from merely handling existing waste to also emphasizing the reduction of waste generation at the source. As such, JAKSTRADA marks a paradigm shift in waste management, transitioning from the traditional collect–transport–dispose approach to a more sustainable 3R (Reduce, Reuse, Recycle) framework.

This policy is designed to be implemented over the period 2018–2025, aiming to reduce household waste generation by 30% and ensure the effective treatment of at least 70% of household waste. Funding for implementation may derive from the Regional Budget (APBD) or other alternative financial sources.

At the local legislative level, Regional Regulation No. 8 of 2015 on Household Waste and Waste Similar to Household Waste was enacted to address the growing volume and complexity of waste caused by population growth and shifting consumption patterns. Inadequate waste management practices, if not properly addressed, can lead to environmental pollution and public health risks. Therefore, the regulation underscores the necessity for an integrated and sustainable waste management system, extending from upstream to downstream processes. This includes the economic utilization of waste and behavioral transformation at the community level.

The primary objective of this regulation is to enhance public health and environmental quality while transforming waste into a valuable economic resource. The regulation is guided by principles of responsibility, sustainability, utility, equity, public awareness, cooperation, safety, security, and economic value.

The scope of the regulation covers household waste and similar types of waste generated from residential areas, commercial zones, industrial sites, public facilities, and other sources. Under this framework, local governments play a critical role in waste governance. Their responsibilities include raising public awareness, advancing technologies for waste reduction and treatment, providing necessary infrastructure, and facilitating the economic reuse of waste.

Moreover, the local government holds the authority to formulate local waste policies, designate waste management sites, and monitor, supervise, and coordinate waste management initiatives involving various stakeholders.

This regulation addresses two major components of waste governance: reduction and treatment. Reduction efforts involve waste minimization at the source, reuse of materials, and recycling. Treatment covers the processes of sorting, collecting, transporting, processing, and final disposal in an environmentally safe manner.

D. Waste Reduction and Management Provisions under Regional Regulation No. 8 of 2015

Waste reduction, as outlined in Regional Regulation No. 8 of 2015 of Bangka Regency, is implemented through three core approaches:

1. Waste Generation Limitation

This approach aims to minimize waste production at the source. It involves encouraging the use of durable goods, avoiding single-use packaging, and reducing excessive consumption. The main objective is to prevent waste before it is generated, thereby reducing the overall waste burden on the environment and waste management systems.

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2. Reuse

Reuse refers to the direct utilization of used items either for the same or different purposes without undergoing processing. Examples include reusing glass bottles as containers, bringing reusable shopping bags, or using scrap paper for notes. This approach extends the lifecycle of products and reduces the need for new materials.

3. Recycling

Recycling involves processing waste into new materials or products. Common recyclable items include plastics, paper, metals, and glass, which can be collected, treated, and repurposed as raw materials for new production. This method reduces the extraction of natural resources and decreases the volume of waste sent to landfills.

Waste reduction is framed as a shared responsibility between local communities, private sector actors, and the local government. Citizens are encouraged to adopt less consumptive behavior, practice waste separation at the source, and reuse items when possible. The local government supports these efforts through education campaigns, incentives, and infrastructure provisions such as waste banks and 3R-based temporary waste collection sites.

In addition to reduction, the regulation also specifies five primary stages in waste handling:

a. Sorting

Waste sorting involves categorizing waste based on type, volume, and characteristics. This activity is carried out at the source—such as households, offices, or markets—to facilitate subsequent treatment or recycling processes.

b. Collection

Sorted waste is collected and transported to Temporary Disposal Sites (TPS) or 3R facilities. This process may be carried out by sanitation workers or local waste management entities.

c. Transportation

Collected waste is then transported from TPS to recycling facilities, reuse centers, or final disposal sites (TPA). This task is executed by government-designated agencies or departments.

d. Processing

Waste is processed to reduce its volume or hazardous properties. Processing techniques include composting, environmentally friendly incineration, or other technologies aimed at transforming waste into safer or more useful forms.

e. Final Disposal

Residual waste that cannot be reused or recycled is directed to final disposal facilities using environmentally safe technologies such as sanitary landfill systems. The objective is to minimize environmental pollution, including soil, water, and air contamination. The following is data on landfills in Bangka Regency, including information on type, area, capacity, and existing volume, as shown in Table 3:

No	Regency	Location	Landfill Name	Type of Landfill	Wide (Ha)	Capacity (M3)	Existing Volume (M3)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	Bangka	Jalan TPA Kenanga, Kelurahan Kenanga	TPA Kenanga	TPA Control Sanitary	4.95	540,000	125,925

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		Kecamatan Sungailiat					

Table 3. Final Disposal Site in Bangka

The regulation also includes sanctions for violations, ranging from administrative penalties such as written warnings, governmental enforcement measures, and permit revocation, to criminal sanctions for actions that cause environmental damage or pollution. Additionally, waste management disputes may be resolved through mediation, negotiation, arbitration, or legal proceedings, ensuring a comprehensive legal framework for sustainable waste governance.

E. Community Participation in the Implementation of Waste Management Policy in Sungailiat City, Bangka Regency, Bangka Belitung Islands

Community participation in waste management decision-making in Sungailiat City represents a vital aspect of the participatory governance approach mandated by Regional Regulation No. 8 of 2015 of Bangka Regency. This regulation normatively provides space for citizens to engage not only in technical activities—such as waste sorting and collection—but also in the planning, monitoring, and evaluation of waste management policies at the local level.

In this study, community participation is conceptualized based on the framework developed by Cohen and Uphoff (1977), which outlines community involvement across four key dimensions of development processes, particularly in rural and community-based development projects.

Decision-making participation:

a. Community members are involved in formulating policies or selecting development programs.
b. Implementation participation: Citizens take an active role in the execution of development initiatives.
c. Benefit participation: The community enjoys and utilizes the outputs of development programs.
d. Evaluation participation: Residents contribute to assessing the success and effectiveness of the programs implemented.

Cohen and Uphoff emphasize that the degree of community participation significantly influences the success of development initiatives, as such participation fosters a sense of ownership, responsibility, and sustainability.

F. Community Participation in Decision Making

In the context of decision-making, for example, community involvement in Sungailiat can be observed during public consultations for the Strategic Environmental Assessment (KLHS) at the regency level. During these sessions, representatives from civil society organizations are invited to offer input and recommendations regarding development planning in Bangka Regency. However, this participation is generally broad in scope and covers a range of development sectors at the regency level, rather than being focused specifically on waste management.

At the local level in Sungailiat, community decision-making participation is often realized through neighborhood discussions at the RT (neighborhood unit), RW (community unit), village/kelurahan, or sub-district levels, particularly on matters such as the location of temporary waste collection sites (TPS), garbage collection schedules, the establishment of waste banks, or community clean-up programs.

Moreover, residents actively participate in the formation and management of waste banks, community-based waste management groups (Kelompok Swadaya Masyarakat/KSM), and volunteer-based environmental activities, including clean-up campaigns. Community forums such as youth organizations (Karang Taruna) and women's groups (PKK) frequently act as intermediaries between the public and the local government, channeling proposals, concerns, or feedback related to waste management programs.

This diverse range of participatory mechanisms illustrates the multi-level nature of community engagement in urban environmental governance and underscores the potential for co-production of public services in achieving sustainable waste management outcomes.

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G. Community Participation in Waste Management Implementation

Despite the existing participatory frameworks and initiatives, the level of community engagement in Sungailiat remains uneven. While a number of residents actively participate in waste management activities—such as community clean-ups and waste processing—public involvement in strategic decision-making processes, such as the planning of new landfill (TPA) sites or the formulation of waste collection fee policies, remains limited. In many cases, participation is largely consultative rather than genuinely participatory or collaborative in nature.

In terms of participation in program implementation, several noteworthy community-led initiatives have emerged in Sungailiat. These include the establishment of waste banks, the promotion of 3R-based (Reduce, Reuse, Recycle) waste practices, and partnerships with schools and youth organizations for environmental education and awareness campaigns. Community-driven efforts such as collective clean-up events—particularly targeting drainage systems and neighborhood sanitation—represent tangible forms of direct involvement in mitigating the impacts of waste accumulation. Figure 2 illustrates one example of a community-based waste bank in Bangka Regency:

Figure 2. Waste Bank in Sungailiat City

However, such participation tends to be sporadic and lacks institutionalization. Waste segregation at the source and Temporary Waste Disposal Site, for example, has not yet become routine among most households, and public awareness of the importance of waste reduction largely depends on personal motivation or the influence of community leaders. Structural limitations, such as the insufficient number of 3R-based Temporary Waste Collection Points (TPS 3R), inadequate waste transportation fleets, and suboptimal dissemination of government programs, also pose significant barriers to enhancing the quality and scale of community participation. The condition of the temporary waste disposal site in Sungailiat City (Bangka Regency) can be seen in Figure 3:

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Figure 3. Temporary Waste Disposal Site in Sungailiat City

Community engagement is further reflected in the presence of local civil society organizations, particularly self-initiated waste banks that operate in collaboration with both government agencies (notably the Environmental Agency of Bangka Regency) and non-government stakeholders. These organizations often serve as key advocates for village-level waste reduction and management. Nevertheless, participation remains confined to a relatively small subset of active community organizations. When viewed in proportion to the total population, this level of involvement is insufficient to fully leverage community capacity in support of sustainable waste management.

From a day-to-day operational perspective, basic community participation in solid waste management remains underdeveloped. A significant portion of residents continue to neglect waste sorting at the household level, which is critical for the success of integrated waste management systems. In addition, public compliance with proper waste disposal practices is limited; many continue to dispose of garbage improperly, as evidenced by the widespread littering around official TPS sites. For instance, at the Bukit Betung TPS, waste is often scattered along the roadside due to residents discarding trash outside of designated containers.

One of the core programs in Sungailiat's waste management system involves the daily collection and transportation of waste from households to TPS, recycling facilities, and the final disposal site (TPA). However, the effectiveness of this system is hindered by suboptimal public participation in early-stage waste handling—namely sorting and timely disposal. This gap reduces the efficiency of the entire waste flow chain, undermining downstream processes such as recycling and landfill optimization.

H. Community Participation in the Utilization

In the utilization phase, community participation in Sungailiat is still in a developmental stage and primarily driven by grassroots initiatives, community-based organizations, and environmentally conscious individuals committed to promoting circular economy practices. The outcomes of waste management are currently being utilized in two primary ways: economic and ecological.

From an economic perspective, residents have begun engaging in activities facilitated by waste banks, where inorganic materials such as plastic bottles, cardboard, and metals are collected, sorted, and sold to

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aggregators or recycling industries. Some individuals and community groups have even established micro-enterprises focused on waste processing, including the production of handicrafts from plastic waste, compost from organic matter, and ecobricks from non-recyclable inorganic waste. These initiatives offer added value and create new economic opportunities, particularly for housewives and youth groups.

From an ecological perspective, processed compost from organic waste is used in home gardening and school-based agricultural activities. These efforts are typically organized by farming groups, school communities, or environmental clubs that have received basic composting training. Although the scale remains limited, these initiatives reflect a growing awareness of the ecological benefits of reintegrating processed waste back into the environment in a productive manner.

Individuals involved in waste bank operations also gain economic benefits, both as managers and as clients. Based on interviews conducted at one of the waste banks in Bangka Regency, waste bank operators receive modest financial returns from managing operations. Clients also benefit by earning small amounts of money when depositing recyclable waste. However, considering the number of waste banks relative to the total population, these economic benefits are only felt by a small segment of the community.

Nonetheless, significant challenges remain, particularly related to limited access to basic waste-processing technologies, a lack of continuous training programs, and underdeveloped markets for recycled products. Moreover, a considerable portion of the population still lacks awareness of the economic and environmental potential of properly managed waste.

I. Community Participation of Evaluation Phases

In the evaluation phase, community participation plays a critical role in ensuring that waste management systems operate effectively and align with local needs. When communities are involved in evaluation, they provide constructive feedback that can inform improvements to existing policies and programs. However, although this potential exists, current implementation remains limited and requires more structured and systematic mechanisms for civic engagement.

In Sungailiat, while some public input has been incorporated through forums and consultations, comprehensive and sustained community participation in monitoring and evaluation is still lacking. Community members often convey their opinions and suggestions to the Environmental Agency (DLH) informally, for instance, through the social media platform of the agency's head, who actively communicates updates on urban waste management and related challenges. However, formal evaluation meetings involving the public are infrequent and not yet institutionalized.

Efforts to broaden civic engagement are also being pursued through community programs such as the Clean River Movement and Friday Clean-Up Campaigns, which mobilize participation across all societal levels—from neighborhoods and schools to local government institutions.

The education sector plays a vital role by integrating environmental awareness into school curricula and establishing on-site waste-processing facilities. Students are trained to maintain a clean environment, fostering a sense of responsibility from an early age and encouraging innovation in sustainable living practices.

Additionally, community participation in waste valorization is supported through initiatives such as recycling training programs for members of the Family Welfare Movement (PKK) in various subdistricts. These trainings focus on converting inorganic waste into economically valuable products, thus enhancing both environmental outcomes and local livelihoods.

Conclusion

Community participation in waste management in Sungailiat, Bangka Regency, demonstrates promising yet uneven progress across various stages—utilization and evaluation in particular. Economically, waste banks and community-led recycling initiatives have generated tangible, albeit limited, benefits, primarily among small groups such as women and youth. Ecologically, composting activities and school-based environmental programs illustrate a growing awareness of sustainable practices, though they remain small in scale.

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Despite these positive developments, broader community involvement remains constrained by limited access to recycling infrastructure, insufficient training, and lack of formal mechanisms for feedback and evaluation. Although informal communication channels with local authorities are utilized, structured participation in policy assessment and monitoring is still underdeveloped.

To ensure effective and sustainable waste management, it is essential to reinforce participatory mechanisms across all phases—from upstream to downstream—enhance public awareness, and strengthen institutional support through adequate facilities and regulatory frameworks that encourage inclusive community engagement. Strengthening institutional support, expanding public education, and fostering inclusive platforms for dialogue are essential to enhance community engagement. These efforts are critical for achieving effective, sustainable, and community-driven waste management aligned with the principles of a circular economy and environmental governance.

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