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ANALYSIS OF THE WASTE MANAGEMENT SYSTEM IN TANA TIDUNG REGENCY

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Abstract

Waste management in Tana Tidung Regency faces complex challenges due to population growth, urbanization, and infrastructure limitations. This study aims to analyze the waste management system in Tana Tidung Regency by highlighting the challenges and opportunities in achieving a sustainable environment.waste management infrastructure, such as final disposal sites (TPA) and temporary disposal sites (TPS), is still inadequate. In addition, public awareness of sorting and processing waste is also low. Other constraints include the limited fleet of waste collection vehicles and the minimal use of modern technology. Opportunity aspects such as the development of community-based waste banks, the application of waste processing technologies like biodigesters and waste-to-energy systems, as well as collaboration with the private sector through corporate social responsibility (CSR) programs. The strategy to improve the waste management system, which includes community education, infrastructure investment, and the application of the reduce, reuse, recycle (3R) principle, is deemed important to support the creation of a cleaner and more sustainable environment. waste management in Tana Tidung Regency requires a holistic approach involving the government, the community, and the private sector. By addressing existing challenges and seizing opportunities, Tana Tidung Regency can improve the quality of its waste management towards sustainable development.

Keywords: Waste management, Tana Tidung Regency, environmental sustainability..

INTRODUCTION

Waste is one of the increasingly complex environmental issues in the modern era, especially in developing areas. Tana Tidung Regency, as one of the regencies in North Kalimantan Province, faces similar challenges in waste management. As a relatively new region with a continuously increasing population, the waste management issue in Tana Tidung has become an urgent matter that needs to be addressed immediately (Hidayat, 2019). Suboptimal waste management can cause various negative impacts, both on the environment, public health, and the aesthetics of the area. Therefore, it is important to analyze the waste management system currently implemented in Tana Tidung Regency in order to find effective and sustainable solutions.

Based on Law Number 18 of 2008 concerning Waste Management, waste management must be carried out systematically, comprehensively, and sustainably. However, the implementation of these principles often faces various obstacles, especially in developing areas. Tana Tidung Regency, which consists of various sub-districts with diverse demographic and geographic characteristics, requires a waste management approach that is suitable for local conditions. One of the main challenges is the lack of waste management infrastructure, such as adequate final disposal sites (TPA) and sufficient waste collection fleets (Rahmawati, 2020). In addition, the low public awareness of the importance of proper waste management further exacerbates the situation. The waste problem in Tana Tidung Regency is not only related to technical aspects but also involves social, economic, and cultural aspects. In the social context, community participation plays a significant role in supporting the success of waste management. However,

based on previous research, the level of community participation in waste management activities in this area is still relatively low (Sutrisno, 2021). This is due to the lack of education and socialization regarding the importance of proper waste management. In addition, from an economic aspect, high operational costs become an obstacle for local governments in providing adequate waste management facilities and services. Environmental education and awareness are also very important to support waste management systems. With integrated environmental education programs in school curricula, the younger generation can be taught how to manage waste responsibly. To change the way society treats waste production and management, a sustainable environmental awareness campaign is needed (Indrawanto, 2026).

Waste management is also an important part of climate change mitigation efforts. Poorly managed waste, especially organic waste, can produce methane gas (CH4), which is one of the greenhouse gases responsible for global warming. Therefore, the implementation of an environmentally friendly waste management system, such as composting and recycling, becomes a strategic step to reduce environmental impact while also providing economic benefits to the community (Widodo, 2018). In Tana Tidung Regency, such efforts are still very limited and require further attention from various parties.

In the geographical context, Tana Tidung Regency has a relatively large area with a relatively low population density. This presents a unique challenge in the distribution of waste management services. Remote and hard-to-reach areas often become neglected regions in waste management. As a result, practices of indiscriminate waste disposal, such as in rivers or vacant land, are still commonly found. This practice not only pollutes the environment but also has the potential to cause disasters such as floods and landslides (Nasution, 2021).

To address the issue, an in-depth analysis of the waste management system in Tana Tidung Regency is required. This analysis covers various aspects, ranging from policies, infrastructure, community participation, to the technology used. Through this analysis, it is hoped that more effective, efficient, and sustainable waste management strategies can be found. This research also aims to provide recommendations to the local government in formulating appropriate policies to address the waste issues in this area.

As one of the efforts to support better waste management, the roles of the government, society, and the private sector are very important. Local governments have the primary responsibility of providing facilities and regulations that support waste management. The community, on the other hand, needs to be encouraged to actively participate in waste management activities, such as sorting waste at the source and participating in recycling programs. Meanwhile, the private sector can contribute through investments in waste management technology or corporate social responsibility (CSR) programs related to environmental management (Setiawan, 2019).

Figure 1 Sustainable Development Goals

In the context of achieving the Sustainable Development Goals (SDGs), waste management in Tana Tidung Regency plays an important role in supporting the 11th goal on sustainable cities and communities, the 12th goal on responsible consumption and production, and the 13th goal on climate action. With the right strategy and strong commitment from all stakeholders, Tana Tidung Regency can overcome existing challenges and seize opportunities to realize a more sustainable waste management system.

METHOD

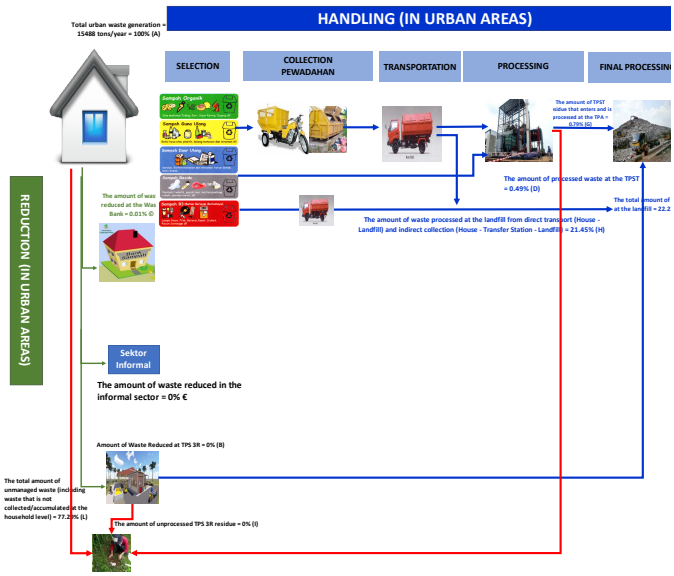

Figure 2. Waste Management Service Chain

RESULTS AND DISCUSSION

Technical Aspects

The technical aspects of waste management in Tana Tidung Regency encompass various components that play a role in supporting the effectiveness of the waste management system. These components include infrastructure, technology, operational processes, as well as waste collection and processing mechanisms. In the context of this research, the technical aspects become one of the main focuses to understand the extent to which the existing system can handle waste management challenges and seize the available opportunities.

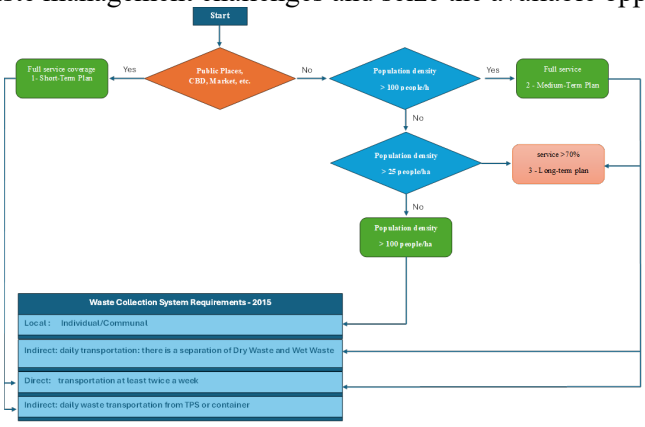

Figure 3 Waste management and collection and recycling system

3.1 Waste Management Infrastructure

Infrastructure is very important for the waste management system. The existing infrastructure in Tana Tidung Regency includes: Temporary Disposal Sites (TPS): The number of TPS in Tana Tidung is still limited and unevenly distributed, especially in rural areas. This causes people to often throw garbage on the ground or in river streams. In addition, the existing waste collection points do not have adequate waste sorting facilities, causing the collected waste to tend to mix.

In the transition to the Sanitary Landfill System, the Tana Tidung Regency Landfill applies a Controlled Landfill System.

3.1.1 Operational Method: Controlled Landfill:

- The mechanism involves the landfill officers levelling the incoming waste and then covering it with soil periodically—once a week—creating alternating layers of waste and soil. This method is different from the ideal sanitary landfill system, which covers the waste every day.

- Methane Gas Management: The Environmental Agency installs gas pipes to prevent explosions due to the accumulation of methane gas in the landfill.

3.1.2 Target and Transition Towards Sanitary Landfill

The Tana Tidung Regency Government is preparing to switch to a sanitary waste disposal system, which will be more environmentally friendly. The national goal is to stop the practice of open waste disposal, as recommended by the Ministry of Environment. The main obstacles in this transition include limited budgets and a lack of facilities and infrastructure, especially heavy equipment such as bulldozers and excavators.

Table 1. Condition of the Final Disposal Site (TPA)

Name of the Waste Disposal Site	Year of Initial Operation	Total Area of the Landfill	Luas Sel *Landfill*	Waste Generation Estimation	Estimation of Waste Reduction at the Source	The Amount of Waste Transported to the Landfill	The Amount of Unmanaged Waste	Scope of services	Age Range of Landfills	End of Technical Life	Status
										Landfill	
		(Ha)		(ton/day)				%	(Tahun)	(Year)	
TPA Limbu Sedulun	2018	4	2	11,46	3,46	7,31	4,15	43,75	18,6	2042	Not yet full

Source: DLH & Analysis Results, 2025

3.2 Waste Management Technology

The use of technology in waste management in Tana Tidung Regency is still very limited. Simple technologies, such as manual composting, are used by some members of the community to process organic waste. However, modern technologies such as biodigesters, environmentally friendly incinerators, or recycling facilities have not yet been widely implemented,

- Composting:
  Composting organic waste is carried out by a small portion of the community and society. Large-scale composting technology has not been implemented due to the lack of facilities and training.
- Recycling:
  Efforts to recycle plastic and paper waste are still sporadic, especially by scavengers and small entrepreneurs.

An integrated recycling system is not yet available at the district level.

3.3 Waste Transportation Mechanism

The process of transporting waste from TPS to TPA in Tana Tidung still faces various obstacles, such as:

- Fleet Limitations:
  The number of waste collection vehicles owned by the local government is insufficient to serve the entire district, especially in remote areas.
- Transport Frequency:
  The frequency of waste collection is often not regular, causing a buildup of waste at the TPS.
- Operational Efficiency:
  The transportation system has not yet adopted the optimal route, resulting in high time and operational costs.

3.4 Waste Management

The waste processing in Tana Tidung Regency is still simple and not yet integrated. The waste collected at the TPS is mostly taken directly to the TPA without undergoing any sorting or further processing. This creates various problems, such as:

- Organic Waste:
  Organic waste that has the potential to be processed into compost or biogas is often not utilized and is directly disposed of in landfills.
- Inorganic Waste:
  Inorganic waste, especially plastic, which should be recyclable, often ends up in landfills due to the lack of sorting systems at the source or TPS.

3.5 3R System (Reduce, Reuse, Recycle)

The implementation of the 3R principle in Nunukan Regency is still very minimal. Although there have been several waste bank programs at the community level, their scale is still limited and not yet integrated with a broader waste management system. According to Susilawati and Rahayu (2019), the implementation of the 3R principle requires infrastructure support, community education, and economic incentives to encourage active participation.

Table 4. Condition of 3R TPS in Tana Tidung Regency

No.	Name of TPS3R	Year built	Location
1	TPS 3R Kujau	2020	Desa Kujau
2	TPS 3R Rian	2020	Desa Rian
3	TPST 3R Tideng Pale Timur	2015	Desa Tideng Pale Timur
4	TPS 3R Sepala Dalung	2015	Desa Sepala Dalung

Sumber : DLH & Analysis Results, 2025

3.6 Technical Challenges

Some technical challenges faced in waste management in Tana Tidung include:

- Budget Constraints:
  The budget allocation for the procurement and maintenance of waste management infrastructure is still low, resulting in limited facilities.
- limited facilities.
  Waste management officers often lack adequate skills and knowledge related to modern technology or environmentally friendly waste management methods.
- Access to Modern Technology:
  Waste management officers often lack adequate skills and knowledge related to modern technology or environmentally friendly waste management methods.

3.7 Technical Opportunities

On the other hand, there are several technical opportunities that can be utilized to improve waste management, including:

- Development of Modern Infrastructure:
  The government can invest in the development of landfills that use sanitary landfill technology or large-scale composting systems.
- Implementation of Waste-to-Energy (WTE) Technology:
  This technology can convert waste into alternative energy sources, such as electricity or biogas, thereby providing economic benefits while reducing the burden on landfills.
- Collaboration with Private Sector:
  Collaboration with the private sector can help provide recycling facilities and more efficient waste processing technology.

CONCLUSION

Tidung shows that waste management in this area faces various complex challenges, including population growth, urbanization, and infrastructure limitations. The existing infrastructure, such as landfills (TPA) and temporary disposal sites (TPS), is still inadequate, and public awareness in sorting and processing waste is also relatively low. In addition, there are limitations in the waste collection fleet and minimal use of modern technology. However, there are opportunities that can be utilized to improve the waste management system, such as the development of community-based waste banks, the implementation of waste processing technologies like biodigesters and waste-to-energy systems, as well as collaboration with the private sector through corporate social responsibility (CSR) programs. The necessary strategies include community education, investment in infrastructure, and the implementation of the reduce, reuse, recycle (3R) principle. By addressing existing challenges and leveraging available opportunities, Tana Tidung Regency can improve the quality of its waste management towards sustainable development and create a cleaner and healthier environment for the community.

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