

## Identification of the Implementation of Environmental Sanitation in Settlements in Mataram District, West Nusa Tenggara

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**Abstract:** Sanitation is an important health initiative that protects the cleanliness of the environment and its users. Basic sanitary facilities include clean water, wastewater treatment, drainage channels, and waste management. This research aims to provide an overview and information regarding the availability of basic sanitation facilities in a settlement. The research was conducted in Mataram District, West Nusa Tenggara. The research method used in this research is a descriptive qualitative method. The research focuses on identifying fundamental sanitation aspects, which include design and construction, waste management, wastewater management, and drainage systems. Direct observation, structured interviews, and in-depth interviews gathered data. According to the research findings, Mataram District's clean water supply comes from PDAM and drilled wells; waste management is not optimal because waste sorting and processing are not yet available, wastewater treatment is still done on-site in septic tanks in each house, and some wastewater comes from washing activities. While bathing drains into the gutter, the residents' yards have a gutter-based drainage system. The participation of all stakeholders, including the local administration and the local community, is necessary to optimize the sanitation system in Mataram District. The implementation of regulations and the provision of infrastructure are essential for the support of drainage and waste management systems. To preserve the cleanliness of wastewater channels, the community can take an active role in processing refuse, beginning at the household level and cleaning the gutters.

**Keywords:** Basic Sanitation; Mataram District; Waste Water; Drainage; Waste Management.

### Introduction

Sanitation is a health initiative that protects the cleanliness of the environment [1] and its inhabitants by controlling environmental factors that affect physical development, health, and human survival [2]. Safe sanitation is critical for health, from infection prevention to improved and sustained mental and social well-being. Environmental protection for safe sanitation is outlined in the Sustainable Development Goals (SDGs) for sanitation and water quality.

Basic sanitation comprises clean water, wastewater disposal, drainage channels, and waste management [3,4]. Every home and family has established a basic sanitation system as a prerequisite for environmental health and the sustainability of daily life. Diarrhea, a public health issue and the leading cause of disease and death in children under the age of five in low—and middle-income countries can be exacerbated by a lack of good sanitation. Poor sanitation contributes to neglected tropical diseases and broader negative consequences, including hunger [5].

Environmental protection related to the implementation and access to sanitation in West Nusa Tenggara (NTB) has been listed in the 2020-2024 RPJMN, which states that the government will focus on increasing the target of safe and sustainable sanitation access, namely 90 percent of access to proper sanitation, including secure

access by 20 percent and the practice of open defecation (BABS) decreasing to 0 percent. Most households in NTB have defecation facilities that are utilized for their household (76.65%). In addition, 10.07% of households use these defecation facilities in conjunction with other households. Meanwhile, 1.02% of households do not have private defecation facilities but use communal/public toilet facilities that the general public can access. Around 12.10% of households still need defecation facilities [6].

There are still households that do not have defecation facilities, and these need attention because of the availability of facilities where defecation is important for health. Mataram City has 5% access to adequate sanitation, with 91% of families having proper access and 4% not having proper access. Furthermore, 97% of families employ feces storage that does not meet SNI 2398:2017 standards. Mataram City has adequate sanitary facilities; however, it falls short of satisfying SNI 2398:2017 criteria. Work and population density can be contributing factors [7].

Mataram District is a sub-district in the center of Mataram City, West Nusa Tenggara. Selaparang District borders Mataram City to the north, Sekarbela District to the south and west, and Sandubaya District to the east. The population of Mataram City is 79,672 people, divided into nine urban villages [8]. Increasing population growth causes the need for clean water and safe access to sanitation to be higher. An initial identification related to basic

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sanitation facilities in Mataram District settlements was carried out to improve access to basic sanitation that is safe for the community. This research aims to map the condition of essential sanitation components in Mataram District, consisting of urban villages with low, medium, and high populations. The identification results can be used as material for the study and development of the basic sanitation system in Mataram District to realize environmental health protection and as a consideration for the local government to make proper facilities and infrastructure for the sanitation system in Mataram District.

## Research Methods

### Location of Research

This research was carried out in September – October 2023 in three villages in Mataram District, West Nusa Tenggara: West Pagesangan Village, which represents a low population density; Pejanggik Village, which represents a medium density; and Pagesangan Village, which represents a high density.

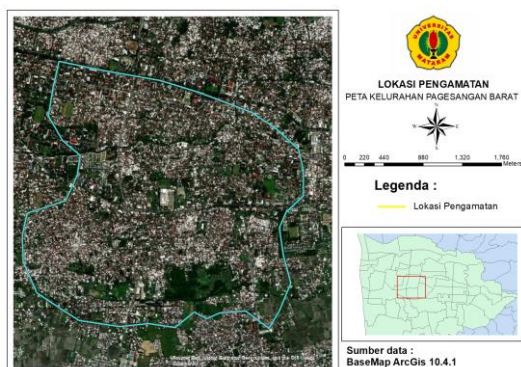


Figure 1. West Pagesangan Village



Figure 2. Pejanggik Village

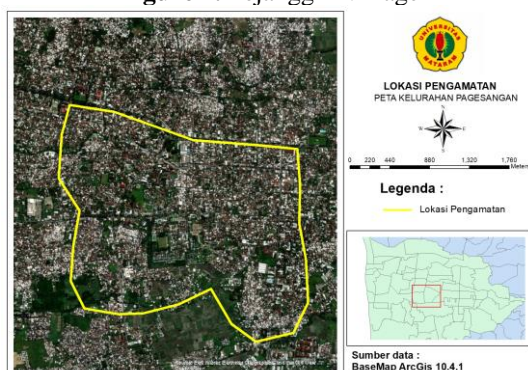


Figure 3. Pagesangan Village

## Data Collection

This study used a qualitative descriptive approach, including a literature review, interviews, and direct observations at the research location. The descriptive qualitative approach is a strategy for gathering data and events described and interpreted descriptively [9]. From September to October 2023, the team methodically planned and collected data in Mataram City, evaluated it, and published reports.

This research focuses on identifying components of fundamental sanitation, such as design and construction, waste management, wastewater management, and drain systems. The purposive sampling method, which considers the synchronous sample, is thought to be capable of identifying the population.

The primary and secondary data used in this research are primary and secondary. Primary data was obtained from interviews and direct observation at the research location. Secondary data was obtained from related agencies in Mataram Sub-district. Primary data collection was conducted through interviews, observation, and documentation. Interviewees were determined randomly using structured interview techniques. Secondary data analysis and literature observation were conducted extensively to compile population statistics (population, administrative areas, and population density), review applicable policies, and collect other related data. Secondary data collection is related to the Mataram City office.

## Data Analysis

The data analysis technique used in this research is a qualitative analysis conducted to examine aspects of the physical condition of basic sanitation in settlements. The analysis is a qualitative descriptive analysis to determine the feasibility level of environmental sanitation of housing, offices, and schools. Analysis of the feasibility level of drainage (wastewater) to see the condition of this drainage (wastewater) with field observations and interviews. Analysis of the feasibility level of clean water to see the source and condition of clean water is seen by field observation in the form of questionnaires and interviews with respondents and to know the level of waste management analysis such as seeing waste management techniques and waste collection by field observation in the form of questionnaires and interviews with respondents [10].

## Results and Discussion

### Overview of the Research Site

Kecamatan Mataram has an area of 1076 ha with a total population of 79672 people (Table 1). Mataram sub-district consists of nine villages, namely Pagutan, Pagesangan Timur, Pagutan Barat, Pagesangan Barat, Pejanggik, Pagesangan, Pagutan Timur, Punia, and Mataram Timur. Based on Table 1, the population density value in the Mataram sub-district shows that the highest density is in the Pagesangan Barat sub-district while the lowest density is in the Pagesangan sub-district.

**Table 1.** Data on Population and Sub-district Area in Mataram

The Village	Total Population	Area (Ha)	Density (People/Ha)	Category
Pagutan	11754	186	63.19	Peri-Urban
East Pagesangan	11549	110	104.99	Low-Urban
West Pagutan	10845	91	119.18	Low-Urban
West Pagesangan	10576	75	141.01	Low-Urban
Pejanggik	7662	103	74.39	Peri-Urban
Pagesangan	7642	196	38.99	Peri-Urban
East Pagutan	7359	103	71.45	Peri-Urban
Punia	6412	88	72.86	Peri-Urban
East Mataram	5873	124	47.36	Peri-Urban
Total	79672	1076		

Source: BPS, 2023

**Identification of Basic Sanitation in Mataram Sub-district**

Rural environmental sanitation is intricate and comprehensive, encompassing water safety, waste management, sanitation infrastructure, food hygiene, air quality, soil cleanliness, vector control, and residential sanitation [11]. This study identifies waste management, wastewater management, and drainage systems as fundamental aspects of sanitation. The choice of these three factors is predicated on the research site's environmental circumstances and sanitary issues.

**Design and construction of Buildings**

A ventilation system, home floors, house walls, and enough lighting are all components of the design and construction of the observed dwellings. In general, permanent dwellings comprise most of the housing buildings in the sub-districts of Pagesangan Barat, Pagesangan, and Pejanggik. The observations indicate that the roof utilized is tiled, most of which is fitted with a ceiling or a ceiling built of clipboard construction. For the most part, the house's walls are constructed out of red brick. This is the predominant material used in architecture. Large amounts of ceramics have been utilized to cover the house's floors. The design and construction of the structure are the responsibility of each homeowner. When deciding on the structure and design of the building, the primary consideration is to create an atmosphere that is both secure and pleasant.

The settlement conditions in Kelurahan Pagesangan are close to densely populated settlements, offices, and health institutions. The dwellings are situated in a clean and well-maintained environment. Sanitation also emphasizes the surveillance of the physical structures that serve as residences and impact human health. Sanitation facilities encompass ventilation, humidity, temperature, occupancy density, natural illumination, building construction, waste disposal facilities, and human faeces disposal facilities [12]. This condition has the potential to mitigate the transmission of disease.

**Waste Management**

Waste management includes storing, collecting, and destroying waste, which aims not to interfere with public health and the environment [12]. Improperly executed waste management can lead to environmental pollution. Inappropriate waste disposal was prevalent due to the need

for adequate methods established by the government and residents for solid waste management. Consequently, household and community dumping sites evolve into permanent and definitive disposal locations. Without fundamental garbage collecting facilities at the source, communities dispose of waste on streets, open areas, and drains, resulting in unhygienic circumstances [13]. Indiscriminate disposal poses an environmental risk and can jeopardize health and safety. It can foster habitat for pathogenic microbes and disease vectors, generate public annoyance due to odor, and perhaps affect water quality. These factors may contribute to cholera, typhoid, and other sanitation-related diseases, particularly during the rainy season [14].

The interviews indicate that organic waste, specifically kitchen and garden trash, predominates among the types of garbage created. The trash management system in the three sub-districts needs to be fixed. Refuse produced from domestic activities is gathered in receptacles supplied by each household. Additionally, officials will collect the garbage and transport it to the TPS for interim processing before its transfer to the TPA.

In the Pagesangan sub-district, waste management involves personnel collecting and transporting refuse to the Temporary Disposal Site (TPS). A limited proportion of families have segregated organic and inorganic trash. Conversely, some individuals incinerate garbage in open environments. This may result in soil and air contamination.

The trash management in the West Pagesangan sub-district is comparable to that of the Pagesangan sub-district. The management collects and transports cleaning personnel to the Temporary Processing Site (TPS). Rubbish is incinerated in the Pagesangan Barat sub-district. In the Pejanggik sub-district, designated personnel collect waste generated by households biweekly.

Observations indicate that the management system needs to be fixed efficiently, particularly about trash sorting and processing procedures. Consequently, a strategy is required to enhance current waste management practices. This necessitates the involvement of all stakeholders, including local authorities and the community. Local governments are capable of formulating and executing regulations about waste management, encompassing collection, transportation, processing, and disposal. Furthermore, the government must facilitate allocating budgetary resources and supporting infrastructure for waste management. The community plays a significant role in waste management. As a waste generator, the community

requires socialization and education regarding waste segregation and management at the household level. Public understanding of the environmental consequences of waste and the significance of waste processing is crucial for effective waste management.

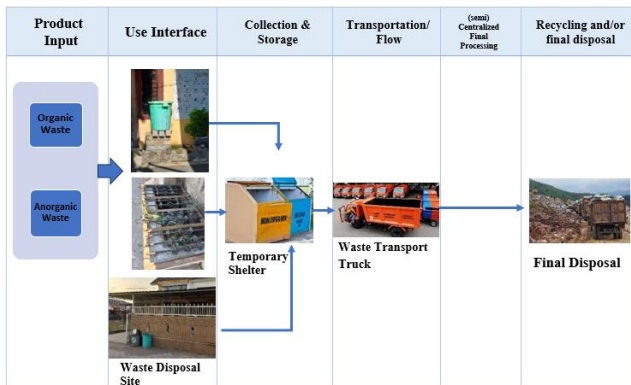


Figure 5. Map of sanitation system - waste management of Mataram District

**Wastewater Management**

Water is the primary need that must be met for domestic and non-domestic activities [15]. The source of clean water used in the Mataram Sub-district for community daily activities comes from PDAM and boreholes. Wastewater disposal from household activities is channeled to places or latrines that meet health requirements. The requirements for healthy latrines include having a lid and having a floor. A place to stand that is strong and not slippery, does not cause odor, no visible dirt, the distance between the latrines is approximately 10 meters, cannot be touched by animals such as insects, and the availability of cleaning tools [16]. However, in other literature, a pit latrine is the most basic form of sanitation facility used by most people who don't have any toilet facilities. Nevertheless, the pit latrine may not be the best form of sanitation disposal of human excreta. In more privileged locations, flush toilets and sewage systems are developed through both public and private arrangements [17].

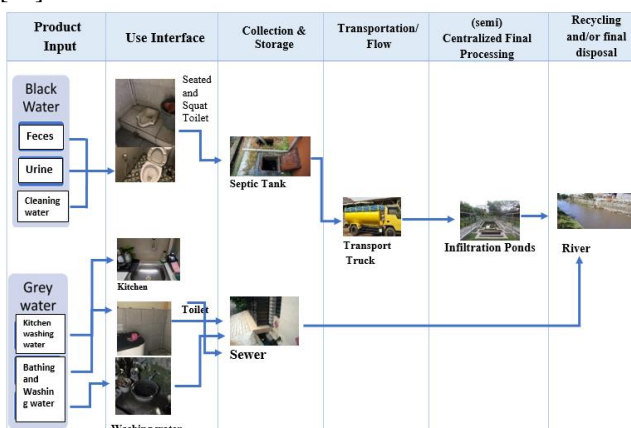


Figure 6. Map of sanitation system - wastewater treatment of Mataram District

Pagesangan urban village has a temporary shelter for faeces with a local system (SPLAD-S). The distance from the water source to the refuge in Kelurahan Pagesangan not pay much attention to the distance between the faeces storage and the water source. This is due to the need for

more land to create a safe distance from the water source. Residential sewage and feces in landfills are disposed of in septic tanks. Wastewater from toilets or sinks in housing is discharged through open storage outside the yard.

In Pagesangan Barat urban village, wastewater from bathing and MCK activities (black water) is collected and collected directly into septic tanks. Meanwhile, water from washing dishes and clothes is mainly disposed directly into the sewer or river. In Pejanggih Kelurahan, all respondents revealed that the Domestic Wastewater Management System is carried out locally to collect and treat domestic wastewater (black water and gray water) at the location of the wastewater source. A total of 40% of the respondents dispose of non-caustic wastewater (gray water) into the drainage because they assume that the wastewater they produce is safe to enter the water body. Meanwhile, 60% of respondents dispose of gray water into septic tanks.

**Drainage System**

A drainage system refers to the activity of draining water, both surface water and groundwater, from an area or region [18]. Drainage is a fundamental element of the sanitary system. Maintaining sanitation is crucial to decrease the risk of infection. Inadequate plumbing and waste disposal systems, without sufficient maintenance, constant monitoring, evaluation, enforcement, and updating of building regulations and practices, can elevate the risk of SARS and other infections [19,20].

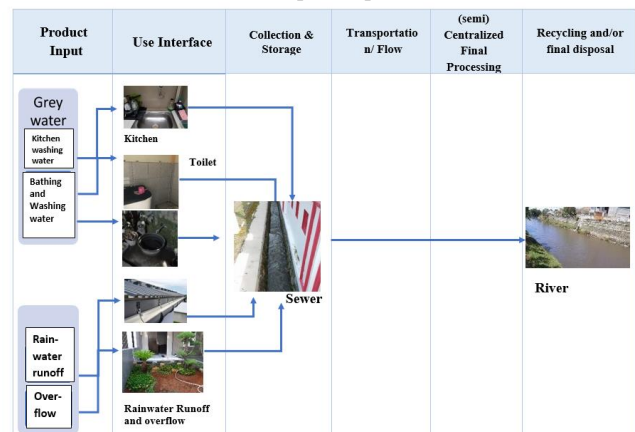


Figure 7. Map of sanitation system - drainage system of District Mataram

In general, the housing in Mataram District is equipped with a drainage system that consists of a drain/gutter. Rainwater runoff and wastewater generated by drains are the sources of wastewater. The housing sector also experiences smooth drainage conditions; however, leaf debris remains. The roads surrounding the housing are not stagnant due to the sufficiently large drainage channels and are not overly obstructed by debris. Furthermore, the community frequently engages in community service activities to maintain the local drainage system near the housing. The runoff of precipitation that occurs and the high housing conditions can also influence the frequency of flooding in this region. The local government has yet to realize the respondent's request to clean the gutters on the side of the highway despite the community performing community service to prevent and surmount drainage blockages.

## Conclusion

Basic sanitation systems in Mataram District are identified through drainage channels, wastewater treatment, and refuse management. Clean water is supplied to Mataram District through drilled wells and PDAM. However, the observation location's waste management needs to be more suboptimal. To manage waste, housekeeping personnel collect, transport, and store it in the TPA. Only a minor portion of the community is responsible for waste sorting, and individuals continue to burn waste. In Mataram District, wastewater remediation continues to be conducted on-site. Black water generated by household activities is directed to septic tanks for collection, while grey water is directed to downspouts. Most drainage systems comprise gutters already present in individual residents' yards. Grey water, rainwater runoff, and water used to irrigate plants are all flushed into the gutters, ultimately forming rivers. For further research purposes, it is necessary to identify and map the essential sanitation components at each population density level in each Mataram City district.

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