

Strategy For Developing a Slum-Free City With a Sustainability Approach in Dili, Timor Leste

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ABSTRACT

The rapid population growth and increasing demand for residential areas in Dili City, Timor-Leste, have led to the emergence of slum settlements, particularly in the Tasitolu area, which faces environmental, social, and economic pressures. This study aims to analyze slum conditions in Tasitolu and formulate strategies for a slum-free Dili City using a sustainability-based approach. A mixed-methods approach was employed, with primary data collected through field surveys and interviews, and secondary data sourced from planning documents and statistical reports. The analysis used seven indicators from the *Kota Tanpa Kumuh (KOTAKU)* model: building conditions, roads, water access, drainage, wastewater management, solid waste management, and fire protection. These indicators were grouped into social, economic, and environmental sustainability aspects. Results showed critical issues in the environmental and economic aspects, with relatively better conditions in the social aspect. Development strategies include in-situ upgrading, limited relocation, strengthening local economic activities, and enhancing government capacity in spatial planning and control. A phased roadmap of short-, medium-, and long-term actions is proposed to achieve a sustainable, slum-free Dili City.

Keyword: Tasitolu area; slum settlements; sustainable development; Kota Tanpa Kumuh); Dili City

INTRODUCTION

The development of urban areas in developing countries is generally characterized by rapid population growth, pressure on built-up space, and an imbalance between planning capacity and the dynamics of community needs (Artmann et al., 2019; Blakime et al., 2024; Farrell, 2017; García-Ayllón, 2016; Msuya et al., 2021). The city of Dili, as the national political and economic center, faces similar challenges. In the last two decades, the urbanization process in Dili has been intense and unmanaged due to inadequate planning tools (Artmann et al., 2019; Faye et al., 2022; García-Ayllón, 2016). This condition has encouraged the emergence of expanding informal settlements, especially in strategic areas such as Tasi Tolu, which feature very limited flat space, important ecological functions, and strategic value for urban development (Addas, 2023; Chen & Xu, 2022; Yao et al., 2022).

The growth of informal settlements in Tasi Tolu occurs sporadically and organically, without following spatial planning rules or infrastructure technical standards (Husain et al., 2020; Medina, 2021). This phenomenon not only increases the risk of slums but also contributes to declining environmental quality, vulnerability to disasters, and reduced regional capacity to support urban socioeconomic functions (Zhang & Wang, 2020; Yuliana, 2021). The urban studies literature confirms that informal settlements often indicate weak physical planning systems, limitations in land governance, and an imbalance between the supply of formal housing and the real needs of low-income communities (Sari & Fadilah, 2020; Patel & Singh, 2021; Nugroho & Salim, 2022).

On the other hand, the Government of Timor-Leste has worked to reduce slums but faces limitations in policy integration, spatial data collection, and implementation of sustainability-based strategies (Silva & Santos, 2020; Smith & Lee, 2021). In the context of Tasi Tolu, the challenges are increasingly complex because this area serves an ecological role as a water

reservoir, a nature conservation zone, and an area sensitive to climate change (Miller et al., 2020; Gifford & Wong, 2021). Thus, conventional approaches to handling slums are no longer adequate. A sustainability-oriented regional development model is needed—one that not only organizes informal settlements but also ensures the protection of ecological functions, strengthens social inclusion, and provides adaptive spatial management mechanisms (Wells & McDonald, 2021; Rani & Iqbal, 2020; Purnama & Setiawan, 2022).

Nationally, development in Timor-Leste is based on the National Strategic Development Plan (PEDN) for the 2011–2030 period, which is the only plan document that descriptively formulates visions, challenges, actions, and targets in a systematic and integrated manner across three development sectors.

The area of Dili City is 227.6 km², with an annual population growth rate of 4.1%—far above the national average of 2.45%—and a very high population density of 1,424.7 people per km². The population of Dili City represents 25% of Timor-Leste's total population, which exceeded 1.3 million in 2020 (Belo, 2015; GoTL-DGE-MF, 2023; GoTL-MPIE, 2016).

If this slum condition is left unchecked, it will degrade quality of life and productivity because, according to Jones, P. (2017), people living in slums often suffer more economically and socially than those in non-slum areas.

Thus, the model for the development strategy of the City of Dili to achieve a slum-free city must align with the sociocultural, economic principles of the local community and the natural physical environment of Dili. This is known as the sustainability approach or the principle of sustainability. Urban development principles, including those for slum residential areas, must always start with a sustainable development approach. According to Jones, P. (2017), the complexity of urbanization problems and urban sector development poses considerable challenges that require good and appropriate policies and strategies to achieve sustainable urban development. These include special and specific policies and strategies to immediately improve housing and environmental quality in existing locations without relocating residents.

The city of Dili must project an image as an attractive, safe, and healthy capital through physical housing conditions that provide comfort, a supportive environment, vibrant community social life, a productive economy, comfortable workplaces, and an orderly physical environment free from shabbiness and flooding.

This study aims to analyze the development of increasingly dense settlements in Dili City, especially in the Tasitolu area, as well as their impact on slum formation and the decline in residential environmental quality. This has the potential to damage city life quality, the urban economy, and community social patterns. The research also aims to identify factors affecting the sustainability of slums in Tasitolu and to develop strategies to prevent and reduce slums in Dili City. The benefits of this research include serving as input for revising Timor-Leste's national housing policy, providing considerations for housing sector policymakers, and offering a model applicable to other cities in Timor-Leste for holistic and sustainable slum management.

METHOD

This research was carried out in the city of Dili, Timor-Leste, which consists of six sub-districts, with a focus on the Tasitolu area, which is located in the western part of Dili City, precisely in the administrative area of Dom Aleixo. This area is located about 8 kilometers from the center of Dili, facing directly to the Sawu Sea. This research was carried out for 12 months, starting from the preparation stage to the improvement of the thesis. The data used consisted of primary data, obtained through field surveys, interviews, visual observations, and expert assessments, and secondary data, obtained from previous planning, policy documents, and study reports. Primary data sources include local communities, local government officials, and experts, while secondary data were obtained from government agencies and international institutions such as UN-Habitat and the Cities Alliance.

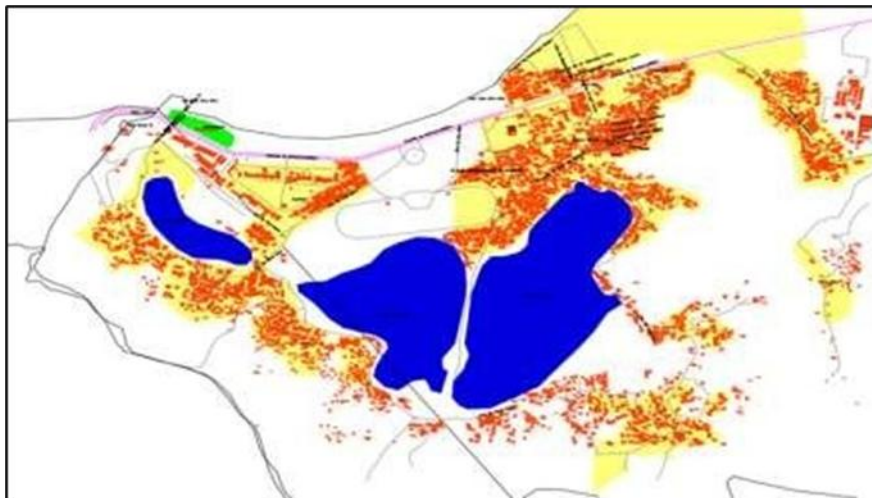


Image 1. Map of Tasitolu Dili, Timor Leste Research Location

The data collection technique used field surveys, interviews, and visual observation methods, while the analysis was carried out with a quantitative approach using the calculation model of Indonesia's City Without Slums (KOTAKU) which included seven main indicators, such as building conditions, environmental roads, drinking water supply, and drainage. Furthermore, the data collected was analyzed to assess the level of sustainability of slums in Tasitolu by dividing these indicators into three aspects of sustainability: social, economic, and environmental. The results of this sustainability analysis are then used to develop a development strategy for the City of Dili without slums, which includes measures to prevent and reduce slums based on existing physical data and policies that have been prepared by relevant ministries.

RESULTS AND DISCUSSION

Identification of Tasitolu slums

The identification of the Tasitolu slum area is carried out based on the survey results. The data will be analyzed by assessing the score on the indicator criteria of the calculation model of the City Without Slums, then from the score/assessment results it can be known the level of slums and problems in the settlement location.

The following are the results of the assessment of each slum indicator in the Tasitolu Area:

Building Condition

Analysis of area characteristics, building conditions in the Tasitolu area shows a high level of non-conformity with the standards of habitable settlements. The three criteria analyzed, namely building irregularities, building density level, and building quality, were mostly in conditions that did not meet the technical requirements of buildings and spatial planning.

- a. Building irregularities are in the form of unpatterned building orientation, do not follow the road network, and are built without clear planning.
- b. The very high level of building density is characterized by a very tight distance between houses, a lack of open space, and the formation of narrow alleys that are difficult to access.
- c. Low building quality, with the dominance of semi-permanent materials, weak structural conditions, lack of ventilation and natural lighting, and inadequate sanitation.

The following are the results of the assessment of each criterion from the building condition indicator in the Tasitolu Area:

Table 1. Building Condition Assessment in the Tasitolu Area

No	Indicator	Criteria	Value
1	Building Condition	Building Irregularities	5
		Building Density Levels	5
		The quality of the building is not qualified	5

Source : survey results, 2025

Neighborhood Roads

The physical condition of the road network and environmental roads in the Tasi Tolu area is in a condition that has not met the feasibility standards as residential infrastructure. Most of the roads are still in the form of dirt and gravel, with uneven surfaces and many potholes. During the rainy season, this condition worsens due to inundation and erosion, thus endangering road users and hindering the mobility of residents.

- a. The condition of the road surface cannot be passed by vehicles safely and comfortably. More than 76% of the neighborhood's road network has damaged, uneven, pothole, and slippery surfaces when it rains. This makes it difficult for two-wheeled and four-wheeled vehicles to pass safely.
- b. Inadequate road width, the width of the environmental road in Tasi Tolu ranges from 1.5–4 meters, even some sections are narrower, so that it can only be passed by motorcycles or small vehicles. This width does not meet the minimum standards of residential environmental roads.
- c. Inadequate road equipment, there are almost no road markings, traffic signs, or street lighting (PJU). At night, most sections rely only on lighting from residents' houses, which is insufficient for the safety of road users.

The following are the results of the assessment of each criterion from the building condition indicator in the Tasitolu Area:

Table 2. Assessment of Environmental Road Conditions in the Tasitolu Area

No	Indicator	Criteria	Value
1	Neighborhood Roads	Road surface conditions that cannot be passed safely and comfortably by vehicles	5
		Inadequate road width	5
		Inadequate road equipment	5

Source : survey results, 2025

Drinking Water Supply

With the clean water supply system in the Tasitolu Area, most of the population has not received decent, safe, and sustainable drinking water services. The water sources used are still highly dependent on dug wells, borewells, and supplies from tank cars (water trucking), which shows that the pipeline clean water service network has not fully covered the entire area.

- a. Unavailability of drinking water access, more than 76% of residential areas in Tasitolu do not have proper access to drinking water through a reliable pipeline network. Most households still must rely on alternative water sources that are not always safe and sustainable.
- b. Unmet drinking water needs for everyone
The availability of clean water is not continuous. Dug wells, drilled wells, and supplies from tank cars (water trucking) have limited supplies. As a result, the drinking water needs per individual cannot be met consistently.
- c. Lack of compliance with drinking water quality according to health standards
Coastal geographical conditions and the existence of salt lakes greatly affect the quality of groundwater, which tends to have high salt levels and is prone to pollution. Most of the water sources used by the community have not gone through an adequate treatment process so that they do not meet the quality standards of drinking water that are safe for health.

The following are the results of the assessment of each criterion from the indicators of Drinking Water Supply in the Tasitolu Area:

Table 3. Assessment of Drinking Water Supply Conditions in the Tasitolu Area

No	Indicator	Criteria	Value
1	Drinking Water Supply	Unavailability of access to drinking water	5
		Unmet drinking water needs for every individual	3
		Lack of fulfillment of drinking water quality according to health standards	5

Source : survey results, 2025

Environmental Drainage

The environmental drainage system in the Tasitolu area is basically unavailable and not formed in a planned manner. Almost all residential areas do not have formal drainage channels, both open and closed, and no functioning culverts or roadside channels are found. This condition causes rainwater and surface runoff to not be able to flow in a directional and controlled manner.

- a. Inability to drain rainwater runoff, more than 76% of residential areas do not have drainage channels capable of channeling rainwater. Surface water only follows the natural contours of the soil, forming puddles at low points, and causing microerosion that worsens environmental and road conditions.
- b. In some locations, rainwater mixed with domestic wastewater and household waste stagnates for a long time. This condition triggers the appearance of unpleasant odors and reduces the quality of the environment in which people live.
- c. Not connected to the urban drainage system. There is no connection between the water flow in the Tasitolu area and the larger urban drainage system. There are no collector lines, connecting channels, or sewer outlets integrated into the main drainage network of the city of Dili.

The following are the results of the assessment of each criterion from the indicators of Drinking Water Supply in the Tasitolu Area:

Table 4. Environmental Drainage Assessment in the Tasitolu Area

No	Indicator	Criteria	Value
1	Environmental Drainage	Inability to drain rainwater runoff	5
		Creating odors	5
		Not connected to urban drainage system	5

Source : survey results, 2025

1. Wastewater Treatment

The domestic sanitation system in the Tasitolu Area, it can be concluded that most areas do not have a proper and standardized wastewater management system. Wastewater treatment is entirely dependent on limited individual facilities, while communal systems and sewerage piping networks are not available. This condition shows that more than 76% of residential areas do not have wastewater infrastructure that meets technical requirements.

- a. Unavailability of wastewater management system. There is no wastewater pipeline network, communal WWTP, or centralized treatment system in the Tasitolu area. Some houses use non-standard septic tanks, while others still dump wastewater directly into the environment. This shows that wastewater management systems in more than 76% of the region are unavailable or not functioning properly.
- b. The unavailability of waste quality according to applicable standards. Due to the absence of standardized treatment plants and the number of sanitation facilities that are not impermeable or do not meet technical requirements, the quality of wastewater discharge cannot be controlled. Wastewater released into the environment has the potential to contain pollutants and does not meet the domestic wastewater quality standards required for healthy residential areas.
- c. Pollution of the surrounding environment, discharge of wastewater into the ground, yards, and open areas, especially in areas near the coast and salt lakes, shows indications of soil and water pollution. This has an impact on reducing environmental quality and increasing the risk of health problems for the community.

The following are the results of the assessment of each criterion from the wastewater management indicator in the Tasitolu Area:

Table 5. Wastewater Management Assessment in the Tasitolu Area

No	Indicator	Criteria	Value
1	Wastewater Management	Unavailability of wastewater management systems	5
		Unavailability of disposal quality according to applicable standards	5
		Pollution of the surrounding environment	5

Source : survey results, 2025

2. Waste Management

Waste management in the Tasitolu area is still in inadequate condition and has not met the minimum service standards for residential areas. Based on the results of field observations and supporting information, most of the residential areas in Tasitolu have not been served by an organized waste management system. The absence of structured waste collection,

transportation, and processing system causes garbage piles to spread across various environmental points.

- a. The unavailability of a waste management system, there is no structured and integrated waste management system. There is no routine garbage transportation service that reaches all settlements. Most households dispose of waste independently without a clear system, such as burning, discarded into vacant land, beaches, or areas around lakes. No TPS (Temporary Shelter) has been identified as having a well-functioning TPS (Temporary Shelter) or an environment-based collection system.
- b. The unavailability of waste management facilities and infrastructure, the lack of basic waste facilities, the community tends to use methods that are not environmentally friendly such as open burning or direct disposal to the surrounding environment
- c. Pollution of the surrounding environment, The direct impact of poor waste management is clearly seen through: , Garbage piles on vacant land and roadsides, Plastic waste and domestic waste around the coast and lake of Tasitolu, Unpleasant odors in some residential points, Potential for the development of disease vectors (flies, rats, mosquitoes), Decrease in aesthetic and environmental quality of the area.

The following are the results of the assessment of each criterion from the Waste Management indicator in the Tasitolu Area:

Table 6. Assessment of Offering Management in the Tasitolu Area

No	Indicator	Criteria	Value
1	Waste Management	Unavailability of waste management system	5
		Unavailability of waste management facilities and infrastructure	5
		Pollution of the surrounding environment	5

Source : survey results, 2025

3. Fire Safety

The study of the physical condition of the area, fire security in Tasitolu can be categorized as very inadequate. In terms of active and passive systems, water supply, and accessibility, all important elements in fire prevention and handling have not been met.

- a. Availability of active and passive fire protection systems. In the Tasitolu area, there are no active fire protection facilities such as public hydrants, hydrant pipelines, adequate light fire extinguishers (APAR), and fire alarm systems. In terms of passive protection, most buildings use flammable materials (wood, board, and thin zinc) with tight distances between buildings, without any safe zones or separators (fire breaks). This condition shows that more than 76% of the region does not have a proper fire safety system.
- b. Unavailability of adequate water supply for extinguishing. There are no dedicated water sources that can be utilized for firefighting needs, such as hydrants, reservoirs, or emergency water storage ponds. The water available in the region is more focused on domestic needs and the amount is limited and not continuous. In fire situations, the water supply for extinguishing is unreliable and relies heavily on the arrival of fire engines from outside the area. This shows that the majority of areas do not have adequate water supply for fire control.
- c. Unavailability of access for fire engines Access to residential areas is mostly in the form of narrow, unpaved environmental roads, and obstructed by residents' activities and vehicle parking. Many roads have a width below the minimum standard for fire engines to pass. In addition, the connection of the neighborhood road with the main road is also not optimal,

making it difficult to respond quickly in the event of a fire. This condition shows that more than 76% of the area has access barriers for fire engines.

The following are the results of the assessment of each criterion from the fire safety indicators in the Tasitolu Area:

Table 7. Fire Safety Assessment in the Tasitolu Area

No	Indicator	Criteria	Value
1	Fire safety	Active and passive availability of fire protection systems	5
		Unavailability of water supply for adequate blackouts	5
		Unavailability of access for fire engines	5

Source : survey results, 2025

The scoring results of each indicator based on the results of the assessment of the criteria of each indicator have been carried out, the next stage is to analyze the level of slum in the Tasitolu area:

The first step is to calculate the average value for each of the key indicators. This average value describes the level of slum on the indicator as a whole., Then weighting is carried out, which is multiplying the average value of the indicator by the weight that has been set for each indicator. Weighting is necessary because each indicator has a different level of influence in determining the slum conditions of the area. This weight is determined based on the level of relative importance of each indicator to the quality of settlements. Here are the weights used in this analysis for each indicator:

Table 8. Weight Criteria of each Indicator

Indicator	Weight
Building Condition	20%
Roads	15%
Drinking Water	15%
Neighborhood Roads	15%
Wastewater	15%
garbage	10%
Drinking Water Supply	10%

The result of multiplication between the indicator score and the weight of the indicator results in the contribution value of the indicator. All contribution values are then added up so that the Total Slum Index is obtained, after the Total Slum Index is known, the next step is to categorize the total value based on the category of Level to Slum by calculating:

$$\text{Category of Score} = \frac{\text{Slum Total Index}}{5 \text{ categories}} \times 100\%$$

After knowing the score from the calculation results, it can be known that the score is included in the category of slum level which is followed by looking at the table of the slum level category:

Table 9. Categories of Slum Criteria

Score	Category
0–20	Not slums
21–40	Light slums
41–60	Moderate slums
61–80	Heavy slums
81–100	Very shabby

The results of the calculation of the identification analysis of the Tasitolu Slum area are known that the score obtained is 98 where the value is categorized as a very slum area. The following calculation of the identification analysis of the Tasitolu Slum Area can be seen in the following table:

Table 10. Analysis of Scoring Indicators of Tasitolu Slums

No	Indicator		Criteria	Value	Rata2	Weight Indicator	Total
1	Building Condition		Building Irregularities	5	5	20%	1
			Building Density Levels	5			
			The quality of the building is not qualified	5			
2	Neighborhood Roads		Road surface conditions that cannot be passed safely and comfortably by vehicles	5	5	15%	0.75
			Inadequate road width	5			
			Inadequate road equipment	5			
3	Drinking Water Supply		Unavailability of access to drinking water	5	4.333333333	15%	0.65
			Unmet drinking water needs for every individual	3			
			Lack of fulfillment of drinking water quality according to health standards	5			
4	Environmental Drainage		Inability to drain rainwater runoff	5	5	15%	0.75
			Creating odors	5			
			Not connected to urban drainage system	5			
5	Wastewater Management		Unavailability of wastewater management systems	5	5	15%	0.75
			Unavailability of disposal quality according to applicable standards	5			
			Pollution of the surrounding environment	5			
6	Waste Management		Unavailability of waste management system	5	5	10%	0.5
			Unavailability of waste management facilities and infrastructure	5			
			Pollution of the surrounding environment	5			
7	Fire safety		Active and passive availability of fire protection systems	5	5	10%	0.5
			Unavailability of water supply for adequate blackouts	5			
			Unavailability of access for fire engines	5			
Total						100%	4.9

$$\begin{aligned}
 \text{Category of Score} &= \frac{\text{Slum Total Index}}{5 \text{ categories}} \times 100\% \\
 &= \frac{4,9}{5} \times 100\% \\
 &= 98
 \end{aligned}$$

Analyze and calculate the value conditions of sustainability factors to develop cities without slums

This analysis aims to assess and calculate the value conditions of sustainability factors as the basis for efforts to develop the city of Dili without slums, with a focus on the Tasitolu Area. The sustainability assessment is carried out by utilizing slum condition data that has been analyzed in the first goal, including the condition of buildings, environmental roads, drinking water supply, environmental drainage, wastewater management, waste management, and fire safety. These seven parameters are used as the main variables to assess the level of sustainability of the region from various aspects.

The approach used in this analysis refers to the concept of sustainable development, which emphasizes the interconnectedness between social, economic, and environmental aspects. Each slum parameter is analyzed for its contribution to the three aspects of sustainability, so that it can be known which aspects are most affected by the condition of the slum area in Tasitolu.

The grouping of these indicators aims to see more comprehensively the impact of slums on the sustainability dimension of the region, as well as to identify the aspects that need the most attention in the development of slum-free areas in Tasitolu.

The grouping of slum indicators into sustainability aspects is as follows:

1. Social Aspects

The social aspect represents the quality of life, safety, and comfort of the community in a residential environment. Indicators included in the social aspect include:

- a. Building Condition, which reflects the feasibility of occupancy, density level, and the regularity of the building.
- b. Environmental Roads, which affect accessibility, safety, and social interaction of the community.
- c. Fire Security, which relates to the level of security and safety risks of life and property.

2. Economic Aspects

The economic aspect describes the region's ability to support community economic activities and the efficiency of resource utilization. Indicators included in the economic aspect include:

- a. Environmental Roads, as an infrastructure to support economic mobility and the distribution of goods and services.
- b. Provision of drinking water, which affects household productivity and informal economic activities of the community.
- c. Infrastructure conditions that are limited to these indicators have an impact on the increasing cost of living, dependence on informal services, and declining economic productivity of the community in the Tasitolu area.

3. Environmental Aspects

The environmental aspect reflects the region's ability to maintain the quality of the environment and its carrying capacity. Indicators included in the environmental aspect include:

- a. Drinking Water Supply, related to the quality and sustainability of water resources.
- b. Environmental Drainage, which plays a role in rainwater runoff control and inundation prevention.

- c. Wastewater Management, which is related to the prevention of soil and water pollution.
- d. Waste Management, which affects the cleanliness and health of the environment.

These indicators directly determine the level of environmental pollution and degradation in the Tasitolu area.

The following are the results of the analysis of the value conditions of sustainability factors.

Table 11. Tasitolu's sustainability factors

Aspects	Indicator	Score	Value	Normalization of values
Social Aspects	Building Condition	5	5	1
	Neighborhood Roads	5		
	Fire Safety	5		
Economic Aspects	Neighborhood Roads	5	4.78	0.96
	Drinking Water Supply	4.33		
	Building Condition	5		
Environmental Aspects	Drinking Water Supply	5	5	1
	Environmental Drainage	5		
	Wastewater Management	5		
	Waste Management	5		

Source : Analysis Results (2025)

The next stage is to analyze the sustainability value of the area using a spider chart (radar chart). This chart is compiled based on the final value of the indicators that have been obtained in Goal 1, without recalculation.

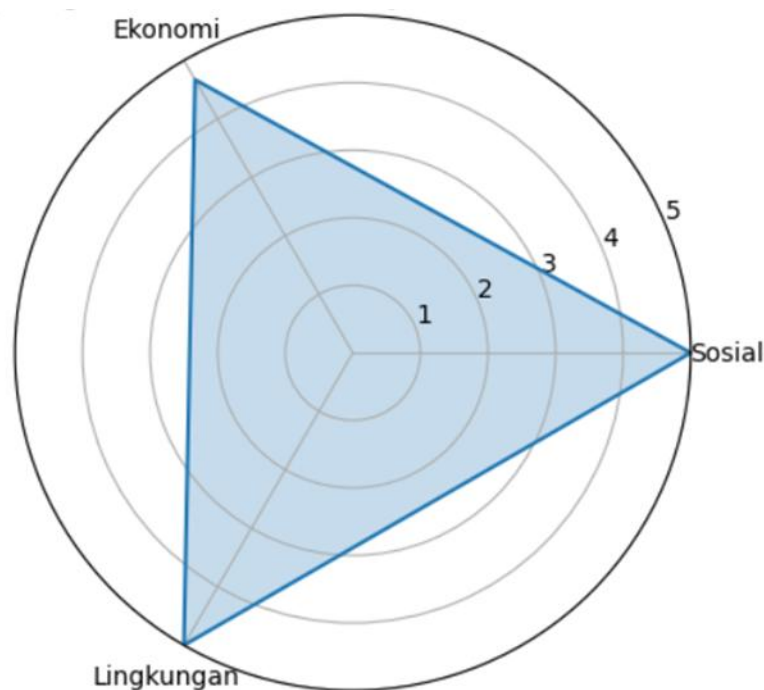


Image 2. Sustainability Diagram of Tasitolu Slum Area

The results of the analysis of sustainability factors show that the Tasitolu slum area has a very significant impact on the sustainability of the region. Social and environmental aspects have the highest score (5.00), which reflects low housing quality, basic infrastructure, and high pressure on the environment. The economic aspect has a value of 4.67, relatively lower than other aspects, but still shows unsustainable conditions. Visualization in the form of a spider

web diagram shows that all aspects are in critical condition and require priority handling in the preparation of a development strategy for the City of Dili without slums.

Developing a strategy for the development of the Tasitolu area

The preparation of the development strategy for the Tasitolu area was carried out based on the results of analysis in Goal 1 and Goal 2. The results of the identification of the slum level show that the Tasitolu area has dominant problems in the condition of buildings, basic infrastructure (environmental roads, drinking water, drainage), environmental management (wastewater and waste), and fire safety aspects. Furthermore, the results of the sustainability analysis in Goal 2 show that social and environmental aspects are the most affected, while the economic aspect is also in unsustainable conditions.

Based on these conditions, the development strategy of the Tasitolu area is directed at improving the quality of settlements in an integrated manner by integrating the physical improvement of the area, improving the quality of the environment, and strengthening the social and economic capacity of the community. This strategy is prepared by considering the priorities of the problems that have the most influence on the sustainability of the region.

1. Strategies from various aspects

a. Social Aspect Development Strategy

The strategy on the social aspect is focused on improving the quality of life of the community through:

- 1) Arrangement and improvement of the quality of residential buildings to meet feasibility, safety, and health standards.
- 2) Increasing the accessibility of safe and comfortable environmental roads to support community mobility.
- 3) Provision of adequate fire protection systems, both actively and passively, to improve the safety of settlements.
- 4) Strengthening community participation in maintaining and caring for the residential environment through community-based programs.

b. Economic Aspect Development Strategy

The strategy for developing economic aspects is directed to increase productivity and community welfare, among others through:

- 1) Increase access to basic services, especially drinking water and sanitation, to support household economic activities.
- 2) Development of local economic activities based on regional potential, such as micro enterprises and the informal sector.
- 3) Provision of proper supporting infrastructure so that it can encourage an increase in the value of the area and job opportunities.
- 4) Collaboration between the government and the community in settlement-based economic empowerment programs.

c. Environmental Aspect Development Strategy

The strategy on the environmental aspect is focused on efforts to improve the quality and sustainability of the regional environment, including:

- 1) Improvement and development of environmental drainage systems to reduce inundation and flood risk.
- 2) Improving domestic wastewater management to comply with environmental standards and not pollute the surrounding area.
- 3) Strengthening the waste management system through the provision of facilities and infrastructure as well as increasing public awareness.
- 4) Environmental pollution control to maintain the quality of water, soil, and ecosystems around the Tasitolu area.

d. Government Governance and Planning Strategy

As material for government planning, the development strategy of the Tasitolu area is directed to be integrated into official planning documents, including:

- 1) Integration of strategies into the RTRW and RDTR of Dili City, as the basis for controlling the use of space.
- 2) Strengthening institutions and coordination between agencies in handling slums.
- 3) Preparation of policies and regulations on regional planning, which support the control of slums and the prevention of new slums.
- 4) Continuous monitoring and evaluation, to ensure the effectiveness of the implementation of regional development strategies.

Thus, this strategy is not only conceptual, but can also be a reference for government operations in planning and developing the Tasitolu area.

2. Regional Development Priority Strategy

Based on the level of slum and the results of the sustainability analysis, the priority strategies for the development of the Tasitolu area include:

- a. Improving the quality of basic infrastructure, especially environmental drainage, drinking water, sanitation, and environmental roads to improve the quality of life and public health.
- b. Control and arrangement of residential buildings, in order to reduce density and irregularity of buildings.
- c. Protection of the Tasitolu environmental area, especially the lake area, through restrictions on space use and rehabilitation of affected areas.
- d. Community empowerment and strengthening the local economy, as an effort to increase the independence and socio-economic sustainability of the community.
- e. Strengthening governance and institutions, through increasing inter-agency coordination, enforcing spatial planning rules, and monitoring and evaluating the handling of slums.

3. Government Governance and Planning Strategy

As material for government planning, the development strategy of the Tasitolu area is directed to be integrated into official planning documents, including:

- a. Integration of strategy into Dili City planning, as the basis for controlling space utilization.
- b. Strengthening institutions and coordination between agencies in handling slums.
- c. Preparation of policies and regulations on regional planning, which support the control of slums and the prevention of new slums.
- d. Continuous monitoring and evaluation, to ensure the effectiveness of the implementation of regional development strategies.

Thus, this strategy is not only conceptual, but can also be a reference for government operations in planning and developing the Tasitolu area.

4. Regional Development Strategy Approach

Based on the results of the analysis, the development strategy of the Tasitolu area was formulated using a mixed strategy, which consisted of:

- a. Limited and Phased Relocation
Applied to residential zones located in environmentally high-risk areas, such as lake border areas and permanently uninhabitable areas. The relocation is carried out in stages by considering the social and economic aspects of the community, and accompanied by the provision of suitable replacement housing.
- b. Regional Redevelopment (Limited Redevelopment)
Applied to very slum areas with high density and low building order, but still in the zone allowed for settlements. The rearrangement was carried out through rearrangement of plots, increasing environmental road access, and providing adequate basic infrastructure.
- c. Settlement Quality Improvement (In-situ Upgrading)
Applied to moderate slum areas that are still possible to improve their quality without relocation. These efforts are focused on improving the physical condition of buildings, providing basic infrastructure and facilities, and improving the quality of the residential environment.

Table 12. Tasitolu Area Development Road Map

Time Stages	Key Focus	Key Strategies	Related KOTAKU Indicators	Sustainability Aspects
Short Term (0-2 years)	Emergency handling and settlement policy	- Repair of unsuitable buildings	Buildings	Social Environment
		- Provision of decent drinking water	Neighborhood Roads	
		- Environmental drainage improvements	Drinking Water	
		- Environmental road arrangement	Drainage	
		- Provision of basic fire safety systems	Fire Safety	
Medium Term (3-5 years)	Improving the quality of the community environment and economy	- Development of wastewater management system	Wastewater	Environment Economy
		- Improved waste management	Waste	

Time Stages	Key Focus	Key Strategies	Related KOTAKU Indicators	Sustainability Aspects
Long-Term(>5 years)	Sustainability and prevention of new slums	- Community empowerment and participation	All KOTAKU indicators	Social Economy Environment Governance
		- Development of local economic activities		
Long-Term(>5 years)	Sustainability and prevention of new slums	- Arrangement of integrated areas according to RTR	All KOTAKU indicators	Social Economy Environment Governance
		- Strengthening institutions and governance		
		- Control of space utilization		
		- Continuous monitoring and evaluation		

CONCLUSION

Based on the results of research on the development of the Tasitolu area towards a slum-free and sustainable area, it can be concluded that this area has a high level of slums, with major problems such as building irregularities, limited road access, lack of proper drinking water, dysfunctional drainage, and waste and waste management that has not met standards. The sustainability analysis shows that social and economic aspects still have significant challenges, with inequality between aspects that need to be addressed in an integrated manner. The development strategy of the Tasitolu area is suggested to be carried out through a gradual and integrated approach to improving the quality of the area (slum upgrading), with a focus on infrastructure, building arrangement, strengthening the community's economy, and improving the environment. The government is expected to play a leading role as a policy director, regulator, and facilitator in planning and implementation, involving the community and other stakeholders. For the community, it is expected to play an active role in maintaining the residential environment, as well as increasing awareness of the importance of decent housing and sanitation. Suggestions for further research include more in-depth economic analysis, the use of advanced quantitative methods, and studies on financing schemes and partnerships in slum management.

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