

HANDLING SLUM AREAS IN TANJUNG TIRAM AND MEDANG DERAS DISTRICTS IN BATUBARA REGENCY

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ABSTRACT

The issue of slum housing and slum settlements remains a major challenge in regional development, particularly in coastal areas and regions experiencing relatively high population growth. Batubara Regency, as a coastal area in North Sumatra Province, faces dynamic settlement development that has not been fully balanced by the adequate provision of infrastructure, facilities, and public utilities. This study aims to analyze the existing conditions of slum housing and slum settlements in Tanjung Tiram and Medang Deras Districts, assess the conformity of slum area location designation with the provisions of Article 106 paragraph (3) of Government Regulation Number 14 of 2016 and Article 36 paragraph (7) of the Regulation of the Minister of Public Works and Housing Number 14/PRT/M/2018, and formulate integrated and sustainable priorities and strategies for slum area management. The research method employed is a qualitative approach, with data collected through document studies, field observations, and interviews with relevant stakeholders. The results indicate that slum areas in Tanjung Tiram and Medang Deras Districts exhibit varying levels of slum severity, ranging from mild to moderate and severe, influenced by limited basic infrastructure, population density, the socio-economic conditions of the community, and weak control over land use. The designation of slum area locations by the local government has normatively complied with prevailing laws and regulations and serves as an important basis for determining appropriate management patterns

Introduction

The problem of slum housing and slums is still a serious challenge in regional development in Indonesia, especially in coastal areas and areas with fairly rapid economic growth but have not been balanced with the provision of adequate housing and basic infrastructure. Coal Regency, as one of the coastal areas in North Sumatra Province, faces

development dynamics that encourage increasing residential needs, especially for low-income communities. This condition has the potential to cause the growth of unplanned residential areas and develop into slums. Tanjung Tiram and Medang Deras Districts are examples of areas in Batubara Regency that show indications of slum problems. Coastal economic activities, trade, fisheries, and proximity to industrial areas and ports encourage population concentration in certain locations. However, limited access to infrastructure, facilities, and public utilities such as environmental roads, drainage, drinking water, sanitation, and waste management cause the quality of the residential environment to be low. Building density, uninhabitable housing quality, and vulnerability to floods and storm surge further strengthen the characteristics of slums in the region.

The problem of slums not only has an impact on the physical aspects of the environment, but also affects the quality of health, social, and economic of the community. Unhealthy residential environments increase the risk of environment-based diseases, reduce community productivity, and increase social inequality. Therefore, the management of slums cannot be done partially, but requires a planned, integrated, and clear regulation-based approach. In the context of national policy, the government has established a legal framework that regulates the implementation of housing and residential areas. One of them is Government Regulation Number 14 of 2016 concerning the Implementation of Housing and Residential Areas, which affirms the role of local governments in determining and handling slums. In addition, the Regulation of the Minister of Public Works and Public Housing Number 14/PRT/M/2018 provides technical guidelines related to the prevention and improvement of the quality of slum housing and slum settlements. Thus, the handling of slums in Batubara Regency needs to be based on the provisions of the laws and regulations in order to have legal certainty, clear policy directions, and the effectiveness of implementation in the field.

Determining the location of slum housing and slum settlements is a very important initial stage in the process of handling slums. This is as stipulated in Article 106 paragraph (3) of Government Regulation Number 14 of 2016, which states that the determination of the location of slum housing and slum settlements is carried out by the local government. This provision confirms that the district government has the authority and responsibility to officially identify, determine, and classify slums in its area. In Batubara Regency, especially in Tanjung Tiram and Medang Deras Districts, the determination of the location of slums is the legal basis in formulating treatment programs and activities. In the absence of an official determination, efforts to improve the quality of settlements have the potential to be directionless, overlapping, or unsustainable. Location determination is also the basis for the preparation of planning, budgeting, and integration of cross-sector and cross-regional apparatus program integration.

Article 36 paragraph (7) of the Minister of Public Works and Housing Regulation Number 14/PRT/M/2018 emphasizes that the determination of the location of slum housing and slum settlements is carried out by local governments as the basis for the implementation of prevention and quality improvement. This provision shows that the determination of location is not only administrative, but has a strategic function in determining the form of intervention to be carried out, both through preventing the growth of new slums and improving the quality of existing slums. In the context of Tanjung Tiram and Medang Deras Districts, the determination of the location of slums allows local governments to determine the appropriate handling patterns, such as restoration,

rejuvenation, or resettlement in accordance with the level of slums and socio-economic conditions of the community. In addition, location determination also encourages a more integrated handling approach between improving the physical quality of the environment, strengthening community capacity, and controlling space use so that there is no degradation of the residential environment in the future.

The determination of the location of slum housing and slum settlements in Batubara Regency has strategic implications for the achievement of sustainable settlement development. With a clear legal basis, local governments can optimize collaboration with the central government, the private sector, and the community in handling slums. This approach is in line with the principles of sustainable development that emphasizes a balance between environmental, social, and economic aspects. Therefore, the handling of slums in Tanjung Tiram and Medang Deras Districts is not only understood as an effort to improve physical improvement, but as part of a regional development policy oriented towards improving the quality of life of the community. The implementation of Article 106 paragraph (3) of Government Regulation Number 14 of 2016 and Article 36 paragraph (7) of the Minister of Public Works and Public Works Regulation Number 14/PRT/M/2018 is the key to realizing livable, orderly, and just settlements in Batubara Regency.

Table 1.1 Condition of Slums in Medang Deras and Tanjung Districts

es	Districts	Village/Village	Slum Levels
	Heavy Field	Dodek Base	Medium Slums
	Heavy Field	Pagurawan Village	Medium Slums
	Heavy Field	Lalang Village	Light Slums
	Tanjung Tiram	Bandar Rahmad Village	Heavy Slums
	Tanjung Tiram	Bagan Dalam Village	Heavy Slums
	Tanjung Tiram	Bagan Arya Village	Medium Slums
	Tanjung Tiram	Suka Maju Village	Medium Slums
	Tanjung Tiram	Hero Village	Medium Slums

Based on existing data on slums in Batubara Regency, the problem of slum housing and slum settlements is spread across two main sub-districts, namely Medang Deras District and Tanjung Tiram District. This condition shows that the problem of slums is not local, but has become a regional issue that requires integrated and sustainable handling. In Medang Deras District, slum areas with moderate slum levels are found in the Pangkalan Dodek Area with a population of 1,685 people and an area of around 457.88 hectares. The relatively large area with a fairly high population shows that there is pressure on the

carrying capacity of the residential environment, especially related to the availability of basic infrastructure, the quality of residential buildings, and sanitation and drainage systems. In addition, Pagurawan Village is also categorized as a moderate slum area, which indicates problems in the residential environment that require quality improvement. Meanwhile, Lalang Village is in the category of light slums, which indicates that this area still has a great opportunity to be addressed through a preventive approach so that it does not develop into a medium or severe slum

Meanwhile, in Tanjung Tiram District, the level of slums shows a more serious condition. Bandar Rahmad Village and Bagan Dalam Village are categorized as heavy slums with a population of 1,870 people and an area of around 325.21 hectares. This heavy slum condition reflects the complexity of settlement problems, ranging from high building density, uninhabitable house quality, limited access to clean water, poor sanitation, to inadequate environmental management. The high level of slums in the two villages makes this area a top priority in handling slums in Coal Regency. In addition to heavy slum areas, Tanjung Tiram District also has several areas with moderate slum levels, namely Bagan Arya Village, Suka Maju Village, and Pahlawan Village. The existence of this moderate slum area shows the existence of a settlement pattern that develops unplanned and has the potential to experience further environmental degradation if the quality and control of space utilization is not immediately improved, the data shows that Batubara Regency faces variations in the level of slums ranging from light, medium, to severe slums. This condition emphasizes the importance of determining the location of slum housing and slum settlements by local governments, as mandated in Article 106 paragraph (3) of Government Regulation Number 14 of 2016 and Article 36 paragraph (7) of the Minister of Public Works and Public Works Regulation Number 14/PRT/M/2018, as a basis for determining the appropriate handling pattern. Data on population, area area, and slum level are the main foundations in developing a strategy for prevention and improvement of the quality of settlements that are directed, effective, and sustainable in Batubara Regency.

Empirically, data shows that slum areas in Batubara Regency accommodate a large number of people, such as the Pangkalan Dodek area in Medang Deras District with 1,685 people and Bandar Rahmad Village and Bagan Dalam Village in Tanjung Tiram District with 1,870 people who are in the severe slum category. This condition reflects the high pressure on the residential environment, especially related to the limitations of basic infrastructure, the quality of residential buildings, environmental sanitation, and access to basic services. If not addressed immediately, these areas have the potential to experience more severe environmental degradation and cause wider social, economic, and health impacts. In terms of policy, the urgency of this research is strengthened by the mandate of Article 106 paragraph (3) of Government Regulation Number 14 of 2016 and Article 36 paragraph (7) of the Regulation of the Minister of Public Works and Public Housing Number 14/PRT/M/2018, which emphasizes that the determination of the location of slum housing and slum settlements by the local government is the basis for the implementation of prevention and improvement of the quality of slum areas.

However, in practice, the location determination and handling of slums often faces obstacles in the form of limited spatial and social data, the lack of integration of cross-sector planning, and the lack of optimal community involvement. Therefore, this research is important to provide a scientific and analytical basis that can support local government decision-making. The urgency of this research also lies in the need to determine the

priorities for handling slums appropriately. The difference in the level of slum between the heavy slum areas in Bandar Rahmad and Bagan Dalam Villages, the moderate slums in Pangkalan Dodek, Pagurawan Village, Bagan Arya Village, Suka Maju Village, and Pahlawan Village, as well as the light slum areas in Lalang Village show that each area requires a different handling approach. Without a comprehensive study, treatment programs are potentially ineffective, unsustainable, or inappropriate for the social and physical characteristics of the region. In addition, this research has strategic urgency in supporting the development of sustainable settlements in Batubara Regency. Regulation-based handling of slums, population data, and slum levels will contribute to improving environmental quality, reducing public health risks, and strengthening community social and economic resilience.

Thus, this research not only functions as an academic study, but also as a planning instrument that can be used by local governments in formulating policies, programs, and determining the location of slum housing and slum settlements in a targeted manner.

Problem Identification

Based on the empirical conditions and regulatory framework that have been described, the problems that can be identified in the handling of slum areas in Tanjung Tiram and Medang Deras Districts, Batubara Regency are as follows:

1. There are still residential areas and slums with varying levels of slums (light, medium, to severe slums) spread across Medang Deras and Tanjung Tiram Districts, showing inequality in the quality of housing and residential environments.
2. Limited infrastructure, facilities, and public utilities (PSU) such as environmental roads, drainage, drinking water, sanitation, and waste management that have not met minimum service standards, thereby reducing the quality of the residential environment.
3. The density of buildings and the quality of uninhabitable houses, especially in heavy slum areas (Bandar Rahmad Village and Bagan Dalam Village), which increase vulnerability to floods, robbery, and public health risks.
4. The determination of the location of slum housing and slum settlements in a comprehensive and data-based manner, both spatial, population, and slum data, as mandated in Government Regulation Number 14 of 2016 and Permen PUPR Number 14/PRT/M/2018 has not been optimal.
5. The lack of integrated planning for the handling of slums across sectors and across regional apparatus has the potential to cause overlap in programs and low effectiveness and sustainability of handling.
6. Differences in the social, economic, and physical characteristics of slums that have not yet become the basis for determining the pattern of handling (restoration, rejuvenation, or resettlement).
7. There is limited community involvement in the planning and management process of slums, so that the interventions carried out do not fully reflect the needs and capacity of the local community.

Problem Formulation

Based on the identification of these problems, the formulation of the problem in this study is as follows:

1. How is the existing condition of slum housing and slum settlements in Tanjung Tiram and Medang Deras Districts, Batubara Regency reviewed from the level of slums, population, area area, and availability of infrastructure, facilities, and public utilities?
2. How is the suitability of the determination of the location of slum housing and slum settlements in Batubara Regency with the provisions of Article 106 paragraph (3) of Government Regulation Number 14 of 2016 and Article 36 paragraph (7) of the Minister of Public Works and Housing Regulation Number 14/PRT/M/2018?
3. What are the factors that affect the occurrence and development of slums in Tanjung Tiram and Medang Deras Districts, both from physical, social, economic, and spatial aspects?
4. What is the priority of handling slums in Tanjung Tiram and Medang Deras Districts based on the difference in the level of slums (light, medium, and severe)?
5. What is the most appropriate handling pattern (prevention, restoration, rejuvenation, or resettlement) for each slum area in Tanjung Tiram and Medang Deras Districts to suit the characteristics of the area and the needs of the community?
6. What is the strategy for handling slums in Batubara Regency based on regulations, data, and community participation?

Literature Review

The Concept of Slums and Slums

Slums are understood as residential areas that do not meet the criteria for habitability due to limited infrastructure, facilities, basic utilities, and physical and social order, which results in the quality of the environment and people's lives being substandard. According to UN-Habitat, the goals of the Housing and Slum Upgrading policy are to increase access to decent housing, improve living standards in slums, and control the spread of slums in a sustainable manner through structural and non-physical interventions. This approach emphasizes the overall improvement of the environment and the improvement of the quality of life of residents by taking into account their limited resources and unmet basic needs. In the context of informal settlement theory, Dovey & colleagues (2021) criticize the narrow distinction between informal settlements and "slums", suggesting that informal settlements have their own social and spatial dynamics that are often overlooked in conventional planning approaches because most of the literature still focuses on the physical conditions of slums without an in-depth understanding of the social and economic structure of their communities.

Slum Upgrading and Planning Theory

Slum Upgrading Theory is a concept that has evolved from the paradigm of handling slums that was originally only physical to a more integrated approach that includes social, economic, institutional, and community empowerment aspects. According to Sibyan (2020), the slum planning approach is not solely about physical improvements or

spatial formalities, but must include social and economic orientation in the improvement strategy. This comparative study confirms the importance of understanding the local context, community characteristics, and the involvement of local actors in each phase of the intervention to achieve more effective and sustainable outcomes. Furthermore, a recent study by Azunre (2025) shows that the implementation of a slum improvement strategy that upholds authentic community participation (not just symbolic consultation) results in a greater impact on infrastructure, welfare, and sustainability of program outcomes. This participatory approach includes shared decision-making mechanisms, cross-community dialogue, and strong community support structures.

Empowerment and Collaboration Approaches in Slum Management

Based on modern theoretical studies, the community empowerment approach is a key element in the slum management strategy. This approach puts local communities at the forefront of the process of improving the quality of their settlements, while strengthening their capacity to identify problems and participate in solutions. Recent research by Muhammad & Fadila (2025) confirms that the use of collective action and multi-stakeholder collaboration between governments, communities, NGOs, and other institutions allows the management of slums to be more effective. This collaborative approach helps to create synergy between infrastructure provision, institutional policies, and the active role of the community in program implementation, so that it does not rely solely on government intervention. The empowerment approach is also supported by the Marlina study (2025) which highlights the role of community empowerment in increasing access to basic facilities, clean water services, sanitation, and other supporting facilities as part of the sustainable development goals (SDG 11) for inclusive and sustainable cities and settlements.

Theory of Sustainable Settlement Development

The handling of slums must also be based on the theory of sustainable settlement development. This approach emphasizes a balance between environmental, social, and economic aspects in a long-term development plan that is able to accommodate today's needs without harming future generations. In the study of informal area development, Elgohary (2024) emphasizes the importance of applying the principles of sustainable urbanism, including residential design that supports mobility, access to public facilities, energy efficiency, and adaptation to climate change as part of a slum improvement strategy based on urban sustainability theory. This principle goes beyond just physical improvements, but also promotes spatial structures that are inclusive, resilient, and resilient to socio-environmental challenges.

RESEARCH METHOD

Research Approach

This study uses a qualitative approach that aims to understand in depth the social phenomena related to the handling of slums in Tanjung Tiram and Medang Deras Districts, Batubara Regency. The qualitative approach was chosen because it is appropriate to explore complex social realities, including the perceptions, experiences, and social

contexts of the people in the research area, which cannot be captured in their entirety through statistical figures alone. According to Savin-Baden & Major (2025), qualitative research is an approach that allows researchers to understand the natural context of social phenomena and interpret meaning from the perspective of research participants, so that a more holistic and contextual understanding is obtained in social-humanities research.

Philosophy and Qualitative Foundations

The philosophy of qualitative research is based on the paradigms of interpretivism and constructivism which emphasizes that social reality is constructed by the subjective experiences of individuals within their social environment. Asmawi & Alam (2026) emphasized that the understanding of social reality must depart from the perspective of the participants, because their life experiences give meaning to the observed phenomena. In this study, an interpretive approach was used to understand the community's perception of the condition of slums and efforts to handle them.

Qualitative Research Design

Qualitative research design describes an overall strategy in research that focuses on explaining phenomena in their context holistically. According to Savin-Baden & Major (2025), qualitative design does not follow a structure as a rigid plan, but is flexible and iterative, so that researchers can make adjustments according to findings in the field to explain the phenomenon in a richer and more in-depth way. Several qualitative approaches are relevant in social research, such as case studies, phenomenology, grounded theory, and narratives that allow for an in-depth analysis of social phenomena in the research site. The approach chosen in this study is a qualitative case study, because the main objective is to understand the specific characteristics of slums in a particular location, their handling policies, and contextual community experiences.

Data collection techniques

In qualitative research, data collection is carried out through several complementary techniques, including:

1. In-depth interview: This technique is used to obtain descriptive data from key sources such as local communities, community leaders, and local government officials related to the handling of slums, so that researchers can capture their subjective perspectives in detail.
2. Participatory observation: Direct observation in the field is carried out to observe the physical condition of slums, community social interactions, and daily life dynamics, so that the data obtained reflects the real context.

According to Anto et al. (2024), qualitative data collection techniques should be oriented towards the meaning of participants' experiences and allow researchers to capture

social realities contextually and holistically, including beliefs, perceptions, and social practices in the field.

Informant and Sampling

Sampling in qualitative research generally uses purposive sampling and snowball sampling techniques to select informants who are really relevant and have important experience related to the phenomenon being studied. Purposive sampling allows researchers to select participants based on specific criteria, while snowball sampling allows the development of a list of informants through initial informant recommendations. This method is in accordance with the character of qualitative research that is not oriented to generalizations but to an in-depth understanding of the context of a particular phenomenon.

Data Analysis Techniques

Qualitative data analysis in this study is carried out inductively through the process of data reduction, data presentation, to conclusion drawing and verification. The stages of analysis include:

1. Transcribing and organizing data from interviews and observation notes into written format.
2. Open coding to identify the main themes of the narrative data.
3. Categorization and theme development based on the pattern of concept relationships in the data.
4. Triangulation of data between sources (interviews, observations, documentation) to increase the credibility of findings.
5. Interpretation of results by linking empirical findings into a predetermined theoretical framework.

Savin-Baden & Major (2025) noted that qualitative data analysis emphasizes social meaning and cultural context so researchers need to be active in deep reflection on the process of data interpretation.

Validity and Credibility of Data

To ensure the quality of qualitative research, researchers need to apply validity techniques such as:

1. Triangulation of sources to compare data from different collection techniques.
2. Member checks to re-verify the interpretation with the informant.
3. Trail audit to maintain transparency of research procedures.

According to Sale & Carlin (2025), the use of a strong conceptual framework and reflective strategies is an important step to strengthen the trust of qualitative findings, so that research results are more scientifically valuable and relevant for policy decision-making.

Results and Discussion

How is the existing condition of slum housing and slum settlements in Tanjung Tiram and Medang Deras Districts, Batubara Regency reviewed from the level of slums, population, area area, and availability of infrastructure, facilities, and public utilities

The existing condition of slum housing and slum settlements in Tanjung Tiram and Medang Deras Districts, Batubara Regency shows that there are quite serious settlement problems with variations in slum levels, population density, area area, and limitations in infrastructure, facilities, and public utilities. The two sub-districts are coastal areas and areas with growing economic activity, but settlement growth is not fully balanced by the provision of adequate basic infrastructure. This has an impact on the emergence of residential areas that develop unplanned and tend to form slum characteristics.

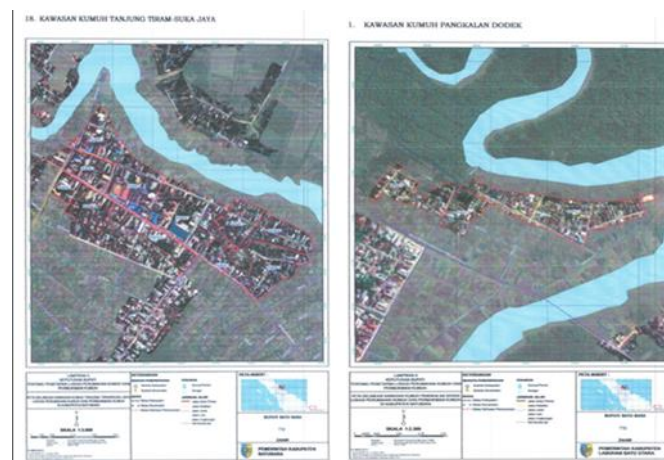


Figure 1. Tanjung Tiram Slum and Dodek Base

In Medang Deras District, slum areas with moderate slum levels are found in Pangkalan Dodek Village. This area is inhabited by around 1,685 people with an area of 457.88 hectares, which shows that there is considerable pressure on the carrying capacity of the residential environment. The relatively large area with a fairly dense population indicates that the provision of infrastructure and public utilities is not even and has not been able to serve the entire region optimally. The condition of environmental roads in some parts of the area is still limited, the drainage system is not functioning properly, and access to clean water and proper sanitation is still a major problem. The moderate level of slum in Pangkalan Dodek reflects that this area needs to improve the quality of settlements as a whole so that it does not develop into a heavy slum area. In addition to Pangkalan Dodek, Medang Deras District also has Pagurawan Village which is categorized as a medium slum area. The condition of settlements in this area is characterized by the varying quality of residential buildings, limited sanitation infrastructure, and suboptimal waste management. The availability of public utilities has not fully met the needs of the population, so the quality of the residential environment is still low. Meanwhile, Lalang Village is in the category of light slums, which shows that the physical condition of the settlement is relatively better than other slum areas. However, there are still shortcomings in the aspects of basic infrastructure and environmental planning, so preventive measures are needed through improving the quality of settlements so that this area does not experience a decline in conditions to become moderate or severe slums.

In contrast to Medang Deras, the condition of slums in Tanjung Tiram District shows a more complex level of slums and tends to be heavier. Bandar Rahmad Village and Bagan Dalam Village are categorized as heavy slums, with a population of around 1,870 people and an area of around 325.21 hectares. This level of severe slums describes the condition of the settlement that is very uninhabitable, characterized by high building density, low house quality, limited access to clean water, poor sanitation, and inadequate drainage system. This condition makes this area vulnerable to inundation, flash floods, and environmental health problems, so it requires priority and comprehensive handling.



Figure 2 Bandar Rahmar and Bagan Dalam slums

In addition to heavy slum areas, Tanjung Tiram District also has several areas with moderate slum levels, namely Bagan Arya Village, Suka Maju Village, and Pahlawan Village. These areas show a pattern of settlements that develop unplanned, with limited infrastructure such as environmental roads, drainage, and waste management. Although the physical condition is not as bad as heavy slums, without improving the quality and control of space utilization, these moderate slums have the potential to experience environmental degradation and develop into heavy slums in the future. In general, the existing condition of slum housing and slum settlements in Tanjung Tiram and Medang Deras Districts shows a close relationship between the level of slum and population density, area area, and the availability of infrastructure, facilities, and public utilities. Areas with severe slum levels tend to have more significant infrastructure limitations than medium and light slum areas. This condition emphasizes the importance of handling slums based on the level of slums, population characteristics, and capacity of infrastructure services, so that the interventions carried out are on target, effective, and sustainable.

How is the suitability of the determination of the location of slum housing and slum settlements in Batubara Regency with the provisions of Article 106 paragraph (3) of Government Regulation Number 14 of 2016 and Article 36 paragraph (7) of the Minister of Public Works and Public Works Regulation Number 14/PRT/M/2018

The determination of the location of slum housing and slum settlements is a crucial stage in the implementation of slum handling, because it is the legal basis for local governments in intervening to improve the quality, prevention, and rejuvenation of the

area. In the context of Coal Regency, especially in Tanjung Tiram and Medang Deras Districts, the determination of slum areas needs to be reviewed for their suitability with the normative provisions stipulated in laws and regulations, namely Article 106 paragraph (3) of Government Regulation Number 14 of 2016 and Article 36 paragraph (7) of the Regulation of the Minister of PUPR Number 14/PRT/M/2018. Based on Article 106 paragraph (3) of Government Regulation Number 14 of 2016, the determination of the location of slum housing and slum settlements must be carried out by the local government by taking into account the results of data collection, the level of slums, area area, the number of population, the legality of land, as well as the condition of infrastructure, facilities, and public utilities (PSU). This provision emphasizes that the determination of slums cannot be done subjectively, but must be based on measurable data and technical indicators. In this case, slum areas in Batubara Regency such as areas with light, medium, and severe slum levels have been identified based on the number of population, density, and physical conditions of the residential environment, so that in principle it is in line with the mandate of the PP.

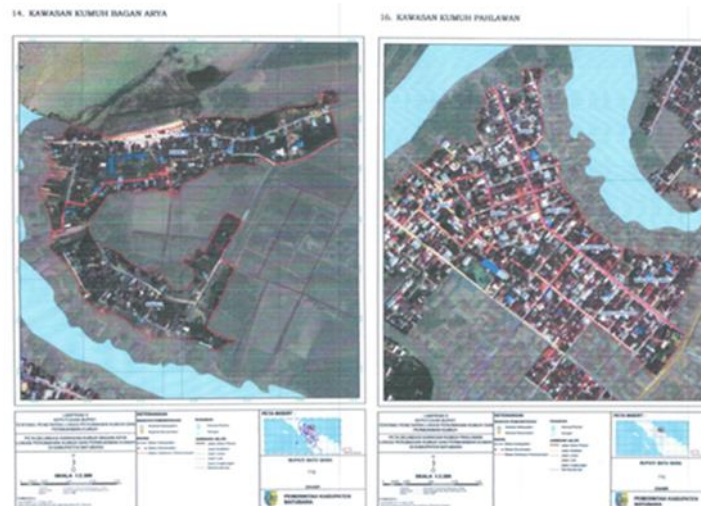


Figure .3 Bagan Arya and Pahlawan Slums

Furthermore, Article 36 paragraph (7) of the Minister of Public Works and Public Works Regulation Number 14/PRT/M/2018 emphasizes that the determination of the location of slums must be outlined in the Regional Head Decree and is equipped with a location map and a description of the condition of the area. This provision aims to ensure legal certainty, integrated planning, and accountability in the implementation of slum management programs. In practice, the determination of slums in Batubara Regency shows that there are efforts to fulfill this provision, especially through the identification of village-based and sub-district areas and the grouping of slum levels that are the basis for determining handling patterns.

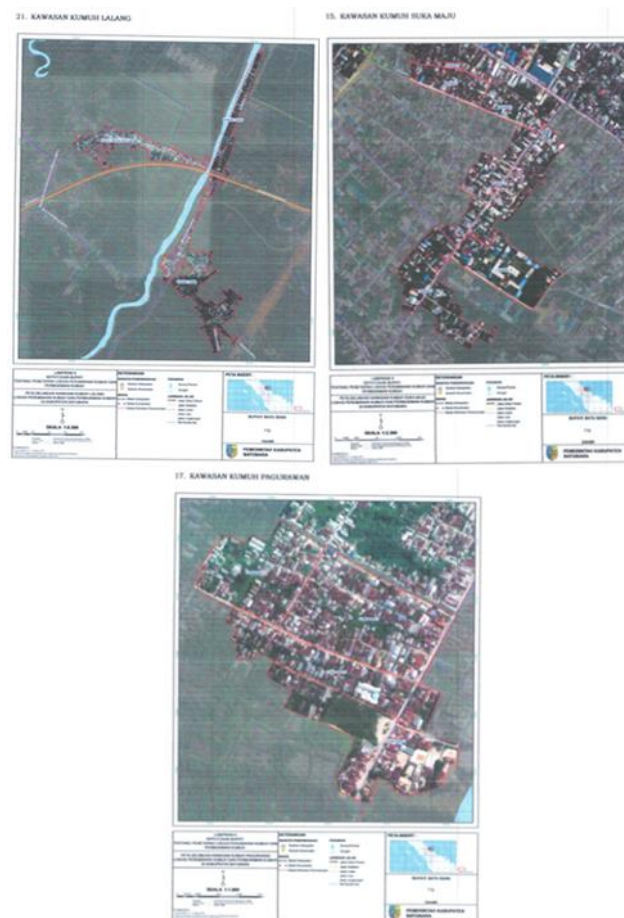


Figure 4 Slums of Lalang, Suka Maju and Pagurawan

However, if reviewed more critically, there are still challenges in the suitability of the implementation of these provisions, especially related to the completeness of land legality aspects and the integration of slum determination with spatial planning documents and regional housing. Some slum areas in coastal areas and riverbanks have the potential to be on land with a status that is not in accordance with the allocation of space, so it requires special handling in the form of rejuvenation or relocation, as also mandated in Government Regulation Number 14 of 2016. Overall, the normative determination of the location of slum housing and slum settlements in Batubara Regency has referred to the provisions of Article 106 paragraph (3) of Government Regulation Number 14 of 2016 and Article 36 paragraph (7) of the Regulation of the Minister of Public Works and Housing Number 14/PRT/M/2018, especially in the aspects of data collection, classification of slum levels, and determination based on administrative areas. However, to increase substantive suitability, it is necessary to strengthen the legal-formal aspects, integrate with spatial planning, and periodically update slum data so that the handling carried out is truly on target and sustainable.

What factors affect the occurrence and development of slums in Tanjung Tiram and Medang Deras Districts, both from physical, social, economic, and spatial aspects

The occurrence and development of slums in Tanjung Tiram and Medang Deras Districts, Batubara Regency is a multidimensional phenomenon and interrelated between various aspects. The geographical condition of the area, which is dominated by coastal areas, people's ports, and informal economic activities, is the main driving factor for the growth of settlements with low environmental quality. These areas develop gradually without adequate planning, giving rise to complex physical, social, economic, and spatial problems. From the physical aspect of the environment, slum areas in the two sub-districts are characterized by the condition of residential buildings that do not meet feasibility standards, both in terms of structure, building density, and material quality. Many houses stand in close proximity with very narrow distances between buildings, thus reducing lighting and air circulation. In addition, the limitations of infrastructure, facilities, and public utilities such as environmental road networks, drainage, clean water, sanitation, and waste management make residential environments vulnerable to inundation, pollution, and various health risks. This unorganized physical condition further accelerates the degradation of the quality of the area.

From the social aspect, the high population density and heterogeneity of community backgrounds also contribute to the development of slums. Most of the population is immigrant people who work in the informal sector, such as fishermen, dockworkers, small traders, and freelance day laborers. The high mobility of the population and the weak social and institutional ties of the community cause low concern for the maintenance of the residential environment. On the other hand, limited access to education and information also affects the low public awareness of the importance of a healthy and orderly residential environment. Economic aspects are the dominant factor in the formation of slums in Tanjung Tiram and Medang Deras Districts. The low level of income of the community leads to limited ability to build and repair houses according to technical standards. The choice to settle in unplanned areas is often driven by the proximity of the location to sources of livelihood, such as coastal areas and local economic activity centers, even though the area poses a high environmental risk. These vulnerable economic conditions also hinder community participation in financing and maintaining environmental infrastructure independently.

Meanwhile, from the spatial aspect, the development of slums is influenced by weak control of space use and incompatibility between spatial plans and existing conditions. Some slums are in zones that should be intended for protection functions, coastal borders, or port infrastructure areas. The indecisiveness of enforcing spatial regulations and limited supervision have led to the growth of illegal and semi-legal settlements that are increasingly difficult to control. In addition, the limited availability of affordable housing land encourages low-income people to live in locations that are not in accordance with the designation. Overall, physical, social, economic, and spatial factors interact with each other and strengthen each other in encouraging the occurrence and development of slums in Tanjung Tiram and Medang Deras Districts. Therefore, the handling of slums cannot be done partially, but must be through an integrated approach that includes improving the physical quality of the environment, empowering the socio-economic community, as well as strengthening spatial control and providing decent and affordable housing.

Recent research has shown that the planning and management of residential areas, especially in areas with complex geographical and social characteristics, requires a contextual approach based on the social structure of the community. Nuraini et al. (2023) through the study Planning with 'Three-World Structures' emphasized that settlement patterns are greatly influenced by the interaction between the physical structure of the region, the socio-cultural system of the community, and formal government policies. In the context of rural areas and remote areas, settlement planning that does not consider these three structures has the potential to trigger spatial irregularities and a decrease in the quality of the residential environment. A community participation-based approach has also proven to be a key factor in the success of settlement infrastructure management. Research by Hidayat et al. (2023) regarding the management of wastewater infrastructure in residential areas shows that active community involvement from the planning stage to maintenance contributes significantly to the sustainability of infrastructure functions. These findings reinforce the view that slum management cannot rely solely on physical interventions, but must be accompanied by strengthening community capacity and awareness.

From the perspective of regional development, economic and spatial integration has a direct impact on settlement patterns and regional development. Sugiarto and Ramadania (2023) explain that the relationship between economic activities and regional spatial structure affects population concentration and distribution of urban facilities. This integration imbalance has the potential to encourage the growth of informal settlements and slums, especially in buffer and coastal areas. The regional economic aspect also contributes to the dynamics of settlements. Research by Sugiarto et al. (2023) shows that increasing economic activities, such as the tourism and service sectors, encourages regional economic growth, but if not balanced with spatial planning policies and adequate housing provision, it can cause pressure on residential areas. This condition is relevant to coastal areas that are rapidly developing but have limited basic infrastructure.

Riverbank land management is an important issue in the context of sustainable settlement development. The study of Sugiarto and Ramadania (2024) emphasized that the use of space in river border areas must refer to the provisions of the RTRW and RDTR to prevent environmental degradation and the emergence of slums. Indecisiveness in controlling space use often leads to the growth of unsuitable housing in disaster-prone areas and environmental pollution. In addition, the quality of drainage and sanitation infrastructure is an important indicator in assessing the level of habitability of an area. Hartini et al. (2023) revealed that the non-optimal drainage system contributes to inundation, local flooding, and a decline in the quality of the residential environment. This condition accelerates the degradation process of the area and strengthens the characteristics of the slums, especially in areas with high population density. Especially in the context of Batubara Regency, the concept of sanitation planning for slums based on empathy and community participation put forward by Akus Harmoko et al. (2024) shows that the social approach is an important complement in handling slums. Planning that takes into account the real needs and perceptions of the community is able to increase the effectiveness of the program and the sustainability of development results.

What is the priority for handling slums in Tanjung Tiram and Medang Deras Districts based on the difference in slum levels (light, medium, and severe)

The priority of handling slums in Tanjung Tiram and Medang Deras Districts, Batubara Regency needs to be arranged gradually and proportionately by taking into account the level of slums in each area. The grouping of slums into light, medium, and heavy categories is the main basis for determining the urgency, form of intervention, and effective resource allocation. This approach aims to ensure that the treatment is not only physical, but also able to improve the quality of life of the community in a sustainable manner. Areas with severe slum levels are a top priority in handling because they have the most complex environmental problems and are at high risk to public health and safety. In Tanjung Tiram District, heavy slum areas are generally characterized by very high building density, inadequate housing quality, and limited basic infrastructure such as clean water, sanitation, drainage, and environmental road access. The priority of handling this area is directed at rearranging the area (redevelopment or limited resettlement), improving the quality of uninhabitable houses, and providing basic infrastructure as a whole. Government intervention is needed intensively because the capabilities of non-governmental organizations are relatively limited. Areas with moderate slum levels occupy the second priority in handling. This area still has a residential structure that can be relatively repaired without having to do a thorough rearrangement. In Tanjung Tiram and Medang Deras Districts, moderate slum areas generally face problems with the quality of environmental infrastructure, such as drainage that does not function optimally, inadequate waste management systems, and limitations on proper sanitation. The handling strategy is focused on improving environmental quality (upgrading), repairing uninhabitable houses, and strengthening community participation in infrastructure maintenance. A collaborative approach between government, society, and the private sector is the key to success in this category. Meanwhile, areas with a mild slum level are a priority for medium- to long-term handling with a preventive approach so that they do not develop into medium or severe slums. This area generally still has relatively adequate basic infrastructure, but it is beginning to show symptoms of environmental degradation, such as increased density, declining building quality, or suboptimal environmental management.

The handling is focused on maintaining existing infrastructure, increasing public awareness and capacity, and controlling space utilization through regulatory enforcement and technical assistance. Overall, the priority of handling slums in Tanjung Tiram and Medang Deras Districts must be carried out in stages, starting from heavy slum areas as the main priority, followed by medium slum areas, and then light slum areas as a preventive measure. This approach needs to be integrated with regional housing and settlement policies, spatial control, and community economic empowerment programs so that the handling of slums is not temporary, but is able to create a decent, healthy, and sustainable residential environment. Studies on settlements and residential environments in the Mandailing area show that the morphological character of settlements is greatly influenced by geographical conditions, local culture, and the value system of the local community. Nuraini (2019) in his research on the morphology of the residential environment of Sigengu Village emphasized that the spatial pattern of settlements is not formed randomly, but is the result of community adaptation to topographic conditions, climate, and socioeconomic activities. The structure of the residential space reflects the close

relationship between the physical environment and the local culture that forms the identity of the residential area.

A historical study of the settlement of the Mandailing Batak Tribe submitted by Nuraini (2004) shows that traditional settlement patterns have long applied the principles of spatial order, social hierarchy, and balance between humans and the environment. These values are reflected in the arrangement of houses, communal spaces, and building orientations that are full of symbolic and functional meanings. These principles are an important foundation in understanding the development of the Mandailing settlement to date. From an architectural point of view, Nuraini (2024) highlights the architectural tectonics aspect of traditional Mandailing buildings that emphasizes the integration between structures, materials, and spatial expressions. This approach shows that traditional architecture serves not only as a place to live, but also as a representation of cultural values and adaptation to the natural environment. Understanding this aspect of tectonics is important in designing sustainable settlements rooted in local wisdom.

The interaction between humans and residential space is also studied through the concept of space attachment. Nuraini and Suprayitno (2021) explained that people's attachment to residential space affects behavior patterns, space utilization, and sustainability of the residential environment. Residential environments that are adaptive and responsive to the socio-cultural needs of communities tend to have a higher level of sustainability. In a methodological context, Nuraini and Sudrajat (2010) emphasize the importance of a contextual and analysis-based approach to architectural design of the physical and social environment. A design method that is sensitive to the local context allows for the creation of a residential environment that is not only functional, but also meaningful for its residents. The aspect of community participation in the management of residential infrastructure is also an important concern. Hidayat et al. (2023) show that the success of wastewater infrastructure management is greatly influenced by community involvement in the planning and maintenance process. These findings reinforce the view that social and participatory approaches are key elements in creating a decent and sustainable residential environment. The symbolic dimension and sacred value in the spatial layout of the Mandailing residence are also reflected in the arrangement of the heirloom house space. Nuraini (2017) explained that the sacred and profane concepts in traditional houses form a spatial structure that is not only physical, but also spiritual and social. Understanding this dimension is important in maintaining the sustainability of traditional settlement cultural identity. In addition, social dynamics, including patterns of gender interaction in residential environments, also affect the character of housing. Nuraini et al. (2024) found that gender-based social interaction has implications for the use of space, the division of activities, and the social structure in the Mandailing Natal residential environment. The environmental wisdom of local communities is an important factor in sustainable natural resource management. Nuraini (without an exact year in the title, published in the *Journal of Humans and the Environment*) asserts that traditional practices in forest, soil, and river management reflect local knowledge systems oriented towards environmental sustainability. These values are relevant to be integrated in the planning and arrangement of modern settlements to be in harmony with the principles of sustainable development, various studies show that sustainable settlement planning and management must be based on a deep understanding of spatial morphology, cultural values, social structure, and community participation. The integration of physical, social, and local

wisdom aspects is the key to creating a decent, identity, and sustainable residential environment.

What is the most appropriate handling pattern (prevention, restoration, rejuvenation, or resettlement) for each slum area in Tanjung Tiram and Medang Deras Districts to suit the characteristics of the area and the needs of the community

The pattern of handling slums in Tanjung Tiram and Medang Deras Districts, Batubara Regency must be adjusted to the level of slums, physical conditions of the area, land status, and socio-economic characteristics of the community. The selection of the right handling pattern is crucial so that the interventions carried out not only improve the physical condition of the environment, but also maintain the social and economic sustainability of the local community. Four treatment patterns, namely prevention, restoration, rejuvenation, and resettlement, need to be applied selectively and contextually. For slum areas with a mild level of slums, such as Lalang Village in Medang Deras District, the most appropriate handling pattern is prevention. The area still has a relatively well-organized settlement structure and basic infrastructure that has mostly been available, but it is starting to show a decline in environmental quality. The prevention pattern is focused on controlling the use of space, maintaining existing infrastructure, and increasing public awareness and participation in maintaining cleanliness and environmental feasibility. Technical assistance and strengthening community institutions are the key so that this area does not develop into a medium or heavy slum.

Areas with moderate slum levels, such as the Pangkalan Dodek area and Pagurawan Village in Medang Deras District as well as Bagan Arya Village, Suka Maju Village, and Pahlawan Village in Tanjung Tiram District, are more appropriately handled through a restoration pattern. This pattern focuses on improving the physical quality of the environment without changing the basic structure of the settlement as a whole. Interventions are carried out through repairing uninhabitable houses, improving drainage networks, sanitation, environmental road access, and waste management. The restoration pattern was chosen because these areas generally have strong social attachments and strategic locations to people's sources of livelihood, so relocation is not an ideal option. Meanwhile, areas with severe slum levels, such as Bandar Rahmad Village and Bagan Dalam Village in Tanjung Tiram District, require a more comprehensive handling pattern, namely area rejuvenation. This area is characterized by very high building density, unsuitable residential conditions, and limited basic infrastructure and utilities that are difficult to partially repair. The pattern of rejuvenation is carried out through the rearrangement of the area, the arrangement of the road network and infrastructure, and the construction of more decent and regular housing. In its implementation, a participatory approach needs to be put forward so that the community can continue to be active and adapt to a new environment that is more organized.

Under certain conditions, especially if the slum area is located in a location that is not in accordance with spatial planning, such as coastal borders, disaster-prone areas, or land with problematic legal status, the pattern of resettlement (relocation) becomes an unavoidable alternative. However, this pattern must be the last resort and implemented by considering the sustainability of livelihoods, access to public facilities, and the socio-economic readiness of the community. The provision of suitable and affordable replacement housing is the main prerequisite so that relocation does not cause new social

problems. Overall, the pattern of handling slums in Tanjung Tiram and Medang Deras Districts needs to be carried out in a differential and integrated manner. Prevention is applied to light slum areas, restoration in moderate slum areas, rejuvenation in heavy slum areas, and resettlement in areas that do not allow it to be handled in-situ. This approach is expected to be able to answer the needs of the community while creating a decent, healthy, and sustainable residential environment.

How is the strategy for handling slums that are integrated and sustainable in Batubara Regency based on regulations, data, and community participation

An integrated and sustainable slum management strategy in Batubara Regency must be built through a multidimensional approach that combines regulatory aspects, data-based planning, and active community involvement. The complexity of slum problems, which includes physical, social, economic, and spatial planning aspects, requires synergy across sectors and stakeholders so that the handling is not partial and short-term, but is able to create sustainable improvements in the quality of the residential environment. In terms of regulations, the strategy for handling slums needs to be based on a clear and consistent legal framework, both at the national and regional levels. The Batubara Regency Government needs to optimize the implementation of regulations related to housing and residential areas by harmonizing regional policies, such as the RPJMD, RTRW, and the Plan for the Prevention and Improvement of Slum Housing and Slum Settlements (RP2KPKP). The certainty of this regulation is important to provide a firm handling direction, including the determination of the location of slums, permissible handling patterns, and mechanisms for controlling space utilization. Consistent enforcement of rules is also an instrument of prevention so that new slums do not grow again.

Data-based strategies are an important pillar in realizing effective and targeted handling of slums. Local governments need to develop an accurate, up-to-date, and integrated slum data collection system, including population data, slum levels, infrastructure conditions, land status, and socio-economic vulnerabilities of the community. This data is the basis for determining location priorities, selecting handling patterns, and allocating budgets. The use of information technology, such as geographic information systems (GIS), can improve the quality of planning and facilitate the monitoring and evaluation process of slum management programs in a sustainable manner. Community participation is a key element in the sustainable slum management strategy in Batubara Regency. Community involvement from the planning, implementation, to infrastructure maintenance stages will increase the sense of ownership of development results. The community is not only positioned as an object, but as a subject of development that plays an active role in decision-making. Strengthening local institutions, such as non-governmental groups (NGOs) and citizens' forums, is an effective means to encourage participation, transparency, and accountability in handling slums.

Integration between sectors and stakeholders is also an important strategy in handling slums. Local governments need to build collaboration with the central government, the private sector, universities, and civil society organizations in supporting financing, technical innovation, and community empowerment. This collaborative approach allows for diversification of funding sources and capacity building for program implementation, so that the handling of slums does not depend solely on local government budgets. Overall, an integrated and sustainable slum management strategy in Batubara

Regency must prioritize synergy between strong regulations, accurate data-based planning, and active community participation. With this approach, the handling of slums is expected to not only improve the physical quality of settlements, but also strengthen the social and economic resilience of the community, as well as prevent the emergence of new slums in the future.

Conclusion

Based on the results of the research and discussions that have been carried out, it can be concluded that the existing conditions of slum housing and slums in Tanjung Tiram and Medang Deras Districts, Batubara Regency show a significant variation in the level of slums, ranging from light slums, medium, to heavy slums. Slums in Medang Deras District are dominated by moderate and light slum levels, with the main emphasis on the limitations of environmental infrastructure and housing quality. Meanwhile, Tanjung Tiram District faces more complex problems, especially in areas with heavy slum levels characterized by high building density, uninhabitable housing quality, and limited access to clean water, sanitation, drainage, and waste management

The determination of the location of slum housing and slum settlements in Batubara Regency is substantially in line with the provisions of Article 106 paragraph (3) of Government Regulation Number 14 of 2016 and Article 36 paragraph (7) of the Minister of Public Works and Housing Regulation Number 14/PRT/M/2018, which affirms the authority of local governments in determining slum areas as the basis for the implementation of prevention and quality improvement. The determination of the location is an important instrument in providing legal certainty, policy direction, and the basis for planning and budgeting slum management programs in a directed and sustainable manner.

The factors that affect the occurrence and development of slums in Tanjung Tiram and Medang Deras Districts are multidimensional, including physical, social, economic, and spatial aspects. Limited infrastructure, facilities, and public utilities, low quality of residential buildings, high population density, socio-economic conditions of vulnerable communities, and weak control of space utilization are the dominant factors that are interrelated and strengthen the characteristics of the slums of the area. The priority of handling slums in the two sub-districts needs to be carried out in stages based on the level of slums. Heavy slums are a top priority with a limited area replanting or resettlement approach, slums are being handled through environmental quality improvement and restoration, while light slums are focused on prevention efforts so that they do not develop into heavier slums. This approach allows for more effective, efficient, and appropriate treatment according to the physical characteristics and socioeconomic needs of the community. An integrated and sustainable slum management strategy in Batubara Regency must be supported by a synergy between strong regulations, accurate data-based planning, and active community participation. Community involvement from the planning stage to maintenance is the key to the sustainability of handling results. With this approach, the handling of slums is not only oriented towards improving the physical environment, but also on improving the quality of life, social resilience, and economic welfare of the community in a sustainable manner.

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