

# Strategies for Enhancing Slum Settlement Study Case: Tegal Sari Mandala III, Medan Denai District

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## ABSTRACT

Tegal Sari Mandala III in the Medan Denai District is a residential area characterized by poor sanitation and a high risk of flooding, making it a mild slum. To prevent slum conditions from becoming normalized in Indonesian society, it is essential to address and eliminate such settlements. Each location presents unique challenges and requires tailored solutions to tackle slum issues effectively. This research employs both qualitative and quantitative methods, which are suitable for examining slum areas. The analysis reveals that the primary problems include poor environmental maintenance, such as garbage accumulation and improper waste management, leading to flooding, polluted rivers, and foul-smelling surroundings. Solutions to these issues include developing and enhancing the settlement quality by establishing a night market and creating green spaces along the banks of the Sulang Saling River.

**Keyword:** Slum Settlement, Flooding, Riverbank, Night Market, Green Open Space

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## ABSTRAK

Tegal Sari Mandala III di Kecamatan Medan Denai adalah kawasan perumahan yang ditandai dengan sanitasi yang buruk dan risiko banjir yang tinggi, menjadikannya daerah kumuh ringan. Untuk mencegah kondisi kumuh menjadi hal yang biasa di masyarakat Indonesia, sangat penting untuk menangani dan menghilangkan permukiman seperti itu. Setiap lokasi menghadirkan tantangan unik dan membutuhkan solusi yang disesuaikan untuk mengatasi masalah kumuh secara efektif. Penelitian ini menggunakan metode kualitatif dan kuantitatif, yang cocok untuk meneliti daerah kumuh. Analisis mengungkapkan bahwa masalah utama termasuk pemeliharaan lingkungan yang buruk, seperti penumpukan sampah dan pengelolaan limbah yang tidak benar, yang menyebabkan banjir, sungai yang tercemar, dan lingkungan yang berbau tidak sedap. Solusi untuk masalah ini termasuk mengembangkan dan meningkatkan kualitas permukiman dengan mendirikan pasar malam dan menciptakan ruang terbuka hijau di sepanjang tepi Sungai Sulang Saling.

**Kata Kunci:** Permukiman Kumuh, Banjir, Tepian Sungai, Pasar Malam, Ruang Terbuka Hijau.



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## 1. Introduction

Medan City is the capital city of North Sumatra, the largest city in the eastern region of the island of Sumatra. In 2021, there were 2,460,858 populations in Medan City while in 2022 there were 2,494,512 populations, meaning that this figure shows a population increase of 33,654 people. This indicates that the population of Medan City tends to increase every year (BPS, 2022). The definition of settlements according to law No. 12 of 2021, concerning Housing and Settlements is a place where people gather and become a living environment or residential environment located in cities and villages (Peraturan Pemerintah RI No 12, 2021).

High-density settlements are often caused by human actions that do not consider the sustainability of where they live. Land use in the formation of settlements in Indonesia often does not consider the characteristics of the natural landscape, which causes flooding and makes the settlements unsanitary (Ilmi et al., 2022). Good settlement quality can be seen from the cleanliness of the environment. The low environmental cleanliness of a settlement can cause a decrease in the environmental quality of the settlement. This condition can endanger the health of residents in the settlement. Environmental conditions that are not clean or dirty, causing the settlement to become a slum (Oktarini et al., 2022).

This is a major problem for a city that is a destination for migrants. The challenges that arise include the poor arrangement of buildings so that they look unsightly, the unorganized buildings in the settlement are unsightly, the people who settle are usually low-income people which causes the settlement to be dense with non-permanent houses, and finally the residential area is not clean and uncomfortable to live in (Handryant, 2012). Tegal Sari Mandala III is highly prone to flooding due to the dominance of densely built residential areas (Masyhuri, 2018). The area has already been addressed by the Medan city government, namely, the handling of drainage structures, wastewater management systems and solid waste facilities. However, these measures were not enough to make the settlement slum-free (Akbar & Novira, 2019).

### *1.1 Slum Settlements*

Settlements slum can be defined as settlements that are not livable due to dense buildings, inconsistent or irregular buildings, poor building quality, and inadequate facilities and infrastructure (Sulaiman, 2021). Urban slums are the most complicated problem. The complicated problems include underprivileged communities, low public education, and the imbalance and irregularity of the surrounding environment (Beddu & Yahya, 2015).

Settlements slum can also occur due to migrants who need a place to live in the city center close to where they work. And the area undergoes building development and then creates a slum settlement area (Annisa Amalia, 2018). Settlements slum need more attention from the government so that these settlements have a healthy environment and good facilities and infrastructure. However, these slum neighborhoods are neglected. Due to lack of attention, these settlements will become criminal dens, sources of social disease, and even places for other crimes (Kamalia & Sari, 2021). Another opinion also says that slums have three conditions, namely physical conditions, socio-economic conditions of the culture of migrants who live in these settlements, and finally the influence of these two conditions (Suska, 2020).

### *1.2 Slum Housing and Slum Settlement Criteria*

Based on PUPR Government Regulation No. 14/2018 on Slum Housing and Slum Settlement Criteria, these criteria will be used to determine the condition of slums in slum housing and slums. The criteria are reviewed from (Kemen PUPR, 2018): the buildings, environmental drainage, wastewater management, waste management, and fire protection.

### *1.3 Socio-economic Factors*

Socio-economic factors are one of the causes of slums in Indonesia. These factors are that slum communities have low income due to the type of work they do. The type of work they get and do is also lacking due to their low education standards (Wimardana, 2016). Poverty is also one of the socio-economic factors in slums. People with a low economy and do not have land ownership rights (Arung & Ulimaz, 2021).

Medan City faces challenges of increasing population density, leading to slum settlements in areas like Tegal Sari Mandala III. This study focuses on addressing slum conditions caused by factors such as inadequate waste management, poor sanitation, and high flooding risk. Despite previous government interventions, these issues persist. Thus, this article aims to investigate specific strategies that can mitigate these challenges, such as improving environmental sanitation, drainage systems, and enhancing community-driven waste management initiatives. The ultimate goal is to explore comprehensive and targeted solutions that align with the local socio-economic context.

## **2. Method**

This research uses a mixed method that brings together qualitative and quantitative methods in research. This method is integrating both qualitative and quantitative techniques to ensure a holistic understanding of slum settlement issues in Tegal Sari Mandala III (Syam, 2017). Base on the qualitative data, field observations and interviews were conducted with individuals and groups associated with the research subject. Purposive

sampling was used to select these respondents, as this method allows the researcher to deliberately choose sources that are most relevant to the topic. The selection was based on predetermined criteria related to their connection with the research subject.

For the quantitative data, the study utilized the Slovin formula to determine the sample size. This method is commonly used due to its simplicity and reliance on demographic data. According to the 2022 population census, Tegal Sari Mandala III has a population of 30,108 people. Using the Slovin formula, a total of 100 respondents were chosen to receive questionnaires. These questionnaires focused on environmental sanitation, waste management, and socio-economic conditions and employed a Likert scale to assess the satisfaction levels of local residents, specifically in Neighborhood 5. The data collected through these questionnaires were analyzed using descriptive statistics to evaluate the primary issues affecting the settlement.

### **3. Discussion**

#### *3.1 Settlements Slum identification*

The Settlements slum in Tegal Sari Mandala III are spread across neighborhoods 4, 5, 8, and 10. The distribution of slums in Tegal Sari Mandala III according to the Medan City Slum Decree is 5.83 Ha. While the area of Tegal Sari Mandala III is 103 hectares. Tegal Sari Mandala III is categorized as a mild slum with all the assessments and checks conducted by the government. Neighborhood 5 is the most slum among the other neighborhoods.

#### *3.2 Slum Settlement Management Strategy*

##### *3.2.1 Buildings*

Buildings are the physical result of permanent construction work in a certain location, with part or all of it above or in the ground or water. This building is a place for humans to carry out various activities, such as housing or shelter, religious activities, business, social, cultural, and other special activities (Dwiretnani et al., 2023).



Figure 1. Building Condition

The Building borders observed at the research site show that the distance of settlements does not meet the set requirements. According to the Ministry of PUPR, buildings around rivers must have a minimum Building border of 10 meters from the riverbank. This provision aims to protect and preserve the river and reduce the risk of damage to the river (Kemen PUPR, 2015). Measures such as increasing monitoring of development around rivers, enforcing the Building borders policy, and conducting socialization to raise awareness of the importance of keeping rivers clean can help address this issue. Involving the community in river conservation efforts can also be key to creating a better environment.



Figure 2. (a) Semi-Permanent House (b) Non-Permanen House

In Neighbourhood five, there are a total of 320 housing units, with 210 of them or about 67.2% not meeting livable standards. This condition causes unrest in the community and makes the neighbourhood look slum. Many semi-permanent and non-permanent buildings were erected due to the need for quick construction and low construction costs. The dominance of semi-permanent buildings also contributes to the emergence of slums. Therefore, local governments need to pay attention to the technical aspects and regulations related to the construction of semi-permanent buildings to prevent negative impacts on the environment and surrounding communities (Bela Barbara & Umilia, 2014).

### 3.2.2 Environmental Drainage

Environmental drainage is a system that aims to manage the flow of rainwater and waste, help prevent flooding, and ensure the smooth flow of water. These drainage systems can be in the form of drains, ditches, or various other methods that allow water to escape from an area (Andung et al., 2022).

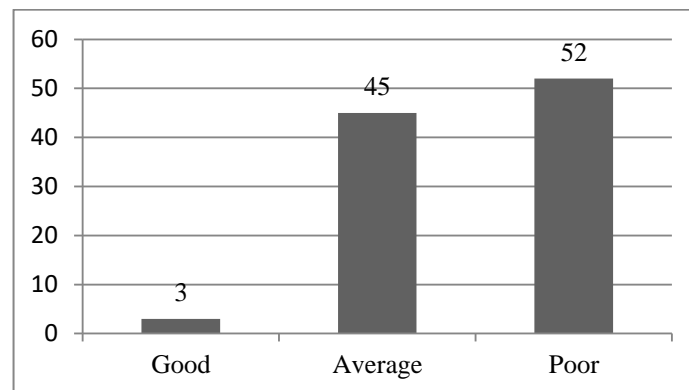


Figure 3. Physical Condition of the Existing Drainage System in this neighbourhood

In the figure 3, it can be seen that 3 respondents stated that the physical condition of the drainage was good, 45 respondents stated that the condition was average, and 52 respondents stated that the condition was poor. In summary, the data clearly shows that most respondents consider the drainage system to be in poor condition, followed by a substantial number who see it as average, and only a very few who find it good. This indicates a general dissatisfaction with the drainage infrastructure in the neighborhood, pointing to a potential need for improvements or interventions to enhance the system's effectiveness and reliability.



Figure 4. Drainage Condition

In Neighborhood Five, as a result of these blockages, the area frequently experiences flooding, especially during heavy rains. The stagnant water in the drainage system can overflow, leading to water entering community houses, causing significant inconvenience and potential damage to property. The presence of trash and poor maintenance of the drainage system contribute to these recurring issues, highlighting the need for improved waste management and regular cleaning of the drainage to prevent blockages and subsequent flooding. From the observations, the researcher concluded that one of the causes of mild slum settlement in Neighborhood Five of Tegal Sari Mandala III is flooding. This flooding makes the environment unclean because the drainage are clogged. Therefore, the local government needs to be more active in keeping the drainage in each street clean and functioning properly, so that flooding can be reduced (Mononimbar, 2014; Roeswitawati et al., 2022).

### 3.2.3 Wastewater Management

One of the indicators of a clean and healthy home is having an internal sanitation system in each house. Poor sanitation systems can harm the settlement environment. This sanitation system includes the presence of internal latrines or family latrines, liquid and solid waste disposal from residential houses, as well as the availability of septic tanks and Waste Water Management Systems for public buildings or houses that produce waste (Sari et al., 2020).

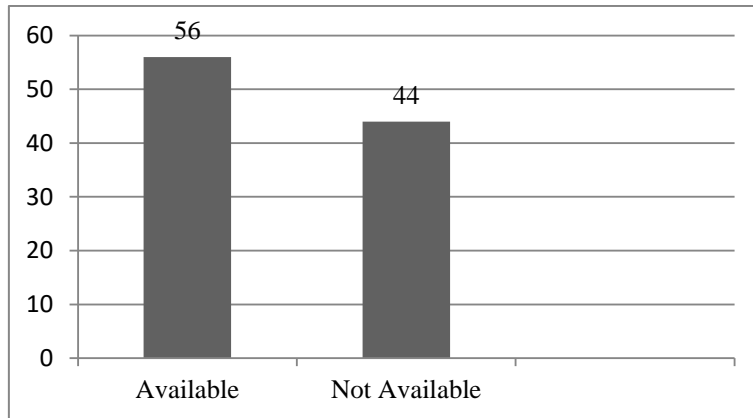


Figure 5. Permanent Toilet Available at community houses

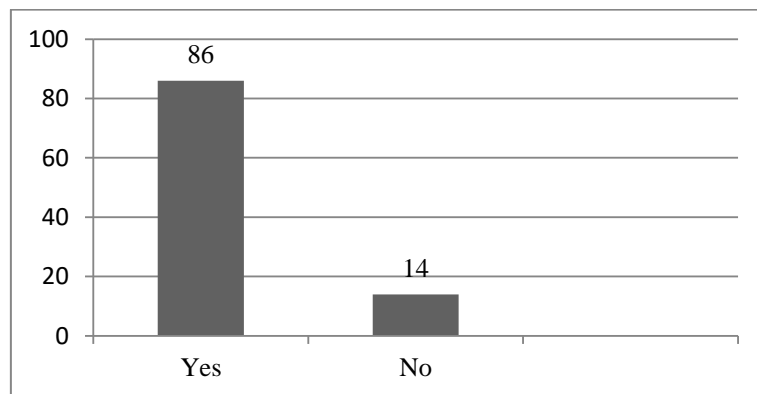


Figure 6. Toilets in community houses are connected to septic tank

From figure 5, 56 residents of Neighborhood Five stated that they have permanent toilets in their houses, while the other 44 residents stated that they do not have permanent toilets. In addition figure 6, 86 respondents stated that their toilets are connected to septic tanks, while 14 respondents stated that their toilets are not connected to septic tanks. Next, the researcher will discuss the observation results regarding wastewater management in Neighborhood Five.



Figure 7. Condition of Semi-Permanent Toilet

In the picture above we can see a picture of a semi-permanent MCK that is not in good condition. The walls of this MCK are partly made of bricks and partly of zinc sheets from the roof of an unused house. Inside the bathroom, several plastic buckets and tubs look messy, as well as a cloth used to cover the window. The walls of the bathroom look mossy and dirty, indicating that hygiene care is lacking. These conditions reflect the lack of proper sanitation facilities and the need for repair and reorganization.



Figure 8. Condition Sulang Saling River

As household wastes are not all biodegradable, the Sulang Saling River is polluted. Researchers noted that the river was in very poor condition, with water not flowing and a lot of garbage piled up, indicating a lack of maintenance. Based on interviews with the community, it is known that wastewater from septic tanks flows directly into the river. This has a negative impact on the river, such as causing pollution, water discoloration, and a decrease in water quality, which can adversely affect public health (Rukandar, 2017). To solve river water pollution due to sewage, several steps can be taken. First, sewage must be properly treated before being discharged into the river, for example by using communal wastewater treatment systems or septic tanks. Second, the community should be encouraged not to throw garbage in the river or other water sources that flow into the river. Third, the local government needs to routinely clean the river to keep the environment clean. Finally, planting trees or plants on every plot of land can help keep the river clean and serve as a natural barrier. (PSDA, 2022).

### 3.2.4 Waste Management

Waste management in Indonesia is divided into two categories: household and similar waste management, and specific waste management. Specific waste management is the responsibility of the government, while household and similar waste management includes waste reduction and waste management. Waste reduction includes limiting waste generation, recycling waste, and reusing waste. In this case, the central government, local governments, businesses, and communities each have an important role in waste management (Kusumawati & Ramayanti, 2023).

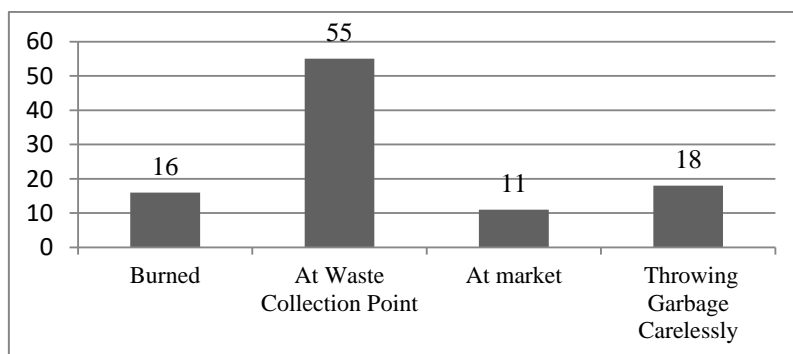


Figure 9. Community Throwing Household Waste

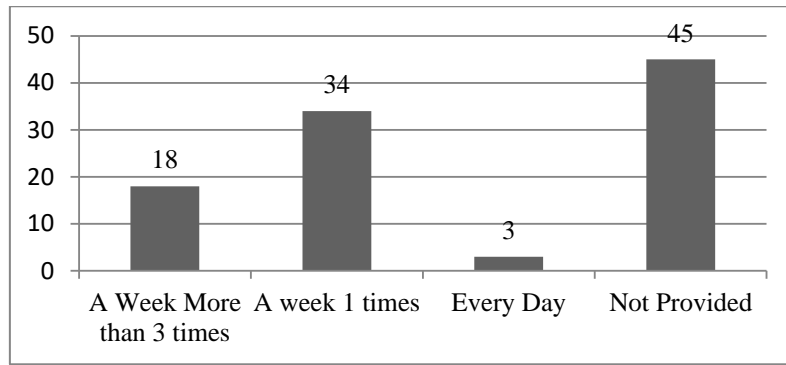


Figure 10. Many Times A Week is Waste Collection Garbage

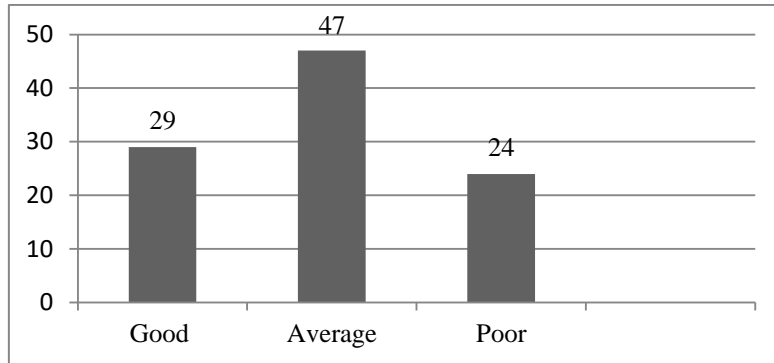


Figure 11. How is Waste Managed in This Neighbourhood

In figure 9, it can be seen that 55 respondents dispose of their household waste at the waste collection point. However, 45 respondents feel reluctant to pay the waste fee due to limited daily expenses. A total of 11 respondents usually dispose of their waste at Sukarame Market, 16 respondents burn their waste, and 18 respondents throwing garbage carelessly. In addition figure 10, 45 respondents were not provided by waste collection, 18 respondents said their waste was collected three times a week, 34 respondents said their waste was collected once a week, and 3 respondents stated their waste was collected every day. Regarding waste management at figure 11, 29 respondents said the management was good, 47 respondents said it was average, and 24 respondents said it was poor



Figure 12. Solid Waste

This condition can cause many losses to the community, such as flooding, an unclean environment, and unpleasant odours. If the entire community of Neighborhood Five does not pay fees for waste management, waste will accumulate and flow into the river, causing river water pollution.

Trash scattered in the sewers can cause various problems, such as environmental pollution, the spread of disease, and aesthetic disturbances. Therefore, efforts are needed to overcome the accumulation of garbage in slums, for example by conducting regular gotong-royong actions. In addition to cooperation, the local government must also provide adequate waste storage facilities. (Natsir Abduh et al., 2020).

### *3.2.5 Fire Protection*

Fire Protection System in buildings and the environment is a system consisting of equipment, equipment and facilities, both installed and built-in buildings that are used both for active protection systems, passive protection systems and management methods to protect buildings and their environment against fire hazards. In neighborhood five there is no fire protection. Actually, in Indonesia, there is a lack of fire protection in settlements. Not only in slums, in various housing estates there is also a lack of awareness of the importance of fire protection. If there is no fire protection in a settlement, the risk of fire will increase and can cause significant material and non-material losses such as damage to buildings, loss of property, and even loss of life (J. Wahyu Kusumosusanto, 2022). In addition, dense neighbourhoods with limited accessibility can complicate fire-fighting efforts. So the local government needs to make efforts to improve fire protection in slums, such as by building adequate fire protection infrastructure, increasing community awareness about the dangers of fire and how to prevent it, and training the community in carrying out emergency actions when a fire occurs (Andiyan et al., 2021).

### *3.3 Socio-economic Factor*

#### *3.3.1 Poverty*

Poverty is a situation where there is an inability to fulfil basic needs such as food, clothing, shelter, education, and health. Poverty can be caused by the scarcity of means to fulfil basic needs or the difficulty of access to education and employment. Poverty is a global problem. Some people understand the term subjectively and comparatively, while others see it in moral and evaluative terms, and still others understand it from an established scientific angle.

The community in neighbourhood five is 70% poor. With jobs that are also makeshift and even unemployed. Therefore, there are several solutions in eradicating poverty, namely the local government helps develop the human resources of its community such as improving the quality of education, health, and environmental security and supporting employment opportunities for the poor or poor people. The local government should also help develop human resources through training and job training programs for the poor to develop skills and increase their income. And finally, using technology and innovation to increase the productivity of local communities, facilitate access to resources, and create new job opportunities for those who are struggling to find decent work (Babelprov, 2020).

#### *3.3.2 Income*

In Neighbourhood Five, people's income ranges from IDR 1.1 million to IDR 2 million per month, which still falls into the low-income category. This low income causes many families to struggle to fulfil their basic needs. As a result, they are unable to provide nutritious food, proper education, or adequate health care for their family members. These difficult economic conditions also impact on their quality of life, exacerbating social and environmental problems in the area.

In addition to getting a good education, the people of Neighborhood Five also need to be given training to improve their skills. This training can help them get better-paying jobs or even allow them to start their businesses with the skills they have. In addition, the government can provide facilities for people to start their businesses, which in turn will improve the overall economic situation in the neighbourhood. Thus, these measures can help the people of Neighborhood Five escape poverty and significantly improve their quality of life (Jailani, 2021; Wimardana, 2016).

Several steps can be taken to prevent Neighborhood Five from becoming a physical slum settlement. These measures include regular mutual cooperation by the local community, cleaning up drainage, garbage, and rivers, planting plants around the land, providing waste disposal facilities, and building fire infrastructure. In addition to improving the quality of the environment physically, there are also non-physical efforts that need to be taken, such as developing the local community's Human Resources (HR), improving education, and providing skills training to increase community income.

The researcher has a planning concept that combines an MSME market and green open space (RTH) on the banks of the Sulang Saling River. This concept aims to create a gathering point for the local community and solve physical and non-physical problems in Neighborhood Five. Design Concept:



Table 1. Design Concept With Solution

Indicator	Solution
Buildings	<ul style="list-style-type: none"> <li>- Make a building border of the river to be 10 meters from the riverbank</li> <li>- Ensure that non-permanent buildings are made semi-permanent or permanent.</li> </ul>
Environmental Drainage	<ul style="list-style-type: none"> <li>- Conducting mutual cooperation to clean the ditch</li> <li>- The local government supervises to keep the ditches clean.</li> <li>- Make water infiltration to prevent flooding</li> </ul>
Wastewater Management	<ul style="list-style-type: none"> <li>- Build public toilets</li> <li>- Ensure all community toilets are connected to septic tanks</li> <li>- Community wastewater is filtered first so that the river is not polluted</li> <li>- Planting trees or plants around the land</li> </ul>
Waste Management	<ul style="list-style-type: none"> <li>- Encourage the community not to throw garbage in the wrong place</li> <li>- Educate the community to manage waste</li> <li>- Providing trash management facilities</li> <li>- Conduct mutual cooperation</li> </ul>
Fire Protection	<ul style="list-style-type: none"> <li>- Building fire protection infrastructure</li> <li>- Socialize community awareness about the dangers of fire and how to prevent it, as well as train the community in taking emergency measures in the event of a fire</li> </ul>
Poverty	<ul style="list-style-type: none"> <li>- Developing community human resources</li> <li>- improving the quality of education</li> <li>- Access or chance of new jobs from the government</li> </ul>
Income	<ul style="list-style-type: none"> <li>- Skill training</li> <li>- Sharpen skills to become a business enterprise</li> <li>- Community business facilities</li> </ul>

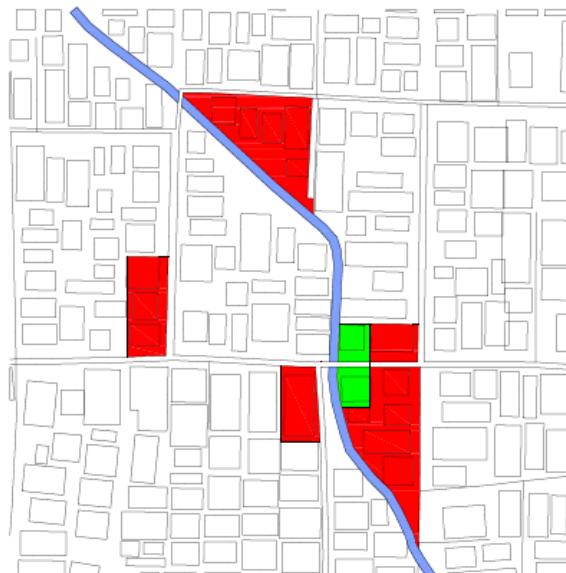


Figure 13. Slum Settlement Zoning

Description :

- : Sulang Saling River
- : Mild Slum Settlement
- : MSMEs and green Open spaces

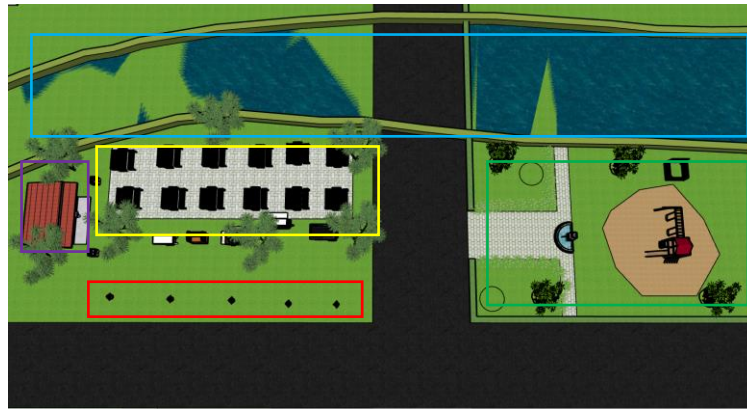


Figure 14. MSMEs and green open spaces Zoning

Description :

- : Sulang Saling River
- : Hydrant
- : Public restrooms
- : MSMEs Marker
- : Green Open Spaces

#### 4. Conclusion

Based on the analysis, the primary causes of slum settlement in Tegal Sari Mandala III include frequent flooding, the accumulation and scattering of garbage, river pollution, low community income and education levels, and a general lack of awareness regarding personal and environmental hygiene. To address these issues, a structuring concept has been proposed to improve the quality of the slum environment. This includes the development of MSMEs (Micro, Small, and Medium Enterprises) and the creation of green open spaces within the neighborhood, which will not only address the environmental concerns but also foster community engagement. These efforts aim to enhance cleanliness, improve the quality of life, and promote better social interaction among local residents, particularly in Neighborhood Five.

This research is limited to identifying the distribution of slum settlements and exploring strategies to improve the quality of slum areas specifically in Tegal Sari Mandala III. The scope does not extend to analyzing other contributing factors, such as socio-economic dynamics or government policies, that might influence slum formation and persistence in different areas. Additionally, the findings and strategies proposed are tailored to the unique conditions of Tegal Sari Mandala III, and may not be fully applicable to slum settlements in different regions with varying environmental or socio-economic contexts. Future research could expand on this work by including comparative studies across multiple slum areas to gain broader insights into urban slum management.

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