



An Analysis of the Factors Contributing to Slum Development from the Perspective of Sustainable Settlements in Ngrampal Subdistrict, Sragen Regency

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Abstract: Sragen Regency is one of the regencies experiencing regional development by facing challenges in infrastructure distribution. One of the manifestations of these challenges is the presence of slum areas, namely the Ngrampal slum. This study aims to determine the existing conditions and factors that influence the existence of Ngrampal slums in the perspective of sustainable settlements, using quantitative methods through a deductive approach. This research uses quantitative methods, with data collection techniques through observation, questionnaires, and institutional surveys. The data analysis technique used was Exploratory Factor Analysis (EFA). This research has resulted in new factor groups regarding the factors that influence the existence of slums in Ngrampal slums: 1) infrastructure factors and cultural preservation efforts and 2) spatial factors and environmental-social conditions of the community. With these results, attention to the maintenance, availability, and affordability of basic settlement infrastructure is one of the important steps to improve community welfare. In addition, development is also important to improve the environmental and social quality of the community.

Keywords: Environmental Quality, Sustainable Development, Slum Settlement

Introduction

Slums are a common problem in every city and region in the development and construction process. Slums occur because the development is not balanced with the availability of land and basic settlement facilities and infrastructure. In Law Number 1 of 2011 concerning Housing and Settlement Areas, Slums can be defined as uninhabitable settlements characterized by building irregularities, high levels of building density, and the quality of buildings, facilities, and infrastructure that do not meet the requirements. The existence of slums is also characterized by low levels of income and education ([Wardoyo et al, 2012](#)).

Sustainable development is a way that can be done to overcome these slums. That is because sustainable development has three main principles that can be the key to successful implementation of its development, namely economic, social, and environmental ([UN World Summit Outcome, 2005](#)). Therefore, these three aspects must be considered in urban

development. With the definition and classification of slums that have been explained, the concept of sustainable development is one of the solutions that can be chosen in overcome slum problems in an area.

Based on the Regent Decree Number 900/163/01.3/2022 of Sragen Regency, there are slum areas with a mild slum level of 114.51 Ha, covering 12 areas of 28 locations spread across Sragen Regency. In this study, researchers chose 3 areas to focus on: the Bandung area, Karangudi area, and Klandungan area located in Ngrampal sub-district, Sragen Regency. The selection of the area is considered appropriate because the area has a slum area that has not decreased from year to year, and is characterized by the characteristics of slums that will be studied using the perspective of the concept of sustainable settlements. By looking at the conditions that occur, the existence of slums in Sragen Regency, especially in Ngrampal Sub-district, which includes the Bandung, Karangudi, and Klandungan Areas, which until now have not decreased, is a problem that, if not handled immediately, can become an important problem. This is also done to achieve one of the objectives of Sragen Regency contained in the 2021-2026 Sragen Regency RPJMD: creating clean settlements and decent housing for the community. In addition, this research can also be used as a reference in the formulation of the next Regional Long-Term Development Plan (RPJPD) and RPJMD of Sragen Regency. Therefore, this research is important to determine the factors that influence the existence of slums in Sragen Regency from the perspective of sustainable settlements, which is expected to be one of the reference materials in overcoming these settlement problems.

The conditions described above can lead to the formulation of the problem, namely, to determine the factors that influence the existence of the Ngrampal slum area of Sragen Regency in the perspective of sustainable development. For this reason, the purpose of this research is to analyze the factors that influence the existence of slums in the perspective of sustainable settlements. The objectives are to identify the general characteristics of Ngrampal slums, secondly to analyze the factors, and thirdly to determine the factors that influence the existence of Ngrampal slums of Sragen Regency in the perspective of the concept of sustainable settlements.

Methods

This research uses a deductive approach. Then, to support the deductive approach as the chosen approach, this research uses a quantitative research design. This research has three aspects with 8 variables obtained from various literature on slums, slum existence factors, and sustainable settlement development by the theoretical framework above. These variables are used to answer the research question of what factors influence the existence of

Ngrampal slums in Sragen Regency using a sustainable settlement perspective. The variables discuss what factors can be considered in causing the existence of slums in sustainable settlements. For more details, it will be shown in the table below.

Table 1. Variables Influencing the Existence of Slums from a Sustainable Settlement Perspective

Variable	Sub Variables	Indicator
Land Ownership Status		Type of land ownership status <i>Law No.5 of 1960 concerning Basic Regulations on Agrarian Principles.</i> <i>Rachmawati S.D, Widayastuty (2015) Land Ownership Status Supporting Slum Settlement Growth in the Rail Area</i>
	Community environmental benefits from the utilization and maintenance of the environment	Benefits obtained by the community in the utilization and maintenance of the environment <i>Government Regulation Number 29 of 2011 concerning Guidelines for Providing Area-Based Housing and Slum Settlement Environmental Handling Assistance (PLP2K-BK)</i>
Sustainable Utilization and Maintenance of the Environment	Efficiency of utilization and maintenance of the environment in a sustainable manner	The level of wasteful use of natural resources (water for basic daily needs) <i>According to the Clean Water Needs Standard (SNI 6728 1: 2015) in Afriyanda Ridha, et al (2019). Analysis of Domestic Clean Water Needs in Penjajap Village, Pemangkat District, Sambas Regency.</i>
		The level of environmental impact of the pollution produced <i>According to KLH (1990), in Dr. Lina Warlina, M.Ed.Module 1: Principles of Environmentally Sound Development and Environmental Management</i> <i>According to the World Health Organization, in Pratiwi Rina H et al (2022). Environmental Health. Bandung: Widina Bhakti Persada Bandung.</i>
Availability of Basic Facilities and Infrastructure for Conducive Housing	Government Facilities and Public Services	The reach of government facilities and public services to residential areas <i>SNI 03-1733-2004 Procedures for Planning Residential Environments in Urban Areas.</i>
	Education Facilities	The reach of education facilities (elementary school) to the settlement area <i>SNI 03-1733-2004 Urban Housing Environment Planning Procedure.</i>
	Health Facilities	Reach of health facilities (Clinic, Health Center) to residential areas <i>SNI 03-1733-2004 Procedures for Planning Housing Environment in Urban Areas.</i>
	Means of Worship	Reach of worship facilities (Mushola, Mosque, Church) to the settlement area. <i>SNI 03-1733-2004 Procedures for Planning Housing Environment in Urban Areas.</i>

Variable	Sub Variables	Indicator
	Trade Facilities	Reach of trade facilities (Traditional Market) to the settlement area <i>SNI 03-1733-2004 Urban Housing Environmental Planning Procedures.</i>
	Green Open Space and Park Facilities	Reach of green open space facilities (field, park) to residential areas <i>SNI 03-1733-2004 Procedures for Planning Housing Environment in Urban Areas.</i>
	Clean Water Network	The quality of clean water in meeting daily needs <i>According to the Ministry of Health in Vivi Sisca (2016). Determination of Refill Drinking Water Quality against Nitrate, Iron, Manganese, Turbidity, pH, E.coli, and Coliform bacteria.</i>
	Wastewater Network	Availability of septic tanks and wastewater piping networks in slum residential areas <i>SNI 03-1733-2004 Procedures for Planning Housing Environment in Urban Areas.</i>
	Solid Waste Network	Availability of solid waste facilities and infrastructure in slum areas <i>SNI 03-1733-2004 Urban Housing Environment Planning Procedure.</i>
	Drainage Network	Quality of the drainage network in slum areas <i>SNI 03-1733-2004 Urban Housing Environment Planning Procedure.</i>
Conformity of City Spatial Utilization for Settlement		Conformity of spatial utilization with the spatial pattern plan <i>Endasmoro T.K., Akliyah L.S (2023) Analysis of the Suitability of Space Utilization in Cianjur District</i>
Disaster Mitigation Efforts	Environmental disaster mitigation efforts	Disaster mitigation efforts in the event of a disaster in slum areas <i>SNI 835:2017 Disaster Resilient Villages and Villages</i>
Community Economic Level	The economic level of the community, as seen from income	The income level of slum communities, as seen from income <i>According to BPS, in Liani Surya Rakasiwi and Achmad Kautsar (2021), The Effect of Demographic and Socioeconomic Factors on Individual Health Status in Indonesia</i>
Availability of social activities to increase social solidarity	Communities and activities are to increase social solidarity.	Availability of communities and tangible manifestations in improving the social solidarity of slum communities <i>Mayang Serungke et al, (2023). Improving Social Solidarity Through Gotong Royong Activities in Naga Timbul Village.</i>
The Efforts of the Community and Government in Preserving Cultural Diversity	Efforts in preserving cultural diversity	Availability of groups and efforts in cultural preservation in slum areas <i>Sains et al, (2004). Sustainable Development Concept</i>

Data collection techniques were conducted through observation, questionnaires, and institutional surveys to support the research approach. Furthermore, researchers used probability sampling techniques to obtain the desired data. A simple random sampling technique was chosen to support this technique, which randomly takes the entire population with the same chance of being taken. Based on the secondary survey that has been conducted, it can be seen that the total population of slum residents in the Ngrampal slum area is 931 people. With the Slovin formula calculation results, the number of samples is divided proportionally based on the total population in each slum area. So that the sample distribution results are obtained as follows.

Table 2. Sample Distribution by Slum Area in Ngrampal Based on Population Proportion

No.	Research Area	Total Population	Number of Samples
1	Bandung Area	122	12
2	Karangudi Area	188	18
3	Klandungan Area	621	60
Total			90

The data analysis method used in this research is the factor analysis technique using JASP software. Factor analysis aims to produce a new group of factors simpler than the results of the correlation between variables. Factor analysis covers several steps, including variable selection by looking at the value of Sampling Adequacy / Measures of Sampling Adequacy (MSA) and the Kaiser-Meyer-Olkin (KMO) method, rotating factors, and naming factors.

Results and Discussion

A. Overview of the Research Location

The research site is located in the Ngrampal Sub-district area, which is spread into three slum areas with an area of 25.6 hectares. The three areas are Bandung Area, Karangudi Area, and Klandungan Area. These slum areas are the focus of research because, from year to year, these areas have not experienced a reduction in slum area based on the Sragen Regency Slum Decree 2022. Based on data regarding slum problems in the Slum Upgrading Program implemented by Sragen Regency in 2022, there are three main problems: the availability of fire protection, facilities and infrastructure and waste management, and unmet drinking water needs.

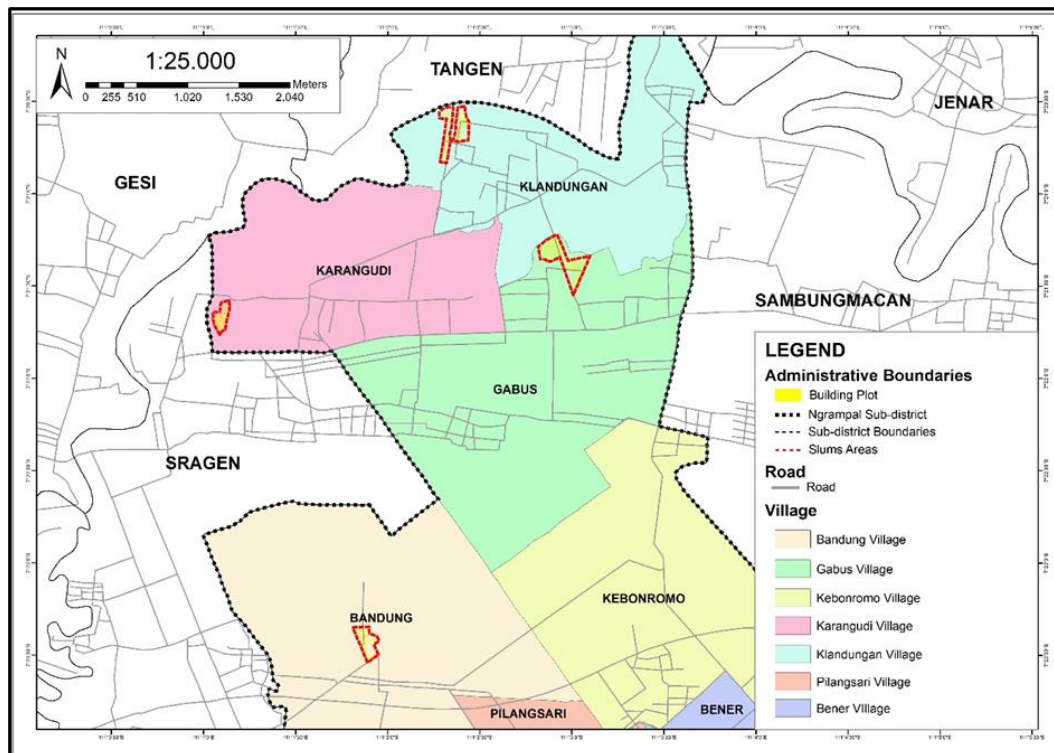


Figure 1. Map of Ngrampal Slum Research Area

B. Results of Analysis of Factors Affecting the Existence of Ngrampal Slums in the Perspective of the Sustainable Settlement Concept

Based on the results of factor analysis of the data obtained, several sub-variables were selected that passed the KMO and *Barlett's Test*. The results of the sub-variables can be seen in the table below.

Table 3. Selected Sub-Variables Based on KMO and Bartlett's Test Results

<i>Kaiser-Meyer-Olkin Test</i>	
	MSA
Overall MSA	0.823
P1 (Land Ownership Status)	0.594
P2 (Benefits provided from Sustainable Environmental Utilization and Maintenance Results)	0.619
P4 (Environmental Impacts resulting from the Utilization and Use of the Environment)	0.718
P5 (Elementary Education Facilities)	0.889
P6 (Junior High School Education Facilities)	0.830
P7 (Government Facilities and Public Services)	0.906
P8 (Health Facilities)	0.916
P9 (Means of Worship)	0.639
P10 (Trade Facilities)	0.822
P11 (Green Open Space Facilities)	0.902
P14 (Waste Network)	0.797
P15 (Drainage Network)	0.594
P16 (Conformity of Urban Spatial Utilization for Settlements)	0.643
P19 (Social Activities in Efforts to Increase Social Solidarity)	0.853
P20 (Efforts from the Community and Government in Preserving Cultural Diversity)	0.967

Table 4. KMO and Bartlett’s Test Results for Sub-Variable Feasibility

<i>Bartlett's Test</i>		
X ²	df	p
1368.882	105.000	< 0.001

Based on the table above, the KMO and Bartlett's test have a KMO value of 0.823 with a significant value of <0.001. The sub-variable analysis can be carried out with these results to the next stage.

Table 5. Results of Factor Loadings

<i>Factor Loadings</i>			
	Factor 1	Factor 2	Uniqueness
P14 (Waste Network)	0.982	0.164	0.008
P11 (Green Open Space Facilities)	0.974	0.160	0.026
P20 (Efforts from the Community and Government in Preserving Cultural Diversity)	0.942	0.155	0.088
P10 (Trade Facilities)	0.905	0.206	0.137
P8 (Health Facilities)	0.751	0.158	0.412
P7 (Government facilities and public services)	0.678	0.245	0.480
P6 (Junior High School Education Facilities)	0.608		0.627
P19 (Social Activities in Efforts to Increase Social Solidarity)	0.586	0.638	0.250
P5 (Elementary Education Facilities)	0.480		0.768
P9 (Means of Worship)	0.143	0.364	0.847
P15 (Drainage Network)	0.127	0.713	0.475
P16 (Conformity of Urban Spatial Utilization for Settlements)		0.954	0.087
P4 (Environmental Impact resulting from Utilization and Use of the Environment)		0.703	0.506
P1 (Land Ownership Status)		0.466	0.777
P2 (Benefits provided from Sustainable Environmental Utilization and Maintenance Results)			

Note. The applied rotation method is varimax.

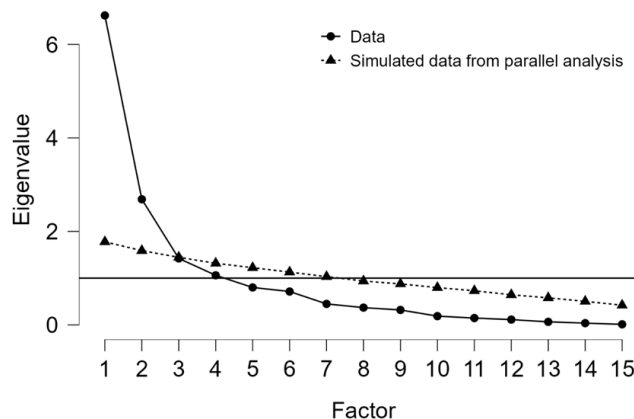


Figure 2. Scree Plot

Based on further analysis that can be seen in the figure above, there are 2 new factor groups regarding the factors that influence the existence of Ngrampal slums in the perspective of sustainable settlements. The 2 new groups are important components. After all, they have eigenvalues > 1, so they are considered significant. The first factor is name infrastructure factors and cultural preservation efforts, the second factor is named spatial planning and community environmental conditions. The naming of the group formed can reflect the variables that make up the factor group. The new factor group variables can be seen in the table below.

Table 6. Grouping of Variables into New Factors Based on Factor Analysis

No.	Factor Name	Sub-variables	Factor Loading Value
1	Infrastructure and Cultural Preservation Efforts	Waste Network	0.982
		Green Open Space Facilities	0.974
		Efforts from the Community and Government in Preserving Cultural Diversity	0.942
		Means of Trade	0.905
		Health Facilities	0.751
		Government and Public Service Facilities	0.678
		Junior High School Education Facilities	0.608
		Elementary Education Facilities	0.480
2	Community Spatial and Environmental Conditions	Social Activities to Increase Social Solidarity	0.638
		Means of Worship	0.364
		Drainage Network	0.713
		Conformity of Urban Spatial Utilization for Settlement	0.954
		Environmental Impacts Resulting from the Utilization and Use of the Environment	0.703
		Land Ownership Status	0.466

Based on the table above, it can be seen that the first factor (Infrastructure and Cultural Preservation Efforts) is formed by several variables, including waste networks, green open space facilities, efforts from the community and government in preserving cultural diversity, trade facilities, health facilities, government facilities and public services, and educational facilities. Slum areas can be formed due to problems with inadequate basic settlement facilities and infrastructure, including the waste network ([Sari and Ridlo, 2021](#)). In sustainable development, sustainable waste management is the first step in achieving various goals of the SDGs, namely Goal 12, by ensuring sustainable consumption and production patterns ([Noviandita and Ikmal, 2023](#)). In slum areas in Ngrampal Sub-district, waste management facilities are not yet available and affordable. Most people manage waste by burning it in their yard, although a small number of people have waste facilities in the form of small trash cans in each house. Under these conditions, programs and in-depth waste management are needed in slum areas.

Furthermore, green open space (RTH) facilities are important in improving the quality of life ([Tumeang et al., 2023](#)). The lack of availability of green space can cause various problems, in air pollution, flooding, and other negative environmental impacts ([Astriani, 2014](#)). In the Ngrampal slum area, there is a Green Open Space (RTH) in the form of a sports field near educational facilities. With this location information, this is by the provisions in SNI 2004 that the location of sports fields is adjacent to educational facilities. In addition, the sports field in the Ngrampal slum area directly functions as a sports facility. Thus, the presence of green spaces in the Ngrampal slum area can already be said to be ideal. Cultural development must be done to improve the quality of socio-cultural aspects in a settlement area.

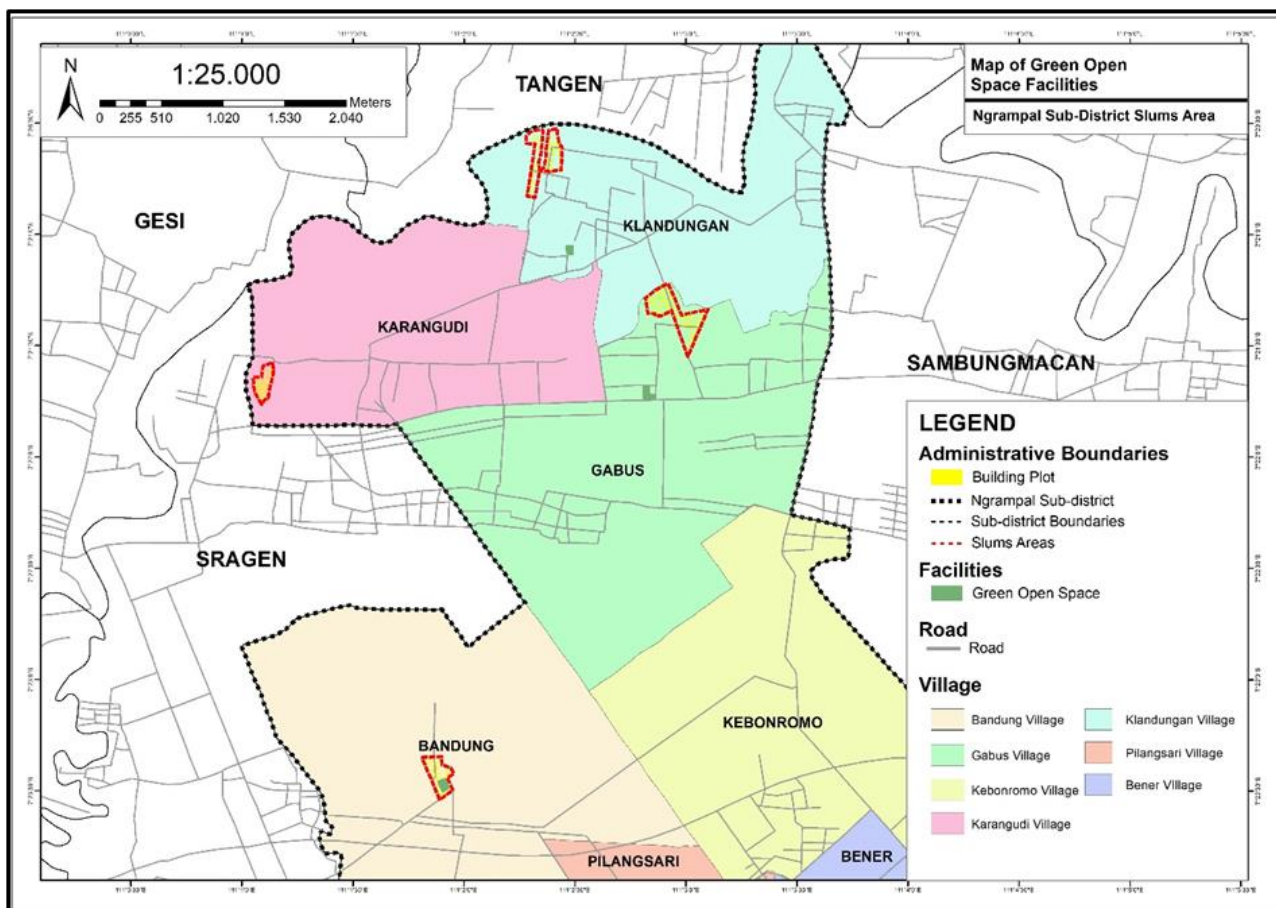


Figure 3. Green Open Space Location Map

Cultural development is based on the interaction and cooperation of various actors that make up the cultural ecosystem (including the public, civil society organizations, and the private sector), by encouraging innovation ([UCLG, 2015](#)). The availability of basic settlement facilities is one factor that led to the emergence of slums ([Krisandriyana et al., 2019](#)).

The second group of factors that influence the existence of Ngrampal slums in the perspective of sustainable settlements are social activities to increase social solidarity, worship facilities, drainage networks, suitability of urban spatial utilization for settlements, environmental impacts resulting from the utilization and use of the environment, and land ownership status. The social aspect is one of the factors that can cause slums. This is because the impact of urbanization affects the community's social conditions, which in turn causes people to reside in inappropriate places and causes slum areas to be temporarily created (Taufik et al., 2019). In sustainable settlements, development is carried out to achieve goals oriented towards building social solidarity and community self-reliance, which are expected to create a strong community to reduce poverty independently and sustainably (Indonesia's Ministry of Public Works, 2012). In the Ngrampal slum area, the social conditions between communities can be good. This is because the Ngrampal slum community still maintains habits, norms, and customs that have been implemented for generations. These social activities include village cleaning and cooperation, and a youth organization still actively increases community solidarity.

The characteristics of slums can also be seen from the drainage conditions of the environment (PERMEN PU No. 2 Year 2016). Drainage can be defined as an assessment of urban areas closely related to the physical and socio-cultural environment in the city area (Romadhon, 2022). So, the drainage network must have the maximum possible function in accommodating water discharge so that no inundation can cause flooding and degrade environmental quality. Ngrampal slum area, the condition of the drainage network allows water to drain smoothly. However, the network is poorly maintained, as evidenced by the solid and liquid waste in the drainage network. So that with these conditions, the drainage network in the Ngrampal slum area is in line with the characteristics of slums described above, and maintenance is needed to maintain cleanliness so that the drainage network continues to function well.

Spatial utilization that is by spatial plans and orderly in its control can realize community welfare and sustainable environmental protection. In addition, spatial policies also play a strategic role in environmental management. Therefore, the suitability of spatial utilization in development is important to achieve balanced and wise development. The Ngrampal slum area has some land included in the riparian area. Some community residences are located near the Bengawasan Solo River. When viewed on the Sragen Regency RTRW map, the area is included in the riparian area.

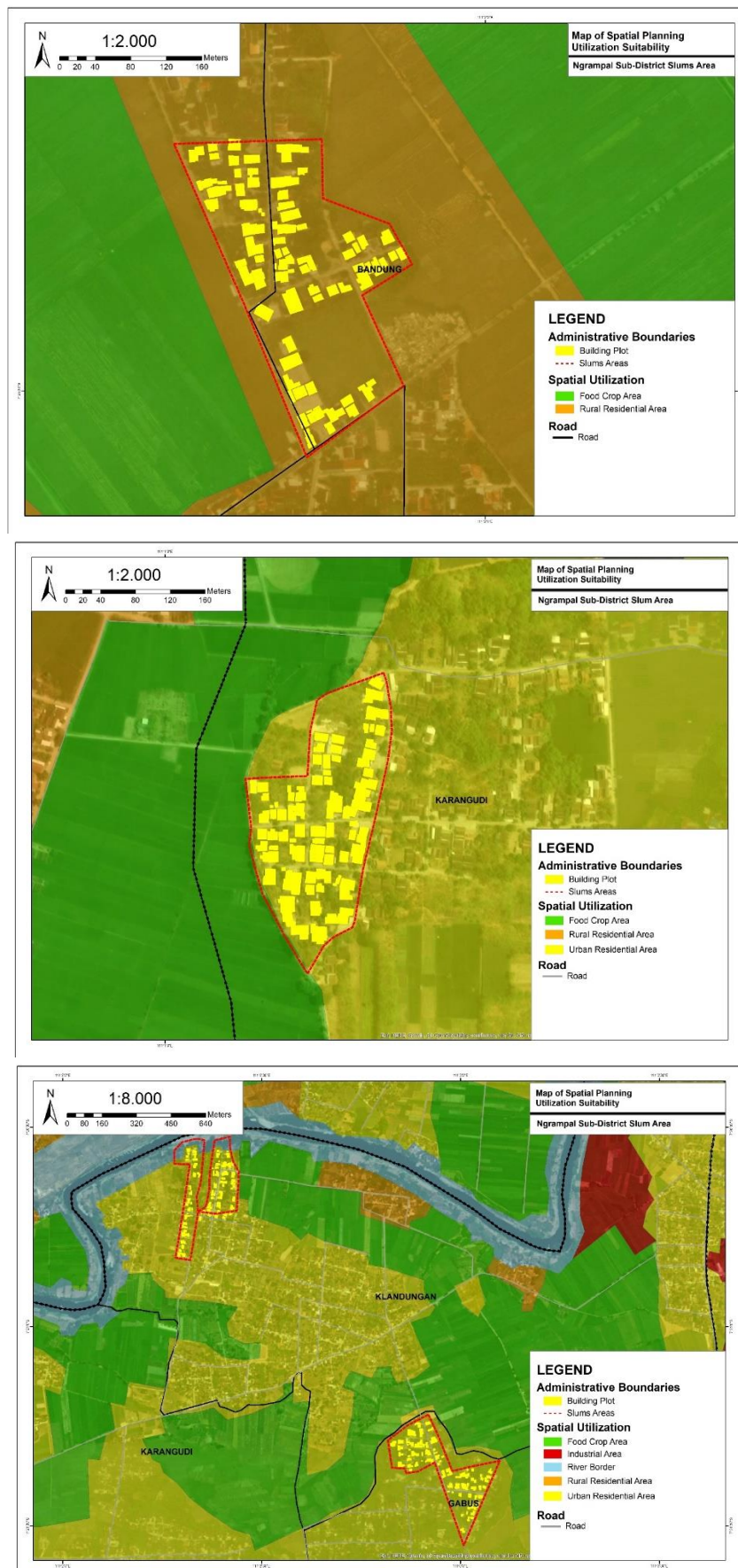


Figure 4. Spatial Utilization Conformity Map

This becomes a serious matter if left permanently, because it will produce a slum environment in the riverbank and can be one of the triggers for the emergence of flood disasters. The development of the results of environmental utilization, if not carried out in an integrated, directed, and planned manner, will result in environmental degradation, which can lead to the emergence of slums ([Sari and Ridlo, 2021](#)). Therefore, the environmental impact resulting from environmental utilization must be given very concerned to create a sustainable environment. In the Ngrampal slum area, environmental utilization is carried out well, which results in new employment opportunities for the settlement community through utilized rice fields, and the existence of an industrial area, which so far has not had a positive impact on the surrounding community. Ownership of land rights has a role in increasing community concern in maintaining environmental quality ([Surtiani, 2006](#)). In the Ngrampal slum area, most people have land titles, but some dwellings still do not have clear land titles.

Conclusion

Based on factor analysis, 8 significant variables produce 2 groups of factors that influence the existence of Ngrampal slums in the perspective of sustainable settlements. First, infrastructure factors and cultural preservation efforts, including waste networks, green open space facilities, efforts from the community and government in preserving cultural diversity, trade facilities, health facilities, government facilities and public services, and educational facilities. Moreover, second, spatial factors and community environmental conditions, consisting of social activities to increase social solidarity, worship facilities, drainage networks, suitability of urban spatial utilization for settlements, environmental impacts resulting from the utilization and use of the environment, and land ownership status. Recommendations that can be given based on this research are that the government of Ngrampal Sub-district is expected to focus on efforts to build, maintain, and improve basic settlement infrastructure to improve environmental quality and as an effort to realize sustainable settlements. In addition, there needs to be cooperation between the community, government, and the private sector in community empowerment. Then, future researchers are expected to go further and deeper in identifying other factors that influence the existence of Ngrampal slums.

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