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DEVELOPMENT OF THE TELUK GELAM URBAN AREA, OGAN KOMERING ILIR REGENCY, SOUTH SUMATRA PROVINCE

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Abstract

This study aims to develop the Teluk Gelam Urban Area, Ogan Komering Ilir Regency, as a strategic collection and distribution center that serves the needs of the Teluk Gelam District community and its surroundings. The strategic location of the area, close to Kayu Agung City and located on the East Sumatra Cross-Island Road, has great potential for sustainable regional development. This study uses a mixed method with a quantitative and qualitative approach, supported by secondary data and field observations. The analysis includes spatial structure, land capability, accessibility, and environmental carrying capacity and capacity. The results of the study indicate that there are three levels of service center hierarchy, namely the Area Service Center (PPK) in Mulya Guna, Sub Area Service Center (SPPK) in Menang Raya, Seriguna, and Talang Pangeran, and Local Service Center (PPL) in other villages. Areas with high accessibility are directed for further development, while areas with low land capability are directed for conservation. This study provides a strong planning framework for sustainable and equitable regional development in the Teluk Gelam Urban Area.

Keywords: ***Teluk Dalam Urban Area, Regional Development, Spatial Analysis***

1. INTRODUCTION

The Vision of Golden Indonesia 2045 reflects Indonesia's determination to become an advanced and sovereign country, which requires sustainable urban development as a center for economic, social and environmental growth. However, rapid urbanization also poses complex challenges, such as pressure on resources and environmental degradation.[1]. Urban areas in Indonesia grow and develop dynamically in line with the dynamics of demographic, economic and physical-spatial developments.[2].

Regional development aims to build links between economic, social, and environmental systems in an integrated manner, both in urban and rural areas. This effort is made to create a balance in development through community participation, initiative development, and improvement of services and infrastructure. The connectivity of cities and villages needs to be strengthened for mutual benefit.[3]. Regional development is a government effort to encourage socio-economic growth, reduce disparities between regions, and maintain environmental sustainability. This policy is important because each region has different characteristics and potential. Therefore, its implementation must be adjusted to local conditions and strategic issues, in order to support the planning of national spatial areas that are safe, comfortable, productive, and sustainable. [4].

Rapid growth and development in urban areas has led to an increase in the need for basic urban infrastructure and facilities such as housing, education, transportation, markets, clean water, drainage and flood control, waste disposal facilities and waste water treatment.[5]. Population surge increases the need for land, forcing poor people to live in unsuitable areas such as disaster-prone riverbanks. Proper spatial studies are needed so that spatial planning policies support sustainable development according to field conditions.[6].

Development aims to realize the welfare and prosperity of society in a fair manner. In the context of Indonesia's national development, society plays a role as both an actor and a beneficiary of development in various sectors.[7].Urban planning is essential to promote sustainable regional development. Without planning that takes into account potential and constraints, cities are vulnerable to problems such as slums, development inequality, traffic

congestion, and lack of basic infrastructure. Governments in developing countries need to focus most of their budgets and spending on developing social infrastructure, especially in the education and health sectors. This is because investment in both areas plays an important role in building the quality of human resources. Improving social infrastructure also contributes to improving the welfare of people in urban areas.[8].

The study of facilities, population, and accessibility shows that urban development is uneven, with disparities between fast-growing and slow-growing areas. Scalogram, Centrality, and Rank Size Rule analysis places the City Service Center in a strategic position. It is recommended to develop a regional service system that includes transportation, trade, services, and settlements, supported by a well-connected road network.[9]. So with the existence of good urban area planning and as a reference in development, the development of urban areas in the future can reduce the disparity in development between regions.

Based on the study of land capability, it is obtained that the land capability for each area is very different, depending on the physical characteristics of each area. The development of each area is based on its land capability, so that there are areas that are directed as housing development, trade services in supporting the development of urban areas, there are areas that are controlled and used as protected areas.

Teluk Gelam Urban Area, Regency as one of the 18 Urban Areas mandated in Regional Regulation Number 9 of 2013 concerning the Regional Spatial Planning (RTRW) of Ogan Komering Regency for 2013-2033, in the urban system plan, the regency area has a function as a Regional Service Center (PPK), namely PPK Sriguna and a Local Service Center, namely PPL Mulyaguna.[10]. Teluk Gelam Urban Area geographically has a very strategic position and standing because it is passed by the East Sumatra cross-country road which functions as a Primary Arterial Road.[11]and is one of the transportation arteries and main economic routes in the Sumatra Island region. The existence of the East Sumatra Trans-Sumatra road makes the Teluk Gelam Urban Area have a strategic role for the progress of development in hinterland areas and for the development of Ogan Komering Ilir Regency in general.

In addition to its location on the Trans Sumatra route, there are comparative advantages of the Teluk Gelam Urban area, namely the existence of the Superior Natural Tourism Area of Ogan Komering Ilir Regency, namely the Teluk Gelam Lake Tourism Area, SMA/MA Garuda Transformasi MAN Insan Cendekia OKI in Sriguna Village, Bumi Perkemahan Ek JAMNAS 2012, the plan to build a People's School with a land allocation of 10 hectares and the Teluk Gelam area has potential in the fields of plantations and food crops.

The results of the study on the development of the Teluk Gelam Urban Area are based on a study of the completeness of service facilities, population distribution, accessibility levels and land capabilities, expected to provide strategic recommendations in the development of urban areas in the future with a focus on the development of service centers, increasing accessibility and developing areas based on land capabilities. This study not only contributes to the development of urban planning theory, but also provides practical insights for sustainable urban development policies.

2. LITERATURE REVIEW

a. Facility Service Index Analysis

Facility service index analysis is a tool to assess the completeness and scale of facility services in a region. This analysis is used to evaluate the availability and distribution of public service facilities.[12]. This approach provides an overview of the distribution of facilities and the scale of their services, so that it can determine the priority of service development in a particular area. The results of the facility service index analysis help group areas into a hierarchy based on the completeness of facilities, which supports strategic planning to improve service accessibility.

b. Rank Size Rule

The concept of the rank-size rule was first proposed by Zipf.[13], which bases the analysis on population size. Settlements with the largest population are considered as the main service centers, followed by areas with smaller populations according to hierarchical order. This analysis provides an overview of the hierarchical pattern of settlements with population distribution as a determinant of the attractiveness and accessibility of an area. In this study, the rank-size rule is used to identify areas or sub-areas that have the potential to become service centers based on the size of the population in the area.

c. Spatial Planning Approach to Accessibility Improvement

The accessibility approach plays a strategic role in regional development. According to Batty[14], areas with high levels of accessibility have the opportunity to develop faster than areas with low accessibility. Population growth increases density which has an impact on the decline in groundwater quality, pollution, drainage damage, flooding, and the spread of disease. In addition, erratic rainfall with high intensity worsens environmental conditions.[24].

Good road infrastructure not only supports economic activity, but is also important in emergency situations to speed up aid and evacuation. It strengthens social resilience, attracts investment, creates jobs, and encourages sustainable economic growth that is resilient to future changes.[25]. In this study, the accessibility approach is used to measure the level of regional development and determine service centers.

d. Land Capability

Land capability reflects the physical capacity of an area to support human activities without damaging the environment.[15]. In the context of Teluk Gelam Urban Area, land capability evaluation ensures that the development of the area is in accordance with the environmental carrying capacity. Land capability assessment involves parameters such as slope gradient, soil depth, soil texture, and drainage. Based on technical guidelines, these parameters are given a certain score to determine the level of land capability, from very good to poor. Proper assessment allows urban development planning to be more sustainable and in accordance with environmental capacity.[16],[17].

e. Land Carrying Capacity

Land carrying capacity is the ratio between the availability of resources and the needs of a particular population or activity. This approach ensures that urban development can be carried out without damaging the natural ecosystem, while meeting the needs of the population in a sustainable manner.[18],[19]. Land carrying capacity analysis is carried out using overlapping, weighting, and scoring methods. The parameters used include climatology, topography, geology, hydrology, mineral resources, natural disaster risk, and land use maps. This analysis produces land capability values and land suitability for various uses according to technical guidelines.[20].

f. Land Capacity

Land carrying capacity is the capacity of an area to accommodate a certain number of people without exceeding the carrying capacity of its environment. This analysis aims to estimate the number of people who can be inhabited by considering the land area, availability of infrastructure, and natural resources.[17]. Basic population data is used to estimate land capacity to support population growth by taking into account the availability of basic infrastructure.[19]. In spatial planning, land capacity analysis is very important to maintain ecological balance and ensure that land use is carried out sustainably.[18].

Regional development opens up economic opportunities, but still leaves challenges to quality of life such as congestion, pollution, and lack of public facilities. Good spatial planning policies, incentives for developers, and infrastructure improvements are needed to create a sustainable and balanced environment.[24].

3. RESEARCH METHODOLOGY

Research Area

The delineation of the Teluk Gelam Urban Area covers an area of 4,926.82 Ha which includes 2 Districts, namely Pedamaran District which includes Pedamaran VI Village, Menang Raya Village, Sukaraja Village and Sukapulih Village and Teluk Gelam District which includes Benawa Village, Muara Telang Village, Mulyaguna Village, Penyandingan Village, Serapek Village, Seriguna Village, Sugih Waras Village, Talang Pengeran Village, and Ulak Ketapang Village.

Research Approach

Study methodology for the development of the Teluk Gelam Urban Area, Ogan Komering Ilir Regencydone in a waycollect and analyze datawhich is descriptive with qualitative and quantitative methods. Spatial exploration with analysis techniques based on Geographic Information System (GIS) using the ArcGIS 10.8 application

Data collection

Data collection methods are carried out both primary and secondary. The purpose of this data collection is to review the availability of data and the accuracy of the data that is already available. Primary data is data that will be searched directly in the field towards previously planned data sources. Primary data collection is used to meet the needs of research data on facilities and infrastructure in the Teluk Gelam Urban Area by means of observation, interviews, and questionnaires. Primary data collection is carried out if data is not available at the agency or is not obtained from document reviews. The primary data collected is in the form of datatypes and distribution of public service facilities, and types and distribution of accessibility conditions. Secondary data is data obtained through tracing previous data or existing data. The types of secondary data include mass media, BPS, government or private institutions, research institutions or data bank centers, individual research results, other research, and library research.

Data Analysis Techniques

Data analysis conducted in this study is spatial structure analysis, Rank-Size analysis, accessibility analysis and land capability analysis. The spatial structure analysis stage includes analysis of facility service index to determine the hierarchy of facility services. The next stage is grouping each sub-district/area in the service hierarchy and the third stage is Rank-Size analysis to see the distribution of population/residents, where the sub-district/area with the highest population is the center, followed by accessibility analysis to determine the level of accessibility of each sub-district/area. Based on the results of the analysis of the facility service index, rank size and accessibility, the spatial structure can be determined.

Land capability analysis is conducted to determine the physical potential of the area to support the development of sustainable service and distribution centers. This process involves measuring environmental parameters, such as topography, slope stability, and disaster risk, which are relevant to the research objectives. Based on this analysis, the land carrying capacity can be determined. Areas with high land capacity and carrying capacity are recommended to support the development of urban areas. Furthermore, by superimposing with the estimated population in the future, the carrying capacity of each sub-district/area can be estimated. The carrying capacity is still high, directed to the development of urban areas, while those with small carrying capacities are directed to be controlled for their development. Based on this analysis, the development of the spatial pattern of the Teluk Gelam Urban Area in the future can be estimated.

4. RESULTS AND DISCUSSION

I. Service Center System Analysis

The determination of the hierarchy of service centers in the Teluk Gelam Urban Area is carried out through scalogram analysis to identify service centers based on the completeness of the facilities available in each area. This analysis aims to support the function of the area as a center for the collection and distribution of goods and services, which not only serves the people of Teluk Gelam District but also the surrounding areas. The results of the analysis are the basis for compiling a spatial structure that is efficient and relevant to the needs of the community, and in accordance with the strategic position of the Teluk Gelam Urban Area which is passed by the East Sumatra Cross-Island Road.

Based on the results of facility weighting, the hierarchy of service centers in the Teluk Gelam Urban Area is divided into three levels, namely the first; Area Service Center (PPK), second; Sub Area Service Center (SPPK), and third: Local Service Center (PPL). Each level has a specific role in supporting regional development, with the aim of creating an even and effective distribution of services.

a) Regional Service Center (PPK)

The highest hierarchy in the service system is the Regional Service Center (PPK), with Mulya Guna as the main center. Mulya Guna is designated as the highest center because of the completeness of its facilities which include social, economic, and government services. In addition, this area has high accessibility with adequate transportation infrastructure, so that it functions as the main driving center for community activities throughout the area. Its role includes providing large-scale services that not only support local needs but also the needs of the surrounding areas.

b) Regional Service Sub Center (SPPK)

The second level is the Sub-Center for Regional Services (SPPK), which serves the needs of a region with a more specific scope. These sub-centers are located in Menang Raya, Seriguna, and Talang Pangeran. These three locations have basic facilities to meet the needs of the local community, such as education, health, and small-scale economy. However, for larger and more complex services, the community still relies on the Sub-Center for Regional Services (PPK) in Mulya Guna. The function of SPPK is as a buffer for the main center while supporting the development of the surrounding area.

c) Local Service Center (PPL)

The third hierarchy is the Local Service Center (PPL), which serves the needs of communities in smaller areas such as villages or neighborhoods. In the Teluk Gelam Urban Area, there are nine PPLs, namely Pedamaran VI, Sukapulih, Sukaraja, Benawa, Muara Telang, Penyandingan, Serapek, Sugih Waras, and Ulak Ketapang. These service centers provide basic facilities, such as basic education and health services, to meet the needs of the local community. Although the services offered are limited in scale, the existence of PPLs is very important to ensure that basic services can be easily accessed by residents in remote or decentralized areas.

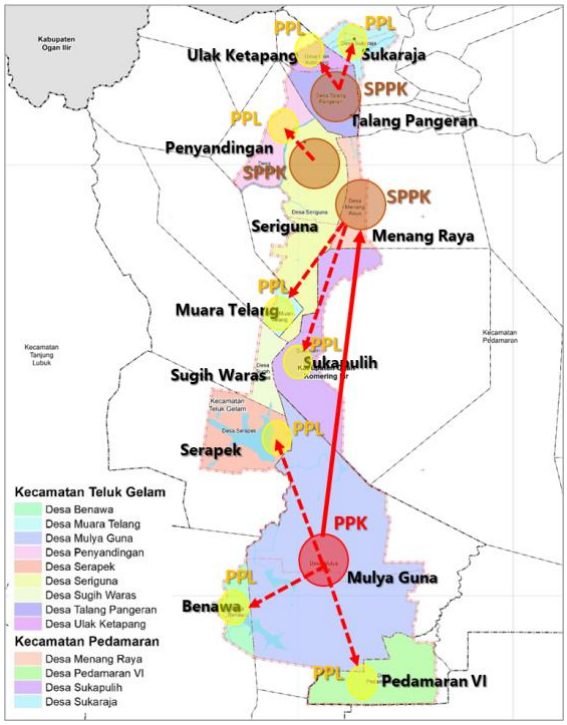


Figure 1. Map of Teluk Gelam Urban Area Service Center
Source: Analysis Results, 2025

Table 1. Availability of Service Facilities in Teluk Gelam Urban Area

NO	VILLAGE	EDUCATIONAL FACILITIES					FACILITIES OF WORSHIP			HEALTH FACILITIES				TRADING FACILITIES						
		Kindergarten	SD	JUNIOR HIGH SCHOOL	SENIOR HIGH SCHOOL/ Vocational School	MESSAGE-TREND	Islamic Prayer Room	Mosque	Church	Health post-des	Pussy-public health	Clinic	Midwife	Roadside stall	Shophouse	Restaurant	Shop	Market	INDUSTRY/WAREHOUSE	OFFICE
1	Win Big	0	0	0	0	0	0	0	0	0	0	0	1	1	1	6	10	0	1	0
2	Damaging VI	0	1	0	0	0	1	1	0	1	0	0	0	2	0	1	9	0	0	0
3	Succumbing to illness	2	1	0	0	0	1	0	0	3	0	0	3	3	1	6	10	0	0	0
4	Sukaraja	3	3	1	0	0	0	1	0	1	0	1	1	0	0	0	6	0	0	2
5	Benawa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	Telang Estuary	1	0	0	0	0	1	1	0	0	0	0	0	2	0	0	0	0	1	0
7	The Greatest Glory	8	3	1	0	2	4	6	1	1	1	0	4	18	1	16	76	1	2	3
8	Pairing	1	1	0	0	0	0	2	0	0	0	0	0	2	0	0	5	1	0	1
9	Serapek	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	5
10	Multipurpose	1	0	0	1	1	1	3	0	2	0	0	0	5	1	10	17	0	1	5
11	Rich and Sane	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	1
12	Prince's Gutter	2	1	0	0	0	0	1	0	1	0	1	0	14	1	13	26	0	0	1

13	Ketapang Ice Cream	1	1	0	0	0	0	1	0	1	0	0	0	0	0	0	2	0	0	2
Amount		**19**	**11**	**2**	**1**	**3**	**10**	**17**	**1**	**11**	**1**	**2**	**9**	**47**	**5**	**53**	**161**	**2**	**5**	**20**
Centrality		**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Amount		**5.26**	**9.09**	**50.00**	**100.00**	**33.33**	**10.00**	**5.88**	**100.00**	**9.09**	**100.00**	**50.00**	**11.11**	**2.13**	**20.00**	**1.89**	**0.62**	**50.00**	**20.00**	**5.00**

Source: Analysis Results, 2025

Table 2. Weighting Value of Service Facilities in Teluk Gelam Urban Area

NO	VILLAGE	POPULATION IN 2022	ANALYSIS		TOTAL	ORDER OF CALCULATION RESULTS	CONCLUSION
			RANK SIZE RULE	SCALOGRAMS			
1	Win Big	1463	1	2	3	II	SPPK
2	Damaging VI	1348	1	1	2	III	PPL
3	Succumbing to illness	877	1	1	2	III	PPL
4	Sukaraja	449	1	1	2	III	PPL
5	Benawa	60	1	1	2	III	PPL
6	Telang Estuary	66	1	1	2	III	PPL
7	The Greatest Glory	4177	3	3	6	I	PPK
8	Pairing	677	1	1	2	III	PPL
9	Serapek	240	1	1	2	III	PPL
10	Multipurpose	1707	1	2	3	II	SPPK
11	Rich and Sane	122	1	1	2	III	PPL
12	Prince's Gutter	1849	2	2	4	II	SPPK
13	Ketapang Ice Cream	268	1	1	2	III	PPL

Source: Analysis Results, 2025

Table 3. Weighting Values

NO	VILLAGE	ORDER OF CALCULATION RESULTS	CONCLUSION
1	Win Big	II	SPPK
2	Damaging VI	III	PPL
3	Succumbing to illness	III	PPL
4	Sukaraja	III	PPL
5	Benawa	III	PPL
6	Telang Estuary	III	PPL
7	The Greatest Glory	I	PPK
8	Pairing	III	PPL
9	Serapek	III	PPL
10	Multipurpose	II	SPPK
11	Rich and Sane	III	PPL
12	Prince's Gutter	II	SPPK
13	Ketapang Ice Cream	III	PPL

Source: Analysis Results, 2025

II. Accessibility Analysis

The level of accessibility of an area has a significant influence on the dynamics of development and population mobility. In the Teluk Gelam Urban Area, the results of the analysis show that most areas have a moderate level of accessibility. However, several villages, such as Menang Raya, Penyandingan, Sugih Waras, and Sukaraja, have a high level of accessibility. A good level of accessibility in these villages supports the ease of fulfilling basic needs, such as education, health, and employment, as well as encouraging economic and social activities.

Accessibility is defined as the ease of moving between locations with minimal time, cost, and effort. The higher the level of accessibility of an area, the easier it is for residents to access public facilities, thereby increasing their time efficiency and quality of life. Conversely, areas with low accessibility tend to experience delays in infrastructure development and minimal connectivity with economic activity centers, which can slow down the dynamics of regional development.[14],[15].

The results of the accessibility index calculation show variations in connectivity between regions. Villages such as Menang Raya and Penyandingan have high accessibility that supports the function of service centers. Conversely, areas with low accessibility, such as Benawa and Mulya Guna Villages, require infrastructure improvements to improve connectivity and equitable development. This analysis uses several indicators, such as area, road length, and access to public service facilities. The following table presents the results of the accessibility index calculation for each village in the research area.

Table 4. Accessibility in Teluk Gelam Urban Area

No	Planning Area	Area (Ha)	Road Length (km)	Accessibility Index	Accessibility Index Level
1	Benawa Village	140.02	1.40	1.00	Low
2	Great Winning Village	165.39	17.99	10.88	Tall
3	Muara Telang Village	77.37	3.62	4.68	Low
4	Mulya Guna Village	1905.95	78.19	4.10	Low
5	Pedamaran Village VI	396.96	20.83	5.25	Currently
6	Penyandingan Village	206.42	18.49	8.96	Tall
7	Serapek Village	376.96	22.32	5.92	Currently
8	Seriguna Village	614.41	41.39	6.74	Currently
9	The Rich and Waras Village	123.14	12.54	10.18	Tall

10 Sukapulih Village	470.23	18.17	3.86	Low
11 Sukaraja Village	143.67	18.37	12.79	Tall
12 Talang Pangeran Village	228.16	18.20	7.98	Currently
13 Ulak Village, Ketapang	78.15	6.07	7.76	Currently
Grand Total	**4926.84**	**277.59**	**5.63**	**Currently**

Source: Analysis Results, 2025

Villages with high accessibility index, such as Menang Raya Village (10.88), Penyandingan Village (8.96), Sugih Waras Village (10.18), and Sukaraja Village (12.79), have good road connectivity, supporting community mobility and effective service distribution. In contrast, villages with low index, such as Benawa Village (1.00) and Mulya Guna Village (4.10), have limited accessibility that can hinder regional growth and development.

The results of this analysis show the importance of increasing accessibility in low-scoring areas, such as Benawa Village and Mulya Guna Village, to support connectivity with economic and social activity centers. Villages with high accessibility must maximize their role as the main nodes in the transportation network and distribution of public services. Thus, the development of the Teluk Gelam Urban Area can be more evenly distributed, productive, and sustainable.

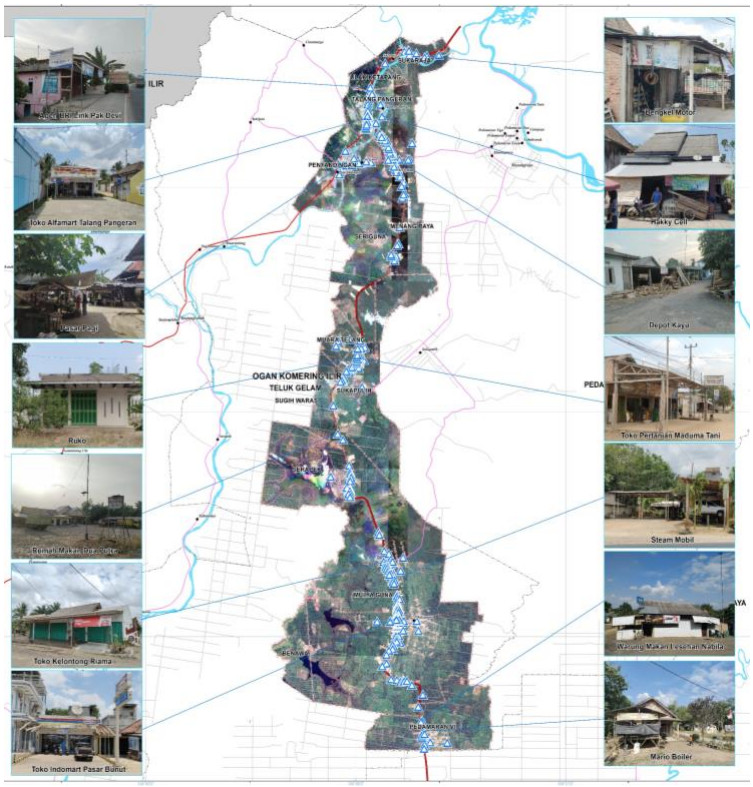


Figure 1. Map of Distribution of Activities in the Teluk Gelam Urban Area

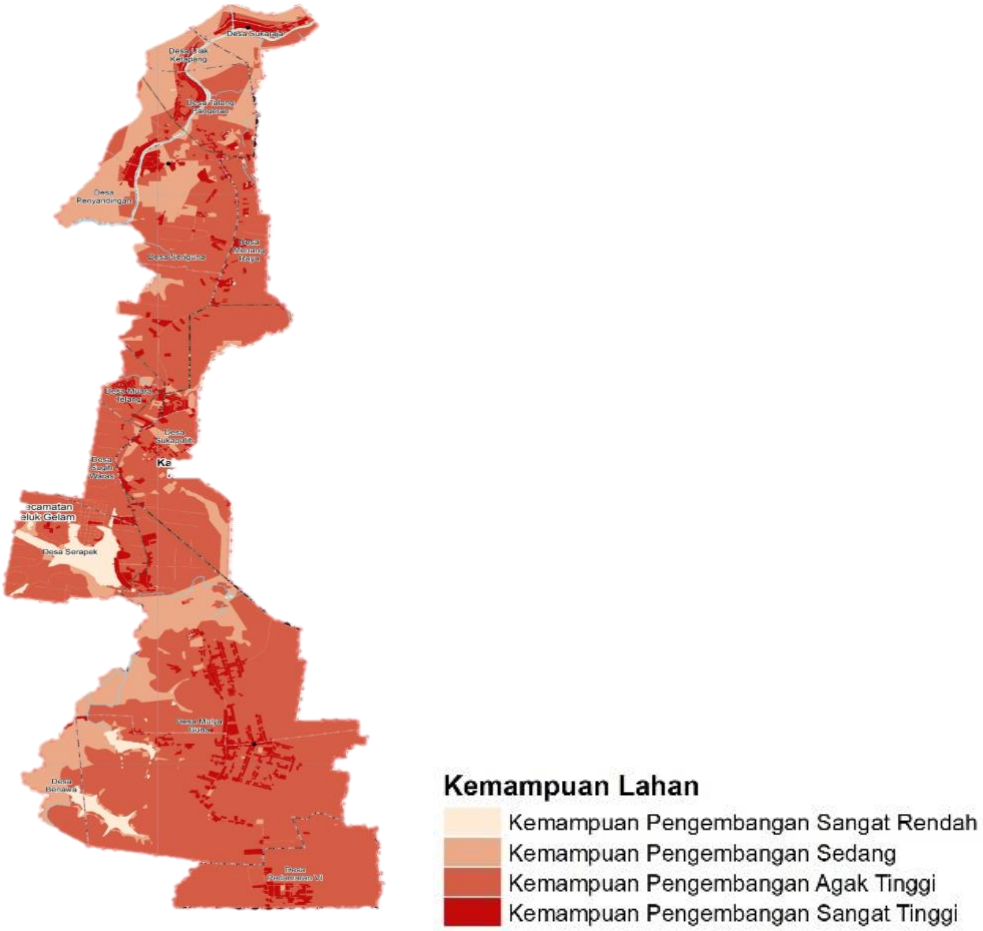
III. Analysis of Land Capability and Land Carrying Capacity

Land capability evaluation in Teluk Gelam Urban Area was conducted to assess the physical potential of the area in supporting optimal development of the area. This analysis includes various environmental parameters, such as topography, geology, hydrology, slope stability, erosion limitations, and risks to natural disasters. Based on the analysis results, areas in Teluk Gelam Urban Area are classified into four categories of development capability, namely very low, low, medium, and high. The results of this evaluation provide a comprehensive picture of the suitability of the land for various development needs.

Table 5. Land Capacity of Teluk Gelam Urban Area

No	Subdistrict	Planning Area	Land Capability				Area (Ha)
			Somewhat High Development Ability	Very Low Development Ability	Very High Development Ability	Medium Development Ability	
1	Pedamaran District	Great Winning Village	144.39	1.72	17.90	1.38	165.39
		Pedamaran Village VI	372.54		21.73	2.69	396.96
		Sukapulih Village	375.93	0.03	28.18	66.08	470.23
		Sukaraja Village	37.31	8.82	20.99	76.55	143.67
2	Teluk Gelam District	Benawa Village	45.79	8.80	1.31	84.13	140.02
		Muara Telang Village	54.75	0.66	15.36	6.61	77.37
		Mulya Guna Village	1454.87	41.49	131.27	278.33	1905.95
		Penyandingan Village	45.93	7.80	15.76	136.94	206.42
		Serapek Village	236.43	86.84	19.66	34.03	376.96
		Seriguna Village	438.09	6.14	45.47	124.72	614.41
		The Rich and Waras Village	113.73	0.88	4.49	4.05	123.14
		Talang Pangeran Village	115.80	8.51	26.18	77.67	228.16
		Ulak Village, Ketapang	8.34	2.63	5.45	61.72	78.15
Grand Total			**3,443.89**	**174.30**	**353.75**	**954.89**	**4,926.84**

Source: Analysis Results, 2025



a) Very High Development Ability

Areas with very high capability have physical characteristics that best support urban development, such as good soil stability, gentle topography, and minimal risk of natural disasters. The total area of land with very high development capability is 174.49 ha, spread across several villages, such as Menang Raya Village and Penyandingan Village. This area can be prioritized for the development of main service centers, such as trade, housing, and large-scale infrastructure.

b) High Development Ability

This area also has good potential to support development, although with some technical limitations that require special management. The total area of the area with high development potential is 353.75 ha, most of which are located in Sugih Waras Village and Talang Pangeran Village. This area can be directed for mixed functions, such as housing, local service facilities, and medium-scale economic activities.

c) Medium Development Ability

This area requires additional development efforts, such as drainage improvement or slope stabilization, before being used for large-scale development. The total area of the area with moderate development capability is 954.89 ha, with significant distribution in Pedamaran VI Village and Seriguna Village. This area is more suitable for limited use, such as local facilities or green areas.

d) Low to Very Low Development Ability

Areas with low to very low capacity, such as Mulya Guna and Benawa Villages, are proposed as protected areas to maintain ecological balance. The determination of this area is in line with the aim of creating sustainable and environmentally friendly regional development. The land area in this category reaches 3,443.89 ha, which is spread across several villages, such as Mulya Guna Village and Benawa Village. This area is proposed to be used as a protected area or for non-urban activities, such as agriculture, forestry, or water conservation.

Environmental carrying capacity is calculated to ensure that regional development is carried out sustainably. By considering population projections and future land needs, areas with high carrying capacity can be directed to

accommodate dense urban activities. Areas with low carrying capacity require interventions, such as replanting vegetation and building environmentally friendly infrastructure, to minimize negative impacts on the environment.

The land capability map presented is the main reference in determining the direction of development of Teluk Gelam Urban Area. Areas included in the high and very high capability categories can be focused on supporting the development of service centers, while areas with low capabilities are directed to conservation or other supporting functions.

Table 6. Land Carrying Capacity and Land Absorption Capacity

Land Capability	Classification	HeightBuilding	Land Carrying Capacity (Ha)	Population Capacity (People)
Zone 1 (Very High)	Max Land Cover Ratio 50%	Building >4 floors	353.75	44,219
Zone 2 (Somewhat High)	Max Land Cover Ratio 40%	Building <4 floors	3,443.89	344,389
Zone 3 (Moderate)	Max Land Cover Ratio 30%	Building <4 floors	954.89	71,617
Zone 5 (Very Low)	Max Land Cover Ratio 10%	Building <4 floors	174.30	4.357
	Total		4,926.84	464,583

Source: Analysis Results, 2025

The results of the land carrying capacity analysis in the Teluk Gelam Urban Area show that the land distribution is divided into three categories, namely: potential areas, constraint areas, and protected areas. The Land Carrying Capacity Map shows that potential areas, marked in green, have the greatest capacity for development. Meanwhile, constraint areas (yellow) and protected areas (red) have certain limitations that need to be considered in regional management.

The results of the analysis of land carrying capacity and capacity classify land capability zones into three levels. Zone 1 (Very High), with land cover of up to 50%, covers 353.75 hectares and can accommodate 44,219 people. Zone 2 (Somewhat High), with land cover of 40–50%, covers 3,443.89 hectares with a capacity of 344,389 people. Zone 3 (Low), with a maximum cover of 30%, covers 1,128.56 hectares that can accommodate 75,851 people. Overall, the total carrying capacity of this area reaches 4,926.84 hectares with a population capacity of 464,583 people.

Further analysis at the Management Area Unit (SWP) level identified that the potential area covers 144.84 hectares, with an effective carrying capacity of 174.30 hectares that can support 4,607 people. Most of this potential area is in Block D, which contributes the highest carrying capacity compared to other blocks. Constraint areas and protected areas are maintained to support the ecological sustainability of the area and reduce the risk of environmental damage. This determination is a strategic basis for the management and development of the area in a sustainable manner.

5. CONCLUSION

The development of Teluk Gelam Urban Area is directed to strengthen its function as a strategic collection and distribution center with principles based on regional potential and sustainability. Mulya Guna Village is designated as the Area Service Center (PPK) due to its complete facilities and superior connectivity. Meanwhile, Menang Raya, Seriguna, and Talang Pangeran act as Sub Area Service Centers (SPPK), and other villages become Local Service Centers (PPL) that serve the needs of the community on a small scale.

The level of accessibility of the area varies, such as Menang Raya and Penyandingan have high connectivity that supports economic activities, while areas such as Benawa and Mulya Guna require infrastructure improvements to reduce inequality. Evaluation of land capability and carrying capacity shows that areas with high capability, such as Menang Raya, have great potential for the development of service centers, while areas with low capability, such as Mulya Guna, are more suitable for conservation functions to maintain ecological balance. Sugiarto stated that development is a process carried out consciously by humans to utilize environmental resources to fulfill their life

needs,[16]so that the development strategy is focused on improving infrastructure in areas with low connectivity, optimizing areas with high land capacity, and protecting protected areas. With this step, the Teluk Gelam Urban Area can develop safely, productively, and sustainably, in accordance with its purpose as a service and distribution center that supports equitable development.

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