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Spatial Mapping Based on The Settlement Carrying Capacity Value in Banjarmasin Utara Sub District, Indonesia

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ABSTRACT– Land Capability Unit refers to the process of evaluating the suitability and performance of land for specific purpose. In this context, it involves the assessment of land to determine the carrying capacity for settlement area in the Banjarmasin Utara Sub-district. This study aims to analyze the carrying capacity of settlement area in Banjarmasin Utara Sub-district. This study uses the quantitative method to determine of the settlement carrying capacity through spatial mapping data processing based on geographic information systems (GIS) using scoring, weighting, and overlay techniques. Based on the Regulation of the Minister of Public Works No. 20/PRT/M.2007, it has nine indicators of land capability units such as, morphology, ease of workability, slope stability, foundation stability, water availability, drainage, against erosion, waste disposal, against natural disasters. The results of the analysis show that there are 2 land classifications in the Banjarmasin Utara sub-district, namely zone II and zone III. Final results of the study showed that all villages in the study area had a DDPm value > 1, which indicates that the carrying capacity of settlement area is relatively high. This value is an indicator that the area has the capacity for residents to settle.

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Introduction

The settlement carrying capacity can be defined as the ability of an area to provide settlement area to accommodate a certain number of residents to be able to live properly [1], [2]. Settlement area structure, encompassing the scale and arrangement of urban settlement area, exerts a pivotal influence on the planning of urban functional zones [3], [4]. Each city exhibits distinct characteristics in its settlement patterns. Banjarmasin, known as the "City of a Thousand Rivers," features a unique settlement structure shaped by its extensive river network [5]. Settlement areas have historically developed along the riverbanks, resulting in a distinctive spatial pattern that reflects the city's fluvial landscape [6].

The growth of the city driven by population growth and the impacts it causes is closely related to the increase in land needs [7]. Along with population growth and the need for housing, people tend to use the remaining space including on the banks and river bodies as a place to live [8]. The phenomenon of using the remaining space (river banks and bodies) as a place to live also occurs in Banjarmasin City even though Banjarmasin City Regulation No. 31 of 2011 concerning the Determination, Regulation, and Utilization of River and Former River Boundaries has emphasized that riverbank areas, especially river bodies, are not for settlement areas [9].

Residential is part of a settlement environment with infrastructure, facilities, public utilities, and other supporting activities (Government Regulation of the Republic of Indonesia Number 14 of 2016). Settlement areas in a regional area will increase along with the increasing population. The increase in the number of settlements is accompanied by the increasing diversity of types of population activities. Population activities both in terms of social and economic, especially settlements, will continue to increase, for that the quantity of land suitable as a settlement area is very much needed. Settlement is one of the basic human needs that cannot be separated from economic activities, industrialization, and development [10]. The surge in uncontrolled settlements can cause urban sprawl in suburban areas, so the carrying capacity of settlements needs to be calculated in order to see the capacity of the land for settlement activities.

The carrying capacity of the settlement environment is the ability of the region to be able to provide the needs of settlement area that can accommodate the number of residents as a decent place to live [11]. Determining the suitability of settlements can be seen from the criteria of locations that cannot be built such as protected areas and areas prone to natural disasters. The high need for settlements can cause a decrease in the carrying capacity of the land.

This study focuses on Banjarmasin Utara sub-district as

the area of interest, taking into account the physical characteristics of the region, the population size and distribution, as well as the availability of land suitable for residential development. The scope of the research includes an analysis of land capability unit (LCU) based on the balance between land availability and residential land demand. The aim of this study is to assess the extent to which the land in Banjarmasin Utara Sub-district can support current and future residential needs, and to provide recommendations that can serve as a basis for sustainable development planning in the area. [12].

Material and Methods

Researh Approach

This study employs a quantitative approach to explain and present findings in numerical or nominal form. The results are clearly described and supported by visual aids such as images, tables, and graphs. The quantitative data presented include variables such as population, land area, building coverage, morphology, elevation, slope, soil type, watershed characteristics, land use, space requirement coefficients, and the amount of land available to support and accommodate housing needs in the Banjarmasin Utara Sub-district.

Research Time and Location

This research commenced in 2024, focusing on projections of carrying capacity as well as population and settlement capacity over the next ten years. The study was conducted in the Banjarmasin Utara Sub District, covering an area of 2.350,74 hectares. A sample of settlement conditions was analyzed using a geodetic engineering approach specifically, Unmanned Aerial Vehicle (UAV) mapping within the Alalak Tengah Village, which spans 93,6 hectares without *Ground Control Point (GCP)*. So that orthophoto is only used to description of the organizational pattern in Banjarmasin Utara Sub District which consists of Ten villages with a total population of 155.493 people and a population growth rate of 2,3% as of 2024. The study area borders Alalak Sub District, which holds significant potential as a center for trade and services in the Barito Kuala Regency. This proximity positions Banjarmasin Utara as a strategically important area for regional development.

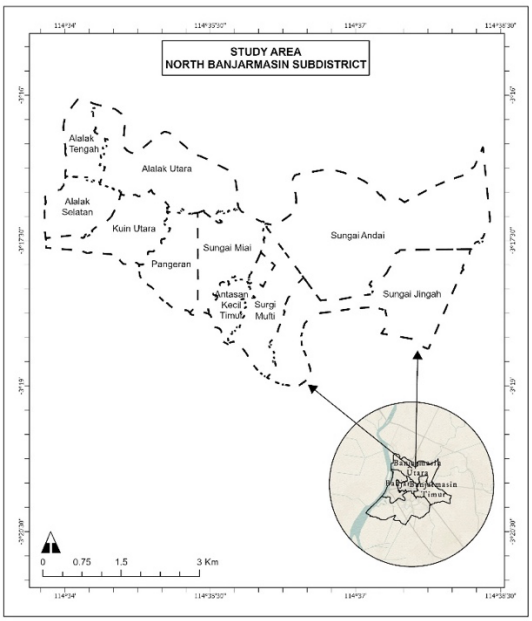


Figure 1. Study Area

Data Collection Method

Data collection in this study was conducted using primary and secondary methods. In general, secondary data collection was conducted through literature studies from various government agencies such as the Central Statistics Agency (BPS) of Banjarmasin City, and the Regional Development Planning, Research and Development Agency of Banjarmasin City. While primary data was obtained through field reviews of the existing conditions of the research area, especially regarding the use of existing land.

Analysis Data

In the Regulation of the Minister of Public Works No. 20/PRT/M.2007 concerning Technical Guidelines for Physical and Environmental, Economic and Socio-Cultural Analysis in the Preparation of Spatial Planning, it is explained that this analysis is carried out to determine the extent of the land's ability to support land use efforts. The output of this analysis is in the form of a land capability class map (zoning) consisting of development areas, buffer zones and protected areas as a description of the level of land capability in the planning area. This land capability analysis is intended to examine the level of land capability to examine the level of land capability in the study area based on basic physical aspects. Basic physical aspects are one of the materials needed in a city's development plan.

Based on the Regulation of the Minister of Spatial Planning No. 20/2007 concerning Guidelines for Analysis of Physical & Environmental, Economic and Socio-Cultural Aspects in the Preparation of Spatial Planning, it is explained that the Land Capability Unit (SKL) consists of several SKL's including:

1. *Land Capability Unit of Morphology*
   Morphological LCU analysis is the process of sorting out the natural landscape/morphology forms in a region and/or planning area that are capable of being developed according to their function.

2. *Land Capability Unit of Ease of Workability*
   The purpose of the LCU Ease of Workability analysis is to determine the level of ease of land in a region or area to be excavated/developed in the process of building or developing the area.

3. *Land Capability Unit of Slope Stability*
   The purpose of the LCU Slope Stability analysis is to determine the level of slope stability in the development area in receiving loads. This analysis is carried out by combining data from topographic maps, slope maps, and morphological maps.

4. *Land Capability Unit of Foundation Stability*
   The purpose of the LCU Foundation Stability analysis is to determine the level of land capability to support heavy buildings in urban development, as well as the types of foundations that are suitable for each level.

5. *Land Capability Unit for Water Availability*
   The purpose of the LCU Water Availability analysis is to determine the level of water availability and water supply capability at each level, for the development of the area.

6. *Land Capability Unit for Drainage*
   The purpose of LCU analysis for Drainage is to determine the level of land capability in draining rainwater naturally, so that the possibility of local or widespread puddles can be avoided.

7. *Land Capability Unit for Against Erosion*
   The purpose of the LCU analysis against erosion is to identify areas experiencing soil erosion, so that the level of land resistance to erosion can be determined and the impact on downstream areas can be anticipated.

8. *Land Capability Unit for Waste Disposal*
   The purpose of the LCU analysis for Waste Disposal is to determine areas that are capable of being occupied as final storage and waste processing locations, both solid and liquid waste.

9. *Land Capability Unit for Against Natural Disasters*
   The purpose of LCU analysis against Natural Disasters is to determine the level of land capability in receiving natural disasters, especially from a geological perspective, to avoid/reduce losses from victims due to the disaster.

Table 1. Land Capability Unit Weighting

No	Land Capability Unit (LCU)	Input	Weight
1	Morphology	Slope, Morphology	5
2	Ease of Workability	Highland, Slope, Soil type	1
3	Slope Stability	Highland, Slope, Morphology	5
4	Foundation Stability	Highland, Slope, Morphology, Soil type	3
5	Water Availability	Watershed Characteristics, Rainfall, Landuse	5
6	Drainage	Highland, Slope, Rainfall	5
7	Against Erosion	Rainfall, Soil type, Morphology, Slope	3
8	Waste Disposal	Highland, Slope, Rainfall, Landuse	0
9	Against Natural Disasters	Landslide Zones, Earthquake Prone	5

Source: Regulation of the Minister of Public Works No. 20/PRT/M/2007

10. *Land Development Capability*
    This analysis is carried out to obtain an overview of the level of land capability to be developed as an illustration in sustainable city development. Land capability analysis is also used as a reference for land suitability directions in the next analysis stage. The data required includes maps of LCU analysis results.

The output of this analysis includes:

a. Land capability classification map for area development.
b. Land capability class to be developed according to area function.

Table 2. Land Development Classification

Classification	Explanation
Zone I	Very High Development Ability
Zone II	Somewhat High Development Ability
Zone III	Moderate Development Ability
Zone IV	Low Development Ability
Zone V	Very Low Development Ability

Source: Regulation of the Minister of Public Works No. 20/PRT/M/2007

Suitability of Settlement Land

Transformations in settlement patterns serve as visible markers of human presence on the land, representing a basic human need. The functions of settlements more than just areas for shelter and rest, settlements function as vital arenas for social interaction, the formation of interpersonal and group relationships, and the development of collective community identities [13]. Based on the SNI 03-1733-2004 concerning Procedures for Planning Urban Housing Environments, settlement areas have several basic physical requirements, namely:

1. Accessibility, is defined as the presence of facilities within a specified neighbourhood and is set as indicator that measure access relationship between an original and a destination. Accessibility indicates also to the extent of easy connection with a site that can be obtained, and it hence can measure the relative opportunity for interactions with a given phenomenon such as open space and parks [13].

2. Compatibility, in settlement planning is one of the important principles so that the functions and activities in an area are in harmony and do not interfere with each other. Compatibility includes the integration between settlement functions and other functions around them, both in terms of social, economic, and environmental aspects.suitability and integration between areas that are its environment [14], [15].

3. Flexibility, regarding the use of multifunctional spaces [16]. It's mean the possibility of physical space changes that can be made to expand or modify of the settlement area.

4. Ecology, namely the integration between the order of natural activities that accommodate it. The above requirements are greatly influenced by the physical characteristics of the land and nature in the form of:

   a) Topography, namely the physical condition of the land surface, both in terms of shape, character, plants, river flow, land contour and others which greatly influence transportation, sanitation systems and spatial planning patterns.
   b) Natural resources, namely all the potential and natural wealth that can support life and livelihood. In addition

to being a source of economic potential, these natural resources can also provide a livelihood for its residents.

c) Physical condition of the land, namely the physical condition of the land where the housing will be built on. With limitations including not containing toxic gases (toxicity), not being flooded and allowing for the construction of settlement environmental facilities and infrastructure.

d) Location or geographical location, namely the position of the housing area in relation to other areas.

e) Land use, land use patterns around the housing area where harmony and integration between areas greatly affect the development of the housing area.

f) Land value and price, namely the value of the potential and economy in the housing area.

g) Climate, namely weather conditions including the direction of the sun, the length of sunshine, average temperature, humidity, rainfall and season.

h) Natural disasters, namely all threats from nature to the area such as whirlwinds, earthquakes, erosion and floods.

i) Vegetation, namely all types of plants that exist and may grow in the area in question, taking into account the type of tree or plant, its influence on the environment and the growth period and age reached.

Settlement Land Carrying Capacity

Demographic factors, especially population, play a major role in assessing the carrying capacity of settlements. In addition to population, another important variable is population growth. Population growth is used to project the population in the future. So that it can be known how much land is needed for settlements in the future. The assessment of settlement carrying capacity uses simple calculations. The calculation is by comparing the area of land suitable for settlement with the existing population. So that the area of existing movement space per person is obtained. The value of the existing movement space area is then compared with the minimum standard needs for settlement. If the resulting value is greater than one (> 1,00), then it describes the existing movement space area is greater than the minimum standard needs and this can be called the settlement carrying capacity is still good or "still supportive" [17].

The carrying capacity of a region for settlements can be interpreted as the ability of a region to provide settlement land to accommodate a certain number of residents to live properly [18]. In formulating the carrying capacity of a region for settlements, in addition to the required size of land that is suitable and feasible for settlements, standards and criteria for land requirements for each resident are also needed [19]. Determining the feasibility of settlements can be seen from the criteria for locations that cannot be built on, such as protected areas, areas prone to natural disasters, and areas prone to landslides.

Result and Discussion

A. Land Capability Unit

Land Capability Unit can be defined as the process of assessment of land performance when used for specified purposes, involving the execution, interpretation surveys, and studies of land managers. In addition, soil, vegetation, climate, and other aspects of the land also used to understanding the inherent capabilities and limitations of the land [20].

1. Land Capability Unit of Morphology

In determining the Morphological LCU, input of slope and morphology map data is required. The following are the results of the morphological LCU in Banjarmasin Utara sub-district. The morphological form in Banjarmasin Utara sub-district is included in the sloping category (0-2%), this indicates suitability for settlements area.

Table 3. Land Capability Unit of Morphology in Banjarmasin Utara Sub District

Land Capability Unit of Morphology	Area (Ha)	Percentage (%)
High	659,19	29,45
Fair	1.579,18	70,55
Total	2.238,37	100

Source: Data Analysis, 2025

2. Land Capability Unit Ease of Workability

Land Capability Unit of Workability, the data needed is including maps of highland, slope, and soil type. The following are the results of the analysis of the Workability LCU in Banjarmasin Utara Sub District.

Table 4. *Land Capability Unit Ease of Workability in Banjarmasin Utara Sub District*

Land Capability Unit Easy of Workability	Area (Ha)	Percentage (%)
High	2.238,37	100

Source: Data Analysis, 2025

3. Land Capability Unit of Slope Stability

As for the LCU of Slope Stability, data needed is map of highland, slope, and morphology. The following are the results of the analysis of the LCU Slope Stability in Banjarmasin Utara Sub District.

Table 5. Land Capability Unit of Slope Stability in Banjarmasin Utara Sub District

Land Capability Unit of Slope Stability	Area (Ha)	Percentage (%)
High	659,55	29,47
Fair	1.578,82	70,53
Total	2.238,37	100

Source: Data Analysis, 2025

4. Land Capability Unit of Foundation Stability

In the LCU of Foundation Stability, data is needed including maps of highland, slope, morphology, and soil type.

The following are the results of the analysis of the LCU Foundation Stability in Banjarmasin Utara Sub District.

Table 6. Land Capability Unit of Foundation Stability in Banjarmasin Utara Sub District

Land Capability Unit of Foundation Stability	Area (Ha)	Percentage (%)
High	1.928,99	86,18
Fair	309,38	13,82
Total	2.238,37	100

Source: Data Analysis, 2025

5. Land Capability Unit for Water Availability

In determining LCU of Water Availability, data input is required, namely watershed characteristics map, rainfall, and land use. The following are the results LCU of Water Availability in Banjarmasin Utara Sub District.

Table 7. Land Capability Unit of Water Availability in Banjarmasin Utara Sub District

Land Capability Unit of Water Availability	Area (Ha)	Percentage (%)
Fair	586,70	26,21
Moderate	1.651,67	73,79
Total	2.238,37	100

Source: Data Analysis, 2025

6. Land Capability Unit for Drainage

As for the LCU of Drainage, data is needed, namely maps of highland, slope, and rainfall. The following are the results of the analysis of the Drainage SKL in Banjarmasin Utara Sub District.

Table 8. Land Capability Unit of Drainage in Banjarmasin Utara Sub District

Land Capability Unit of Drainage	Area (Ha)	Percentage (%)
High	697,49	31,16
Fair	1.540,88	68,84
Total	2.238,37	100

Source: Data Analysis, 2025

7. Land Capability Unit for Against Erosion

In determining LCU of Against Erosion, data input is required, namely rainfall maps, soil types, morphology, and slope. The following are the results of the SKL Against Erosion in Banjarmasin Utara Sub District. Banjarmasin Utara sub-district is included in the light erosion category, although the entire area is dominated by alluvial soil types, this area tends to be swampy and covered in lots of vegetation.

Table 9. Land Capability Unit of Erosion in Banjarmasin Utara Sub District

Land Capability Unit of Erosion	Area (Ha)	Percentage (%)
Low	2.238,37	100

Source: Data Analysis, 2025

8. Land Capability Unit for Waste Disposal

As for the LCU of Waste Disposal, data is needed, namely maps of highland, slope, and rainfall. The following are the results of the analysis of the SKL for Waste Disposal in Banjarmasin Utara Sub District.

Table 10. Land Capability Unit of Waste Disposal in Banjarmasin Utara Sub District

Land Capability Unit of Waste Disposal	Area (Ha)	Percentage (%)
Low	1.230,44	54,97
Very Low	1.007,93	45,03
Total	2.238,37	100

Source: Data Analysis, 2025

9. Land Capability Unit for Against Natural Disasters

In LCU of Against Natural Disasters, data is needed including maps of highland, slope, morphology, and soil type. The following are the results of the analysis of SKL Against Natural Disasters in Banjarmasin Utara Sub District.

Table 11. Land Capability Unit of Natural Disaster in Banjarmasin Utara Sub District

Land Capability Unit of Natural Disaster	Area (Ha)	Percentage (%)
Low	2.238,37	100

Source: Data Analysis, 2025

10. Land Capability Classification

Based on the results of the land capability unit analysis, the land development capability class of Banjarmasin Utara Sub District is divided into 2 zones; 1) Zone II (rather high development capability class), and 2) Zone III (moderate development capability class). The following is a map of land capability in Banjarmasin Utara Sub District in Figure 2.

Table 12. Land Capability Classification of Banjarmasin Utara Sub District

Land Capability Class	Development Classification	Area (Ha)	Percentage (%)
Zone II	Rather High Development Ability	71,81	3,21
Zone III	Moderate Development Ability	2.166,56	96,79
Total		**2.238,37**	**100**

Source: Data Analysis, 2025

Through the assessment of the Land Capability Unit, two types of land capability were determined for Urban Area development. Table 12 shows Land Capability for the Development of the Banjarmasin Utara sub district. Most of the area study has a moderate ability development (96,79%). This happened because the area was dominated by wetlands area and is often affected by tidal flooding. Other areas are Rather high Development Ability (3,21%). This area is quite safe, and is not affected by tidal floods even though it is close to the river. The level of land capability is an accumulation of various physical aspects which are limiting and supporting factors for land potential. A high level of land capability indicates that the land is suitable for settlements (see fig 2).

Referring to the 2023 Banjarmasin City Spatial Structure Plan, the Alalak Tengah and Sungai Andai sub-districts are the environmental service center areas. This area is a

residential center that functions to serve inter-village scale activities. This area is designated based on several factors, including population projections, types and scales of existing service facilities, number and quality of infrastructure, and accessibility.

Currently, development in Banjarmasin City pays little attention to environmental aspects, such as filling rivers and filling drainage network systems that greatly affect flooding or tidal flooding. Based on Regional Regulation No. 15/2012 concerning Building Permits, it is regulated regarding land use policies for housing, namely requiring the creation of a drainage system with a width of 80 cm and must not block river flow.

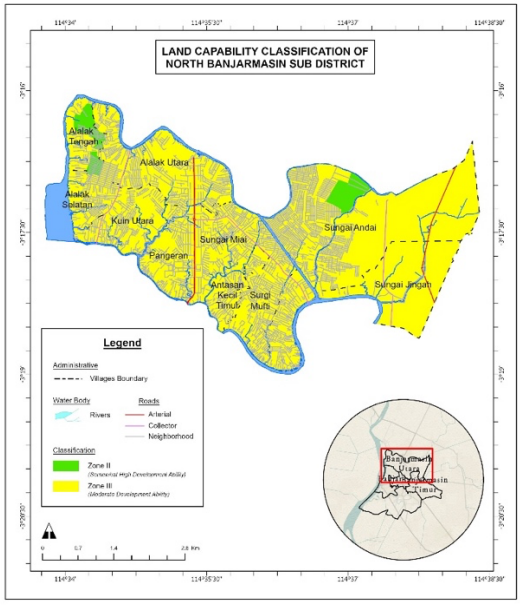


Fig 2. Land Capability Classification of Banjarmasin Utara Sub District Maps



Fig 3. Settlement Condition in Alalak Tengah Village (Part of Banjarmasin Utara Sub District

B. Settlement Land Carrying Capacity

The carrying capacity of settlement land is calculated using three variables, such as population, standard area of space requirements/capita, and suitable area for settlement. The space requirement is based on The Indonesian National Standard Number 03-1733-2004 concerning Procedures for Planning Housing Environments. According to the standard, the space requirements (m^2/capita) is set at 26 m^2 or 0,0026 hectares.

$$DDPm = \frac{LPm / JP}{\alpha} \quad (1)$$

Which:

DDPm	=	Residential Carrying Capacity (%)
LPm	=	Land area suitable for settlement (m^2)
JP	=	Total Population
α	=	Land area requirement coefficient

In obtaining the DDPm calculation, population data (JP) is required which is obtained from the BPS 2024 of Banjarmasin City, while the area of land suitable for settlement (LPm) consists of data on the area of the region, protected area, and disaster-prone area. The area of the region and protected area are obtained from the land use map according to the Bappedalitband of Banjarmasin City in 2023, while the disaster-prone area is obtained from the BPBD of Banjarmasin City.

Based on this formulation, the carrying capacity of a region for settlement land can be grouped into the following three classifications.

a. If DDPm > 1, the carrying capacity of the settlement land is high. This value is an indicator that the region has the capacity for residents to settle.

b. If DDPm = 1, the carrying capacity of the region for recident is optimal. This value is an indicator that there is a balance between the need to settle and the region's capacity to accommodate residents to settle.

c. If DDPm < 1, the carrying capacity of the region for recident is low.

$$LPm = LW - (LKL + LKRB) \quad (2)$$

Which:

LPM	=	Land area suitable for settlement (ha)
LW	=	Total Area (ha)
LKL	=	Protected Area
LKRB	=	Disaster Prones Area

Based on distribution data of protected areas and disaster-prone areas, Banjarmasin Utara Sub District only has a few protected areas because it is a downstream area dominated by fluvial landforms. The protected areas in this area are natural swamps. Meanwhile, disaster-prone areas are floods and tidal flooding, as are the downstream areas that are the estuaries.

Table 13. Protected and Disaster Prones Area (Ha) in Banjarmasin Utara Sub District

No	Villages	Protected Area (Ha)	Disaster Prone Area (Ha)
1	Alalak Selatan	0,16	0
2	Alalak Tengah	0,52	2,64
3	Alalak Utara	4,72	0,47
4	Antasan Kecil Timur	0,64	1,76
5	Kuin Utara	1,15	0
6	Pangeran	1,87	0
7	Sungai Andai	5,52	254,56
8	Sungai Jingah	1,79	9,5
9	Sungai Miai	1,02	52,56
10	Surgi Mufti	0,38	0,39

Source: Data Analysis, 2025

Banjarmasin Utara sub-district is included in the category of high flood disaster prone which is a seasonal disaster because it is located in a tidal swamp area. As for the protected area, Banjarmasin Utara District only has a peat swamp area that is 16 cm below sea level [21].

Table 13 shows the inequality of distribution both in terms of the area of protected areas and vulnerability to disasters. Sungai Andai Village has the largest protected area, namely 5,52 hectares, and is also the area with the highest disaster-prone area reaching 254,56 hectares. This indicates a high potential risk to the protected ecosystem in the village. Meanwhile, several villages such as South Alalak, North Kuin, and Pangeran do not have disaster-prone areas, even though their protected areas are relatively small (<2 ha).

Table 14. Total Population in Banjarmasin Utara Sub-district

Villages	Total Population	Population Growth (%)
Alalak Selatan	13.989	2,07
Alalak Tengah	9.884	1,46
Alalak Utara	22.002	3,26
Antasan Kecil Timur	10.529	1,56
Kuin Utara	12.170	1,80
Pangeran	9.790	1,45
Sungai Andai	32.374	4,79
Sungai Jingah	12.985	1,92
Sungai Miai	14.828	2,19
Surgi Mufti	16.942	2,51

Source: BPS of Banjarmasin City, 2024

Tables 14 shows significant variation in population and population growth rates between villages in Banjarmasin Utara District. The village with the highest population is Sungai Andai, which also recorded the highest population growth rate of 4.79%. This indicates the potential for high pressure on the region's resources and infrastructure. In contrast, the village with the lowest population is Pangeran (9,790 people), with a growth rate that is also low (1.45%).

Based on the calculation results contained in Table 15, it can be seen JPo, which is the optimal population in an area. In fact, from the final calculation of land carrying capacity for settlement land, all villages within the study area exhibit an average settlement land carrying capacity Index (DDPm) greater than 1 (>1). This indicates a high land capacity for supporting settlements, suggesting that these areas are still capable of accommodating additional population growth. The analysis further reveals that the highest DDPm value is found in Sungai Jingah Village, with a score of 10,35. This implies that even if the population of Sungai Jingah were to increase tenfold from current condition, the available land would still be sufficient to support the expanded population.

Table 15. Residential Land Carrying Capacity in Banjarmasin Utara Sub District

Villages	LPm	DDPm	JPo	10 Years Population Projection (2035)
Alalak Selatan	125,16	3,44	48.137	28.978
Alalak Tengah	90,46	3,52	34.790	14.445
Alalak Utara	291,20	5,09	111.999	71.759
Antasan Kecil Timur	75,63	2,76	29.087	16.441
Kuin Utara	161,89	5,12	62.264	21.924
Pangeran	145,15	5,70	55.829	14.210
Sungai Andai	384,96	4,57	148.060	155.119
Sungai Jingah	349,36	10,35	134.368	24.950
Sungai Miai	116,37	3,02	44.757	32.495
Surgi Mufti	158,54	3,60	60.976	42.550

Source: Data Analysis, 2025

Referring to the Banjarmasin City Spatial Plan 2021 - 2041, the strategy for directing land use, especially housing, has been directed to the Sungai Andai village. This is in accordance with the results of the land capability class map analysis. Along with this, the directive has certainly been studied by prioritizing environmental aspects. discipline and harmony between society and the regulations set by the government will reduce disasters in the future

In addition, the population projection for the next 10 years was calculated using the "*arithmetic calculation*" method. The arithmetic method is one of the simple methods for projecting future population. The formula above is based on the principle of linear growth, where the population increases by the same amount each year.

Conclusion

Banjarmasin Utara as a sub-district that has many educational and health facilities, of course it will be an attraction for anyone to live near these facilities, in geography this phenomenon is called the theory of gravity. In addition, Banjarmasin Utara Sub-district is directly adjacent to Alalak Sub-district which has the status of a suburban area (peri-urban) where this term refers to the transition area between urban and rural. As revealed by the analysis Banjarmasin Utara sub-district is dominated by the development of zone III (moderate development capability), with a small part of zone II (rather high development capability). Although most areas have physical limitations (Zone III) the DDPm analysis shows that based on the ratio of land area according to per capita, this area is still able to accommodate the current population and future growth.

This has the potential to cause disharmony between spatial planning and land use must be managed by

considering the classification of existing land capabilities, directing development to more capable areas (Zone II) if possible, or implementing appropriate mitigation and infrastructure in Zone III areas that are forced to be developed. The high carrying capacity of DDPm needs to be balanced with careful planning so as not to exceed physical and environmental limits in the long term use.

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Competing Interest

The authors (s) declare no competing interest.

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