



ANALYSIS OF SPATIAL PATTERNS BASED ON LAND USE IN STABAT DISTRICT, LANGKAT REGENCY, NORTH SUMATRA

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ABSTRACT

The increase in human activity and development causes changes in land use, especially in urban areas such as Stabat District, which is the largest district area as well as the most densely populated in Langkat Regency. Of course, this phenomenon cannot be avoided, so this study aims to analyze the spatial pattern of the Stabat District area based on land use changes through digitization. This study uses a mixed approach with a sequential/staged method that combines or expands from quantitative methods at an early stage with qualitative descriptive method findings at a later stage. The results show that almost all of the Stabat Districts are plantation areas because they are crossed by the main river and many tributaries, which are one of the factors on the periphery of plantation and agricultural land. There have been several changes in land use for five consecutive years from 2017-2021. The land use in Stabat District is dominated by open areas or RTHK (City-scale Green Open Space), and the regional pattern of Stabat District uses a linear or elongated village pattern. This can be seen from the arrangement of residential areas and public facilities scattered on the main highway in Stabat District, which is also a Sumatran crossing connecting Aceh Province with North Sumatra Province.

Keywords: *Land Use, Land Function Transfer, Spatial Patterns, Stabat District.*

INTRODUCTION

The existence of land as a strategic resource with economic value makes the total area of agricultural land decreases every year. This is due to the increasing number of residents and their activities, including development activities. This, of course, results in changes or conversions of agricultural land to non-agricultural land, which cannot be separated from the interests of various parties (Haris et al., 2018; Adiyaksa & Djojmartono, 2020). Land conversion is unavoidable in the implementation of development (Eko & Rahayu, 2012). Land cover/ use changes in urban areas is a process that is not simple, the

process of change among which is not free from the influence of physical factors and human factors (Ridwana, et al., 2018). The increase in population and the demands of community needs for land often lead to conflicting interests over land use and the occurrence of land use incompatibility with the existing plan arrangement. This is based on the existence of limited land and can be added if a reclamation is held (Affan, 2014).

According to Lestari & Arsyad (2018), Land use can be interpreted as a human response to the existence of natural and artificial resources permanently or gradually to meet all needs, whether in the form of objects,

spiritual, or both. Changes in agricultural land use in urban areas urgently require operational planning (Kusumaningrat et al., 2017). Changes in land use in the implementation of development are unavoidable because they are associated with increasing demands for a better quality of life (Sarihi et al., 2020). Changes in land use, especially those that can increase erosion, must be anticipated so as not to damage the environment (Nuraeni et al., 2017).

Referring to Law number 26 of 2007 concerning Spatial Planning, spatial planning and land use need to be carried out to create a good, safe, comfortable, productive, and sustainable space. Changes in land use in areas that are not following the plan will create problems in spatial planning (Panjaitan et al., 2019). Presidential Decree number 60 of 2020 stipulates that the metropolitan area is a coverage area in the form of an urban area (Savitri & Belqis, 2021).

The rapid development of urban areas is directly proportional to the significant problems that arise in urban areas. The phenomenon of land use change can dominantly have an impact, one of which is the negative impact from the ecological, economic, social, and cultural side and the side of urban spatial planning (Wiraguna et al., 2019). Nurfatimah (2020) stated that the grouping is usually done based on similarity in nature and based on specific attribute criteria; for example, the requirements for the type of land use are mainly carried out by several researchers. Regarding spatial planning, based on its primary function, the area on the earth's surface is divided into two: protected areas and cultivated areas.

Adjusting land or land use to the RTRW and RDTR is one of the uses of land data in controlling space use. However, these activities have not run optimally, which causes problems in space utilization (Lababa, 2021). The high activity of the community certainly requires space or land as a location for actions to take place, such as a place to live. This location certainly requires land, while the amount of land available is minimal, so problems in space use and land ownership will be encountered if land management is not

carried out correctly (Purnomo & Kurniawan, 2016).

With the limited availability of land, there will be various problems in allocating space due to interest factors. Deviations in the structure and use of space in the RTRW generally occur due to the high pressure of population growth, mainly due to the flow of urbanization (Khaerani et al., 2018). Zoning rules can be used as a reference in preparing the RTRK/RTBL. RDTR is used to control the quality of regional/city space utilization based on the Regional Spatial Plan (RTRW) (Kurniawan et al., 2021).

The Detailed Spatial Plan (RDTR) in its manufacture uses an RBI map with a scale of 1:5000. Still, if it is not yet available, it can use high-resolution satellite imagery or aerial photography as the basis for updating, and geometric corrections must be made first using a Ground Control Point (GCP) survey. using GPS Geodetic to make corrections because the scale's accuracy of 1: 5000 must have a maximum error tolerance of 2.5 meters (Pribadi et al., 2018). By considering these things, it is necessary to have guidelines for monitoring and evaluating the use of regional space as a guide for local governments in monitoring and evaluating activities on spatial use that take place in their administrative areas (Ghifar et al., 2021).

Langkat Regency has an area of 6,263.29 km² or 626,329 Ha, about 8.74% of the total area of North Sumatra Province. Langkat Regency is the regency with the largest area in North Sumatra (DPMP2TSP, 2019). The existence of the Stabat District cannot be separated from the Langkat District Government; this is because the Stabat District has been designated as the seat of the District Capital, although historically, it has gone through various levels of Government, both during the Dutch Government, Japanese Government and during the Independence of the Republic of Indonesia (BPS Langkat Regency, 2021).

Stabat is the largest District and the most densely populated district in Langkat. Its economic activities are mainly in the trade, agriculture, animal husbandry, plantation, and service sectors. Based on these conditions can

affect the existence of agricultural land and open green space to be converted to its use and use. According to opinion (Rohsulina et al., 2018), in the era of information technology advances, the dissemination of information can be very easy. Computer technology and the internet have brought rapid progress in various scientific fields, including geography. One of them is the emergence of Geographic Information Systems (GIS).

GIS will provide information related to the spatial pattern of the area based on land use with plans that the Government has determined in Stabat District, Langkat Regency. It aims to analyze the spatial design of the site in terms of land use changes through digitization with the help of Landsat 8 images and RBI maps.

RESEARCH METHOD

This research was conducted in Stabat District, Langkat Regency. Geographically, Stabat District is located at 03°47'26" - 04°00'00" North Latitude and 98°15'00" - 98°25'20" East Longitude, has an area of ±10,885 Ha or 108.85 km² and at an altitude of 13 meters above sea level. For more details on the research, space can be seen in Figure 1.

This study uses a mixed-method approach with a sequential/staged method

(Eko & Rahayu, 2012). The technique combines or expands from quantitative methods at an early stage with findings from qualitative descriptive methods later. This research is descriptive, so it tends to use analysis. In this study, the process and interpretation are highlighted by using the theoretical basis as a guide to focus on research based on facts in the field.

The method used in this research is the survey research method and literature study (Laka et al., 2017; M. Laka et al., 2017; Miswar et al., 2020). The research stages generally consist of the preparation stage, data collection, data analysis, field checking, interpretation of results, and preparation of reports (Nuraeni et al., 2017).

This study uses primary data and secondary data. Primary data is obtained based on field surveys. At the same time, secondary data include Landsat 8 images recorded in 2017-2021, an RTRW map of Langkat Regency in 2013-2023, an administrative map of Langkat Regency, administrative map of Stabat District. For more details on the research procedures carried out can be seen in Figure 2.

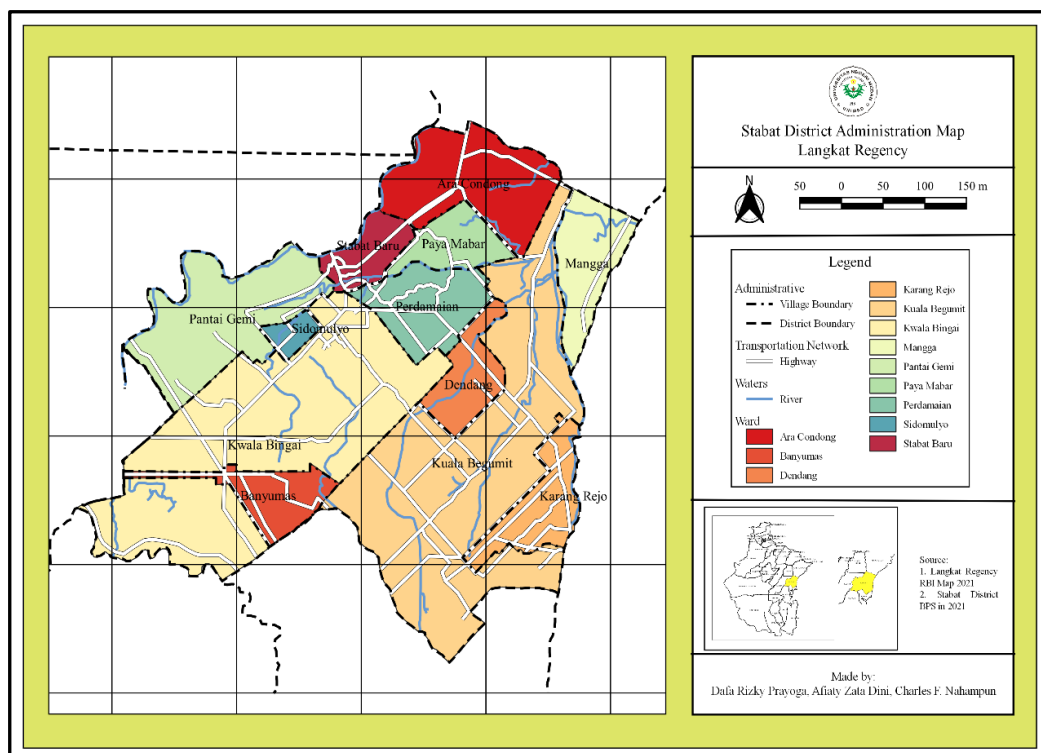


Figure 1. Research Administration Area Map

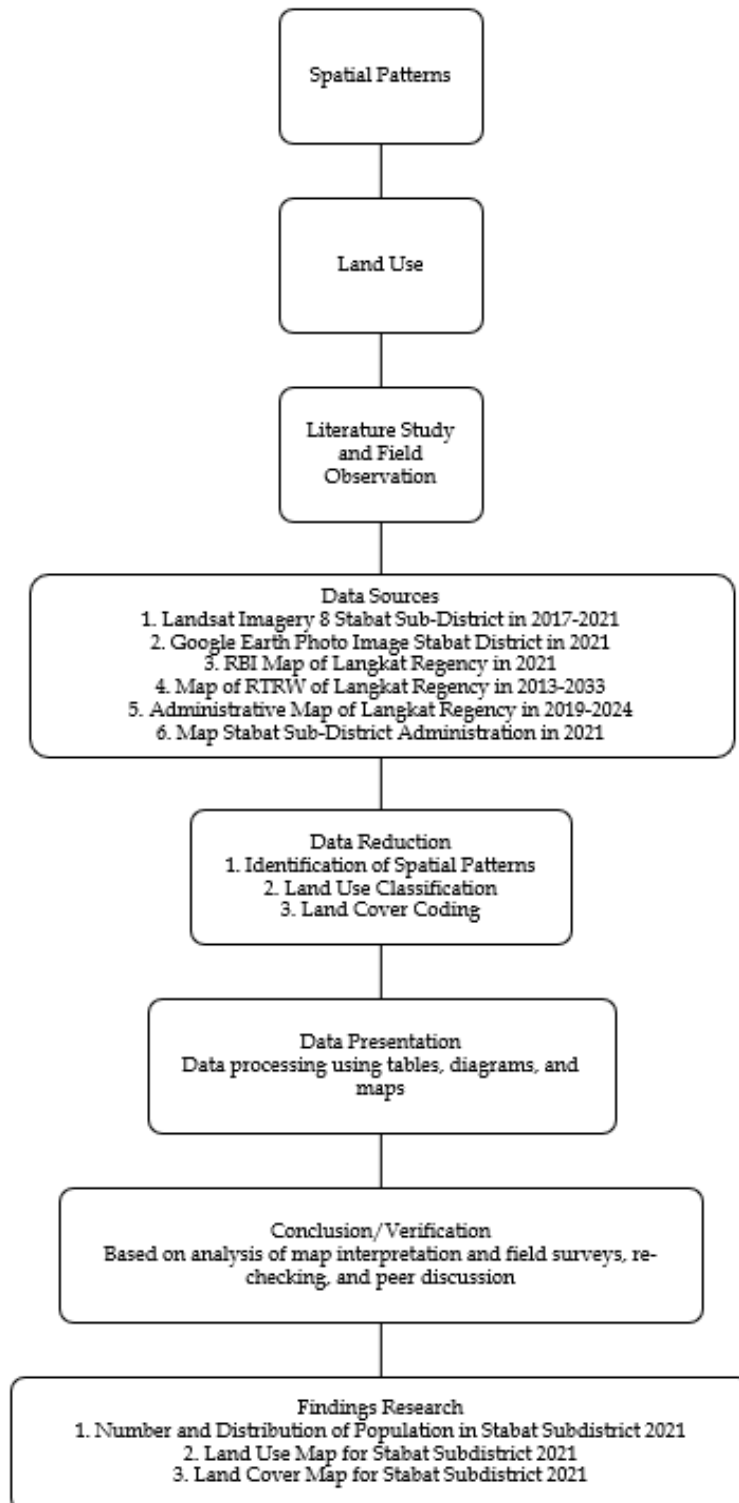


Figure 2. Research Flow Chart

RESULTS AND DISCUSSION

Population Number and Distribution

Based on data from Badan Pusat Statistik Langkat Regency (2021), the population of the Stabat District reached 93,904 people, with a male population ranging from 46,963 people

while a female population was around 46,941 people. Based on the data in the tables and figures, Perdamaian Urban Village has the most population among other villages in Stabat

District. At the same time, Mangga Village has the least population in Stabat District. For more details, the number and distribution of

the population can be seen in Table 1 and Figure 3 below

Table 1. Total Population of Stabat District in 2021

Village	Male Population	Female Population	Total Population
Banyumas	3.075	3.119	6.194
Kwala Bingai	5.983	6.090	12.073
Sidomulyo	3.220	3.230	6.450
Pantai Gemi	4.242	4.108	8.350
Perdamaian	6.591	6.606	13.197
Stabat Baru	2.999	3.182	6.181
Ara Condong	3.540	3.451	6.991
Kwala Begumit	3.836	3.847	7.683
Mangga	1.647	1.628	3.275
Karang Rejo	5.680	5.628	11.308
Dendang	3.829	3.771	7.600
Paya Mabar	2.321	2.281	4.602
Total	46.963	46.941	93.904

Source: BPS Langkat Regency (2021).

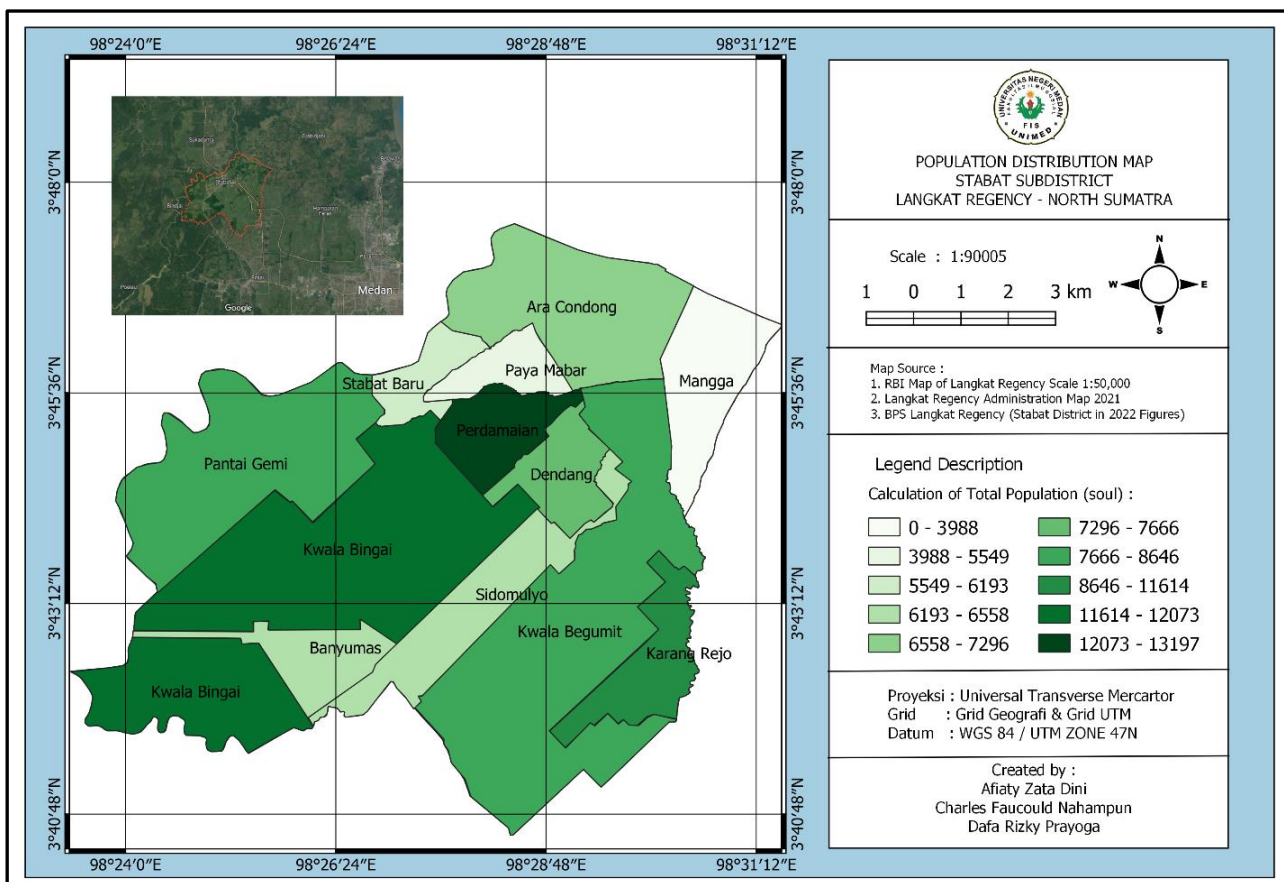


Figure 3. Population Number and Distribution Map (Source: Research Results, 2022).

Land Use in Stabat District

Based on the interpretation of land use in Stabat District from the RBI map of Langkat Regency in 2021 and the RTRW map of Langkat Regency from 2013 to 2033, there are at least seven types of land use, including plantation areas (agri-gardens), dry land agricultural areas (agri-fields), and dry land agricultural areas (agri-fields). Wetland agriculture (agri-rice fields), residential areas, non-agricultural areas (shrubs), fishery areas (ponds and ponds), and water bodies. More details can be seen in Figure 3 below.

agricultural areas (agri-fields), and dry land agricultural areas (agri-fields). Wetland agriculture (agri-rice fields), residential areas, non-agricultural areas (shrubs), fishery areas (ponds and ponds), and water bodies. More details can be seen in Figure 3 below.

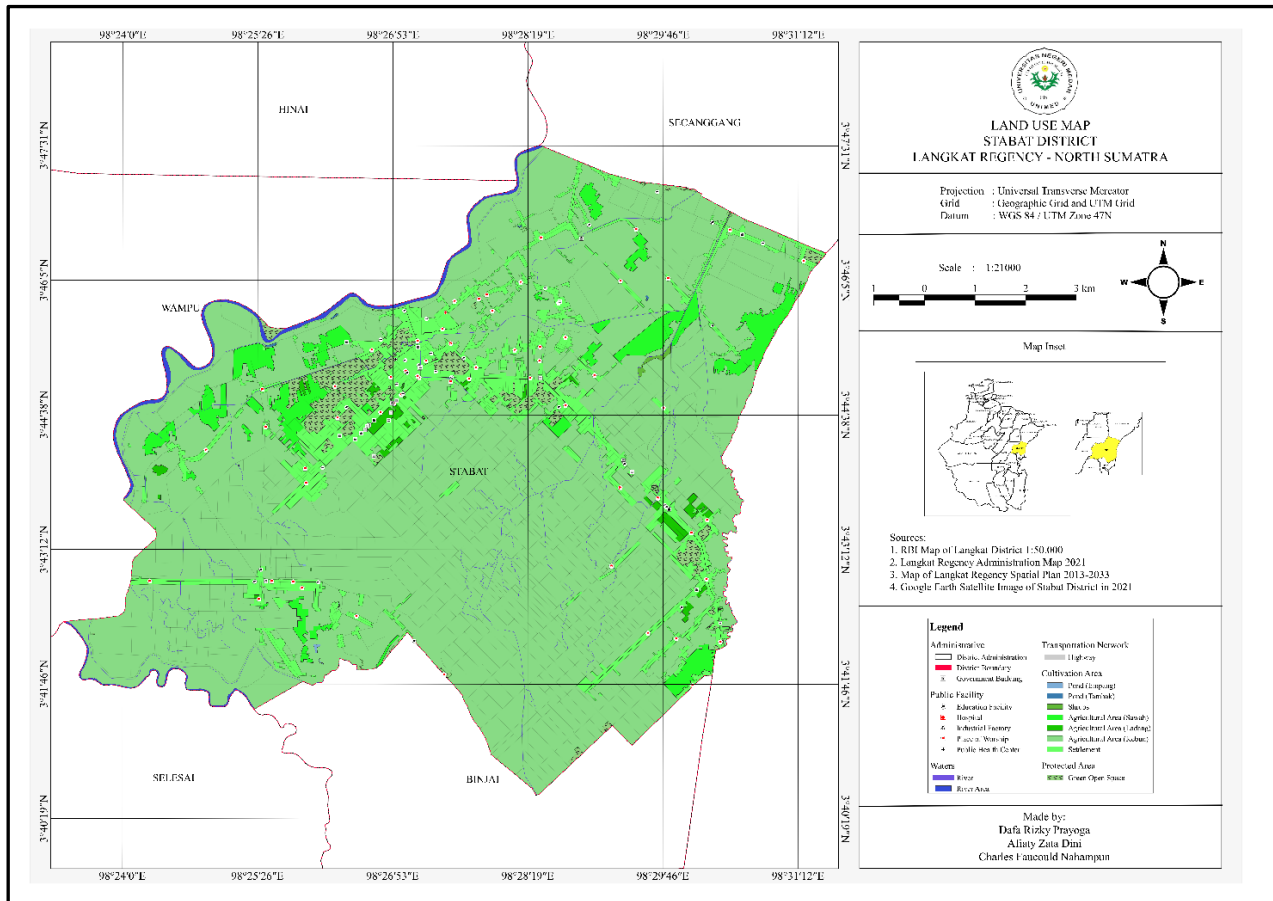


Figure 4. Land Use Map of Stabat District (Source: Research Results, 2022).

Based on Figure 3, almost all areas of the Stabat District are plantation areas. This area is also crossed by the main river and tributaries, one of the factors for plantation and agricultural land fertility. Regarding residential areas, Stabat District has a linear or elongated village pattern. According to (Daldjoeni in Tumigolung et al., 2017), the village's form is linear or extended following the path of the highway or river channel. This definition follows the condition of the settlements in the Stabat District, which are dominantly following the road, especially the

Sumatran traffic lane. This condition is also the same as in the village of Tegallalang, Bali, which also has a linear village pattern with elongated settlements following the river path (Karma, 2017).

Land use in the Stabat District is dynamic because it changes significantly every year. This map displays at least five types of land cover, namely open areas (grass), open spaces (soil), buildings, waters, and vegetation (forests). Changes in land use based on land cover in Stabat District in 2017-2021 can be seen in Figure 3.

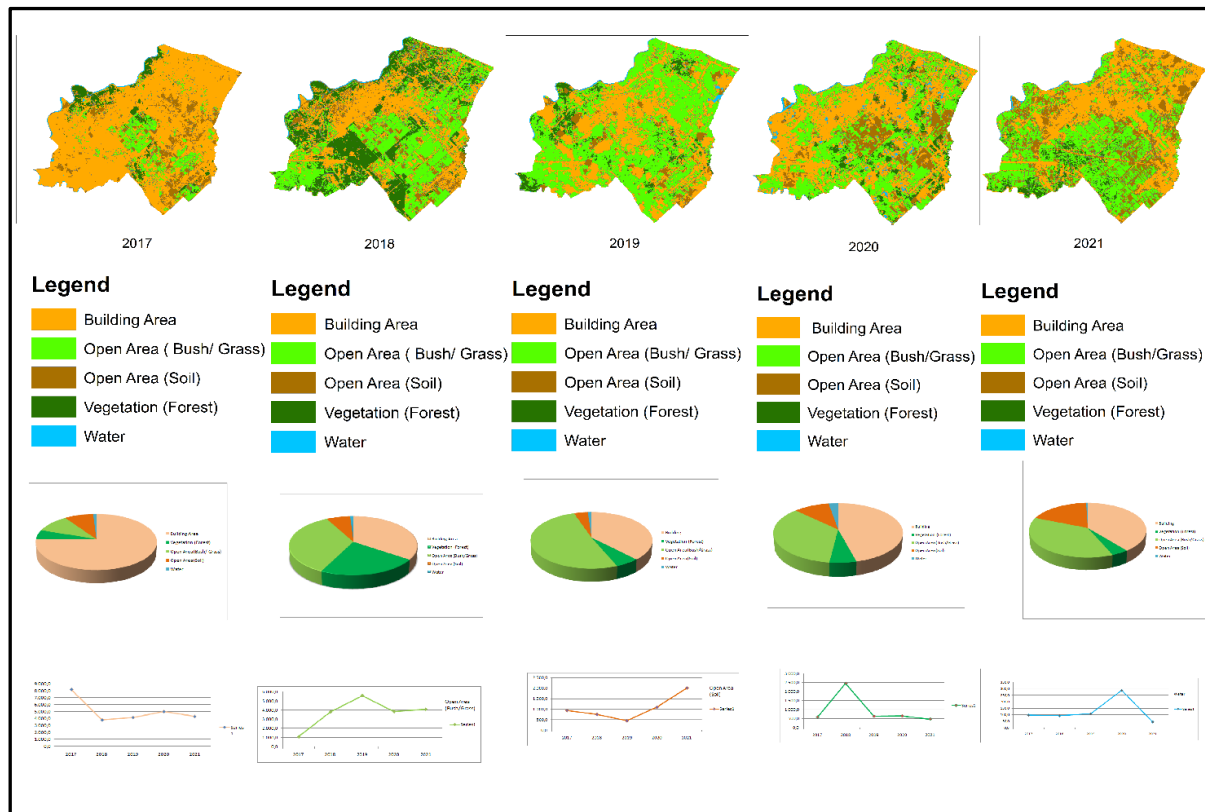


Figure 5. Map of Land Cover Change in Stabat District 2017-2021 (Source: Research Results, 2022).

Land use as a building has decreased significantly, especially from 2017 to 2018, and then underwent an adjustment from 2018 to 2021. In 2017, the building was relatively high, with an area of 8,172 Ha, then changed drastically to 3,782 Ha. After that, the use of built-up land as buildings over time includes 4,131 Ha (2019), 5,002 Ha (2020), and 4,274 Ha (2021). It can be concluded that the use of built-up land as a building is sought to be no more than 5000 Ha or 45% of the total area of Stabat District, which reaches 10,885 Ha.

Then, land use as vegetation or forest also experienced a drastic increase and decrease. In 2017 the forest area was only 581 Ha, then it increased sharply to 2,458 Ha in 2018 and drastically reduced in 2019 to 2021 with an area of 630 Ha (2019), 653 Ha (2020), and 467 Ha (2021). From this, it can be concluded that the use of forest land is large enough to be converted into another land. The percentage of vegetation land use is relatively small, only 600-700 Ha or 5.5% - 6.5% of the total area of Stabat District.

Land cover in open areas is divided into two types: open grass and open land. There was an increase in open grass areas from 2017

to 2019, then a flattening or stabilization of the space in 2020 and 2021. The open grass area in 2017 was around 1,108 Ha, which increased to 3,810 Ha in 2018 and 5,577 Ha in 2019. However, there was a decrease to 3,856 Ha in 2020 and an increase again in 2021 to 4,097 Ha. Meanwhile, the open land area decreased from 2017 to 2019 and increased in 2020 and 2021. These areas include 933 Ha (2017), 749 Ha (2018), 447 Ha (2019), 1,095 Ha (2020), and 2010 Ha (2021). From this condition, the open area of grass gets a share of 37.6%, and the open space of land gets 18.5% of the total area.

The use of aquatic land in the Stabat District is enough to be wary of because its area is getting smaller and smaller. In 2017, the waters were only 97 Ha. Then, in 2018 it decreased to 93 Ha. In 2019 and 2020, water conditions improved by increasing to 108 Ha and 287 Ha. However, it will drastically reduce again in 2021 with an area of only 45 hectares, or about 0.4% of the total area. Although this area is crossed by the main river, namely the Wampu River, if the water conditions in the Stabat District are running low, it is feared that

it can cause problems, especially for the agricultural and plantation sectors.

Based on the result of land cover mapping as a reference basis for land use changes that are adjusted to the area of the Stabat District based on data from the Badan Pusat Statistik (BPS), the current land use is more dominated by open spaces and incredibly open land areas. If the percentage of the open area of grass and soil is combined, the land use area reaches \pm 56% of the total area. As for the built-up land (buildings), the estimated percentage of the allotment or the maximum land use limit only reaches 45% of the total area. The rest is used for vegetated land and water, which get a minor percentage.

This condition shows that land use in Stabat District is dominated by land use as an open area or RTHK (City-scale Green Open Space). Generally, changes in land use to RTHK are motivated by several things, one of which is the development of wetland agricultural areas, which are closely related to the maintenance of urban green open spaces, as happened in Denpasar, Bali (Wiraguna et al., 2019). In addition, as stated by (Nurhanafi in Naqiyya et al., 2020), one of the efforts that can be made to reduce global warming, especially in urban areas, is the existence of Green Open Space (RTH). Green open space balances the ecological conditions in a place so that there is a balance between ecosystems and development in the modern era. Thus, this supports the view of researchers about the estimated land use in Stabat District in the future, and more land use will be converted into green open spaces.

CONCLUSIONS

The regional pattern of the Stabat District uses a linear or elongated village pattern. This can be seen from the arrangement of residential areas and public facilities that are spread out following the Stabat District's main highway, a Sumatran crossing connecting Aceh Province with North Sumatra Province.

Land use in Stabat District is dominated by land use as an open area or RTHK (City-scale Green Open Space). This is due to the conversion of land functions, agricultural land (rice fields), plantations, built-up land

(buildings), and waters (bodies of water) into open areas.

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