

Directions of Settlement Development on Land Availability in Ternate City

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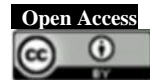
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Abstract

The development of settlements experienced by the City of Ternate has caused quite serious problems, considering that the City of Ternate is an island city dominated by mountainous land, land development for settlements is limited to coastal lands. The purpose of this study is to analyze the direction of settlement development toward the availability of land in the City of Ternate. The method used in this research is the overlay method and uses a qualitative descriptive research type using secondary data in the form of a Map of Disaster Prone Areas from the Ministry of Energy and Mineral Resources. From the results of the overlapping process between settlements in 2010 and 2020, the direction of settlement development in the City of Ternate is to the south and east which are pointing upwards on the slopes of Mount Gamalama. Judging from the Disaster Prone Areas (KRB) map obtained from the Ministry of Energy and Mineral Resources, the direction of settlement development that has occurred in Ternate City is that KRB I is an area that is located along or near the river valley and the lower reaches of the river which originates at the peak area. The availability of land in the City of Ternate which allows for the construction of a settlement is in the south and east. However, the southern and eastern parts of Ternate City are dense enough so that the dominant development is directed upwards. This upward development needs to consider the slope of the slope considering that Ternate City is a volcanic island.

Keywords: Direction of development, land availability, settlement development

1. Introduction

Housing and settlements are multi-sectoral activities whose results directly touch one of the basic needs of society (Ernamaiyanti *et al.*, 2019). Settlements are an important basic human need that continues and increases along with population growth, population dynamics and economic and socio-cultural demands (Pigawati *et al.*, 2011). From the series of human needs, including clothing, food, housing, education and health, it appears that settlements occupy a very important position. Land use for housing and settlements in urban areas has a larger proportion when compared to other types of utilization. Limited land requires optimal land use to minimize the negative impacts that arise. Three elements that influence city morphology include land use, street patterns, and building characteristics (Hanief, 2014; Surya, *et al.*, 2018).

City development can be shown by population growth and increased activity in it (Dwiyanto *et al.*, 2013). The increasing population and its activities have an impact on the need for greater land. City expansion due to urbanization contributes to city growth, changes in spatial structure, and money

polarity in suburban areas, both big and metropolitan cities (Surya *et al.*, 2021). The dynamics of land use in urban areas are due to the need for land for settlements as well as facilities and infrastructure to support residents' activities (Putra *et al.*, 2016). The rapid development of development has implications for high land demand which causes land conversion, especially from agricultural to non-agricultural land (Pribadi *et al.*, 2006; Widiatmaka *et al.*, 2015). Changing non-built-up areas into built-up areas can lead to uncontrolled urban physical development (Putri & Widayani, 2018). Settlement development that occurs in every part of the city is different from one another. This is influenced by the characteristics of people's lives, potential resources and available employment opportunities, natural physical conditions, and the availability of city facilities (Pidora *et al.*, 2014).

The city of Ternate has a process of population development and economic growth that is quite rapid, the pressure of urbanization and growth demands that development needs to be carried out to keep up with needs, both related to land, policies, and

development budgets (Basri, 2017). The city of Ternate, which is conical towards the top of the mountain and surrounded by the sea, has an impact on the availability of land to be developed as a city public space (Umanailo, 2017). From the development of settlements experienced by the City of Ternate, a serious problem has arisen, considering that the City of Ternate is an island city dominated by mountainous land, land development for settlements is limited to coastal lands.

As the population and settlements in Ternate City increase, it is necessary to identify the direction of settlement development. This is because the condition of the land in the City of Ternate is getting smaller, and the City of Ternate is an island that still has an active volcano. The land is an important asset where all activities take place (Sunella & Mamatha, 2016). In addition, there are volcanoes so the slope conditions also need to be considered in the construction of a settlement. In this case, disaster-prone areas also need to be considered in identifying land availability, especially for residential land in Ternate City. Based on this description, the purpose of this study is to analyze the direction of settlement development toward the availability of land in the City of Ternate.

2. Method

2.1 Study site

The location of this research covers the whole of Ternate Island which consists of 4 sub-districts, among others, South Ternate, Central Ternate, North Ternate, and Ternate Island. The area of Ternate City is 5,795.4 km² which is more dominated by the sea area of 5,633.34 km² while the land area is 162,069 km². The city of Ternate consists of 59 sub-districts, of which 14 sub-districts are included in the North Ternate District, 17 sub-districts are included in the South Ternate Region, 15 sub-districts are included in the Central Ternate region, 13 sub-districts are included in the Ternate Island District.

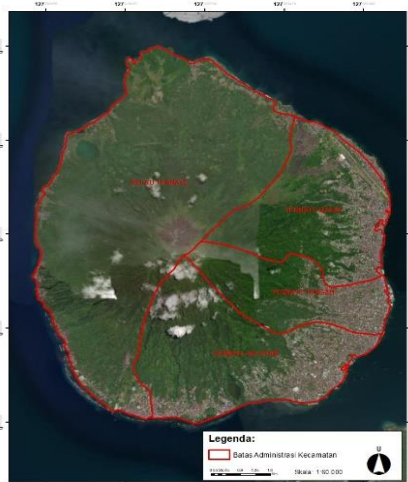


Figure 1. Map of Research Locations
(source: World Imagery Arcgis Online, 2022)

2.2 Data

This study uses Landsat 5 imagery in 2010 and Landsat 8 OLI in 2021. In addition, this study uses secondary data in the form of a Map of the Mount

Gamalama Disaster Prone Area obtained from the Ministry of Energy and Mineral Resources (ESDM).

2.3 Analysis of the direction of settlement development

The method used in this study uses the overlapping method from the interpretation results by utilizing Landsat 5 imagery for 2010 and Landsat 8 for 2021. Interpretation is carried out to distinguish residential and non-residential areas. The results of the overlapping can be seen from changes in land use from non-settlements to settlements to see the direction of settlement development in Ternate City. In addition, this study uses a qualitative descriptive research type using secondary data in the form of a Map of Disaster Prone Areas from the Ministry of Energy and Mineral Resources

3. Result and Discussion

3.1 The direction of settlement development in Ternate City

The development of the population of the city of Ternate from year to year continues to increase. This increase in population was not only caused by natural population growth but also due to urbanization and migration. The increasing flow of urbanization and migration is caused by the increasingly open flow of sea transportation connecting the City of Ternate with its Hinterland and several other cities in the regional area. The progress and acceleration of development in the City Center of Ternate have implications for the development of population and an increase in the need for land for the use of office, government, and private facilities as well as housing. The density occurs so that the need for land increases and reclamation activities are carried out which form new economic activities. From a geographical aspect, Ternate City Center is quite strategic because it can be traversed by roads or land transportation that connects several regions and cities.

Before the development of the waterfront area, the existing conditions of infrastructure services were still limited in the scope of service, especially in the hinterland, namely in the Pulau Ternate sub-district, parts of the North Ternate sub-district and parts of the South Ternate sub-district which tended to be in hilly topographical conditions (upland) and far from the city center. The imbalance in the distribution of infrastructure causes quite significant differences between the western and eastern regions of Ternate Island, in terms of the scope of services to the population. This condition indicates that there is a regional development priority that is oriented toward the eastern part of Ternate Island as a fast-growing area in connecting with the surrounding islands in the local and regional scope.

From the results of the overlay process between settlements in 2010 and 2021, the direction of settlement development in the City of Ternate is to the south and east which is pointing upwards on the slopes of Mount Gamalama. In the center of Ternate City, its development is starting to lead in a vertical direction, due to limited land and also the value of land which makes the Ternate City Center more towards a vertical direction (Umanailo, 2017). The direction of vertical development is clearly visible in

the District of South Ternate. This is because the land in the coastal area has been exhausted so migrants are motivated to build residential land on the slopes of Mount Gamalama. From year to year, developments that are on the coast have resulted in development in the city center of Ternate not allowing it to be directed towards the coast. Even though there has been development through reclamation, it has not been able to stem the rate of economic and population growth in the center of Ternate City. This area is an area that is experiencing rapid development because the center of Ternate City is located in that location and the development of trade and service areas is the main attraction for the dynamics of the city (Bachmid *et al.*, 2017).

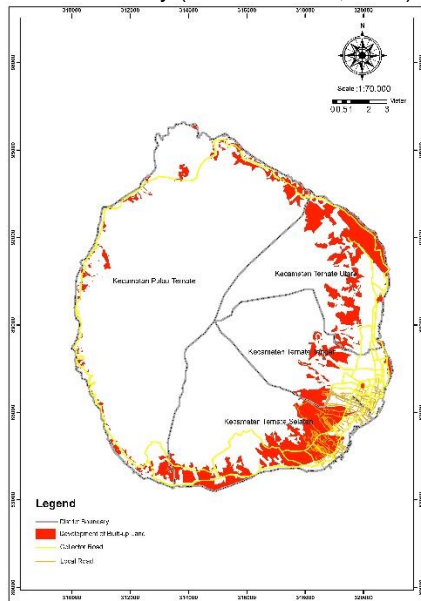


Figure 2. Settlement Development Map

Based on the settlement development map above, densely populated areas are located in the Districts of South Ternate, Central Ternate, and North Ternate. This is because the three sub-districts, especially the Central Ternate District, are the city centers of Ternate City. Public facilities, such as government buildings, economic facilities, health facilities, and the port center are located in the eastern coastal area. So that the development of settlements developed faster to the south and east. Ternate Island District, which is located in the western region far from the city center, can be seen on the map as experiencing very little settlement development. It is influenced by several factors, among others, physical, environmental, educational, social, and economic factors. Some areas in this city are areas with fairly steep mountain slopes, or areas that are prone to disasters so not all of the areas can be used as residential areas (Aryuni, *et al.*, 2021).

2.2 Land Availability for Ternate City settlements

Based on the map of the direction of settlement development above, settlement development on Ternate Island is almost towards the top of the slopes of Mount Gamalama and is denser in the east and south. It is necessary to identify whether the direction of development is an area that is safe from disasters that might arise as a result of Mount Gamalama. If you look at the Disaster-Prone Areas (KRB) map

obtained from the Ministry of Energy and Mineral Resources, the direction of settlement development that occurred in Ternate City is in KRB I, which is an area that is located along or near the river valley and in the lower reaches of the river which originates at the peak area. This area is an area that has the potential to be affected by lava or flooding and does not rule out the possibility of being affected by the expansion of hot clouds and lava flows. During an enlarged eruption, this area may be hit by heavy ash rain and or ejected stones (incandescent).

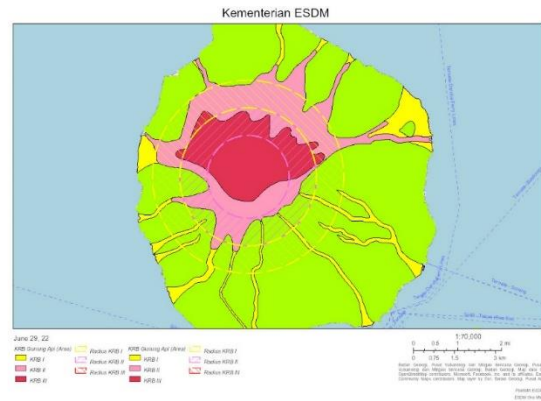


Figure 3. Map of the Mount Gamalama Disaster Prone Area (source: Ministry of Energy and Mineral Resources, 2022)

Development of settlements in the City of Ternate is not possible to build a building to the west and north. When viewed from the pattern of the distribution of the rivers that originate in the peak area, the area that is highly prone to disasters is the area on the western slope starting from the Piatoe River and heading north to the eastern slope in the Togorara River area. This is in line with the results of the overlapping analysis which has shown that most of the development is in the south and east directions. The selection of settlement locations is also a need for settlements (Prakasa *et al.*, 2020). If you look at the availability of land in the City of Ternate, the land that allows for the construction of a settlement is in the south and east. Whereas in the western region or the Ternate Island District, it is not possible to build settlements because the area is a disaster-prone area. The Ternate Island sub-district has the potential to be traversed by pyroclastic flows, lava flows, incandescent rock, and lava avalanches (Hidayat, *et al.*, 2020), so this area has very little settlement land development.

Based on the population in Ternate City, there are 103,429 people living within a 5 km radius of the main crater, 204,820 people living within a 10 km radius, and 308,691 living within a 30 km radius (Global Volcanism Program, 2013). The geographical factor in the form of Mount Gamalama which is in the center of the island, with the direction of the eruption not touching the east side of the island, is the reason this area was chosen to be the center of the city (Ibrahim, 2018). In addition, the slope of the land on the east side is also very good for settlements. However, the southern and eastern parts of Ternate City are dense enough so that the dominant development is directed upwards. This upward development needs to consider the slope of the slope considering that Ternate City is a volcanic island.

4. Conclusion

The development of the population of the city of Ternate from year to year continues to increase. From the results of the overlapping process between settlements in 2010 and 2021, the direction of settlement development in Ternate City is to the south and east which are pointing upwards on the slopes of Mount Gamalama. Judging from the Disaster Prone Areas (KRB) map obtained from the Ministry of Energy and Mineral Resources, the direction of settlement development that has occurred in Ternate City is that KRB I is an area that is located along or near the river valley and the lower reaches of the river which originates at the peak area. The availability of land in the City of Ternate which allows for the construction of a settlement is in the south and east. However, the southern and eastern parts of Ternate City are dense enough so that the dominant development is directed upwards. This upward development needs to consider the slope of the slope considering that Ternate City is a volcanic island.

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