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CARRYING CAPACITY OF SATTLEMENT BASED ON DISASTER PRONE AREAS

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Abstract

The research aims to assess potential locations that can be developed as settlement areas by observing the area's topographical factors as well as the potential for disaster-affected areas. This research used a quantitative qualitative descriptive method with overlay method between existing land use map, topography map with location map affected by flood disaster, volcano eruption, forest fire, avalanche and tsunami. The results of this study was 20,112 ha (24.93%) is a potential area of settlements. Carrying capacity value for the settlements for all districts is above 1 (one) so that all districts have a possibility to develop settlement areas. The development of the settlement area is preferred in the Gangga because the value of the carrying capacity reaches 71.63, while the development of settlements is limited in Bayan and Kayangan. For settlements that have been developed in hazardous areas, the handling is a restriction and prohibition for new developments in disaster-prone areas and relocation in settlement areas in areas with insecurity levels high.

Keywords: *carrying capacity, disaster, prone-area, risk, settlements*

Abstrak

Tujuan penelitian ini adalah untuk mengkaji lokasi potensial yang dapat dikembangkan sebagai kawasan permukiman dengan memperhatikan faktor topografi kawasan serta potensi kawasan terdampak bencana. Penelitian ini menggunakan metode penelitian deskriptif kuantitatif dengan metode overlay antara peta penggunaan lahan eksisting, peta topografi kawasan dengan peta lokasi yang terdampak bencana banjir, erupsi gunungapi, kebakaran hutan, longsor dan tsunami. Hasil dari penelitian ini terdapat 20.112 ha (24,93%) wilayah merupakan kawasan potensial permukiman. Nilai daya dukung lahan permukiman untuk semua kecamatan berada di atas 1 (satu) sehingga masih dapat menampung penduduk untuk bermukim. Pengembangan kawasan permukiman diarahkan terutama pada Kecamatan Gangga karena nilai daya dukung permukiman mencapai 71,63, sedangkan yang perlu dibatasi pengembangan permukiman pada Kecamatan Bayan dan Kecamatan Kayangan. Untuk kawasan permukiman yang telah terbangun pada kawasan rawan bencana arahan penanganannya berupa pembatasan dan pelarangan untuk pembangunan baru dan relokasi pada kawasan permukiman yang berada di kawasan dengan tingkat kerawanan tinggi.

Kata kunci: *bencana, daerah rawan, daya dukung, permukiman, risiko*

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INTRODUCTION

The population of North Lombok Regency has increased from 200,730 (2010) to 220,412 people (2019) with an average growth rate of 1.4% per year. The increase in population growth directly impacts the increasing needs of settlements areas for the community. The area of the settlement reached 2,214 ha (2.74%) from the total area of North Lombok Regency.

Topographically, North Lombok Regency is dominated by areas with slopes above 40% covering an area of 48,406 ha (60% of the total area), while the area that has a slope of 0-15% only reaches 12,102 ha (15% of the total area). This condition is one of the causes of the settlements developments in the highlands (Widayanti, Yuniarman, & Susanti, 2018). The land used in the highlands is usually from the forest. The most common locations that target for development sites are the forest land and shrubs (Delita & Sitompul, 2016). The forest area is not only used as a settlements area, but also used as land for farming.

The target location for the settlements development areas in North Lombok Regency is low-lying areas. In the lowlands, the location is settled not only in the area that has been designated as a settlement area, but also in coastal areas. The choice of a settlement's location depends on the financial ability of the community. Because of the high land price in urban areas, people prefer to live in a suburb where the price is more affordable. One of the suburbs is coastal areas (Damayanti, Hardiana, & Rahayu, 2019)

The development of settlements areas in coastal, topography above 40% that occurred today in North Lombok Regency in inappropriate with the direction of Local Regulation No. 9/2011 obout the Regional Spatial Plan (RTRW) North Lombok Regency where the settlement area is directed at areas with slope 0%-25%, outside wetlands and conservation land. Areas with topography above 40% and coastal areas have the potential as disaster-prone areas so that development in the area should be avoided as the location of settlements areas.

Development of settlements areas in addition to paying attention to the security location of disasters must also pay attention to the carrying capacity and capacity of the area. Optimal development in an area, must pay attention to the capacity and carrying capacity of the environment (Kuswara, 2013). This condition is caused because all activities carried out by humans will directly affect land use in an area. So if the construction of settlements is carried out continuously without regard to carrying capacity and capacity, it will affect the balance of the region (Sadali, 2018).

The carrying capacity is the ability of land in supporting every human activity that is inside to meet the needs of a decent standard of living, while the capacity of the land to accept people living on it (Maria, Sangkertadi, & Supardjo, 2018).

The increasing growth of settlements accompanied by current conditions, there are many settlement areas in disaster-prone areas, so, it is necessary to review the carrying capacity of the land. So the purpose of this research is to review the settlement carrying capacity based on disaster-prone areas in North Lombok Regency.

This research is important to be a direction both for the local government and for developers in ensuring location of settlements development to hold local community settlement area, where the backlog of houses reached 27,161 units in 2019 (BLHKLU, 2019).

RESEARCH METHODS

Research Approach

The research approach used descriptive quantitative research, in which secondary data is obtained from institutions and literature. Data to be analyzed include: spatial data of space, especially data on the

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area of settlements, rice fields, population data, and data on disaster-affected areas (Pridasari & Muta'ali, 2018) (Putri, Sutomo, & Shalihati, 2019).

The data needed in this research can be seen in the following table:

Table 1. *Research Data Needs*

Research objective	Variable	Data
The carrying capacity of sattlements based on disasters prone	1. Demographic carrying capacity	• Population • Area
	2. Settlements carrying capacity of	• Population • Area of potential settlements
	3. Disaster prone areas	• Disaster prone area

Stage of Research

The stages of this research can be seen in the following diagram:

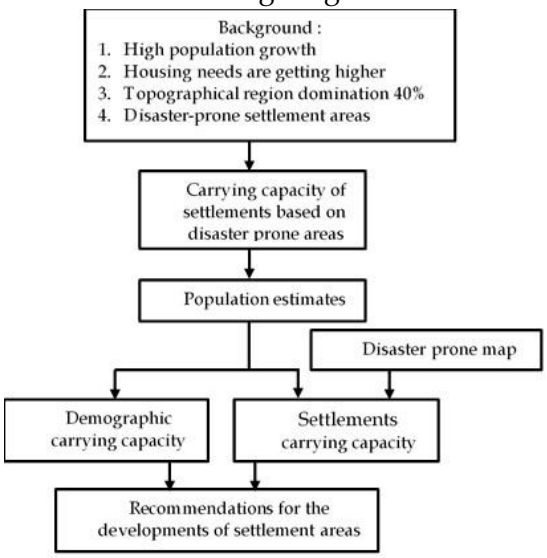

Figure 1. Stage of Research

Analytical techniques

Analysis techniques used in this research are:

a. Demographic Analysis
Demographic analysis is used to calculate the number of population developments over the next 20 years. The formula used using geometric projection method, (Ridha, Vipriyanti, & Wiswasta, 2016):

$$Pn = Po\ (1 + r)^n$$

Where:
Pn : Population in the n-th year
Po : population at the beginning of the observation year
n : difference of years (20 years)
r : percentage (rate) of growth each year

b. Demographic carrying capacity analysis
Demographic capacity is a concept of comparing the area with the number of population compared to normative standards of space needs (Muta'ali, 2012) (KemenLH, 2014).

$$A = \frac{L}{P}$$

Where:
A : land carrying capacity
L : area (ha)
P : population (person)
Reguired land according to the number of settlement, are:
- Total population 10.000 people, so A = 0,1000 ha/person
- Total population 25.000 people, so A = 0,091 ha/person
- Total population 50.000 people, so A = 0,086 ha/person
- Total population 100.000 people, so A = 0,076 ha/person

c. Settlements carrying capacity analysis
The carrying capacity of settlements is the suitability of land in an area as land for settlements. Suitability of land for settlements pays attention to soil texture, soil drainage, surface slopes, erosion and erodibility of soil (Suharto, Rahadi, & Sofiansyah, 2016), but in the analysis of the carrying capacity of settlements in North Lombok Regency focuses on aspects of disaster-prone areas because

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in general the condition of the land has a high topography.

Formula used to calculate the carrying capacity of settlements is (Muta'ali, 2012) (KemenLH, 2014):

$$DPPm = \frac{(LPm/JP)}{\propto}$$

Where:

DPPm : carrying capacity of settlements

JP : population (person)

α : coefficient of space needs / capita (m2 capita) according to SNI 03-1733-2004 of 26 m2, while according to the National Regulation No. 11/Permen/ M / 2008, the value varies by region. So α used in this research is 26 m2 according to SNI 03-1733-2004.

LPm : land area that is feasible for settlements (m2), can use the guidelines: Areas that are feasible for settlement land are outside conservation areas and disaster-prone areas (floods and landslides), where:

LP = LW-(LKL+LKRB)

Dimana:

LW : area

KLK : pconservation area

LKRB : disaster prone area

If the value of DDP > 1, it means that it is able to accommodate residents to settle

If the value of DDP = 1, it means that there is a balance between the residents who live (build houses) and the area of the existing area

If the value of DDP < 1, it means that it is unable to accommodate residents to live (housing) in the area

d. Disaster Prone Areas

Disaster prone areas used in this research are the results of studies that have been conducted by the Local Regulaion SK Bupati No. 420/71/BPBD/2018 about the Post-Earthquake Rehabilitation and Reconstruction Action Plan Document in North Lombok Regency year 2018 - 2019.

RESULTS DAN DISCUSSION

Conditions of Disaster-Prone Settlements Area

The development of settlements in North Regency based on the survey results can be grouped into 3 (three) typologies of settlement areas, namely: new settlements, fishing settlements and highland settlements and traditional settlements. Based on the typology, all settlements areas have the potential for disasters.

a. New Settlement

The settlement development due to the narrow urban land, so that people are finding alternatives to support the development of settlements. These settlements are usually planned by the government or developers of settlements. The new settlement development area in North Lombok Regency is located in Sokong Village, and Sigar Penjalin Village and part of Tanjung city. New settlements construction by developer include BTN Sigar Penjalin Residence, Tanjung Regency Residence, Tanjung Green Land Residence, BTN Jambianom Harmoni, Tanjung Asri Residence located in Tanjung District, and Gangga Asri Residence in Gangga District.

The potential for disaster in this settlements area is due to the passing of a large river. There are 28 rivers in North Lombok Regency, the distribution in the following table.

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Table 2. *River Distribution in North Lombok Regency*

No.	District	River Name
1	Pemenang	– Karang Motong
		– Menggala
2	Tanjung	– Segara
		– Sokong
		– Cupek
3	Gangga	– Jugil
		– Penggolong
		– Luk
4	Kayangan	– Mumbul
		– Padek
		– Tampos
		– Aik Beri
		– Lebah Pebali
		– Beraringin
		– Sidutan
5	Bayan	– Bintang
		– Nawan
		– Gereneng
		– Segoar
		– Reak
		– Bat
		– Koangan
		– Kandang
		– Persani
		– Embar-embar
		– Menangen
		– Lebak
		– Mumbul

Source: BPS, 2019

Figure 2. Disaster Prone Urban Settlements

b. Fishing Settlements

Fishing settlements develop in coastal areas where people are active as fishermen. North Lombok Regency has a coastal area that is used by the community for activities. Location of settlements near the coast because the fishing community is closer to the location of their work as well as to maintain their fishing equipment.

Fishing settlements have the potential for flooding rob. Flood disasters have occurred in fishing settlements, namely: Pemenang Barat, Genggelang, Gondang, Salut, Selengen, Akar- Akar, dan Sukadana.

Table 3. *Distribution of fishing settlements*

No.	Fishing settlements	District
1	Karang Pendagi, Gondang	Gangga
2	Karang Kerakas, Ganggelang	Gangga
3	Lekok, Gangga	Gondang
4	Teluk Kombal, Pemenang Barat	Pemenang
5	Telok Kodek, Pemenang Barat	Pemenang
6	Telok Nare	Pemenang
7	Tanah Song, Tanjung	Tanjung
8	Sorong Jukung	Tanjung
9	Jambianom, Medana	Tanjung
10	Lokok Rangan	Kayangan
11	Air Bari	Kayangan
12	Akar-akar	Bayan
13	Sukadana	Bayan
14	Anyar	Bayan

Source: Survey, 2019

Figure 3. Disaster Prone Fishing Settlements

c. Highland Settlements and Traditional Settlements

Traditional settlements located in North Lombok Regency are usually located above the hills / highlands. People live on hills because their families have lived in the highlands for generations, the land they own is only in the highlands and people have a perception

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that it is safer to live on a hill to avoid the dangers of seawater.

Factors that influence the choice of locations settled in landslide-prone highlands are caused: long distances from noise, at least pollution that affects health and close to work sites (Widayanti, Yuniarman, & Susanti, 2018).

The result of the research is the same as the reason for choosing the location of the highlands in North Lombok Regency, one of which is because their families have lived there for a long time so that their work is around the location.

The type of settlements built in the highlands is not only traditional settlements, but many modern settlements.

Highland settlements have a high level of risk of landslides. Distribution of highland settlements in the following table.

Table 4. *Distribution of Traditional Settlements*

District	Village
Bayan	Sambik Elen, Loloan, Bayan, Senaru, Karang Bajo, Anyar, Akar-akar, Sukadana
Kayangan	Selengan, Salut Kendal, Salut, Salut Barat, Gumanar, Sesait, Santong
Gangga	Bentek, Rempek
Tanjung	Sokong, Tanjung, Jenggala
Pemenang	Pemenang Timur

Source: Alliance of Indigenous Peoples of the Archipelago, 2019

Figure 4. Disaster-Prone Highland Settlements

Potential Disaster of North Lombok Regency

Potential disasters based on Local Regulation SK Bupati No. 420/71/BPBD/2018 about Post-Earthquake Rehabilitation and Reconstruction Action Plan Document in North Lombok Regency 2018-2019, are: floods, flash floods, extreme weather, volcanic eruptions, earthquakes, forest fires and land fires, droughts, landslides, and tsunamis. All disasters in North Lombok Regency affect the safety of the community in choosing a place to live so that in making disaster risk maps all disaster-affected locations are analyzed and overlayed except the earthquake, extreme weather and drought risk maps because all three disasters are affected in all regions.

a. Flash Flood

Flash Floods has a high potential in North Lombok Regency. The cause is the discharge of large rivers when there is rain, while the width of the river ranges from 2-15 meters. Distribution of settlements areas that have the potential to be affected by flash floods in the following table.

Table 5. *Distribution of Areas Affected by Flash Floods*

District	Village
Bayan	Akar- Akar, Sukadana, Karang Bajo, and Sambik Elen
Kayangan	Santong, Pendua, Kayangan, Salut, Selengen
Gangga	Bentek, Genggelang, Gondang
Tanjung	Jenggala
Pemenang	Pemenang Barat

Source: SK Bupati No. 420/71/BPBD/2018

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Figure 5. Risk Map of Flash Floods Disaster in North Lombok Regency

b. Flood

North Lombok Regency is dominated by highlands with slopes above 40%. Flat areas are dominant in the Northern and Western regions.

The highest floods were in Tanjung, Gondang, Jenggala, and Sukadana Villages. This potential threat is due to the topography of the sloping area, as well as fluid circulation on the surface that is not flowed properly given the poor drainage in the area.

Meanwhile, according to the risks that can be caused by flooding, areas that include high risk of flood disaster are: Pemenang Barat, Pemenang Timur, Tanjung, Jenggala, and Gondang Village. Some of these areas are the highest population density settlements, located in lowlands and potentially flooded.

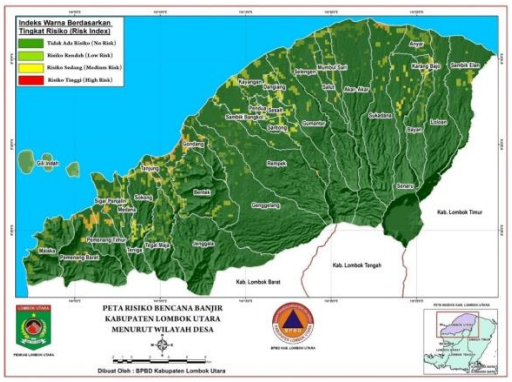

Figure 6. Flood Risk Map of North Lombok Regency

c. Volcanic Eruption

The source of volcanic eruption in North Lombok Regency is Mount Rinjani / Mount Barujari. The types of hazards that arise are: volcanic dust, hot clouds, toxic gases, volcanic earthquakes, flash floods and incandescent lava.

Flash floods are expected to flow towards Santong, Bayan, Karang Bajo, Anyar, and Sambik Bangkol Villages. While incandescent lava will flow in Segara Anak Lake (crater of Mount Rinjani) and flow through the flow of Lokoq Puteq which precedes in Segara Anak Lake and flows along the border with East Lombok Regency. The impact of this disaster reached outside the north Lombok regency.

Figure 7. Volcano Eruption Risk Map of North Lombok

d. Forest Fires and Land Fires

Distribution of forest areas and dry land in North Lombok Regency, mostly in the Southern and Southeastern parts of the region. Urban areas that have the lowest potential threat.

According to the risks that can arise in the event of forest fires and land fires, areas that will have a high risk of disaster are areas with high threats and high exposure populations. The category of areas with high risk of forest fire disasters is the southern part of North Lombok Regency which is dominated by forest areas and dry land.

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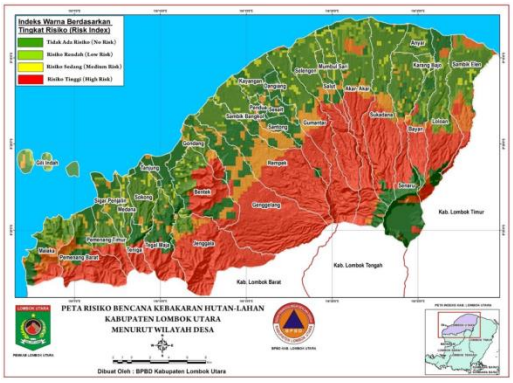

Figure 8. Forest Fore and Land Fire Risk Map of North Lombok Regency

e. Landslides

The area with the highest landslide threat index level is Pemenang District. Gili Indah Village area is relatively safe from landslide even though Gili Trawangan has landslide potential because there are sloping hills on it. Other districts with the threat of high landslides have the potential to occur along large river flows in the form of landslide debris because the river has a large slope of river cliffs.

The risk of landslide impacts is high in Pemenang district. In addition, the risk of landslide disasters is high in community settlement areas with high slope. Higher risk areas (risk index: medium - high) are also present in large river flow that is occupied by community for housing.

Figure 9. Landslide Risk Map of North Lombok Regency

f. Tsunami

Areas with a high tsunami threat are located along the coast of North Lombok Regency, (Klui, Pemenang District - Lokoq Puteq, Bayan District). The lower and closer a place from the coastline, the higher the threat of the area.

The area with the highest threat is the Tiga Gili Islands, where the tsunami occurred with a height of 12 meters. The safe location of the tsunami in The Tiga Gili Islands is Gili Trawangan Hill. Other islands in the archipelago will sink because the height of the island is not more than 10 meters above sea level.

The highest risk of tsunami disaster is Tanjung District (especially Tanjung Village) and Pemenang District (the capital area of the sub-district) because the area has a flat topography. The average risk index in Tanjung District is medium - high. Areas with high risk occur in Gili Indah Village, Pemenang District.

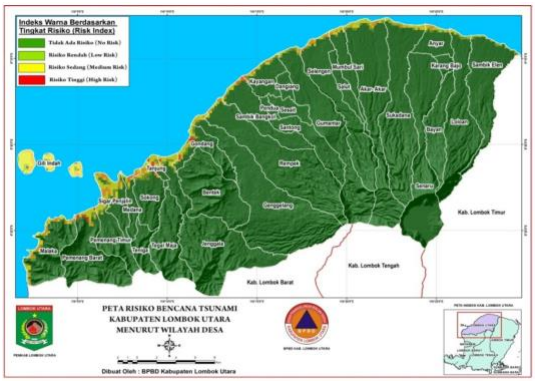

Figure 10. Tsunami Risk Map of North Lombok Regency

Demographic Analysis

The number of people in North Lombok Regency from year to year is increasing. The average population growth rate in North Lombok Regency is 1.4%/year. The population in 2019 reached 220,412 people this condition increased from the previous year. Population development

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from 2015 – 2019 can be seen in the following chart.

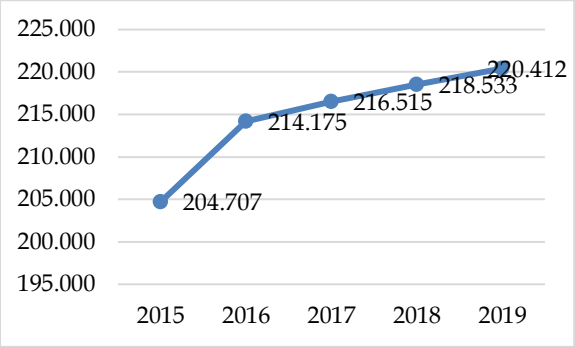

Figure 11. Population Growth 2015 – 2019

Based on the data and the results of the analysis using geometric projection formula, the results of the development of the population for the next 20 years until 2038, can be seen in the following table.

Table 6. *Projected Population of North Lombok Regency 2020-2038*

Year	Population (people)
2020	224,695
2021	227,840
2022	231,030
2023	234,265
2024	237,544
2025	240,870
2026	244,242
2027	247,662
2028	251,129
2029	254,645
2030	258,210
2031	261,825
2032	265,490
2033	269,207
2034	272,976
2035	276,798
2036	280,673
2037	284,602
2038	288,587

Source: Research Results, 2019

Demographic Carrying Capacity Analysis

The value of demographic carrying capacity in North Lombok Regency is calculated by the data of population and area. The population of North Lombok Regency for the next 20 years is projected to reach 288,587 people. The total area of North Lombok Regency is 806.76 km2 with Bayan District having the largest area compared to other districts of 291.33 km2.

The location of settlements in North Lombok Regency is dominant in the highlands because the topography of the dominant area is above 40%. Based on data from the Central Statistics Agency of North Lombok Regency, 2% of areas in North Lombok Regency have topography of 0-2%, 13% of regions have topography of 2-15%, 15% of regions have topography of 15-40% and the remaining 60% of regions have topography above 40%.

For analysis of demographic carrying capacity in each district using the formulations described in the methodology chapter can be seen in the following table.

Table 7. *Analysis of The Carrying Capacity of Demographics of North Lombok Regency*

District	Area (ha)	Area with Topography < 40%	Population Projections for 2038	Land Capacity (A)
Pemenang	12.954	5.182	42.308	0,122
Tanjung	11.564	4.626	80.747	0,057
Gangga	15.735	6.294	51.987	0,121
Bayan	29.133	11.653	48.236	0,244
Kayangan	11.290	4.516	65.309	0,070
Total	80.290	32.271	288.587	0,112

Source: Research Results, 2019

Based on carrying capacity of demographic standards, districts that have low capacity values are Tanjung and Kayangan districts because they have limits values below the average limits of North Lombok Regency, so the growth of settlement areas in those districts must be restricted.

Settlement Carrying Capacity Analysis

In analyzing the carrying capacity of settlements areas in North Lombok Regency, it must be analyzed areas that are prohibited to be built, areas that can be developed as limited settlements areas and areas that are not allowed for settlements areas. The criteria considered in determining areas that should not be built include: disaster prone

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areas, high topography of areas, high rainfall, types of land containing sand and the land use as conservation areas.

By considering the typology of settlements areas, the carrying capacity of land to be developed as a settlement area and disaster-prone maps, the results of the analysis obtained a map of potential and non-potential land (disaster prone) to be developed as a settlements area in North Lombok Regency in the following figure.

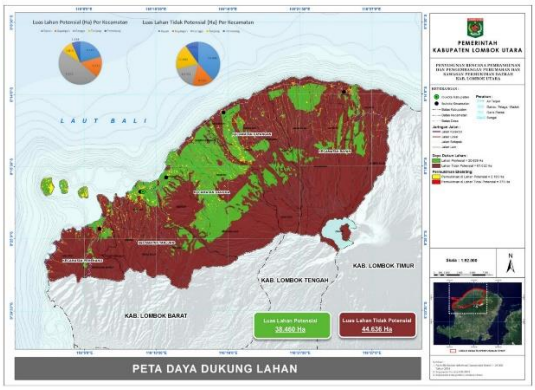

Figure 11. Map of Potential Settlements Developments Areas

Table 8. *Potential and Non Potential Areas (disaster prone) in North Lombok Regency (ha)*

District	Potential Land Area For Settlements Area	Potential Areas (disaster prone)	Settlement Area in disaster prone	Settlements Areas in potentiao l Land
Pemenang	4.117	23.224	31,81	402,19
Tanjung	3.186	9.487	120,37	383,63
Gangga	9.682	10.271	50,93	465,07
Kayangan	1.799	11.604	105,33	320,67
Bayan	1.328	5.977	64,32	269,68
Total	20.112	60.563	372,76	1.841,24

Source: ArcGis Analysis Results, 2019

Based on the results of the carrying capacity analysis, the potential land carrying capacity as a settlement area in North Lombok Regency is 20,112 ha, and non-potential areas as a settlement area of 60,563 ha. The area of settlements located in the area is not potential of 372.76 ha and the settlement area on a potential land area of 1,841.24 ha. The area of land that can be developed into resettlement land, facilities and utilities in North Lombok Regency.

Table 9. *Potential Land in North Lombok Regency (ha)*

District	Potential Land Area of Settlements	Land Area of the House	Land Area for Facilities and Utilities
Pemenang	4.117	2.882	1.235
Tanjung	3.186	2.230	956
Gangga	9.682	6.777	2.905
Kayangan	1.799	1.259	540
Bayan	1.328	929	398
Total	20.112	14.079	6.034

Source: Research Results, 2019

Based on the results of the analysis, the area of land that can be developed for settlements areas is 14,079 ha and the land area for facilities and utilities is 6,034 ha. While the carrying capacity of settlements with the results of analysis of potential areas that can be developed into settlement areas by using a formula on the methodology of the results as follows.

Table 10. *Settlement Carrying Capacity Analysis in North Lombok Regency (ha)*

District	Suitable Land Area for Settlement (ha)	Population Projection 2038	Settlement Support Capacity (DPP)
Pemenang	4.117	42.308	37,427
Tanjung	3.186	80.747	15,176
Gangga	9.682	51.987	71,630
Bayan	1.328	48.236	10,589
Kayangan	1.799	65.309	10,595
Total	20.112	288.587	26,804

Source: Research Results, 2019

Value for the carrying capacity of settlements above 1 so that all districts can still be developed as settlement areas. Areas that need to be limited to the development of settleements areas are Bayan and Kayangan districts. While the development of settlements areas can be more directed to Gangga District.

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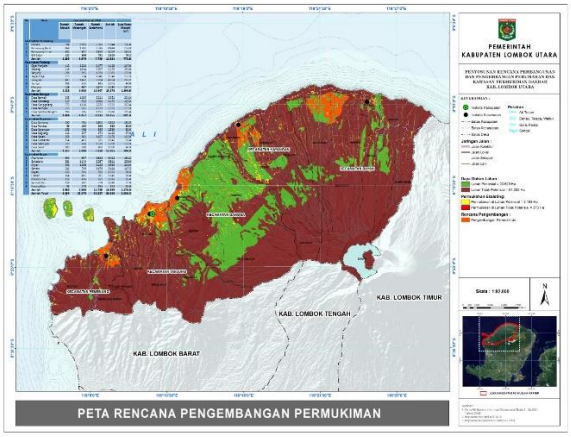

Figure 12. Settlement Development Map

The direction of housing development and settlements areas in North Lombok Regency, are:

1. Housing development and settlements areas are directed according to the direction of the urban system and settlement center in North Lombok Regency
2. Housing development and settlements areas are directed to areas that are in accordance with the carrying capacity and capacity of the region with a slope of 0% - 25%, not on wetlands and conservation areas, have good accessibility and adequate clean water and are not disaster prone areas except earthquake disasters
3. Housing development and new settlements areas will be prioritized for housing of lower middle income communities
4. Housing and settlements areas that have been built in disaster-prone areas, protected areas should be restricted and prohibited from new development. In addition, housing relocation in areas with high levels of insecurity.
5. Improving the quality of settlements buildings and the environment through improvement of public infrastructure services to prevent the decline of the quality of settlements environment
6. Maintaining and reconstructing traditional houses that have cultural value and the peculiarities of local wisdom
7. Handling slums and prevention of slums with a comprehensive institutional system

The Direction of New Settlements Developments

The direction of new settlements are allocated for self-help housing developments built by the community as well as by developers. The directives in the development of new settlements, are:

1. Housing development and new settlements areas are directed to areas that have good environmental carrying capacity and are not disaster-prone areas or protected areas
2. The proportion used is 1 : 3 : 6 with a plot area of 600 m2, 400 m2 and 200 m2
   - Proportion of 1 luxury home directed at hinterland/suburban urban areas
   - The proportion of 3 medium-sized houses is directed at urban support areas
   - Proportion of 6 simple houses directed to urban central areas
3. Provision of public facilities and infrastructure system independently or provided by the government that is individual or communal

The Direction of Fishing Settlements Developments

Fishing settlements in North Lombok Regency are located along the coast of North Lombok. The condition of the fishing settlements is located on the border of the beach with slums condition. For the development of the arrangement of fishing settlement areas need to be done in the future.

Handling slums of fishermen can be done with several models, are:

1. Preservation and restoration model of environmentally degraded fishing settlements. The concept of settlement development with preservation and restoration to change the image of settlements areas with the improvement of good infrastructure, making settlements comfortable and safe to live

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in. Fishing settlements developed with the concept of preservation are: Karang Gondang, Ganggelang, Pemenang Barat, Telok Nare, Sorong Jukung, Lokok Rangan, Air Bari, Akar-akar, Sukadana, and Anyar village.
2. Renewall model. Slums on the shoreline border can be done by renewall or relocation of resettlement areas to a safe and convenient location. The location of fishing settlements directed by the renewal model, are: Gangga, Teluk Kombal Pemenang Barat, Tanah Song Tanjung, and Jambianom Medana.

The Direction of Highland and Traditional Settlement Development

Highland settlements in North Lombok Regency are scattered throughout the district in North Lombok Regency. For its development should be limited because the topography of the region is above 15%. Handling settlements in the highlands can be done in 2 ways, technically and non-technically. Technical handling are:

1. The height of the building 1 floor with the basic coefficient of the building (KDB) a maximum of 20% using a prositas / permeating ground cover water is not allowed to make infiltration wells and retention ponds
2. Road construction should not cut contour lines, drainage should not use concrete pavement so as not to interfere with slope stability
3. Reconstruction of buildings using earthquake resistant building technology and technology that can reduce landslide resistance, making cliff retaining embankments
4. Implementing landslide early warning technology and disaster evacuation routes
5. Relocation for disaster-prone settlement areas

Non-technical handling, are:

1. Repair/ renovation with special permission and strict requirements
2. It is forbidden to build and develop new housing

Traditional settlements in North Lombok Regency are spread almost throughout the district. Traditional settlements in Gangga district are in Bentek and Rempek Village, while traditional settlements in Kayangan District are in Salut, Gumantar, Sesait, Santong Village. Traditional settlements that still have a local culture are located in Senaru, Bayan Village. The direction of the development of traditional settlements is to maintain the local form of wisdom of traditional houses because the buildings is resistant to earthquakes.

Physical preservation directives use the following measures:

1. Preservation, maintenance periodically, replacing building materials that have been damaged / weathered, maintaining the direction of buildings, materials and building construction as well as the rules of house building culture. Keeping traditional settlement elements from damage such as panteq elements, local roads of customary settlements, fences and bongs as well as regular maintenance of ancestral graves;
2. Conservation (rehabilitation) of the return of damaged or decreased building conditions such as roofs, floors, walls, so that it can function again as usual; and
3. Conservation (reconstruction) efforts to restore conditions and rebuild buildings and panteq elements that have been lost as closely as possible to the appearance of the original.

Non-physical preservation directives for traditional settlement areas, are

1. Preservation of economic aspects such as: tax incentives and subsidies;
2. Social aspects such as: awarding from the government, broad publicity, counseling efforts related to the importance of preserving settlement patterns in north Lombok Regency
3. Legal aspects such as: legal designation (legal protection), zoning

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(determination of territory), ownership (ownership).

CONCLUSION

The conclusions of this research are:

1. The carrying capacity of demographics that have a value below the limit value is Tanjung and Bayan District each has a value of 0.057 and 0.07 so there needs to be restrictions on the development of settlements areas in both districts
2. The carrying capacity of settlements areas by analyzing disaster-prone areas, high topography of areas, high rainfall, types of land that protect sand and land use as conservation land is obtained as a potential area of 20,112 ha.
3. The carrying capacity of settlements areas has a value above 1 so that all districts have the possibility to develop settlemetns areas. However, there needs to be restrictions on settlements, especially in Bayan, Kayangan and Tanjung districts. As for the direction of settlement development is more directed to the District Ganges.

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