

Studies of Non-Constructed Land Use Changes into Settlements. Case Study: Ilir Village, Pasar Gunung Sitoli Village, Mudik Village and Saombo Village, Gunung Sitoli City

Hibnul Walid*

Architecture Engineering Department, Faculty of Civil Engineering and Planning, Institute Technology Medan, Indonesia.

ABSTRACT

Population growth and increasingly complex activities in the city resulted in the demand for urban land for a settlement needs. Gunungsitoli is the oldest and the largest city in Nias. Having upgraded from the District into the Autonomous City, the city formed by Law No. 47 of 2008 is increasingly experiencing increasing growth physically. The purpose of this study was to analyze the factors that influence changes in land use non awakened into settlements in Gunungsitoli. The results also showed that factors - factors that affect the population in making changes in land use non awakened (vegetated) into settlements is the number of households, and income level, long lived, and very influential variable ownership status and relate very strong where R of 0.816. In Fisher's exact test (F test) , jointly variable effects of changes in land use non awakened (vegetated) become significant influence settlements. In a partial test (t test) highly influential variable indicated by a variable number of households and the level of income, while the variable for long settled and ownership status variable is not significant.

Keywords: Land Use, Non-Constructed, Settlements.

INTRODUCTION

Gunungsitoli is the oldest and largest city in the Nias Islands. After being upgraded from sub-district to Autonomous City, this city that was formed based on Undang-Undang No. 47 of 2008 is increasingly experiencing a growth that continues to increase physically. The enactment of Undang-Undang No. 47 of 2008, Gunungsitoli City is an expansion of Nias Regency, consisting of 6 (six) subdistricts. Based on the Provincial Spatial Plan, the City of Gunungsitoli is designated as a Regional Activity Center (PKW). Identified as a service center, processing and transport node serving several districts. Hierarchically there is a National Activity Center (PKN) and below it is a Local Activity Center (PKL).

Based on the description, in the study areas such as Ilir Village, Saombo Village, Mudik Village, and Pasar Gunungsitoli Village, there is a change of land use that is not well planned, causing discomfort for the citizens of the city and the imbalance

between land conditions and the use of need land, no alignment of the use of land, no harmony between nature as a residence, such as non-built land that vegetation changed into a settlement.

Based on population data, population growth from 2005 - 2012 has been increasing, where population in 2005 is 21,771 people which continue to increase in 2012 with 22,816 inhabitants. For more details can be seen in Figure 1 Problems that resulted in decreased attention to non-built land within the city due to the needs of city dwellers who need buildings that increasingly crowded non-built land within the city, non-built land is overgrown with plants, often not realized by the city community will its role in harmonizing the pattern of healthy city life.

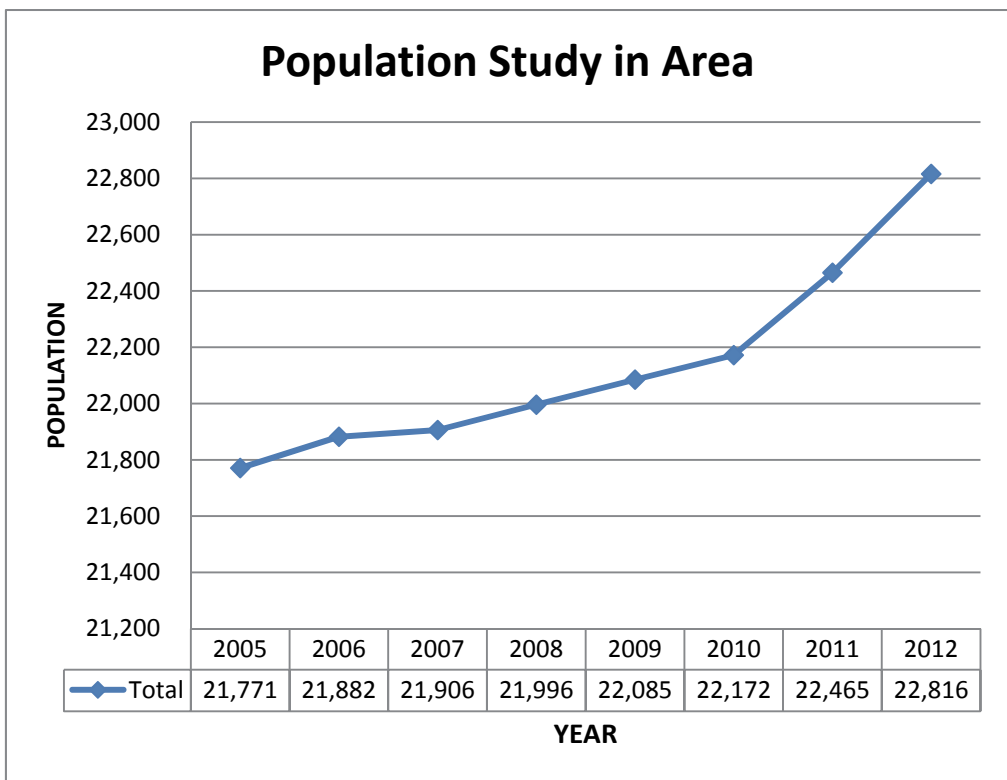


Figure 1: Development of Population in Study Area (Iilir Village, Mudik Village, Pasar Gunungsitoli Village, Saombo Village) 2005 -2012^[6]

LITERATURE REVIEW

The purpose of this study is to analyze the factors that affect the change of non-built land use into settlements in the city of Gunungsitoli.

Overview of Study Areas

The scope of the area being the case study in this study is. Village Iir, Village Market Gunungsitoli, Village Saombo, and Village Mudik. This research area has an important activity in the development of the surrounding area and its existence is very strategic located in the suburbs, apart from the city government center there is also as a center of trade and services supported by the service of land and sea transportation that support the economic growth with marked the density of the building and the population is very high. The administrative boundaries of the study areas are:

- North : Ombolata Ulu Village
- East : Ocean of Indonesia
- South : Sifalaete Village
- West : Boyo Village

By doing research on the area of this study, then the influence gained will be better for the quality and quantity of data needed, especially for primary data. Another reason is that the study area is located in the center of the city that provides all the accessibility for the people so that this can encourage the physical construction especially settlements, so that slowly removes the existence of land non-built (vegetated) land. For more details, see Figure 2.

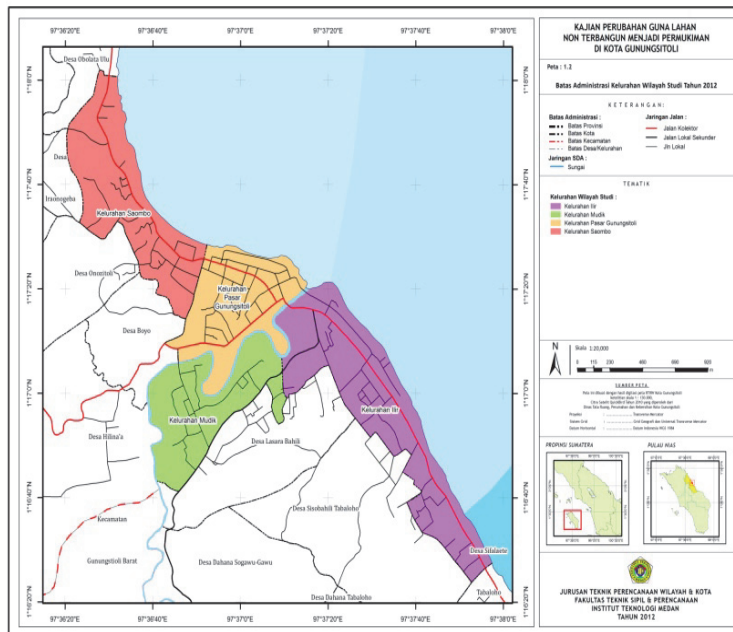


Figure 2: Administrative scope of study area

Population Density

Comparison of the area with the population, the average population density in the research area is 114 people / ha, the highest population density is in the Ilir Village with a population of 10 658 people and the density of 244 people per hectare and followed by Pasar Gunungsitoli Village with a population density of 78 people / ha with a population of 5,589 people. For more details can be seen Table 1 and Figure 3.

Table 1: Population density in study area, 2012 [6]

No	Village Name	Area (Ha)	Population (people)	Population Density (people/Ha)
1	Pasar Gunungsitoli	71,2	5.589	78
2	Saombo	44,6	3.103	70
3	Ilir	43,7	10.658	244
4	Mudik	55,1	3466	63
Total		214	22.816	114

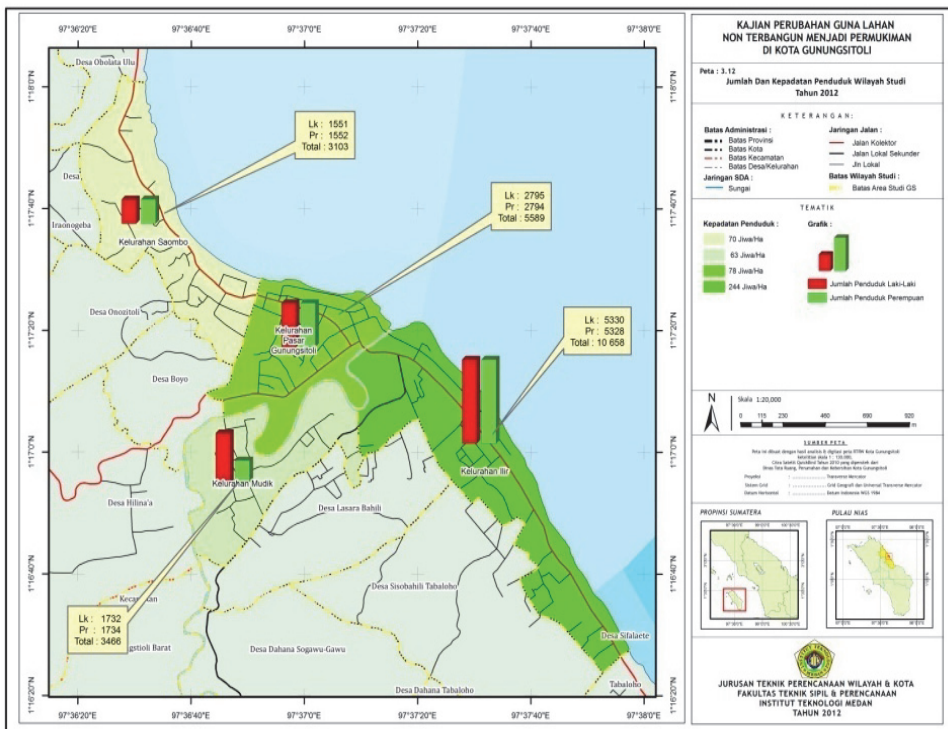


Figure 3: Number and population density in study area [6]

RESEARCH METHODOLOGY

Data Collection Method

The type and source of data needed to obtain the study factors for vegetated land into settlement, required data - data required is primary data and secondary data. Primary data obtained from the field by observation. Observation is a method used to observe directly on the fact of field conditions. Observations made by looking directly at the changing conditions for vegetated land became settlements. Stages performed to obtain primary data is data obtained from the field, in the form of these conditions as well as various opinions of society on social, cultural, and economic conditions. While the distribution of questionnaires is a way or tool in obtaining the data prepared accordingly.

Sampling Technique

Number of Samples

This study uses sampling techniques for study materials on the grounds that researchers are unlikely to observe all members of the population, and also the sample of this use is very useful to save time, cost, and energy. Prior to sampling, of course the number of populations has been calculated first. A sample is part of the population, a sample survey is a procedure in which only a portion of the population is taken and used to determine the nature and desirable characteristics of the population (Nazir 2009: 271). Based on the considerations that have been described above previously, then this research uses the limit of accuracy of 10%. To determine the number of sample sizes then used the opinion of Slovin (Umar, 2011: 78), namely:

$$n = \frac{N}{1 + Ne^2}$$

Where in :

- n = Sample size
- N = Population size
- e = Precision set 10% with 90% confidence level

Then the number of samples that can be considered to represent the population of this study are as follows:

$$\begin{aligned}
 &= \frac{3332}{1 + 3332 \times 10\%} \\
 &= \frac{3332}{1 + 3332 \times (0,1)} \\
 &= \frac{3332}{1 + 3332 \times (0.01)} \\
 &= \frac{3332}{1 + 33,32} \\
 &= \frac{3332}{34,32}
 \end{aligned}$$

Then = 97,1 – 97 Sample

Then to determine the number of samples at each location of research conducted proportionally Rubbin and Luck, 1987 in Yulianto K. (2010), with the following formula:

$$n_i = \frac{N_i}{N} \times n$$

Where in:

- ni = Number of samples to i
- Ni = number of population to i
- n = Total population
- N = Number of samples

So the number of samples taken in each village can be seen in Table 2.

Table 2: Proportional sampling in study area, 2014

No.	Village Name	Houses (Unit)	Sample
1	Iilir	1.366	40
2	Pasar Gunungsitoli	617	18
3	Saombo	758	22
4	Mudik	591	17
Total		3.332	97

Sampling Selection Technique

The sampling technique used for the selection of respondents representing the entire sample using Random Sampling Simple technique, by drawing. The sweepstakes performed in this sampling by numbering the members of the

population, then randomly selected the number according to the number of samples in each village required. The method of sampling can be described as follows:

- The first phase is done by determining the number of settlements that make changes to non-constructed land use (vegetated) on settlements in the study area. Then give the number - the number on the house building plan from number 1 onwards, this number based on the number of population / house in each village.
- Then the number is written on a small rolled paper based on the number of population / settlements in each village that make a non-constructed (vegetated) land conversion, which is then placed on a box. The next step that needs to be done is the distribution of respondent questionnaires to the residents living in the selected settlements to provide an assessment of land use for settlements that indicate non-constructed land use (vegetated).

Rating Scale

Multiple regression analysis uses the scoring scale, then the measured variable is translated into measurable indicators. Finally, this measurable indicator becomes the starting point for making an instrument in the form of a question or statement that the respondent needs to answer. Simply put, for each indicator is given a number 1 for answers A, 2 for answer B, 3 for answer C, and 4 for answer D. Can be seen in Figure 2. on the scale of assessment related to the study.

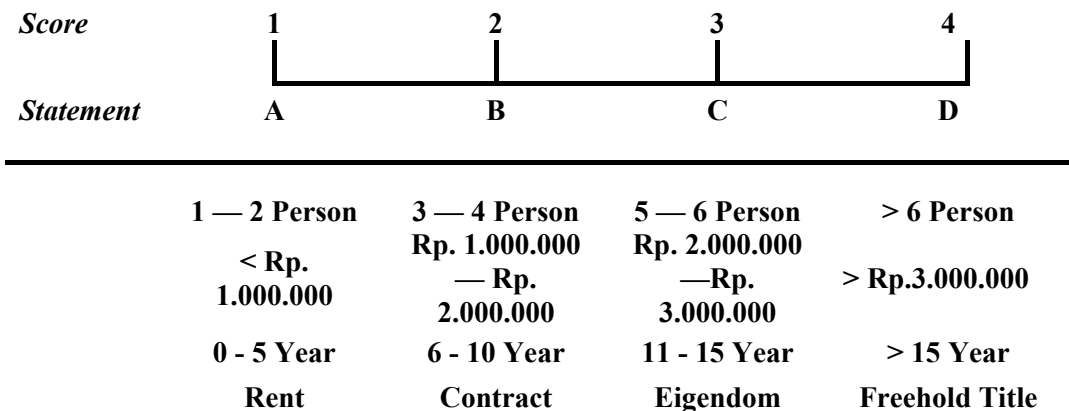


Figure 4: Rating Scale [13]

Rating scale is used to measure public opinion in making changes in non-built land use (vegetation) into settlements.

Data Analysis Method

Methods of data analysis in analyzing the effect of changes in non-built land use (gardens, fields, and shrubs) to settlements, conducted by analyzing the factors of non-constructed land conversion into settlements, namely: Multiple linear regression analysis is a further development of from a simple analysis can interpreted if the parameters of a functional relationship more than one variable want to be estimated. Multiple regression analysis is a tool to obtain a prediction in the past and the future based on the current state.

Prediction in this case is not a sure thing, but close to the truth. This is necessary in viewing the reality that shows several independent variables simultaneously affect the non-free variables. The equation of multiple regression analysis can be seen as follows:

$$Y = a + b_1X_1 + b_2X_2 + \dots + b_nX_n$$

Where in :

Y	=	Variable Tied / Area of Built Land (m ²)
X ₁ X ₂ ... X _n	=	Free Variable (Number of Household Members, Income Level, Length of Stay, Status of Ownership)
A	=	Constant value
b ₁ b ₂ ... b _n	=	Regression coefficient

Then the basic decision-making is:

- a. Determine H₀ and H_a
 H₀ = no linear relationship between independent variables (number of households, income level, length of residence, ownership status) with dependent variable (land area built). H_a = linear relationship between independent variables (number of households, income level, ownership status with dependent variable (land area vegetated).
- b. Determine the level of confidence in this study using 95% or alpha = 5% (0.05). The process of multiple linear regression analysis is done by using SPSS version 19.

ANALYSIS OF THE EFFECTS OF NON-CONSTRUCTED LAND USE CHANGE FACTORS TO BEING SETTLEMENTS

Classic Assumption Test of Regression

The requirement to be able to use multiple linear regression equations is the fulfillment of classical assumptions, can be explained as follows:

Table 3: Multicollinearity calculation result, 2014

Variable	Collinearity Statistics	
	Tolerance	VIF
Number of Households (X1)	0,444	2.253
Income Level (X2)	0,442	2.264
Length of Stay (X3)	0,668	1.497
Ownership Status (X4)	0,486	2.056

Heterocedasticity Test

From the results of heterokedastisitas test can dilhat on SPSS output can be seen based on Spearman's rho test can be seen that between the dependent variable (X1, X2, X3, X4) with Unstandardized Residual yield value of correlation significance greater than 0.05.

Table 4: Heteroscedasticity calculation result, 2014

Variable	Unstandardized Residual
Number of Households (X1)	0,648
Income Level (X2)	0,468
Length of Stay (X3)	0,969
Ownership Status (X4)	0,675

Autocorrelation Test

In the Autocorrelation test is a condition where the correlation between residuals in one observation with other observations on the regression model. Autocorrelation test is used to determine whether or not correlation occurs between residuals in one observation with other observations on the regression model. The prerequisite that must be met is the absence of autocorrelation in the regression model. According to Sutandi in Astuti I. (2011: 30).

Multiple Correlation Analysis (R)

This coefficient shows how big the relationship is between independent variables (X1, X2, X3, X4) and dependent variable (Y). The value ranges from 0 to 1, the value approaches 1 means the relationship is going stronger, otherwise the value is close to 0 then the relationship is going weaker. Guidance to provide interpretation of correlation coefficient as follows:

- 0.00 - 0.199 = Very low
- 0.20 - 0.399 = Low
- 0.40 - 0,599 = Medium
- 0.60 - 0.799 = Strong
- 0.80 - 1,000 = Very Strong

According Sugiyono (2008: 292) the formula of multiple correlation with four independent variables are:

$$R_{y.(1,2,3,4)} = \frac{b_1 \sum X_1 Y + b_2 \sum X_2 Y + b_3 \sum X_3 Y + b_4 \sum X_4 Y}{\sum Y^2}$$

Where in :

- $R_{y.(1,2,3,4)}$ = Correlation of Variable X_1, X_2, X_3 and X_4 together with Y
- $b_1 \sum X_1 Y$ = The Multiple Correlation Coefficient Between X_1 and Y
- $b_2 \sum X_2 Y$ = The Multiple Correlation Coefficient Between X_2 and Y
- $b_3 \sum X_3 Y$ = The Multiple Correlation Coefficient Between X_3 and Y
- $b_{43} \sum X_4 Y$ = The Multiple Correlation Coefficient Between X_4 and Y
- $\sum X_4^2$ = Sum of Squares Regression Dependent Variable (Y)

In accordance with the results of multiple correlation analysis can be seen on the output SPSS in the Model Summary with R number of 0.816. for more details can be seen in Table 5. Because the value of double correlation is between 0,80 - 1,000 it can be concluded that there is a very strong relationship between the variable number of household members, income level, duration and ownership of the land area built.

Table 5: Results of double correlation calculations (r), 2014

Model	Dual Correlation (R)
1	0.816 ^a

Where in :

a = Constant Value

Determination Analysis (R²)

Determination analysis is used to know contribution percentage of independent variable influence (X1, X2, X3, X4) simultaneously to dependent variable (Y). Conversely R² equals 1, then the percentage contribution of the influence given by the dependent variable on the dependent variable is perfect, or the variation of the independent variable used in the model explains 100% variation of the dependent variable. The formula of finding the coefficient of determination with four variables is:

$$R.(1,2,3,4) = \frac{(b_1 \sum X_1 Y + b_2 \sum X_2 Y + b_3 \sum X_3 Y + b_4 \sum X_4 Y)}{\sum Y^2}$$

Where in :

- R² = Coefficient Determination
- $b_1 \sum X_1 Y$ = The Multiple Correlation Coefficient Between X₁ and Y
- $b_2 \sum X_2 Y$ = The Multiple Correlation Coefficient Between X₂ and Y
- $b_3 \sum X_3 Y$ = The Multiple Correlation Coefficient Between X₃ and Y
- $b_4 \sum X_4 Y$ = The Multiple Correlation Coefficient Between X₄ and Y
- $\sum X_4^2$ = Sum of Squares Regression Dependent Variable (Y)

The real level used in this analysis is 5%. The multiple linear regression analysis used is the best analytical model

Table 6: Coefficient of determination (r²), 2014

Model	Adjusted R Square	Std. Error of the Estimate
1	0.652	11.869

Fisher Test (F Test)

Fisher test (F test) is used to determine whether the independent variables (X1, X2, X3, X4) together significantly influence the dependent variable (Y). F arithmetic can be searched with the following formula:

$$F = \frac{R(N - m - 1)}{\frac{m}{(1 - R)}}$$

Where in :

- R = Coefficient of Determination
- N = Amount of data / Case
- M = Number of independent variables

Table 7: Results of regression analysis together (test f), 2014

F	Sig.
45.957	0.000 ^a

Where in :

a = Constant Value

Partial Test (T Test)

This test is used to find out whether in the regression model independent variables (X1, X2, X3, X4), partially significant effect on the dependent variable (Y). T calculation formula on regression analysis. Analysis for the variable of ownership status with the value of t Count (0.811) < t Table (0.95: 92) 1.6619 and Sig (0.419) > (0.05), it can be stated that the old variable settled and the variable of ownership status has no significant effect. For more details can be seen in Table 8.

Table 8: Partial test result (t test), 2014

Variable	t Calculation	Sig.	Description
Numbers of Household (X1)	3.043	0,003	t cal. > t table & Sig < Influenced
Income Level (X2)	5.526	0,000	t cal. > t table & Sig < Influenced
Length of Stay (X3)	1.114	0,268	t cal. < t table & Sig > Not-Influenced
Ownerships Status (X4)	0.811	0,419	t cal. < t table & Sig > Not-Influenced

Regression Equations

From the print out with the SPSS 19 program also obtained the results of multiple linear regression analysis which is a multiple linear regression equation, in looking at the relationship of the two variables, for more details see Table 9 in the table "coefficients", with the equation:

$$Y = 11.060 + 6.753X1 + 10.909X2 + 1.958X3 + 1.685X4$$

Table 9: Result of regression equations calculation, 2014

Variable	Unstandardized Coefficients	
	B	Std. Error
Area of Built Land (Y)	11.060	6.055
Numbers of Household Member (X1)	6.753	2.219
Income Level (X2)	10.909	1.974
Length of Stay (X3)	1.958	1.758
Ownerships Status (X4)	1.685	2.077

DETERMINANTS OF THE EFFECTS OF LAND USE CHANGES INTO SETTLEMENTS

Based on Number of Family Members

Regression results indicate that the price of land has a positive relationship with the value of 6.753 coefficients, that is, if the number of household members increases, it is predicted the average land area converted 6.753 m². Variable number of family member shows Significant 0,003 which means land price give real effect to converted land area with 95% confidence level. The number of household members is one of the factors that determine the decision of the population in the use of vegetated land into settlements. The results of this study are relevant to the results of research Saraswati R. (2002) that the increase of people in a house will require the addition of space.

Based on Income Level

Regression results show that income has a positive relationship with coefficient value 10909. If revenues increase, it is predicted that the average land area converted will increase by 10.9 M². The income variable has a significant effect on the converted land area with 95% confidence level ($= 0.5$). The income level can determine land use change. The results of the study of Yunus E (2010) and Hartini S. (2008) also show that in order to increase the income of the increasing population, they make extensive addition to their homes.

Based on the Length of Stay

The results of this study are relevant to the research Utomo et al. (1992) in Astuti I. (2009), that land conversion in terms of change or adjustment of use is due to factors that largely include the need to meet the increasing population demands and the increased demand for better quality of life.

Based on Ownership Status

Based on land ownership status shown based on result of regression analysis have positive relation with coefficient value 1,685. These results are closely related to Winangun's (2009) study, which explains that utilizing land with privately owned land and leased land is very different. Residents who live in urban areas continue to use land for settlements, considering the area is a very strategic location.

Based on the survey results in the field, then conducted the analysis then obtained the general conclusion that the use of vegetated land changed into settlements. The conclusions in detail can be described as follows:

The use of non-built land (vegetated) has decreased area, which consists of:

- a. The use of 36,34 Ha of garden area decreased by 1.8 Ha
- b. The use of land area of 13.07 Ha decreased the area of 1.3 Ha
- c. The use of bushes of 2.31 Ha has decreased by 0.8 Ha

Decrease in the area of settlements is also due to other land uses, for more details can be seen in Table 10 and Figure 4.

Table 10: Land usage established in 2006 and 2012, identified in 2014

Land Usage	Land Area 2006 (Ha)	Percentage (%)	Land Area 2012 (Ha)	Percentage (%)
Settlement	134,0	62%	170,5	79%
Trade & Services	13,0	0 6%	14,3	14,3 7%
Office area	2,5	2,5 1%	9,8	9,8 5%
Health Facility Area	2,0	2,0 1%	2,2	2,2 1%
Area Public Facilities	5,0	5,0 2%	5,3	5,3 2%
Education Area	3,0	3,0 1%	5,2	5,2 2%
Total	159,5	74%	207,3	97%

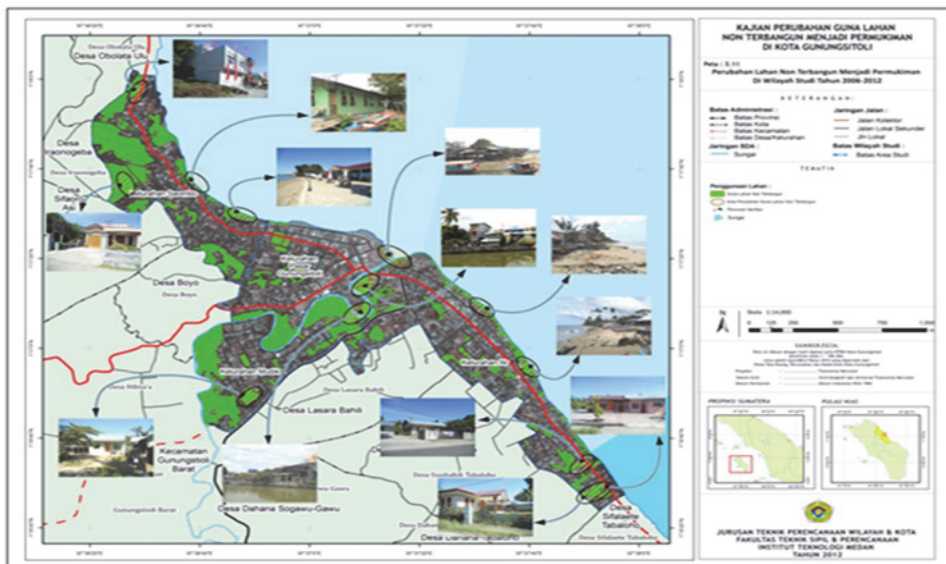


Figure 4: Land changes are built into settlements

CONCLUSIONS

The status of land ownership in the study area is generally land of property rights and has a certificate of property right, so that the land has the potential to manage and utilize the land. Population increase due to urbanization can be seen based on the characteristics of the average respondents came from outside the city of Gunungsitoli compared with the indigenous population, due to the availability of employment in this region. Factors affecting the population in changing land use non-built (settled) into settlements are the number of households, and income level, duration, and ownership status variables are very influential and strongly related where R is 0.816. Fisher test (F test), together variables influence the changes of non-built land use (vegetation) into settlements significantly influence. In the partial test (t test) the highly influential variables are indicated by the variable of the number of households, and the income level, while the variables for the length of stay and the variable of the ownership status do not significantly influence.

RECOMMENDATIONS

Based on the results of research and discussion, it can be suggested:

Gunungsitoli Municipal Government needs to pay attention to the handling of land use issues that can arise in the area of Gunungsitoli City as a new city, due to the development of settlements that continue to grow by enforcing the law and tightening the permit in building. Gunungsitoli Municipal Government cooperates with the community in terms of land use for settlements, either by way of extension to the community about the importance of non-built land (vegetated) because it can disrupt the comfort of the living environment previously known as a beautiful and comfortable environment. And by way of government participate in socialization allotment of land use both about explanation about GSB, GSP, and KDB) to society in doing change of non-constructed land (vegetated) into settlement. The impact of losses due to non-built land conversion (vegetation) in settlement activities requires further research on the mechanisms for the provision of vegetated land. Related to the dominant factors that motivate the community in the change of non-built land use (vegetated) into settlements, the number of household members and income level is very necessary to conduct research on public perception, so that the increasing land conversion can be minimized.

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