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The Model of Land Cover Change into Settlement Area and Tin Mining and its Affecting Factors in Belitung Island, Indonesia

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Abstract
The purpose of this research is to formulate model of land cover change into settlement area and tin mining area and to formulate factors influencing the land cover change in Belitung Island during 1995-2015 period. Formulating model of land cover change into settlement and tin mining area in Belitung Island during 1995-2015 period is done by using the interpretation of Landsat Image 5+TM year 1995 and Landsat Image 7+ETM year 2015 with GIS-ENVI 5.1 and GIS-ERDAS 9.1 using tools analysis supervised classification. The analysis of land cover change (ha) during 1995-2015 period (20 years) is done by using converted GIS-ENVI 5.1 with GIS-ERDAS 9.1 of tools GIS Analysis Matrix. The factors affecting land cover change into settlement and tin mining area in Belitung Island during 1995-2015 period are found out by formulating population social model. The data tabulation of land cover change data analysis (ha) are dependent variables which are then associated with independent variables as the representative of population and social characteristics analyzed with SPSS 15. The method is arranged by using multiple regression analysis technique with forward stepwise regression method. The interpretation results of Landsat Image 5+TM year 1995 and Landsat Image 7+ETM year 2015 show that the change of forest cover into settlement area is 59,840.07 ha, tin mined land/shrubs land into settlement area is 4,511.04 ha, the forest into tin mining area active is 46,122.44 ha, tin mined land/shrubs into active tin mining lands is 352.13 ha, and water/lake former tin mine land into active tin mining lands is 18,417.03 ha. The change of land cover into settlement area in Belitung Island during 1995-2015 period is consistently influenced by the factor of $MINER\_X_5$ positively. On the other hand, change of land cover into tin mining area active is consistently affected by MF_X_2 and $MINER\_X_5$ positively.
Keywords: Land Cover, Settlement Area, Tin Mining

1. Introduction

Land cover change is a major issue in global environmental change (Hermon, 2013 and Hermon, 2014). The analysis of land cover changes using satellite imagery is very effective to use because it is able to provide good information about all land cover changes on earth surface, which is very useful in mapping land cover patterns and changes over time (Sarma *et al.*, 2001 and Hermon, 2015). Land cover change is a phenomenon that is very difficult to overcome quickly and precisely. This is due to the development carried out directly urging the natural lands to change function (Hermon, 2009). As the region develops, greater pressure on lands and areas classified as forests converted into settlement and industrial area also mining activities will result in increased CO_2 percentages in the atmosphere (Hermon, 2010; Hermon, 2014; Hermon, 2015; Hermon, 2016[a]; Hermon, 2016[b]; Hermon, 2017). The increasing percentage of CO_2 in the atmosphere directly affects climate conditions, causing extreme weather symptoms (Hermon, 2012; Hermon, 2013; Hermon, 2014[b]; Hermon, 2016[a]). The occurrence of extreme weather symptoms within a region will trigger land damage and disaster, especially floods, landslides, forest and land fires, land degradation, drought and other hydro meteorological disasters (Hermon, 2016[a]; Hermon, 2016[b]; Hermon, 2016[c]).

Changes in land cover are generally influenced by human factors on the land management (Hermon, 2009). The change of land cover in Belitung Island is very complex, especially the change of land cover into settlement area. In addition, tin mining activities also trigger land cover changes on a wide scale for tin mining. The change of forest land cover into tin mining in Belitung Island is generally done by people who own the lands and work as tin miners in tin companies. This phenomenon has emerged since 1990 when tin companies on the Belitung Island began to reduce the production due to the impact of land and environmental damage that already reached the limit (Hermon, 2016[a]).

Tin is the main source of the community's economy in Belitung Island, which accounts for 33.60% of GDP for the provincial government and it is estimated that more than 70% done by traditional mining system

(Megawandi, 2013). Furthermore, Widyamiko (2012) adds that since 1990, tin mining industry has faced complex problems such as land clearing by traditional miners or better known as UM mines (unconventional mines), underdeveloped downstream, reopening of former mining land into new mining areas managed in traditional manner by society, so that Belitung Island experiencing more severe environmental damage, marked by the emergence of extreme weather symptoms due to very reduced percentage of forest area in Belitung Island, river and coastal pollution by the waste of mining process, sedimentary estuary, loss of mangroves as the balancing of coastal and marine environmental sustainability, flooding, forest and land fires, and tornadoes (Sapanli, 2009; Widyatmiko, 2012; Hermon, 2016[a]). WALHI (2013) also explains about land cover changes into settlement area and tin mining that happen uncontrolled and do not refer to the Spatial Layout Law will cause the utilization of land that is no longer in accordance with its allocation, so that the environmental damage in Belitung Island is getting worse.

The environmental and forest destruction that occurred in Belitung Island was started in 1998, when the community initiated to conduct traditional and illegal mining processes, known as unconventional tin mining (UM). UM is a mining activity that does not pay attention to environmental conservation and violates the law because it generally does not have a mining permit, but provides a substantial income for people who are engaged in illegal mining. (Elfida, 2007; Sapanli, 2009). The occurrence of changes in forest cover into uncontrolled tin mining and settlement area in Belitung Island is the result of the Regional Spatial Layout Law and the Spatial Layout Law of the Island that is not used as the reference for the designation of the area in Belitung Island by the community and local government (Erman, 2007; Resosudarmo and Subiman, 2010; Sidabukke, 2011; Hayati, 2011; Bastida and Paramita, 2013). Hermon (2016[a]) explains that the change of land cover into settlement area in Belitung Island during the period of 1995-2015 is 59,840.07 ha, and forest land into tin mining is 46,122.44 ha. The changes continue to occur constantly due to the increasing number of tin miners as well as the government policies of Belitung Regency and East Belitung Regency also the provincial government of Bangka Belitung Islands that are not responsive to the sustainability of natural resources and environment. Based on this, formulating a model of land cover change into settlement area and tin mining during 1995-2015 period in Belitung Island is needed, so that it can spatially provide information on changing indicators, as well as a reference to formulate factors that affect the land cover change into settlement area and tin mining in Belitung Island during 1995-2015 period.

2. Research Method

2.1. Model of Land Cover Change During 1995-2015 Period in Belitung Island

The spatial model formulation of land cover change into residential and tin mining area in Belitung Island during 1995-2015 period is done by the interpretation of Landsat Image year 1995 and 2015. The interpretation of Landsat Image refers to the image interpretation done by Zain (2002) modified and developed by Hermon (2009); Hermon (2012); Hermon, (2014[a]), Hermon (2015); And Hermon (2016[a]) by interpreting Landsat Image 5+TM year 1995 and Landsat Image 7+ETM year 2015 with GIS-ENVI 5.1 for band change and fusion to be analyzed. The classification of land cover is done by using GIS-ERDAS 9.1 with tools analysis supervised classification for each image, so that six land cover patterns are formulated: (1) forest, (2) settlement, (3) cultivation, (4) tin mining area active, (5) tin mined land/shrubs, and (6) water/lake former tin mine. The analysis of land cover change (ha) during 1995-2015 period (20 years) is done by using converted GIS-ENVI 5.1 with GIS-ERDAS 9.1 of tools GIS Analysis Matrix.

2.2. Factors Affecting Land Cover Change into Settlement and Tin Mining Area Active During 1995-2015 Period in Belitung Island

The factors affecting land cover change into residential and tin mining area in Belitung Island during 1995-2015 period are found out by formulating population social model. The data needed to formulate the population social model refer to Hermon (2009). The data are: (1) HF_Data Total Head of Family_ X1, (2) MF_Percentage of Mining Family_ X2, (3) WORK_Percentage of Land Owner and Miner_ X3, (4) OWNER_Percentage of Land Owner _ X4, (5) MINER_ Percentage of UM Miners_ X5, (6) RENT_Percentage of Land Tenants_ X6, (7) POP_Number of Population_ X7, (8) DENSITY_Population Density_ X8, and (9) PRE_Pre-Prosperous Families_ X9. The analysis of population social model that influences the change of land cover into settlement and tin mining area in Belitung Island is done by: (1) the tabulation of land cover change data analysis (ha) are dependent variable which are then associated with independent variables as the representative of population and social characteristics, namely: (1) HF_Data Total Head of Family, (2) MF_Percentage of Mining Family, (3) WORK_Percentage of Land Owner and Miner, (4) OWNER_Percentage of Land Owner, (5) MINER_Percentage of UM Miners, (6) RENT_Percentage of Land Tenants, (7)) POP_Number of Population, (8) DENSITY_Population Density, and (9) PRE_Pre-Prosperous Families, obtained from the tabular of Belitung Regency and East Belitung Regency Potential of Statistic Center Agency analyzed with SPSS 15, and (2) the method is arranged by using multiple regression analysis technique with forward stepwise regression method

(Ezekiel and Fox, 1959). The resulting model is:

$$y = a_o + a_1x_1 + a_2x_2 + a_3x_3 + \dots\dots\dots + a_nx_n$$

Where:

y : dependent variable (estimated variable);
x : independent variable (estimator variable);
a: regression coefficient

In formulating the equation model above, the independent variables chosen are those that match the characteristics of the study area.

3. Result and Discussion

3.1. Model of Land Cover Change During 1995-2015 Period in Belitung Island

Analysis results of Belitung Island Landsat Image 5+TM year 1995 and Landsat Image 7+ETM year 2015 show that there has been a change in every land cover: forest, cultivation, settlement, tin mining area active, tin mined land/shrubs, and water/lake former tin mine. Spatial model of land cover change during 1995-2015 period in Belitung can be seen in Figure 1.

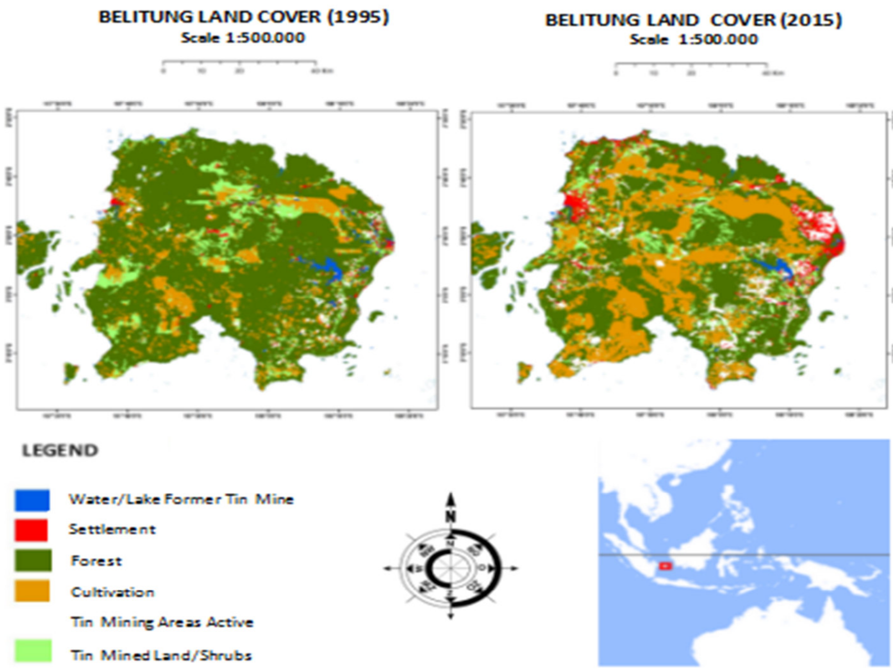

Figure 1. Model of Land Cover Change During 1995-2015 Period In Belitung Island, Indonesia (Hermon, 2016[a])

Hermon (2016a) explains that in 1995, the area of land cover in Belitung Island was 236,114.21 ha of forest, 110,090.02 ha of cultivation, 25,430.11 ha of settlement area, 5,111.24 ha of tin mining area active, 73,844.21 ha of tin mined land/shrubs, and 29,420.24 ha of water/lake former tin mine. In 2015, the area of land cover in Belitung Island was 50.154,67 ha of forest, 190,088.01 ha of cultivation, 89,781.22 ha of settlement area, 70,001,05 ha of tin mining area active, 68,981,05 ha of tin mined land/shrubs, and 11,003.21 ha of water/lake former tin mine (Table 1).

Table 1. Land Cover Change During 1995-2015 Period in Belitung Island, Indonesia

Land Cover	Year 1995 (ha)	Year 2015 (ha)	Change 1995-2015 (ha)
Forest	236.114,21	50.154,67	- 185.959,54
Cultivation	110.090,02	190.088,01	+ 79.994,03
Settlement	25.430,11	89.781,22	+ 64.351,11
Tin Mining Area Active	5.111,24	70.001,05	+ 64.890,60
Tin Mined Land/Shrubs	73.844,21	68.981,05	- 4.863,16
Water/Lake Former Tin Mine	29.420,24	11.003,21	- 18.417,03
Total	**480.010.000**	**480.010.000**	

Source: Hermon (2016[a])

The decreased for the period of 1995-2015 in Belitung Island are 185,959.54 ha of forest, 4.863.16 ha of tin mined land/shrubs, and 18.417.03 ha of lake former tin mining. On contrary, for the increased are 79,994.03 ha of cultivation, 64,351.11 ha of settlement, and 64,890.60 ha of tin mining area active (Hermon, 2016[a]). The extent of land cover change into settlement area and tin mining during 1995-2015 period in Belitung Island can be seen in Figure 2.

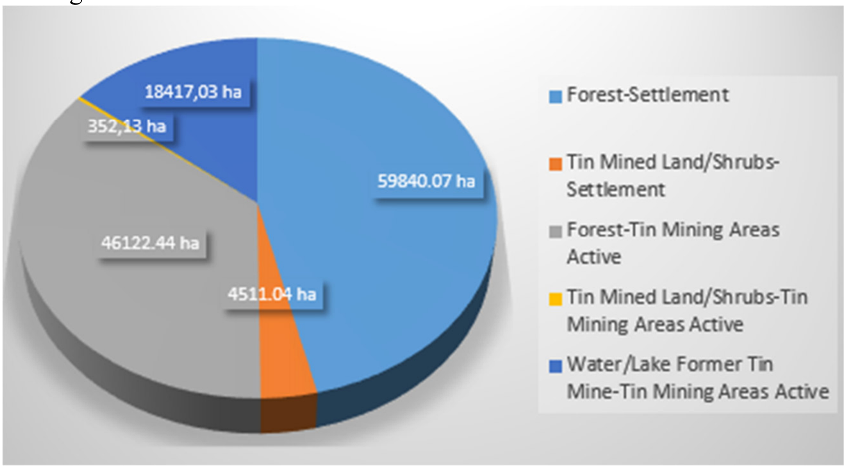

Figure 2. Extent of Land Cover Change into Settlement and Tin Mining Area During 1995-2015 Period in Belitung Island, Indonesia

Source: Analysis Results of Landsat Matrix ETM 7+ Landsat 1995 and 2015 With ERDAS 9.1 (2017)

The land cover changes into settlement and tin mining area active in Belitung Island during 1995-2015 period vary greatly, where the change of forest cover into settlement area is 59,840.07 ha, and tin mined land/shrubs into settlement area is 4,511.04 ha. On contrary, the changes of forest into tin mining area active is 46,122.44 ha, tin mined land/shrubs into tin mining area active is 352.13 ha, and water/lake former tin mine into an active tin mining lands is 18,417.03 ha. Based on the results of image analysis for 2 year dot, it is obtained data of land cover change for 20 years, which is between 1995 until 2015. This data then plotted become dependent variable from equation model which is arranged to find out the factors affecting to land cover change.

3. 2. Factors Affecting Land Cover Change into Settlement and Tin Mining Area During 1995-2015 Period in Belitung Island

a. Factors Affecting Forest Land Cover Change into Settlement and Tin Mining Area Actve During 1995-2015 Period in Belitung Island

The analysis result of forest land cover change into settlement area for the period of 1995-2015 in Belitung Island shows that this model is able to describe the diversity of the dependent variable, where R^2 is 95.3%. The analysis result of partial test on the selected independent variables shows that some significant variables from the largest beta value to the smallest with 95% confidence interval, i.e HF (X_1), MINER (X_5), and WORK (X_3).

Table 2. Analysis Result of Multiple Regressions for Forest Land Changes into Settlement Area in Belitung Island During 1995-2015 Period

Regression Summary for Dependent Variable : FOREST- SETTLEMENT AREA					R^2 = .953
	BETA	**B**	**Std.Error of B**	**t**	**p-level**
Intercpt		-56.467	14.462	-3.904	0.017
X_1	1.012	0.004	0.000	7.582	0.002
X_2	-0.276	-0.098	0.082	-1.191	0.298
X_3	0.435	0.825	0.293	2.819	0.048
X_4	-0.595	-0.701	0.263	-2.661	0.056
X_5	0.903	2.800	0.509	5.498	0.005

Source: Data Analysis Results (2017)

The function of causal relation between forest land changes into settlement area during 1995-2015 period in Belitung Island is as follows:

$$\mathbf{y = -56,467 + 1,012X_1 + 0.435X_3 + 0,903X_5}$$

Where: y = extent of forest land change into settlement area

The HF (X_1) factor has a positive effect on the change of forest land cover into settlement area by 1.012 ($P < 0.05$). This shows that the increase of each unit of the head of family will increase the change of forest land into settlement area by 1,012 times. In addition, the MINER factor (X_5) also positively affects the change of forest land cover into settlement area by 0.903 ($P < 0.05$). The WORK (X_3) factor also positively influences the change of forest land into settlement area in Belitung Island by 0.435 ($P < 0.05$), so that each increase of one percentage unit of land owner and miner will increase the change of forest cover into settlement area in Belitung Island during 1995-2015 period by 0.435 times.

b. Change of Tin Mined Land/Shrubs into Settlement Area During 1995-2015 Period in Belitung Island

The analysis result of tin mined land/shrubs change into settlement area shows that this model is also quite capable of describing the diversity of the dependent variable, where R^2 is 98.7%. The analysis result of partial test on the selected independent variables shows that some significant variables from the largest beta value to the smallest with 95% confidence interval, i.e MINER (X_5), WORK (X_3), RENT (X_6), and POP (X_7).

Table 3. Analysis Result of Multiple Regressions for Land Changes of Tin Mined Land/Shrubs into Settlement Area in Belitung Island During 1995-2015 Period

Regression Summary for Dependent Variable : TIN MINED LAND/SHRUBS-SETTLEMENT AREA R^2 = .987					
	BETA	**B**	**Std.Error of B**	**T**	**p-level**
Intercpt		18.370	5.224	3.516	0.039
X_1	-0.771	-0.081	0.013	-6.234	0.008
X_2	-0.485	-0.001	0.000	-4.666	0.019
X_3	-1.152	-0.079	0.005	-1.447	0.244
X_4	0.480	0.001	0.000	3.488	0.040
X_5	0.831	0.849	0.120	7.073	0.006
X_6	-0.285	-0.000016	0.000	-3.000	0.058

Source: Data Analysis Results (2017)

The function of causal relation between changes of tin mined land/shrubs into settlement area during 1995-2015 period in Belitung Island is as follows:

$$\mathbf{y = 18{,}370 - 0{,}771}\ X_1\ \mathbf{- 0{,}485X_2 + 0.480}\ X_4\ \mathbf{+ 0.831X_5}$$

Where: y = the extent of tin mined land/shrubs change into settlement area

The MINER factor (X_5) has a positive effect on the change of tin mined land/shrubs into settlement area by 0.831 ($P <0.05$), where each increase of one percentage unit of the UM traditional miners will increase the change of tin mined land/shrubs into settlement area in Belitung Island during 1995-2015 period by 0.831 times. The OWNER factor (X_4) also gives a positive effect by 0.480 ($P <0.05$) on the change of the former mining/bush land cover into a settlement area, so that each increase of one percentage of landowners will increase the tin mined land/shrubs into settlement area in Belitung Island during 1995-2015 period by 0.480 times.

c. Change of Forest Land into Tin Mining Area Active During 1995-2015 Period in Belitung Island

The analysis result of forest land cover change into tin mining area active shows that this model is also able to describe the diversity of dependent variables, where R^2 is 96.6%. The analysis result of partial test on the selected independent variables shows that some significant variables from the largest beta value to the smallest with 95% confidence interval, i.e MINER (X_5), HF (X_1), MF (X_2), and POP (X_7).

Table 4. Analysis Result of Multiple Regressions for Forest Land Change into Tin Mining Area Active 1995-2015 Period in Belitung Island

Regression Summary for Dependent Variable : FOREST-ACTIVE TIN MINING R^2 = .966					
	BETA	**B**	**Std.Error of B**	**T**	**p-level**
Intercpt		22.677	5.740	3.951	0.029
X_1	-0.640	-3.457	1.079	-3.202	0.049
X_2	0.077	0.001	0.002	0.391	0.722
X_3	-1.726	-0.219	0.045	-4.913	0.016
X_5	1.678	47.825	10.642	4.494	0.021
X_6	-0.955	-43.131	13.763	-3.134	0.052
X_7	-1.269	-28.467	8.076	-3.525	0.039

Source: Data Analysis Results (2017)

The function of causal relation between forest land change into tin mining area active during 1995-2015 period in Belitung Island is as follows:

$$\mathbf{y = 22{,}677 - 0{,}640X_1 - 1{,}726X_3 - 1{,}269X_7 + 0.077X_2 + 1{,}678X_5}$$

Where: y = extent of forest land change into tin mining Area Active

The MINER factor (X_5) has a positive effect on the change of forest land cover into tin mining area active by 1.678 ($P <0.05$), where each increase of one unit percentage of UM illegal miners will increase the change of forest land into tin mining area active during 1995-2015 period in Belitung Island by 1,678 times. In addition, the MF factor is also a positive influence by 0.007 (P 0.05), meaning that each increase of one percentage unit of the miner's family will increase the change of forest land into active tin mining in Belitung Island during 1995-2015 period 2015 by 0.007 times.

d. Change of Tin Mined Land/Shrubs into Tin Mining Area Active During 1995-2015 Period in Belitung Island

The analysis result of the change of the former tin / bush land cover into the tin mining area active indicates that this model is also able to describe the diversity of the dependent variable, where R^2 is 92.3%. The results of partial test analysis of the selected independent variables can be known some significant variables from the largest beta value to the smallest with 95% confidence interval, namely MINING (X_5), OWNER (X_4), and MF (X_2).

Table 5. Analysis Result of Multiple Regressions for Land Changes of Tin Mined Land/Shrubs into Tin Mining Area Active in Belitung Island During 1995-2015 Period

Regression Summary for Dependent Variable : TIN MINED LAND/SHRUBS-TIN MINING AREA ACTIVE R^2 = .987					
	BETA	**B**	**Std.Error of B**	**t**	**p-level**
Intercpt		11.214	2.732	4.104	0.015
X_1	-0.714	-2.612	0.964	-2.710	0.054
X_2	0.510	7.765	2.729	2.845	0.047
X_4	0.486	14.876	5.703	2.608	0.060
X_5	1.924	25.232	4.050	6.230	0.003
X_9_	-0.832	-1.005	0.000	-3.820	0.019

Source: Data Analysis Results (2017)

The function of causal relation between change of tin mined land/shrubs into tin mining area active during 1995-2015 period in Belitung Island is as follows:

$$\mathbf{y = 11{,}214 + 0{,}510}\ X_4 + \mathbf{1{,}924X_5 - 0{,}832X_9}$$

Where: y = the extent of the tin mined land/shrubs change into tin mining area active

The MINER factor (X_5) has a positive effect by 1,924 (P <0.05) on the change of tin mined land/shrubs into tin mining area active during 1995-2015 period in Belitung Island. This means that each increase of one unit percentage of the number of UM illegal miners will increase the change of tin mined land/shrubs into active tin mining by 1,924 times. The OWNER factor (X_7) also positively influences the change of the tin mined land/shrubs into tin mining area active by 0,510 (P <0.05). While PRE factor (X_9) gives negative effect by 0,832 (P <0,05) to change of tin mined land/shrubs into tin mining area active.

e. Change of Lake Former Tin Mine into Tin Mining Area Active During 1995-2015 Period in Belitung Island

The analysis result of water/lake former tin mine change into tin mining area active for the period of 1995-2015 in Belitung Island shows that this model is able to describe the diversity of the dependent variable, where R^2 is 99.8%. The analysis result of partial test on the selected independent variables shows that some significant variables from the largest beta value to the smallest with 95% confidence interval, i.e MINER (X_5), OWNER (X_4), WORK (X_3), POP (X_7), HF (X_1), and MF (X_2).

Tabel 6. Analysis Result of Multiple Regressions for Land Changes of Water/Lake Former Tin Mine into Tin Mining Area Active During 1995-2015 Period in Belitung Island

Regression Summary for Dependent Variable : WATER/LAKES TIN MINE-TIN MINING AREA ACTIVE R^2 = .998					
	BETA	**B**	**Std.Error of B**	**t**	**p-level**
Intercpt		-17.703	1.350	-1.311	0.001
X_1	-2.306	-4.848	0.375	-12.938	0.001
X_2	1.069	0.045	0.006	7.474	0.005
X_3	0.848	0.006	0.000	16.435	0.000
X_4	0.938	13.117	1.130	11.608	0.001
X_5	1.507	49.882	3.536	14.106	0.001
X_7	0.698	0.0036	0.000	16.428	0.000

Source: Data Analysis Results (2017)

The function of causal relation between water/lake former tin mine change into tin mining area active period 1995-2015 in Belitung Island is as follows:

$$\mathbf{y = -17.703 - 2{,}306X_1 + 0.848X_3 + 1{,}069X_2 + 0{,}938}\ X_4 + \mathbf{1{,}507X_5 + 0{,}698X_7}$$

Where: y = the extent of change of lake former tin mine into tin mining area active

The MINER factor (X_5) has a positive effect on the water/lake former tin mine change into tin mining area active by 1.507 (P <0.05), where each increase of one unit percentage of UM illegal miners will increase the water/lake former tin mine change into tin mining area active by 1,507 times. The MF Factor (X_2) also has a positive effect by 1.069 (P <0.05) on the water/lake former tin mine change into tin mining area active. The OWNER factor (X_4) also positively influences the water/lake former tin mine change into tin mining area active in Belitung Island by 0.938 (P <0.05). The WORK (X_3) factor also has a positive effect by 0.848 (P <0.05) on the water/lake former tin mine change into tin mining area active. The POP factor (X_7) gives a positive effect by 0.698 (P <0.05) to the water/lake former tin mine change into tin mining area active. The KK (X_1) factor had a negative effect on the water/lake former tin mine change into an tin mining area active by 2,306 (P <0,05).

The change of land cover into settlement area in Belitung Island during 1995-2015 period is consistently influenced by the MINER factor X_5 positively, whereby the greater percentage of UM illegal miners will lead to greater land cover changes into settlement area. On the other hand, the change of land cover into tin mining area active in Belitung Island Belitung Island during 1995-2015 period is consistently influenced by MF_X_2 and MINER_X_5 positively, where the greater percentage of miner families and UM illegal miners will cause the change of land cover into tin mining area active is also getting bigger.

Hermon (2009); Ngonyo and Owyer (2017) explain that the change of land cover into settlement area is generally caused by several factors, namely: (1) nature or intrinsic of land resources, in accordance with the principle of supply-demand economy law experiencing the scarcity structure as a result of increasing demand for land for the purpose settlement area that contribute to encouraging the conversion of non-forest land use, and (2) government policies that provide big investment opportunities for industrial and mining sectors, but investment rates in the industrial and mining sectors are still not followed by the rate of legislation stipulation and legislation which can be used as a reference in controlling land cover changes.

4. Conclusion

Changes in forest cover to into residential and tin mining area in Belitung Island in the period 1995-2015 have been very alarming and uncontrolled. Reduction of forest land into settlement area is 59,840.07 ha, while the reduction of forest land due to tin mining area active is 46,122.44 ha. The occurrence of changes in forest cover and other land cover into residential and tin mining area is generally due to the increasing number of traditional UM illegal miners in Belitung Island since 1990. The characteristics of tin mining managed by UM miners are categorized in illegal mining that does not refer to government regulations and the sustainability of natural resources and environment.

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