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LAND CAPABILITY EVALUATION OF FORMER BAUXITE MINING LAND FOR LAND USE PLANNING BY INTEGRATING REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEM IN SANGGAU WEST KALIMANTAN INDONESIA

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Abstract: The bauxite mining activities at Sejotang village, Sanggau district West Kalimantan Province caused siltation of lake, the loss of fish habitat, erosion, forest destruction and the loss of basic livelihoods. This study aimed to determine the class of land capability as well as the land use planning of the former bauxite mining. Methods used namely Landsat 8 satellite image interpretation in 2011-2016, Digital Elevation Model image from DEMNAS Badan Informasi Geospasial (BIG), and ground survey. Data analysis in this study used Geographic Information System (GIS) and Land Capability Land Planning (LCLP) software. The study found that area has III-VI land capability class. Class III land capability has limiting factors of the flood, and gravel. Class IV land capability has limiting factors the landslide, slope, erosion rate, gravel, and drainage. Class V land capability has limiting factors of gravel and permeability. While class VI has soil depth limiting factor. Class III and IV land capability are possible to be used for seasonal crops such as agriculture or plantation, pastures, production forest, protected forests, or wildlife sanctuaries. Meanwhile, Class V and VI cannot be cultivated or processed for agriculture. However, these classes can be utilized as pastures and be shepherding production forests, protected forests, or nature reserves.

Keywords: Land capability, bauxite mining, land use, remote sensing, geographic information system.

Introduction

Mining activities cause adverse impacts on the land. Examples of such mining activities include coal mining, gold, nickel, tin and many more. One of the mining activities is bauxite mining. These impacts could be found in the former bauxite mining land in Sejotang village, Sanggau district West Kalimantan Province. Bauxite mining activities bring about environmental destruction, siltation of the lake, the loss of fish habitat, open soil and thus these things give rise to moisture erosion and surrounding environment (forest) damage as well as the loss of basic livelihood of the surrounding community. The major devastation to the land could degrade the land quality and increase in heavy metal concentrations in the ecosystem (Hashim *et al*., 2018).

Land degradation has many negative effects. The negative effects among others environmental quality degradation and destruction of natural resources (Mamat *et al.,* 2016), reduced land capacity, the loss of ecosystem productivity, shifts in vegetation composition, and the loss of rural livelihoods (D'Odorico & Ravi, 2016), strengthening social and political weaknesses that can also contribute to the threat of illegal migration, transboundary conflicts and the other forms of violence in survival (Barbut & Alexander, 2016) and negatively impact on sustainable development (Barbut & Alexander, 2016; Zambon *et al.,* 2017). Declining land quality is a very serious problem which can decrease the ability or carrying capacity of the land.

Former mine land, which has not been handled well, has the potential to be developed for various uses for instances agriculture, grasslands, and forests depend on the land quality (Skousen & Zipper, 2014; Abdel Rahman, *et* *al*, 2016), biofuel plants, wildlife habitats and building site development (Skousen & Zipper, 2014). Therefore, to develop the land, the land potential and classification of land capacity for proper use or planning should be carried out and identified (Kharche & Gaikawad, 1993; Patel *et al*., 2001) and also evaluation purposely created for land use planning (Armanto *et al,* 2013).

Identification and classification of land capability can be executed using various approaches. Some of them are Remote Sensing and Geographical Information System (GIS) (Widiati *et al*, 2017). Remote Sensing and GIS are very useful and accurate tools for identifying various earth sources, potential, and processing spatial analysis (Razeena Beebi, 2015; Purwanto & Bayuardi, 2016). Through the remote sensing techniques, a variety of resource maps can be created with the help of GIS. This map can then be analysed to obtain composite maps with various information on diverse areas (Abdel Rahman *et al*., 2016). Remote Sensing data can be used for biophysical parameters, plant indices, land use estimates, and land cover at different times. Different time will provide different data information about the characteristics of the object from one year to the next (Panigrahy *et al.*, 2005; Rao *et al.,* 1996; Abdel Rahman *et al*., 2016). GIS can simultaneously transform spatial data as inputs to produce a decision (Kabanda, 2015) which involves an area in support of a particular land use (Qiu *et al*., 2014)

Land use planning for former mining land can be undertaken appropriately through an assessment of its land capability. Land tenure is a very important issue in terms of sustainable land use without permanent damage over long periods of time (FAO, 1983; Atalay, 2016). Land ability means the ability of the soil to support certain types of use without causing permanent destruction (Gad, 2015). Based on its capabilities or limitations, by Soil Conservation Service (1958, 1963) and (Kumar *et al*., 2017), land tenure classes are grouped into eight classes (class I to VIII). From these classes, the first four classes (class I to IV) of land can be used for agriculture or cultivation of crops. These four classes (class I to IV) are distinguished by soil slope, erosion, depth, structure, soil reaction, and drainage. While class V to VIII cannot support the cultivation of plants, but just for growing grass and forestry. The last four classes (class V to VIII) are described based on problems such as river flow, flood, inundation, bedrock and planting season (Abdel Rahman *et al*., 2016).

The classification of land capability provides a guidance for assessment of land constraints and land management, recommendations for multiple scales-use including country, catchment area, and for use planning (Murphy *et al*., 2004; Gad, 2015). Land use planning can be in the form of use for settlements, industry, tourism, parks and for reforestation and others.

The first classification of land capability was developed by Natural Resource Conservation Service in the late 1930s and early 1940s (Helms, 1997; Osman, 2014; Sinclair & Dobos, 2006). There are three classifications of land capability namely: class capability, subclass capability, and unit capability. Land classes are grouped by landscape, slope, depth of soil, texture, and acidity. Subclasses have some limitations such as erosion, wet excess, root zone problems, and climate limitation. The land capability unit is identified as a grouping of land with the same level of results and general requirements for land management (Gad, 2015).

This research aimed to define the class, subclass of the land capability of the former bauxite mining land and provide land use planning for the former bauxite mining land.

Materials and Methods

Study Area

This research was conducted at the site of the former bauxite mining, located in Sejotang Village, Sanggau district, West Kalimantan Province, Indonesia. The area of study site is 93,628.7 Ha. Geographical this area is located between Longitude from 110°4’0” E to 110°5’0” E and Latitude 0°1’30” S to 0°20’30” S. For more details, the bauxite mining location can be seen in Figure 1.

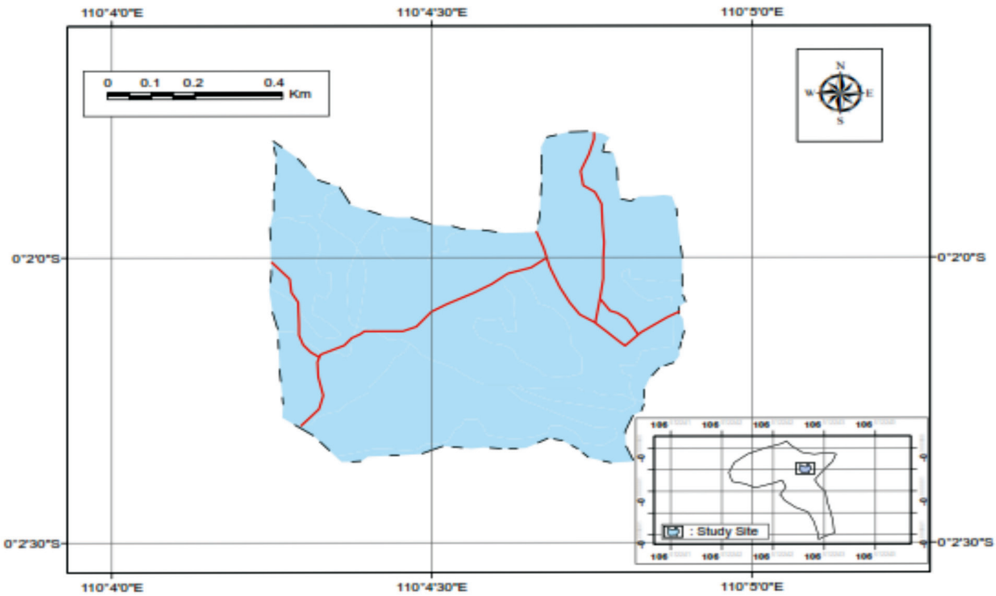


Figure 1: Study area

Research Method

The data that were used in the Soil Survey Staff (1959) classification wich consist of surface slopes, gravel/rock, top layer texture, permeability, bottom layer texture, soil depth, soil drainage, the dangers of erosion, erosion sensitivity, landslide, and flood threats. There is a parameter modification to assess the land capability class carried out on former mining land. The modification is the addition of one parameter of land capability, namely water availability capacity.

In addition to another data of land, there are two data required, namely Digital Elevation Model (DEM) whos taken from DEMNAS Badan Informasi Geospasial (BIG), for slope analysis and Landsat 8 to determine land use change and land damage. The variable of water availability capacity data should be added as it greatly influences soil density, soil strength, and rooting of plants before and after mining (USDA, 1983; Sinclair & Dobos, 2006).

This work employed some methods namely Landsat image interpretation, DEM analysis, and soil surveys for sampling to be analyzed in the laboratory. Image interpretation was utilized to view temporal land use changes (Kanianska *et al*., 2014; Lillesand *et al*., 2015; Liu *et al*., 2017; Dube *et al*., 2017) pre and post activities. Temporal changes in land use of the study area pre and post activities activities can be seen in Figure 2 and Figure 3.

Interpretations were performed for Landsat 8 imagery in 2011 and 2016 and DEM images whose taken from DEMNAS Badan Informasi Geospasial (BIG), while ground survey were conducted to capture land characteristic data. The sampling method used in this research was purposive sampling (Sholihah, Utomo, & Juarti, 2016; Utomo, 2016), with land strata. Land Capability Land Planning (LCLP) Software is used to analyse data. This analysis technique has also been used by Maryati, (2013) and Widiati *et al.* (2017).

Figure 2: Mining sites in 2011

Figure 3: Mining sites in 2016

This research was conducted in three phases. The three phases are as follows.

Phase 1: Preparation Phase

This phase collected and studied secondary data, that were Landsat images, DEM, topographic map, geology map, soil map, and some theories and some theories such used scoring or matching in determining land capability classes.

Phase 2: Landsat Sattelite Image Processing and Interpretation

Stage 1

The first stage in Landsat satellite image processing and interpretation phase was multi-year Landsat interpretation of imagery available from 2011 and 2016. This data was utilized to determine the changes in land use and post mining areas.

Stage 2

The second stage in Landsat satellite image processing and interpretation phase was creating contour maps for the slope gradient (Mohd *et al.,* 2019) obtained from the DEMNAS Badan Informasi Geospasial (BIG), which was processed using ArcGis.

Stage 3

The third stage in Landsat satellite image processing and interpretation phase was making landform maps. Landform maps are made by overlapping the slope gradient maps with geological maps using ArcGIS

Stage 4

The fourth stage in Landsat satellite image processing and interpretation phase was creating the analysis unit map by overlapping landform map with soil map. The unit of analysis used in this research was the land unit.

Phase 3: Field Check (Ground Truth) and Data Analysis

Field checks were conducted directly to the supplement data such as type and structure of rock that could not be obtained in the Landsat image during the interpretation process. Field checks are based on determining Ground Control Points (GCP) (Purwanto & Bayuardi, 2016). Data obtained from the results of the field survey were then analysed using LCLP software.

The use of GIS and Remote Sensing above is very helpful in this research, especially for land use planning. The use of GIS and Remote Sensing starting from planning, assisting in making the basic maps used, to the implementation in taking data at field and analysing data to produce research findings.

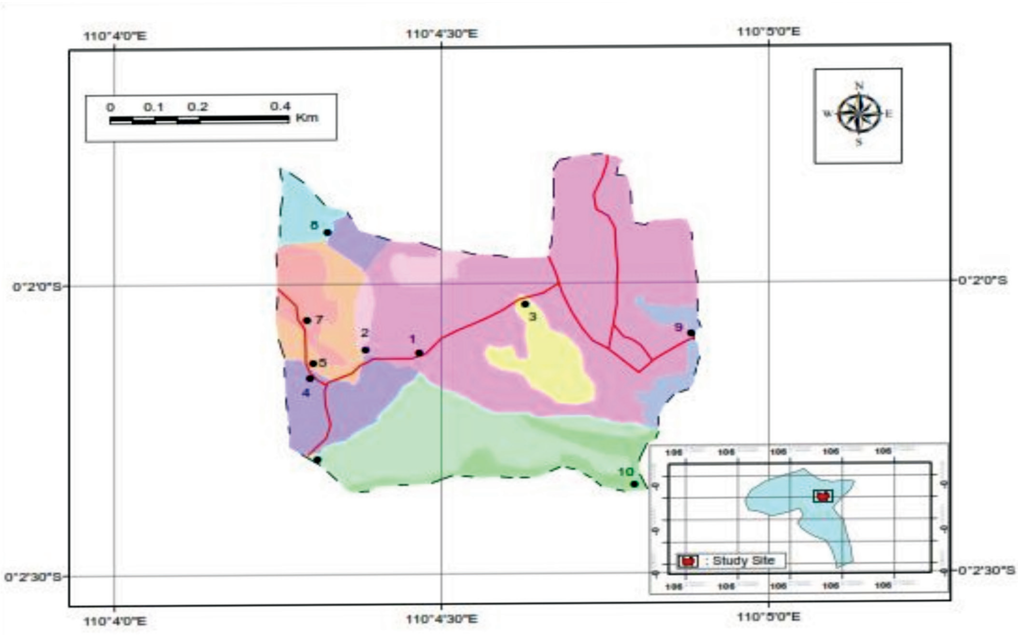


Figure 4: Ground control point

Results and Discussion

The results of this study include the landform former bauxite mining, the characteristics of each landform, and characteristics of the land capability parameters in the former bauxite mining site in the study area.

The study area has two forms of origin, i.e. denudational and fluvial origin. The denudational form of land consists of four units of landform, namely the form of denudational hills (D1), the upper slope of denudational hills granite lauric (D2), the middle slope of denudational hills granite lauric (D3) and the foot slope of denudational hills (D4). The form of the fluvial origin has one unit of landform, namely the form of alluvial plains (F2). The overlapping between the landform map and the soil map produces terrain unit maps. The observation results and measurement in the form of land characteristic and land quality of each land unit can be seen in Table 1.

The slope of the study area ranges from 0%-20% with flat topography to hilly. The distribution of gravel/rock ranges from none (0.01% of total area) to many (15-90% of total area). Top and subsoil texture ranges from smooth (clay) to medium (sandy clay); soil permeability is very slow to medium; water availability capacity ranges from 7.5-22.5 cm (very shallow-deep), poor soil drainage is marked part below the top layer; near the surface, there are colours or spots in grey, brown and yellowish. In addition to bad drainage, there is also a rather good, where there are no patches of yellow, brown or grey on the top layer and the top layer of the bottom to 60 cm from the ground.

The level of soil erosion ranges from none to moderately severe (more than 75% of the top layer to less than 25% of the undercoat is lost). The erodibility or easiness of eroded soils ranges from 0.00 to 10.10 cm/h (very low) to 0.43 (moderately high). Landslides occur only mild to moderate i.e. the landslide on the land surface is about 14-20% of the affected area. Flood incident occurs only on the alluvial plains that occur for one month in one-year flood > 24 hours.

Table 1: Land characteristic and land quality of each land unit

Land Unit Code	Ground Control Point		(l)	(b)	(ta)	(P)	(tb)	(WAC)	(k)	(d)	(e)	(KE)	(L)	(O)
	Longitude	Lattitude	(%)	(cm)		(cm/ hr)		(cm)	(cm)		(%)			
1. D1His	110^{0}4’46.4” E	0^{0}2`10.43” S	14 - 20	15 - 90	smooth	0,5 - 2	somewhat smooth	> 7.5 - 15	50 - 25	poor	25 - 75	0.11 – 0.20	light	never
2. D1In	110^{0}4`20.69” E	0^{0}2`10.42” S	14 - 20	3 - 15	medium	0,5 - 2	medium	> 7.5 - 15	90 - 50	rather bad	> 75	0.21 – 0.32	medium	never
3. D1Ul	110^{0}4`30.4” E	0^{0}2`05.96”S	14 - 20	15 - 90	smooth	6,25 - 12,5	smooth	< 7.5	< 25	good	> 75	0.33 – 0.43	light	never
4. D2His	110^{0}4`6.74” E	0^{0}2`12.57” S	8 - 13	3 - 15	smooth	< 0,5	smooth	>15 - < 22.5	90 - 50	poor	< 25	0.11 – 0.20	no landslide	never
5. D2Ul	110^{0}4`40.27” E	0^{0}2`11.01” S	8 - 13	15 - 90	smooth	< 0,5	smooth	>15 - < 22.5	< 25	good	25 - 75	0.33 – 0.43	light	never
6. D3His	110^{0}4`40.27” E	0^{0}2`15.01” S	3 - 7	0,01	smooth	< 0,5	smooth	> 22.5	90 - 50	bad	none	0.00 – 0.10	no landslide	sometime
7. D3Ul	110^{0}8`23.62” E	0^{0}3`07.33” S	3 - 7	0,01 - 3	somewhat smooth	2 - 6,25	somewhat smooth	> 22.5	90 - 50	good	none	0.00 – 0.10	no landslide	sometime
8. D4His	110^{0}4`6.74” E	0^{0}1’42.57” S	3 - 7	0,01	smooth	< 0,5	smooth	> 22.5	> 90	good	none	0.00 – 0.10	no landslide	sometime

9. F2Ul	$110^0$4`23.18" E	$0^0$2`48.71" S	0-2	0,01	somewhat smooth	0,5 - 2	somewhat smooth	> 22.5	> 90	poor	none	0.00-0.10	no landslide	during one month flood> 24 hours
10. F2In	$110^0$4`20.44" E	$0^0$2'08.68" S	0-2	0.01	somewhat smooth	2 - 6,25	somewhat smooth	> 22.5	90 - 50	good	none	0.00 – 0.10	no landslide	during one month flood> 24 hours

Source: Primary data, 2019

Explanation:

Landform

D1 denudational hills of granite lauric
D2 upper slope of denudational hills granite lauric
D3 middle slope of denudational hills granite lauric
D4 foot slope of denudational hills
D5 alluvial plain

Land characteristics

(I) the surface slope (%)
(b) gravel/rock (%)
(ta) top soil texture
(p) permeability(cm/hr)
(tb) sub soil texture
(WAC) water availability capacity (cm)
(k) depth of soil (cm)
(d) soil drainage
(e) erosion hazard (%)
(KE) Erodibility
(L) landslide threat
(o) flood threat

Soil

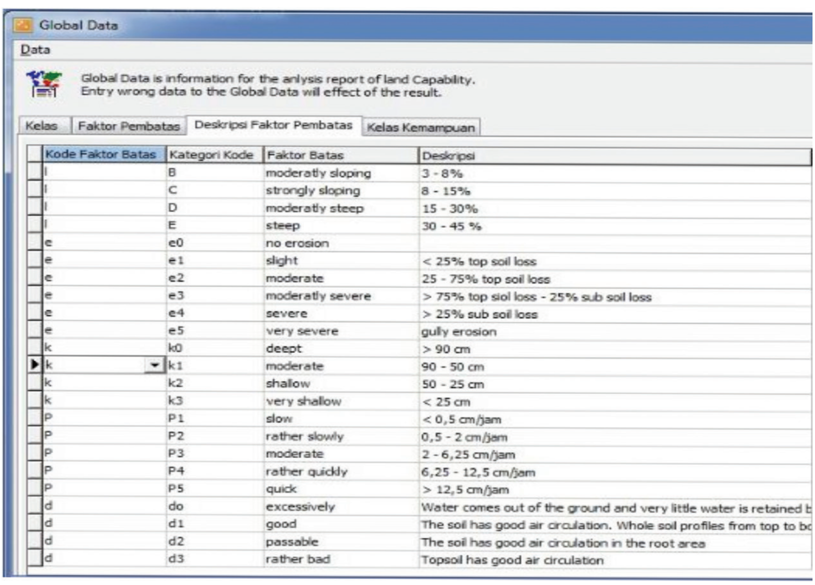
His: Histosol, In: Inceptisol, Ul: Ultisol

The parameters that were used for assessment of land capability in this research consist of 12 parameters categorized as three properties of soil, topographic, and hazard. These parameters obtained from field observations were also taken from remote sensing data. The parameters consist of top soil, subsoil, slope, drainage, soil depth, erosion rate, gravel/rock, flood, permeability, landslide, water available capacity, and soil erodibility. Water availability capacity is an additional parameter, so it is different from the previous land capability parameters. The land capability parameters, code, limit factor and limit factor category can be seen in Table 2.

The description of limiting factor provides information concerning the classification of each parameter. The description of limiting factor of land capability can be seen in Figure 5.

Table 2: Land capability parameters taken from LCLP software

Code	Limit Factor	Limit Factor Catagory
tb	Sub soil texture	Soil
d	Drainage	
k	Soil depth	
b	Gravel/ rock	
p	Permeability	
ta	Top soil texture	
KKA	Water Avaliabel Capacity	
KE	Erodibility	
e	Erosion	Hazard
o	Flood	
L	Land Slide	
I	Slope	Topography



Global Data

Data

Global Data is information for the anlysis report of land Capability.
Entry wrong data to the Global Data will effect of the result.

Kelas | Faktor Pembatas | Deskripsi Faktor Pembatas | Kelas Kemampuan

Kode Faktor Batas	Kategori Kode	Faktor Batas	Deskripsi
l	B	moderatly sloping	3 - 8%
l	C	strongly sloping	8 - 15%
l	D	moderatly steep	15 - 30%
l	E	steep	30 - 45 %
e	e0	no erosion	
e	e1	slight	< 25% top soil loss
e	e2	moderate	25 - 75% top soil loss
e	e3	moderatly severe	> 75% top siol loss - 25% sub soil loss
e	e4	severe	> 25% sub soil loss
e	e5	very severe	gully erosion
k	k0	deept	> 90 cm
k	k1	moderate	90 - 50 cm
k	k2	shallow	50 - 25 cm
k	k3	very shallow	< 25 cm
P	P1	slow	< 0,5 cm/jam
P	P2	rather slowly	0,5 - 2 cm/jam
P	P3	moderate	2 - 6,25 cm/jam
P	P4	rather quickly	6,25 - 12,5 cm/jam
P	P5	quick	> 12,5 cm/jam
d	do	excessively	Water comes out of the ground and very little water is retained b
d	d1	good	The soil has good air circulation. Whole soil profiles from top to bo
d	d2	passable	The soil has good air circulation in the root area
d	d3	rather bad	Topsoil has good air circulation

Figure 5. Description of limiting factor

Data from field observations and image analyses are then analysed. This analysis used the Land Use Land Capability (LCLP) software. Data entered in the software is automatically processed and the results can be known immediately. The results of the analysis of soil characteristics and quality using LCLP software is that land capability in the study area can be classified into classes III-VI. The third class of land capability is located at the middle slope of denudational hills granite lauric (D3) and alluvial plains (F2). Class IV of land capability waste found in hilly denudational hills of granite lauric (D1) and alluvial plains (F2). The class V of land capability is located on the upper slope of denudational hills granite lauric (D2), the middle slope of denudational hills granite lauric (D3) and the foot slope of denudational hills (D4). The land capability class VI is scattered in units of denudational hills forming with granite lauric (D1) and denudational hillside slopes of granite lauric (D2).

The study area also has a subclass III of land capability with flood as the limiting factor and gravel/rock spreading over D3Ul and F2In land units. Subclass IV of land capability has landslide limiting factor, slope, erosion, gravel/rock and drainage spreading over D1In and F2Ul land units. Subclass V of land capability has the limiting factor of gravel/rock and permeability spreading over the units of land D1His, D2His, D3His, and D4His. Subclass VI of land capability has soil depth limiting factor scattering in D1Ul and D2Ul land units. The classes and subclasses of the land capability in the study area can be seen in Table 3 and Figure 6.

The location of former bauxite mining with a land capability class III indicates that the land at that location can be cultivated or processed intensively. In this class, the land has subclass III-b, O. The subclass III-b with limiting factor of gravel/rock has an area of 4.910 ha (6%) and the subclass III-O with limiting factor of flood has an area of 5.100 ha (6.4%). This unit of land can be developed into an extensive agricultural area, so the cultivation system (or animals) only uses low capital and labour inputs, relative to the size of the land used.

Limiting factor in this unit of land can be fixed by moderate conservation measures. Limiting factor is the distribution of the gravel or surface rock factor which can be overcome

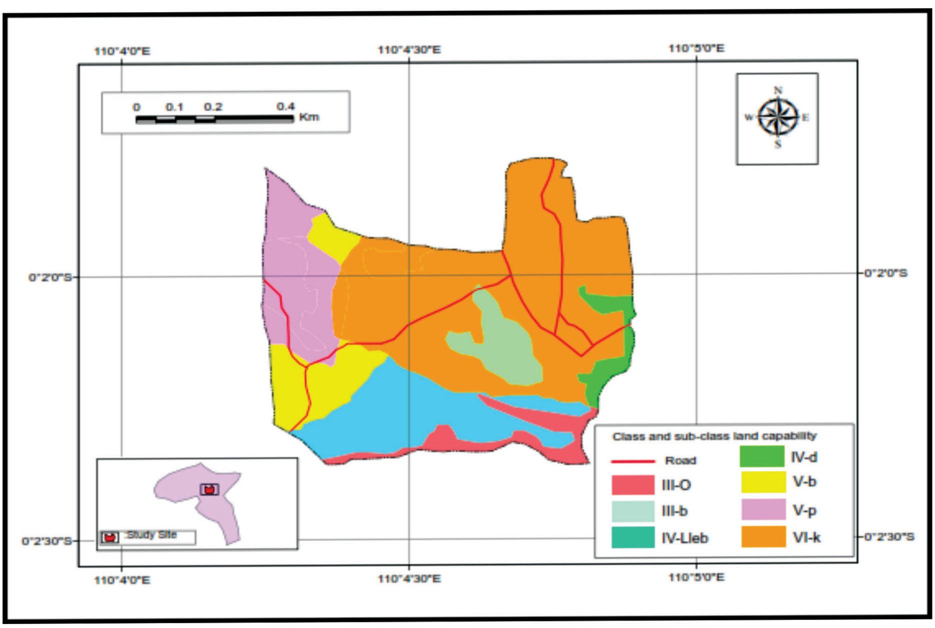


Figure 6: Classes and subclasses of land capability

Table 3: Classes and subclasses of land capability of study areas

<table>
<tr><th>Land Unit Code</th><th>Limiting Factors</th><th>Land Capability Class</th><th>Subclass Land Capability</th><th>Division</th><th>Sub Division</th><th>Conservation Measures</th></tr>
<tr><td>1. D1His</td><td>Gravel/Rock</td><td>V</td><td>V-b</td><td>Land cannot be cultivated/ processed</td><td>Pastures, shepherding</td><td rowspan="6">Severe conservation measures</td></tr>
<tr><td>2. D1In</td><td>Avalanche; Surface Slope; Level of Erosion; Gravel/ Rocks;</td><td>IV</td><td>IV-Lleb</td><td>Land can be cultivated/ processed</td><td>Marginal farming</td></tr>
<tr><td>3. D1Ul</td><td>Soil depth</td><td>VI</td><td>VI-k</td><td>Land cannot be cultivated/ processed</td><td>Limited grazing, plantation</td></tr>
<tr><td>4. D2His</td><td>Permeability</td><td>V</td><td>V-P</td><td>Land cannot be cultivated/ processed</td><td>Pastures, shepherding</td></tr>
<tr><td>5. D2Ul</td><td>Soil depth</td><td>VI</td><td>VI-k</td><td>Land cannot be cultivated/ processed</td><td>Limited grazing, plantation</td></tr>
<tr><td>6. D3His</td><td>Permeability</td><td>V</td><td>V-P</td><td>Land cannot be cultivated/ processed</td><td>Pastures, shepherding</td></tr>
<tr><td>7. D3Ul</td><td>Gravel/Rock</td><td>III</td><td>III-b</td><td>Land can be cultivated/ processed</td><td>Extensive agriculture</td><td>Medium conservation measures</td></tr>
<tr><td>8. D4His</td><td>Permeability</td><td>V</td><td>V-P</td><td>Land cannot be cultivated/ processed</td><td>Pastures, shepherding</td><td>Severe conservation measures</td></tr>
<tr><td>9. F2Ul</td><td>Drainage</td><td>IV</td><td>IV-d</td><td>Land can be cultivated/ processed</td><td>Marginal farming</td><td></td></tr>
<tr><td>10. F2In</td><td>Flood</td><td>III</td><td>III-O</td><td>Land can be cultivated/ processed</td><td>Extensive agriculture</td><td>Medium conservation measures</td></tr>
</table>

Source: Result of Primary Data Processing, 2019

by clearing the surface rock distribution. Flood factor can be shorted out by making good drainage so that the flood on these areas decreases. Good drainage plays a significant role in reducing excessive water, preventing flood and ground damage.

Land capability class IV indicates that the land can be cultivated or processed for agriculture, but it is very limited (marginal). The land in the capability class IV may be used for seasonal crops and the other general crops, grasses, production forests, pastures, protected forests or nature reserves (Klingebiel & Montgomery, 1961; Arsyad, 2010; Maryati, 2013; Osman, 2014). In this class, the land has a land capability subclass IV-Lleb,d. The limiting factors consist of landslide, large slope inclination, high erosion rate, and rocks which have an area of 15.144 ha (18.52%) and drainage limiting factor having an area of 2.632

ha (3.22%). These limiting factors are very heavy and require good conservation measures.

Conservation can be executed mechanically and specifically by making a bench terrace, tilling the soil according to the contour line to prevent erosion and landslide, and making vegetation channel fora good air aeration process in soil. In addition to the mechanical action, it is necessary to maintain the fertility and physical condition of the soil with the planting of ground cover crops. This planting aims to improve soil structure, increase organic material, and prevent nutrient leaching.

However, in the cultivation of crops and their use, the cost was greater than class III. The land capability class IV and sub-class IV-Lleb,d require more serious effort in handling the limiting factors mentioned above namely moderate landslide, large slope inclination, high erosion rate, moderate rock and rocks, and drainage (Arsyad, 2010; Maryati, 2013; Osman, 2014).

Land capability class V means that the land cannot be cultivated or processed. In this class, the land in the study area has a subclass V-b,p capability. The limiting factors consist of gravel/rock and soil permeability. The subclass V-b has an area of 86 ha (0.11%) and subclass V-p has an area of 9.282 ha (11.35%). The land cannot be cultivated so it should be used for the other purposes such as pastures and cultivation, production forests, and protected forests or nature reserves (Arsyad, 2010; Maryati, 2013; Osman, 2014). If it is used for production forest, it is necessary to plant crops that have a high economic value in accordance with the local conditions.

Land capability class VI has similar consequences with land capability class V. Land capability class VI cannot be cultivated or processed. The land at the former mining site has a subclass VI-k having limiting factor of soil depth with an area of 44.631.9 ha (54.57%). The land cannot be cultivated or processed and should be used for limited grazing and plantation. The land use for plantations should be for producing the plants that have a high economic value so that people can still use the land. However, in addition to both purposes, the land can be utilized for production forest, protected forest or nature reserves (Arsyad, 2010; Maryati, 2013; Osman, 2014). The land use planning of bauxite mining sites can be seen in Figure 7.

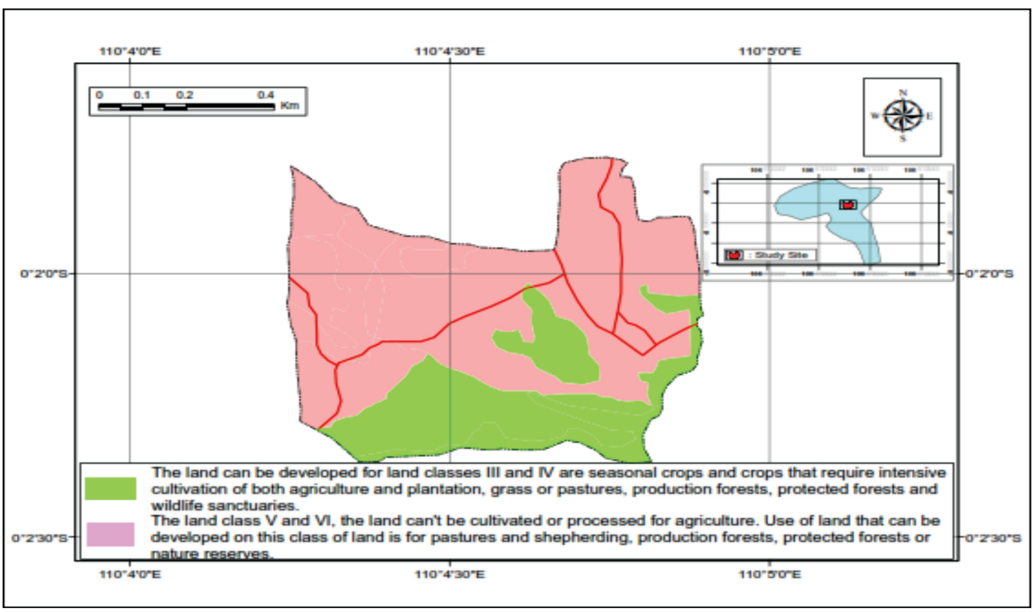


Figure 7: Land use planning of former mining land

Conclusion

The results and discussion of this research show that the study area has the capability class III to VI. The study area also has a land capability subclass III with flood limiting factor and the spread of gravel/rock over D3Ul and F2In land units. Land capability subclass IV has the limiting factors of landslide, slope, erosion rate, gravel/rock and drainage spreading over D1In and F2Ul land units. The land capability class III and IV have an area of 27.786 ha (33.97%) that can be developed for seasonal crops and crops that require intensive cultivation of both agriculture and plantation, grass or pastures, production forests, protected forests, and wildlife sanctuaries.

Subclass V of land capability has the limiting factors of gravel/rock and permeability spreading over the unit of land D1His, D2His, D3His, and D4His. The subclass VI of land capability has soil depth limiting factor spreading over D1Ul and D2Ul land units. The land capability of class V and VI have an area of 54.001 ha (66.03%), the land cannot be cultivated or processed for agriculture. The land use that can be developed in this class of land is for pastures and shepherding, production forests, protected forests or nature reserves.

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