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Mapping and Evaluation of Land Rice Paddy in T District Of *Gajah Hilang Timang Gajah Kabupaten Bener Meriah*

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ABSTRACT
This study aimed to evaluate the suitability class of land in the Timang Gajah Watershed Sub-district of Bener Meriah Regency for rainfed paddy fields. Based on a map of soil type and slope maps from maps generated from topographic, then be overlaid. This study using a survey method consisting of 4 stages: preparatory phase, preliminary stage, primary survey, and data analysis and presentation of result.The assessment of land suitability classes with appropriateness rainfed paddy fields. The result showed that the potential land suitability class LMU 2 is S3 nr-2,eh-1, LMU 5 is S3 nr-2, eh-1, LMU 8 is S3 rc-2, nr-2, eh-1, LMU 9 is S3 nr-4, eh-1,2, LMU 10 is S3 nr-2, eh-1, LMU 11 is S3 eh-1, LMU 12 is S3 eh-1, LMU 13 is S3 nr-2, eh-1, LMU 15 is S3 rc-2, LMU 16 is S3 rc-2, LMU 17 is S2 rc-1,2, nr-2, eh-1, dan LMU 18 is S3 rc-2. Potensial land area for rainfed paddy fields in the Timang Gajah Watershed Sub-district of Bener Meriah Recency is of 277,06 ha
Key word: Land Suitability, Survey, Land Map Unit, Watershed
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INTRODUCTION

Land is the main environment of plants used as a medium to grow, develop and produce. The soil comes from the weathering rocks mixed with the remnants of organic materials and organisms (vegetation or animals) that live on it or therein are a source of plant life. In addition, in the soil there are air and water that is very useful to support the whole process of life that takes place in the soil (Tampubolon and Silitonga, 2012).

According to Hanafiah (2005). The land serves as a place to grow and develop the roots of the support of the growth of plants and the supply of water and air supplies. The soil is chemically functioning as a warehouse and supplier of nutrients (organic and inorganic compounds simple and essential elements N, P, K, Ca, Mg, S, Cu, Zn, Fe, Mn, B, Cl, and others), Biological soil serves as a habitat of biota (organism) that participates actively in the provision of nutrients. The function of soil that is so vital shows that, (1) land as a place to grow and provider of plant needs, and (2) land as a protector of crops from pest attacks and negative impacts of pesticides and hazardous industrial waste.

Soil factors in the evaluation of land suitability are determined by some properties or characteristics of the soil including soil drainage, texture, depth of land and nutrient retention (pH, CEC), as well as several other properties including alkalinity, danger of erosion, and flood\/puddle (Ritung *et al*., 2007).

According to Hardjowigeno and Widiatmaka (2001) declaring land is a physical environments which covers soil, climate, reliefs, hydrology and vegetation, where these factors affect the potential of its use. These include the consequences of human activity, both in the past and present, such as reclamation of coastal areas, logging, and adverse consequences such as erosion and salt accumulation. Social and economic factors are purely excluded from the concept of this land.

Dent and Young (1981) *at* Abdullah (1993) Declare land evaluation is a process of estimation of potential land for various alternatives of its use. Land evaluation is one of the ways used to determine the condition of a region. Conformity evaluation has a sharp emphasis, which is looking for land that has positive properties in conjunction with the success of production and its use, while the appropriation of land is a depiction of the match level of Land with a certain land use and each of its uses has different needs. (Sitorus, 2015).

Food needs from year to year continue to increase in accordance with the growing number of population growth. In Indonesia, in fact, agricultural production, especially rice, continues to decline so that the government imports as an act to meet the needs of the population, especially food. He explained that the production of food especially rice is caused by several factors, among others, the land Fugsi (conversion) and the condition of fertility and soil health that continues to be degraded. The properties and abilities of each land vary from place to place. The soil can function optimally should be used according to its capabilities. Land utilization should be able to improve people's welfare. There needs to be planning how the community can use its potential and proper land management including the use of ground that corresponds to the level of land suitability for certain use.

Mapping by using Geographic information systems (GIS) is an effective and efficient way of guessing and knowing the characteristics of a land dan potensi yang dimiliki lahan tersebut dalam pengembangannya untuk menduga evaluasi kesesuaian lahan pada suatu wilayah. (Fauzi *et al*., 2009).

Sub DAS Timang Gajah is one of the children DAS from the DAS Krueng Peusangan located in Bener Festive district of Aceh province. The elephant is one of the Sub-DAS of the WATERSHED, with an area of 277, 06 ha. In the Sub-DAS area. There are many agricultural activities conducted either in the form of dry land farming, paddy fields, and other plantations (BPS Bener Meriah, 2017). Rice crop in Bener Meriah Festive district has an area of planting as much as 760.21 ha with an area of harvest 1,124.40 ha spread in 10 sub-district located in the district with the rice production of 10754 tons and rice productivity 4.64 ton/ha can be seen in table 1 (BPS Bener Meriah, 2017). This research aims to know and determine the class of land suitability of rice paddy fields (Oryza

sativa L) in Sub DAS Timang Elephant Bener Festive district.

RESEARCH METHODS

Place and time of research Implemented in the Sub-district of the river Flow (DAS), the elephant of the lively Bener. Land analysis was carried out in Laboratorium of land and planting of agricultural research and the Shi'a universitus of Kuala Banda Aceh. Prefix review from February until April 2018.

Materials and tools Research

The materials used in this study are soil samples taken from the research site, criteria for the suitability of rice paddy fields, as well as chemicals to analyse the soil. The tool used in the study is a map with a level of semi-detail (medium intensity). Namely: the soil type map (scale 1:50,000), Land use map (scale 1:50,000), Map slope (scale 1:50,000), the map of the administration (scale 1:50,000), Abney level, GPS (Global Position System), hoe, Dirt drill, label paper, plastic bag, rubber bracelet, paperwork tool and a set of ArcGIS (Geographic Information System) software version 10.1.

Research methods

The research methods used in this study are the 4-stage survey methods: Preparation stage, preliminary stage, main survey, and data analysis and delivery of results. Land Map Unit Map is derived from the overlay result of land type map, land use, and slope which will be used as work map (table 1)

Tabel 1. Data on land map unit in Sub-DAS *Timang Gajah Bener Meriah*

SPL	Slope Slope	Soil Type	Land cover	Specous (ha)
(1)	(2)	(3)	(4)	(5)
1	16%-25%	Andisol	Protected forest	3.224
2	16%-25%	Andisol	Mixed garden	199
3	26%-40%	Andisol	Protected forest	1.149
4	>40%	Andisol	Protected forest	1.461
5	16%-25%	Inceptisol	Mixed garden	355
6	8%-15%	Inceptisol	Settlement	267
			Settlement	
7	8%-15%	Andosol	Settlement	546
8	8%-15%	Ultisol	Scrub	509
9	8%-15%	Inceptisol	Scrub	1.425
10	8%-15%	Andisol	Scrub	4.339
11	8%-15%	Entisol	Scrub	1.246
12	8%-15%	Entisol	Mixed garden	868
13	8%-15%	Andisol	Mixed garden	1.849
14	<8%	Inceptisol	Rice fields	552
15	<8%	Inceptisol	Plantation	279
16	<8%	Inceptisol	Scrub	2.355
17	<8%	Andisol	Scrub	2.375
18	<8%	Inceptisol	Mixed garden	4.644
19	8%-15%	Ultisol	Watershild	163
	Total			27.706

Source: Overlay Results and observations in the field, 2018

RESULTS AND DISCUSSION

Land appropriateness in Sub-DAS Timang Gajah

The results of analysis it has been done to determine the actual land suitability of the rain-field rice crop (Oryza sativa L) can be seen in table 11 at the research site showing the class of land suitability on the Sub DAS Timang Gajah is in the class S2 (appropriate enough) and S3 (marginal). Land that has a heavy barrier factor will affect crop productivity and land use. In the SPL 2 class of the land conformance S3 NR-2, eh-1, SPL 5 class of land-appropriateness S3 nr-2, eh-1, SPL 8-Class The compatibility of its land S3 RC-2, NR-2, eh-1, SPL 9 class of land-Compatibility S3 NR-4, eh-1.2, SPL 10-Class land compatibility S3 nr-2, eh-1, SPL 11 class The appropriateness of S3 eh-1, SPL 12 class The appropriateness of S3 eh-1, SPL 13-Class land appropriateness S3 nr-2, eh-1, SPL 15-Class land conformance S3 RC-2, SPL 16-Class The land suitability S3 RC-2, SPL 17-Class land compatibility S2 RC-1.2, NR-2 Its class of land conformance S3 RC-2. The main barrier factor found in the research site based on actual land conformity assessment results, among others, is the rooting media indicated by the state of soil drainage classified as good drainage criteria On the ground conformity class S2 (appropriate enough) is on SPL 17, and the media of rooting indicated by the percentage of textures that have a class criteria of texture is somewhat rough (sandy loam) is in the S3 (marginal) Land conformity class found in the SPL 15, 16, da 18, nutrient retention indicated by low base saturation values are in the corresponding marginal class (S3) found in SPL 2, 5, 8, 10, and 13, and nutrient retention indicated by C-organic percent of soil classified into very low criteria (< 1.00%) In the marginal Class (S3) is found in SPL 9, the danger of erosion shown by the percent of slope that belongs to ramps criteria (8%-15%) are in a marginal class (S3) are found in SPL 8, 9, 10, 11, 12, and 13, while those belonging to a somewhat steep criterion (16-25%) are on SPL 2 and

Usaha Perbaikan Land done

To improve and improve the condition of land that has the main barrier factor that can interfere with the growth of plants needed some efforts to repair on the quality of land to change the suitability of the land with various limiting factors Suitable for land suitability that matches the conditions of use of rainfed lowland rice fields. In each unit the map of existing land has a different quality of land improvement depending on the problematic characteristics of the land. After the efforts of repairs to each of the limiting factors will be obtained the quality of land that is more suitable for crops in the rainfed rice fields. There are several limiting factors that can be differentiated into two types namely (1) limiting factors that are permanent or uneconomical to be repaired such as: temperature, rainfall, length of dry time, and humidity. It is in accordance with the opinion of Rayes (2007) stating that in the evaluation of land altitude factor of the place which is the temperature regime, moisture can not be repaired by technology. There (2) the limiting factor that can be repaired and economically still profitable by entering the appropriate technology such as: the efforts to repair from each unit of land maps that can be done to overcome all the limiting factors are as follows: drainage, media rooting, nutrient retention, nutrient availability, flood hazard, toxicity, danger of erosion (Hardjowigeno and Widiatmaka, 2007). The improvement efforts that can be done are as follows:

Soil and water conservation measures

The Soil drainage characteristics can be improved by conducting drainage channels such as deep small moats to be able to control incoming water into the ground before it is lost (Ritung et al., 2011). Improvement of drainage system is by improving or repairing and maintaining the drainage of both surface water and groundwater. Drainage function is to reduce or remove excess water from a region or land, so that the land can be optimally enabled. So the drainage should be kept not to clogged or to soak water into the soil. Terracing with the right drainage system can improve the quality and characteristics of the land (Sulistiyono, 2010).

Soil texture also determines the water in the soil, the form of velocity infiltration, penetration and the ability to bind water by the soil. On the characteristics of soil texture has a very close connection with the ability of soil to hold water and nutrient availability. The Textured soil sandy clay (somewhat coarse) has the ability to hold water and provide a lower nutrient than the textured soil that is dusty (medium) clay because the surface area containing the sand has more widespread Surface is much smaller than that containing dust so the water saving power becomes low. According Sinaga *et al* (2014) Soil texture as the main barrier of land conformity class can not be changed because it is permanent, but can be repaired with the provision of organic materials have a role in the process of forming land aggregates, soil structures to be better or And can add to the soil's ability to store water and provide nutrients for plants (Hardjowigeno, 2015).

Characteristic of land with the main limiting factor of alkaline saturation can be corrected by the fertilization and land-enriching activities (Ritung et al., 2011). According to Sinaga et al (2014) Improvement efforts that can be done to increase the value of alkaline saturation is by means of fertilization with fertilizer that contains elements K +, Ca2 +, Mg2 +, Na + For example in fertilizer KCl, CaCO3, and MgSO4 and the addition of organic materials. It is also supported by research results stating that the value of alkaline saturation can be increased and improved by means of fertilization using fertilizers such as KCl, CaCO3, MgSO4, and NaCl (Ferdinan *et al*., 2013).

To increasing the content of C-organic in soil can be done with the addition of organic materials and the posting of organic materials derived from the remaining rice straw harvest (Tampubolon et al., 2015). In accordance with the research results Kadarwati (2016) in the management of soil fertility with the limiting factor of organic matter, one of the efforts that can be done is balanced fertilization (especially fertilizer N) as well as the addition of organic materials. The characteristics of land with the main barrier factor is that the slope will greatly affect the run off condition and the erosion process that occurs. The improvement that can be done to overcome slope slope is by applying soil conservation technique both mechanically and vegetative so as to minimize surface flow and erosion rate. Saleh et al. (2000) states that to address the slope issue of slope can conduct activities of soil conservation techniques. For slope conditions 0-8% the technique that can be done is planting strips combined with the planting of mulch according to Contour (Contour Strip Cropping). The planting of strips and mulch can inhibit erosion rate. For slope conditions 8-15% of soil conservation technique can be done with the Countour Strip Cropping, with a shorter distance of 5-7 meters, while to overcome slope slope can be done by making terracing the form of making Guludun Terrace which is easy and requires no special skills (Arsyad, 2010). Sinaga *et al* (2014) He stated that the danger of erosion can be corrected by mechanical means of making terraces. With the vegetative way of planting the soil retaining plants and planting soil cover crops, by means of chemical adding soil conditioner (soil plant material). Efforts to reduce erosion rate, manufacture of terraces, parallel planting of contours, planting of land cover crops (Ritung et al., 2011).

CONCLUSIONS AND SUGGESTIONS

Class of land appropriateness for rain (Oryza sativa L) rice crop. At 11 units of land map classified as a class of land suitability, according to marginalized (S3) with the limiting factor of rooting media (drainage and soil texture), nutrient retention, (alkaline sauration, and C-organic, erosion hazard (slope and danger of erosion). And 1 unit of land map (SPL 17) which belongs to the class of land suitability quite suitable (S2) with the limiting factor of rooting media (drainage and soil texture), nutrient retention (alkaline saturation), and danger of erosion (slope). In the class of land suitability, that it has various inhibitory factors can be carried out soil and water conservation measures to improve the factors, that is with the manufacture of the porch and planting cover crops to improve the danger of erosion and slope slope, the addition of organic fertilizer, manure and soil improvement materials to improve soil texture and C-organic, the addition of fertilizer KCl and NaCl, Liming MgSO4 and CaCO3 to improve alkaline saturation, and

manufacture of Small trenches/drains to improve drainage.

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