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The Evaluation of the Rice Crop Land of Gogo Using Automated Land Evaluation System (ALES) in the City of Samarinda Town Pampang Cultural Village East Kalimantan

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ABSTRACT

Land evaluation using computer program Auto med Land Evaluation System (ALES) (Rossiter and Van Wambeke, 1989).The ALES Program can display a decision tree about the relationship between land and land use (Rayes, 2007). This Model was applied to evaluate the potential land use in the cultural village of Pampang.. The results are then used to recommend land use that is suitable for upland rice plants. The results of the study showed that the dominance of land suitability classes in Gogo Rice was S2. The most dominant barriers are available nutrients (na) and tc (temperature). Recommendations based on evaluation results are not always in line with and adapt to the character of the *Dayak Kenyah* tribes who still apply the "shifting cultivation" system.The evaluation results will be used to recommend the distribution of potential land for Gogo Rice in the Kelurahan Budaya Pampang, Kota Samarinda.

Keywords: Rice crop Land, Gogo, ALES, Samarinda Town, pampang Cultural Village, East Kalimantan

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INTRODUCTION

Gogo rice (Oryza sativa) is one of the local varieties of rice paddy which is one of the leading commodities in East Kalimantan which is widely distributed. Rice farms in East Kalimantan contribute an average of 20% of total rice production in East Kalimantan each year. http://lppm.ipb.ac.id/wp-content/uploads/2017/06/B112.pdf. One of the areas in Samarinda City, the Capital of East *Kalimantan* Province, that is, a culture village at Pampang has a fairly large area of approximately ± 3800 Ha dominated by agricultural and plantation land (https://kel-culture of -pampang.samarindakota.go.id/monografi).

Livelihoods of local communities are farmers. Agricultural products in the form of local plants typical of *Kalimantan* such as Gogo Rice, Tiwai Onion, Lai Fruit, *Rambutan* and others. The farming system used is the "rotation system". The ongoing rotation system tends to produce low productivity in upland rice plants. This is due to the use of land in addition to agricultural land and plantations in the area as well as mining and oil drilling activities. This aspect of land use is crop production is important and can help determine potential land for optimizing agricultural produce for the benefit of local farmers. The success of local communities in the development of Gogo Rice plants is knowing the conditions of resources including land. Land use planning is needed to ensure the most appropriate farming / farming practices, which provide biophysically the highest yields and are economically profitable. Land evaluation is a tool to identify the suitability of business patterns of land use planning over diverse land sources (Hardjowigeno & Widiatmaka, 2007). The most commonly used physical land evaluation method is the evaluation developed by FAO (1976) to assess land suitability for certain commodities. Conformity is expressed descriptively using the terms: very suitable (S1), quite appropriate (S2), marginal appropriate (S3), not current (N1) or not forever (N2).

The technical approach for assessing the suitability of physical land from the level of experience of farmers and expert assessment to the simulation of integrated computer models of plant growth (Van Diepen et al., 1991; Van Lanen, 1991). Automed Land Evaluation System (ALES) was developed by Rossiter and Van Wambeke (1989) and subsequently refined (Rossiter, 1990; Rossiter and Van Wambeke, 1991). The ALES program is very interactive designed to help users through a series of menus and display a decision tree which is a way for evaluators to express their expertise (expert knowledge) about the relationship between land and land use (Rayes, 2007).

METHOD

The evaluation of the Gogo Rice field, Land Unit Maps, Soil Maps, Contour Maps, soil chemical and physical analysis data, rainfall data, and Samarinda City Spatial Plan Map are used. The software used is ALES ver. 4.65e, Arc View GIS 10.2 and Microsoft Office 32bit. This research integrates Arc-GIS with ALES and expert knowledge in land suitability analysis. Arc-View GIS is used to overlay maps used (maps of land, slopes, vegetation) and land use). Land characteristics used for land evaluation are automatically stored in the ALES database. Furthermore, expert knowledge is used to evaluate the suitability of each Land Map Unit (SPL). Expert knowledge describes land use. After ALES is used for land evaluation, the results are transferred to Arc-GIS for geographic reference to describe the results in the form of maps and tabulations.

STUDY AREA

The cultural village is administratively located in the northern part of Samarinda city, with its geographical position on the map located at 117003'00 "- 117018 '14" East Longitude and 00019 '02 "- 00042 '34" South Latitude. Pampang Cultural Village has a wide area of ± 3,800 Ha which is a cultural tourism area in *Samarinda* City which has potential natural resources including Gogo Rice and Kalimantan local fruit plants.

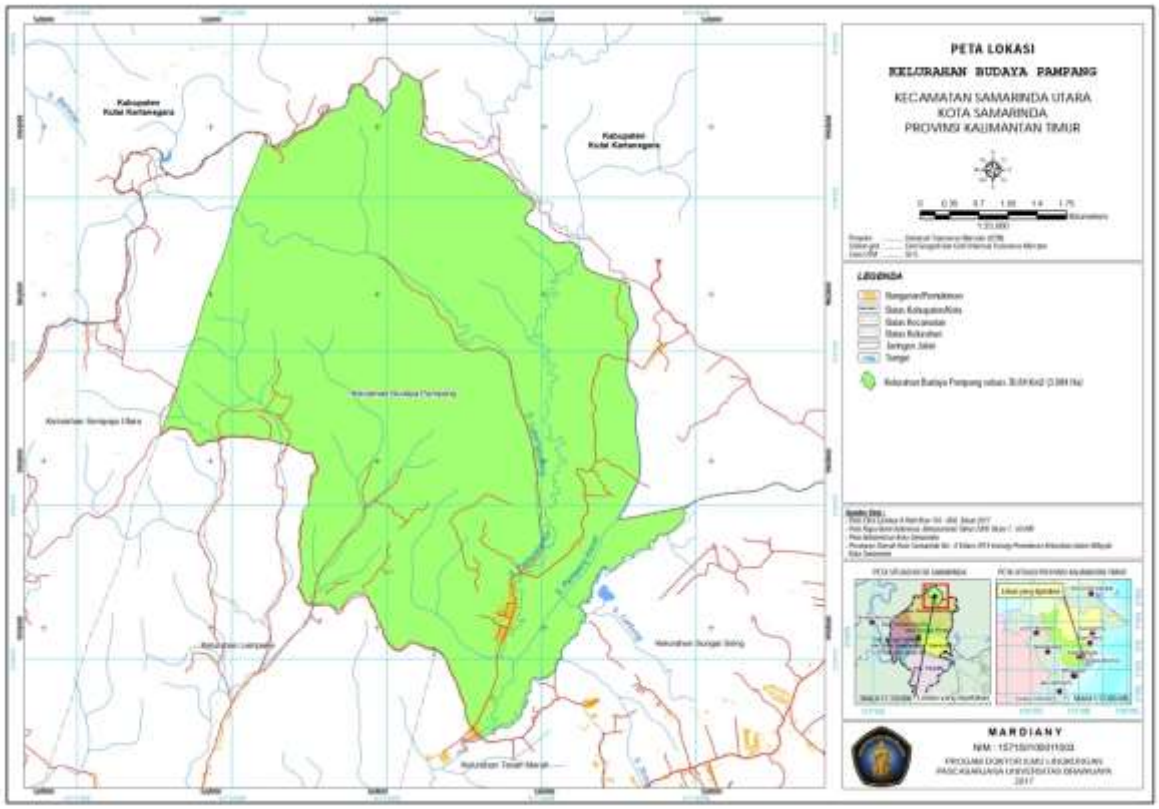

Figure 1. Map of the Pampang Cultural Village Research Location

DATA PROCESSING

This research integrates ArcGIS 10.2 with ALES and expert knowledge in land suitability analysis. ArcGIS is used for overlaying map maps used (land maps, slopes, vegetation and land use). Land characteristics used for land evaluation are automatically stored in the ALES database. Furthermore, expert knowledge is used to evaluate the suitability of each Land Map Unit (SPL). Expert knowledge describes the proposed land use in physical terms. After ALES is used for land evaluation, the results are transferred to ArcGIS for geographical reference to describe the results in the form of maps and tabulations. Land Map Unit (SPT) *Pampang* Cultural Village consists of 5 units of soil maps (SPT) (figure 1). The dominant type of soil is Typical Hapluduts type of Kanhapluduts, corrugated slope reliefs 8-15% with an area of 1,154 Ha or 43.27% of the total land area.

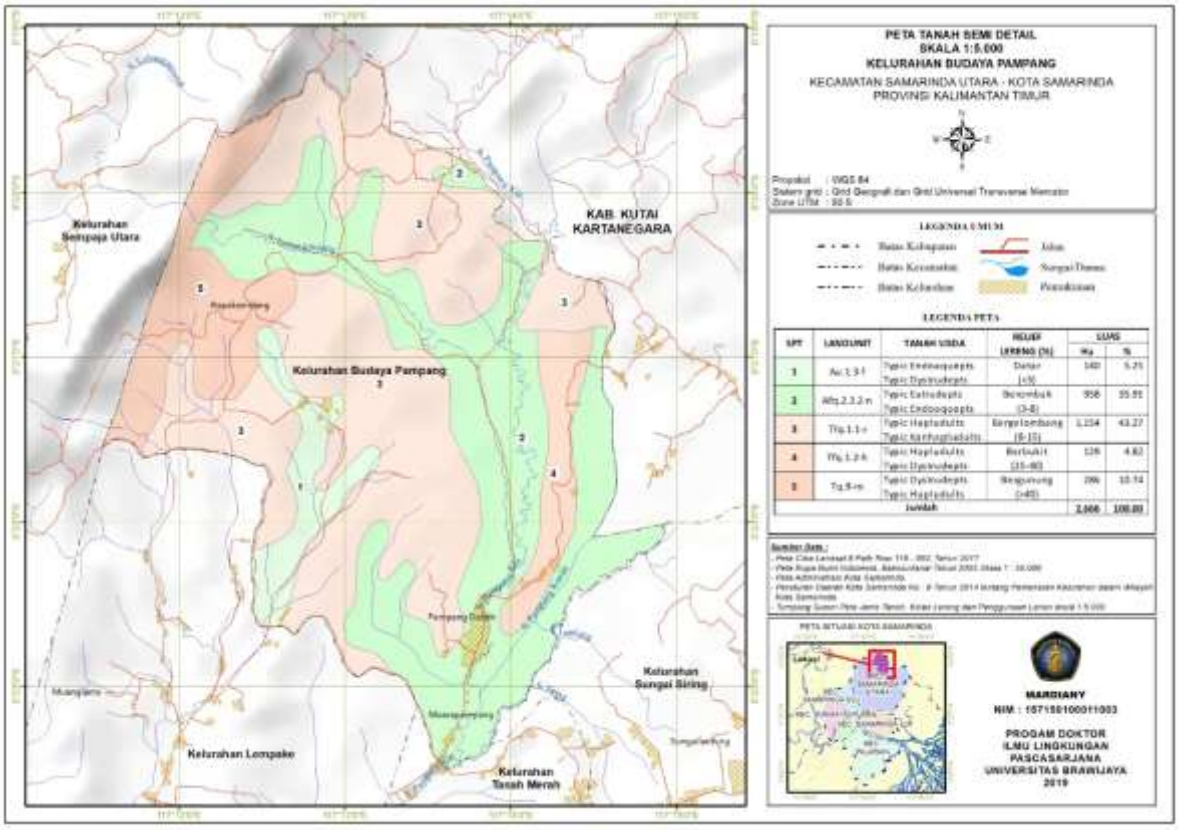

Figure 2. Semi Detailed Land Map Scale 1: 5000 Cultural Village Pampang

Land Evaluation Stage

The stages of preparing a land evaluation model using ALES include: (i) Determination of the type of land use (Land Use Type - LUT); (ii) Determination of Land Use Requirements (LUR) for each LUT; (iii) Selection and determination of Land Characteristics (LC) in each LUR for each LUT; and (iv) Decision Tree (DT) compiler example Decision Tree from *Padi* Gogo

Severity Level Padi Gogo Area,na
> nt (N Total)
sr (lowest) [0-1 %] > P2O5 (P2O5)
sr (lower) [0-10 mg/100g] > K2O (K2O)
sr (lowest) [0-1 : 3
r (low [1-2 mg/100g] : 2
s (middle [2-3 mg/100g] : 1
?..... : ?
r (low) [10-20 mg/100 : =1
s (middle) [20-40 mg/100 : 2
t (high) [40-60 mg/100 : 1
st (high price) [60-1 : =4
?..... : ?
r (low) [1-2 %] > P2O5 (P2O5)
sr (lowest) [0-10 mg/100g] > K2O (K2O)
sr (lowest) [0-1 : 3
r (low) [1-2 mg/100g] : 2
s (middle) [2-3 mg/100g] : 1
?..... : ?
r (low) [10-20 mg/100 : =1
s (middle) [20-40 mg/100 : 2
t (high) [40-60 mg/100 : 1
st (highest [60-1 : =4
?..... : ?
s (middle [2-3 %] > P2O5 (P2O5)
sr (lower) [0-10 mg/100g] > K2O (K2O)
sr (lower) [0-1 : 3
r (low) [1-2 mg/100g] : 2
s (middle) [2-3 mg/100g] : 1
?..... : ?
r (low) [10-20 mg/100 : =1
s (middle) [20-40 mg/100 : 2
t (high) [40-60 mg/100 : 1
st (highest) [60-1 : =4
?..... : ?

Figure 3. Decision tree to determine the level of land quality based on limiting factors (available nutrients)

Table 1. Rice Growth Requirements GOGO (Oryza sativa L)

Terms of Use/land characteristics	Enhancement class			
	S1	S2	S3	N
Temperature (tc)				
Average temperature (°C)	24 – 29	22 – 24 29 – 32	18 – 22 32 – 35	< 18 > 35
Water available (wa)				
Zone agroklimat (Oldeman)	C2,C3,D2,D3	A2,B2,B3	A1,B1,C1,D1, E1,D4,E2,E3	E4
Humidity (%)	33 – 90	30 – 33	< 30 > 90	-
Rooting Media (rc)				
Draimage	Well-Is	Quite-Quick, somewhat retained t	Somewhat-retained	Quick
Texture	Smooth, Farly delicate Is,	Smooth, Fairly delice Is,	ruder	Rude
Coarese Material (%)	< 15	15 – 35	35 – 55	> 55
Landt Deepth (cm)	> 50	40 – 50	25 – 40	< 25
Peat :				
Thicknes (cm)	< 50	50 – 100	100 – 150	> 150
Maturity	sapric	Sapric, hemic	hermic	Fibric
Nutrient Retendom (nr)				
CEC Soil (cmol)	> 16	5 – 16	< 5	-
Base satursion (%)	> 35	20 – 35	< 20	-
pH H_2O	5,5 – 7,5	5,0 – 5,5 7,5 – 7,9	< 5,0 > 7,9	-
C-organic (%)	> 1,2	0,8 – 1,2	< 0,8	-
Hara available (na)				
N total (%)	very	low	Very low	-
P2O5 (mg/100 g)	height	Very Low	low– very low	-
K2O (mg/100 g)	medium			-
Toksisity (xc)				
Salinity (dS/m)	< 2	2 – 4	4 – 6	> 6
Sodisity (xn)				
Alkalinity /ESP (%)	< 20	20 – 30	30 – 40	> 40
Sulfidic Hazard (xs)				
Sulfidic Depth (cm)	-	-	-	-
Danger of erosion (eh)				
Slope(%)	< 3	3 – 8	8 – 15	> 15
Danger of erosion		Very light-very lightway	low - Medium	Very weighty
Danger of flooding/ puddle in planning				
- Height (cm)	-	-	-	-
- Old (day)	-	-	-	-
Land Setup lp)				
Surface Rocks (%)	< 5	5 – 15	15 – 40	> 40
Rock Outwwhen (%)	< 5	5 – 15	15 – 25	> 25

RESULT DISCUSSION

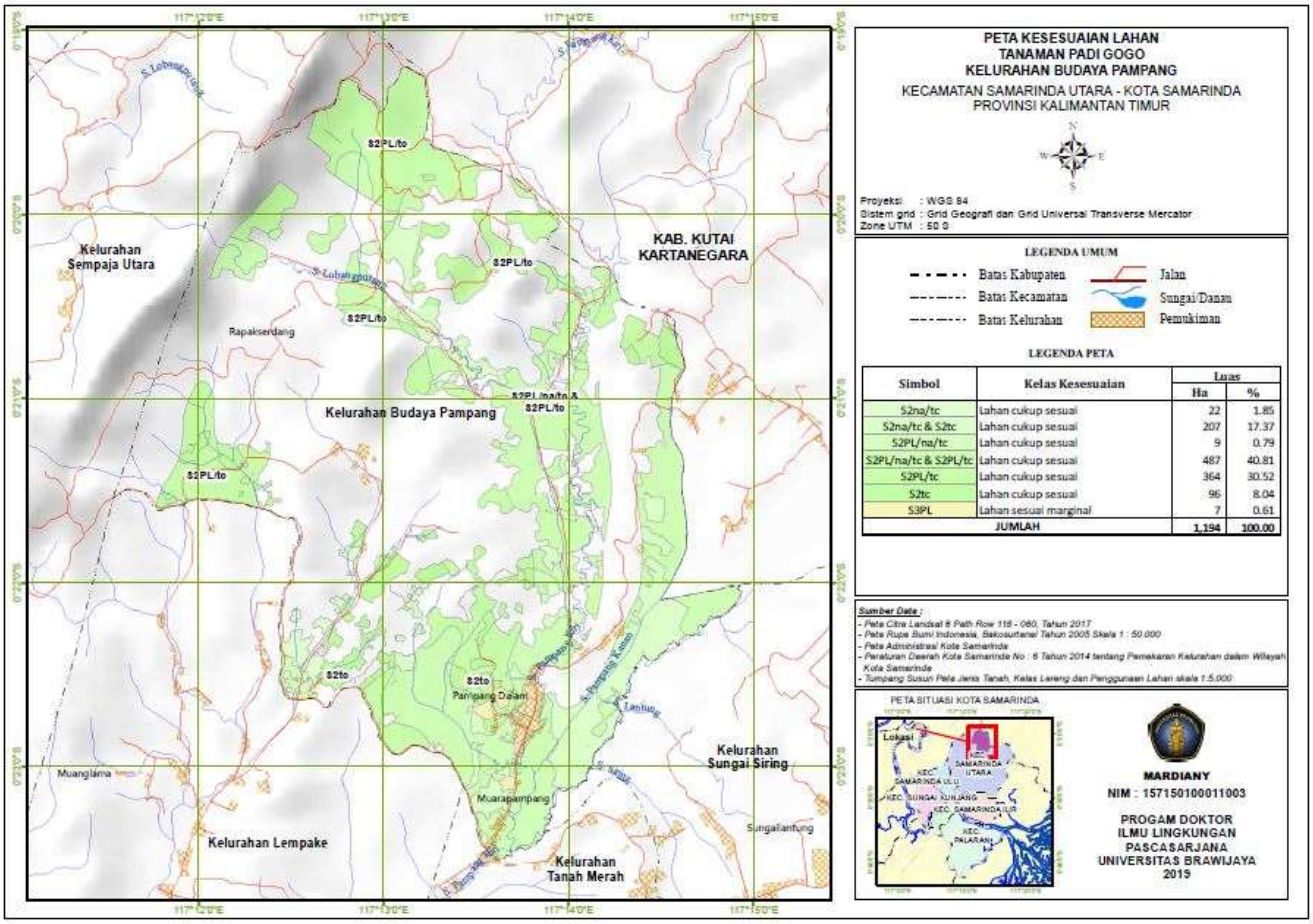

Figure 4. Map of Land Suitability of Gogo Rice Plant in cultural village Pampang

The results of the actual land suitability assessment at the Pampang Cultural Village study site showed that the dominant land suitability class in all LUTs was S2 (quite appropriate). On the map of suitability of dominant boundary land can be seen in Figure 3 namely available nutrients (na), temperature (tc) and rooting media (rc) with land suitability class S2 (quite suitable) with an area of 487 Ha or 40.81%. The availability of nutrients (N total and P205) is relatively easy to improve through liming and fertilizing according to commodity needs. Rainfall factors with high intensity in short periods, high slope, opening of natural / forest land cover, lack of soil conservation efforts, all cause high erosion. Soil texture is what influences the limiting factor of rooting media so it is difficult to overcome because it is also related to natural factors, which cannot be directly influenced by humans.

SUGGESTION

From the results of the land suitability analysis results in land suitability maps for upland rice in the Cultural Village of Pampang. The land suitability can then be overlayed spatially with the Samarinda City spatial map to determine the suitability of the land potential in other typical Kalimantan local plants. In addition, the recommendations need to consider the land allotment planned by the Samarinda City government

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