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FEASIBILITY ANALYSIS OF SUSTAINABLE CASSAVA FOOD ESTATE IN GUNUNGMAS REGENCY CENTRAL BORNEO PROVINCE

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ABSTRACT

The purpose of this study is to find the availability of land conformity for the development of cassava's food estate in Gunungmas regency. Gunungmas regency is one of the location targets for the development of food estates in Indonesia . The combination of multi criteria based on hierarchical analytical process analysis and geographic information system (GIS) to produce the map of land used availability and sustainable cassava's food estate land. The Principles that used to determine of food estate suitability are the sustainability criteria of economy, social and environmental . The data used was spatial data relating, and interviews with experts regarding the weight and value to determine the extent of the interest in the hierarchy analytical process. Weighting is done on each criterion based on its level of importance on land suitability. The value of all by virtue of conformity each sub criteria . The highest value represents an area that has a high level of suitability. The weighting overlay method was used to produce a land suitability map for a sustainable cassava food estate. The results of the study show that the available land for the development of a food estate in Gunungmas Regency is 33,799.15 Ha. Sustainable cassava food estate land suitability class is 31,496.21 Ha, very suitable 496.74 Ha, class is not suitable 1,806.21 Ha.

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1. INTRODUCTION

The national food burden is getting heavier with the Covid-19 pandemic outbreak. The joint statement of the G-20 Ministers of Agriculture at the Extraordinary Meeting (FAO, 2020) said that the pandemic had caused restrictions on movement within and across countries that hampered logistics services, disrupted the entire supply chain, and affected food availability. The impact of the pandemic on the movement of agricultural labor and input supplies poses new challenges and jeopardizes food security.

Food estate development is one way to meet national food needs and increase national logistics reserves. Food Estate is dedicated to creating food-agriculture centers by developing food commodities according to available land conditions. The Food Estate is the center for the production of food reserves from state-owned land.

At the Plenary Cabinet Meeting on May 5 2020, the Government of the Republic of Indonesia decided to build a National Strategic Food Reserve in the form of a Food Estate in Central Kalimantan. The purpose of the commodity being developed for the food estate is cassava because it has high adaptability and productivity. At the plenary meeting it was agreed on a land directive for the development of a food estate using forest land (Ministry of Defense, 2020).

Forests have social, economic and ecological functions (Arif, 2011). The development of a food estate on forest land will change land cover and use from initially forest cover to cassava plantation land. An activity will result in a change called impact (Soemarwoto, 2005). Conversion of land into other uses without regard to the biophysical conditions of the environment will not provide benefits, but instead cause losses that will be difficult to repair (Tarigan, 2005).

Spatial and environmental planning is a path that can be taken if you want development that is harmonious, harmonious, balanced and sustainable between social, economic and environmental aspects. Tarigan (2005) explains that the purpose of spatial planning is to create harmonious relationships

between various activities in a certain area in order to create harmonious and harmonious relationships to accelerate the process of achieving prosperity and ensuring environmental sustainability.

From the description above, this study aims to

1. Knowing the availability of land for the development of cassava *food estate* in Gunungmas Regency.
2. Develop land suitability for a sustainable cassava *food estate* in Gunungmas Regency.

2. METHOD

The location of this research is in Gunungmas Regency, Central Kalimantan Province. The research was carried out in February 2022. The tools used included laptops that had ArcGis 10.5 software installed to help the process of mapping potential land, Microsoft Word to compile scientific papers, Microsoft Excel to process research data. Materials used for analysis of the availability and suitability of sustainable cassava food estate land.

The data collection method used is the method of literature study and questionnaires. Literature study is a research method in which researchers diligently examine the literature needed in research (Syukwansyah 2016). Questionnaire is a data collection technique that is carried out by giving a set of questions or written statements to respondents to answer. This questionnaire is used to determine the hierarchy in the Analytical Hierarchy Process (AHP).

The data collected includes the Gunungmas District Administration Map, forest area function map, indicative map of delays in granting new permits, land map of agrarian reform objects, forest area permit map, peat area map, cassava land suitability map in Gunungmas district, road network map, map slopes, soil type maps, land cover and land use maps and Gunungmas Regency in Figures 2022.

Data processing techniques are carried out to determine the availability of land for food estate development using overlays. Overlay analysis is a spatial analysis method that is done by performing a join operation and displaying it together or in the same map area (Handayani et al . 2005). The overlay results will produce two classes of land, namely available land and unavailable land. Available land is land that can be used for the development of a food estate because it is not burdened with management permits.

The development of cassava food estate is carried out using a GIS approach based on Multi Criteria Analysis. The method for compiling multi criteria analysis is the Analytical Hierarchy Process . The goal to be achieved is a sustainable cassava food estate . The principles of sustainability used are the principles of economic, social and environmental sustainability. Table 1 shows the criteria, sub criteria and indicators that make up the principle of sustainability.

Table 1 Principle continuity social arranged with criteria potency conflict and availability power work .

Goals	Principle	Criteria	Sub Criteria	Indicator	Source
Land Suitability for Sustainable Cassava *Food Estate Development*	Social	Labor Availability	Highly Available Available Less Available	Class calculations and class intervals of productive age on available land are based on sub-district administration.	BPS Kab . Gunungmas 2022 and RBI
		Potential Conflict	Tall	Land Cover and Land Use in the form of dry swamp forest, primary swamp forest, and secondary swamp forest	KLHK
			Currently	Land Cover and Use in the form of shrubs, swamp thickets and open land	
			Low	Land Cover and Land Use in the form of plantations, mining, agriculture, and mixed dryland agriculture	
	Economy	Land suitability	Perfect fit	S1	Department of Agriculture Kab . Gunungmas

		Corresponding	S2	
		Less Appropriate	S3	
		It is not in accordance with	N	
	Accessibility (m)	Very close	0 - 500 m	RBI
		Close	500 - 1000 m	
		Far	1000 - 1500 m	
		Somewhat Far	1500 - 2000 m	
		Very far	>2000	
	Slope (%)	Flat	0 – 8	DEM
		Sloping	8 – 15	
		Rather Steep	15 – 25	
		Steep	25 – 40	
		Very Steep	Over 40	
Environment	Soil Sensitivity to Erosion	Not sensitive	Alluvial, glei soil, planosol, gray hydromorph, leterite groundwater	
		Less Sensitive	Latosol.	
		Somewhat sensitive	Brown forest soil, celeic brown, mediterranean.	
		Sensitive	Andosol, leterite, grummusol, podsol, podzolic.	
		Very Sensitive	Regosol, litosol, organosol, renzina.	

The preparation of AHP will involve 3 experts. Implementation of the AHP assessment using pairwise comparisons from Saaty (2008). Each pair of criteria is assessed according to the level of importance with a value of 1 – 9. The higher the weighted number indicates that the criterion has a higher level of importance than the other criteria. The results of the process are measured with a *consistency ratio* (CR) of 10% (Saaty, 2008). The weighting and scoring numbers are carried out by experts. The weighting on the principles and criteria provided by the expert is then normalized according to the Malczewski formula (1999).

$$W_j = \frac{(n - r_j + 1)}{\sum (n - r_k + 1)}$$

Wj = normal weight for principles / criteria jth
n = amount moderate principles / criteria _ considered (k = 1,2, ..., n)
rj = rating position principles / criteria j
rk = position ranking principles / criteria k

Values are awarded based on the contribution of each sub-criteria to land suitability for the development of a sustainable cassava food estate . The range of the highest score of 10 is given to the sub-criteria that really influences the goals to be achieved while the lowest score is given to the sub-criteria that has little effect on agricultural land. Some sub-criteria can be given a value of 0, this is done as an indication that these sub-criteria cannot be used (Widiatmaka et al . 2016).

The weighting results are used to make land suitability maps for sustainable cassava food estates . The land suitability map is made by multiplying the weight of the criteria and the values of the sub criteria. The suitability is then divided into three classes: very suitable, suitable, marginally suitable and not less suitable by dividing the same quartiles, according to the equation below (Cengiz and Akbulak, 2009; Widiatmaka et al, 2016):

$$S = \sum_{i=1}^{n} Wi\, Xi$$

Description :
S = Sustainability
Wi = Weight Criteria Continuity
Xi = Criteria Score Continuity

n = Criteria Continuity

3. RESULT AND DISCUSSION

Land availability based on spatial pattern allocation, area status and actual use needs to be known to find the most appropriate available location. Locations that can be categorized as available land are forest lands that can be converted to agricultural land and are not burdened with management permits. Other areas besides that can be categorized as unavailable land.

The total land area available for food estate development is 33,799.15 Ha. The location of the available land for the development of cassava food estate in Gunungmas Regency is spread over 4 sub-districts namely Kurun, Mihing Raya, Rungan, Sepang Simin Districts. The most widely available land is in Mihing Raya District with an area of 12,570.29 Ha. Mihing Raya, Rungan, and Sepang Simin sub-districts have an area of 4,666.40 Ha, 8,002.87 Ha, and 8,559.59 Ha, respectively (Figure 1).

The land available for the development of a sustainable cassava food estate has the status of a forest area in the form of Production Forest and Conservation Production Forest. Available land for the development of sustainable cassava food estate is dominated by area functions in the form of Production Forest with an area of 31,795.95 Ha or 94.07% of the available land area. Land available with area status in the form of Convertible Production Forest covering an area of 2,003.20 Ha, (5.93%)

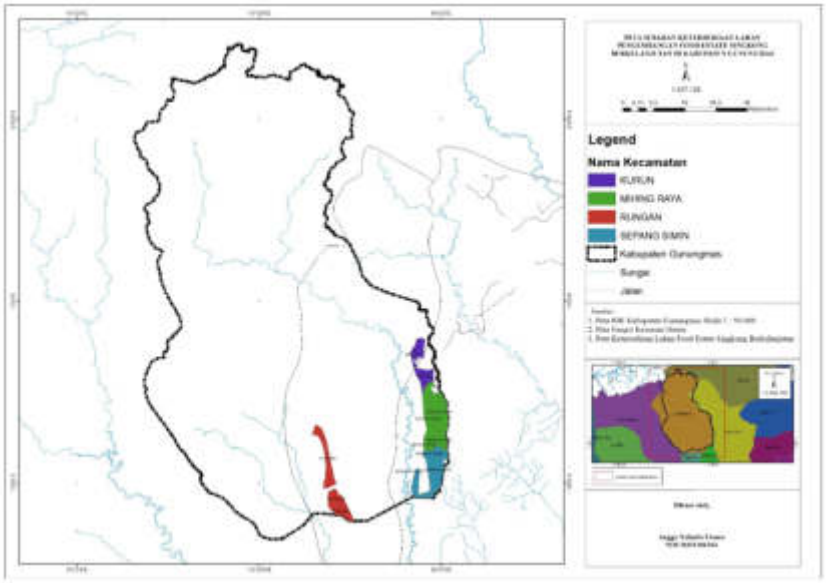


Figure 1 Availability Map Land *Food Estate*

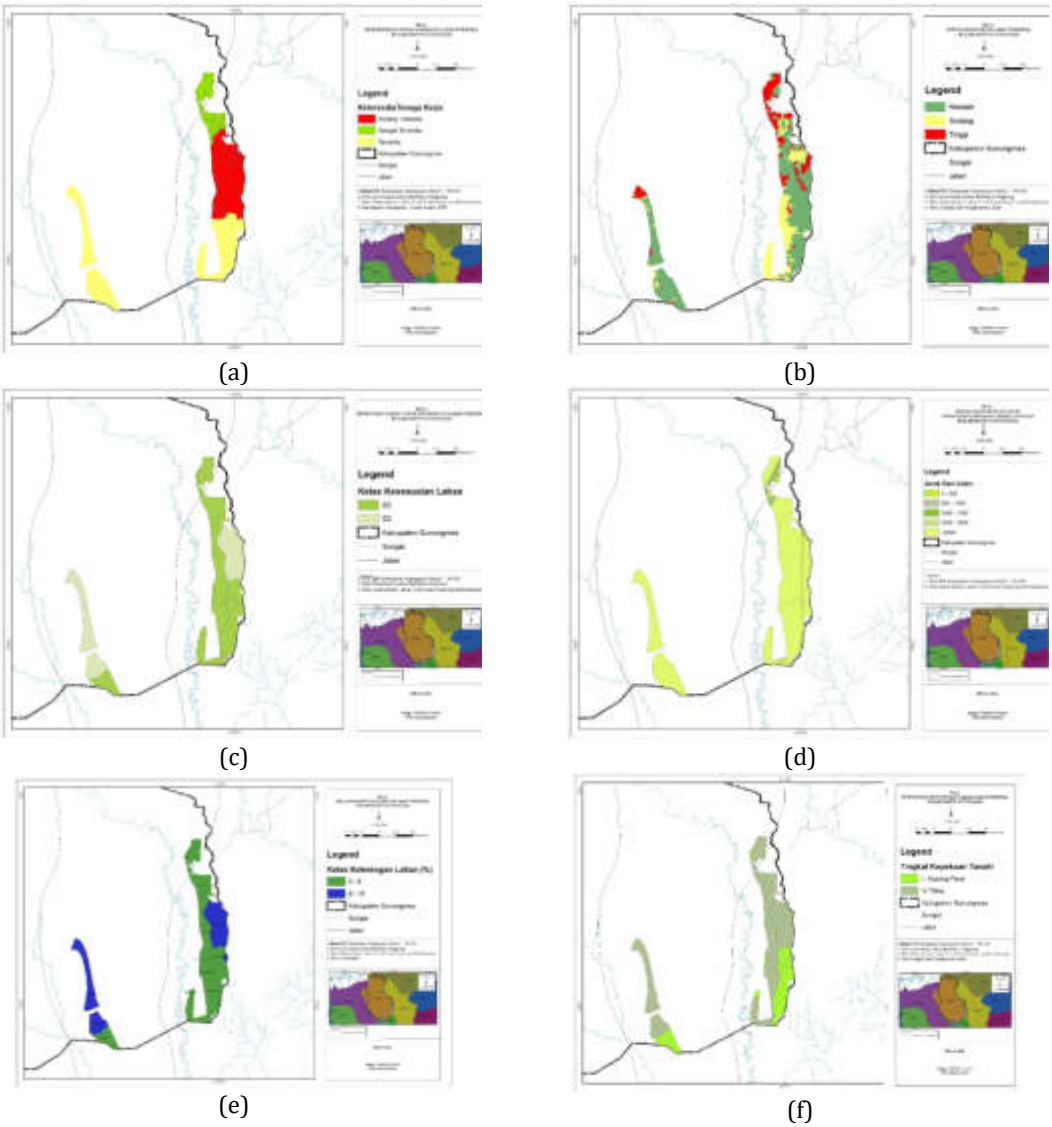
suitability Cassava Food Estate Land Sustainable

Analysis of land availability and suitability for the development of a sustainable cassava food estate in Gunungmas Regency uses the principle of sustainability. The principles of sustainability used are social sustainability, economic sustainability, and environmental sustainability. The criteria for social sustainability are the availability of labor on available land and potential conflicts.

The criteria for economic sustainability are access to available land and the suitability of available land for cassava plants. Locations that are closer to road access will have high economic value because they will reduce transportation costs. The land suitability sub-criteria, the higher the land suitability level will have high economic value, because it will have a high level of productivity, besides that when compared to land that is not suitable, land that has high suitability will minimize inputs to obtain the same results.

The criterion for environmental sustainability is the sustainability of soil nutrients. Sustainability of soil nutrients is approached by the rate of erosion. Erosion is the movement or transport of parts of the soil from one place to another by natural media, namely water and soil (Arsyad, 2006). Arsyad (2006) said that evaluation of erosion can be approached by analyzing climate, topography and soil sensitivity to erosion. This study uses topographical parameters and soil sensitivity to erosion alone to measure the rate of erosion because the level of rainfall in the study locations is the same.

Spatially, in terms of labor availability, available land is dominated by available labor availability. This illustrates that available land has a potential number of workers of high productive age who are unemployed. The potential for conflict in available land is dominated by low conflict potential, which indicates that if the land is managed, the conflict of interest of the surrounding community that triggers conflict is low. The physical suitability of the land in the available land is dominated by the suitable category, which shows that the soil nutrient content is suitable for the development of cassava plant species. The accessibility of the available land is dominated by the very remote land access class, which means that the land is very far from the main road access. Meanwhile, the available land slope class is dominated by the slope class which is in the flat category, this shows a low level of erosivity because the steeper the slope also increases the speed of surface runoff which causes the greater surface flow transport energy (Arsyad, 2006). The sensitivity of the soil to erosion is dominated by the insensitive sensitivity class, this means that the level of erosivity is low because the sensitivity of the soil, namely the ease with which the soil erodes is a function of various interactions of the physical and chemical properties of the soil (Arsyad, 2006) and the type of soil in the land available in the classification according to SK. Minister of Agriculture No. 837/KPTS/Um/11/1980 concerning Criteria and Procedures for Designating Protected Forests in this category.



(a) (b) (c) (d) (e) (f)

Figure 2 (a) Labor availability map (b) Potential map Conflict (c) Class conformity Land Sinkong (d) Accessibility Map To Land (e) Class Map Restrictions (f) Class Map Soil Sensitivity To Erosion

Land characteristic maps are available according to the criteria selected above, overlaid and weighted and graded according to the AHP results which have been given weights and scores by experts. The results of the weighting will be classified as land suitability. Land suitability classification for sustainable cassava food estate development is classified into three classifications, namely very suitable, suitable and less suitable. From the results of spatial analysis on available land, there are three suitability classifications. The results of weighting carried out by experts have a *Consistency Index of* 0.08 , *Random Index of* 1.24, and *Consistency Ratio of* 0.07. With a CR value ≤ 0.1, the calculation results can be declared usable. The results of the weighting and assessment of the criteria and indicators show that the criteria for potential conflict and land suitability have a greater weight than the weights on other criteria, this shows that these criteria have a greater influence when compared to other criteria (Table 2).

Table 2. Suitability Land *Food Estate* Cassava Sustainability in the District Gunungmas

Principle	Criteria	Weight	Sub Criteria	Score	Area (Ha)
Social	Labor Availability _	0.08	Highly Available	10	4.666.40
			Available	6	16.562.46
			Less Available	3	12,470.29
	Potency Conflict	0.31	Low	10	20,409.48
			Currently	6	7,965.67
			Tall	3	5,423.99
Economy	suitability Land	0.29	Perfect fit	10	0
			Corresponding	8	21,969.60
			Less Appropriate	6	11,829.58
			Not Corresponding	4	0
	Accessibility (m)	0.14	Very Close	10	280.4
			Close	8	309.25
			Far	6	451.66
			Rather Far	4	545.98
			Very Far	2	32,231,86
Environment	Slope (%)	0.11	Flat	10	21,969.60
			Sloping	8	11,829.55
			Rather Steep	6	0
			Steep	4	0
			Very Steep	0	0
	Soil Sensitivity To Erosion	0.08	Not Sensitive	10	0
			Less Sensitive	8	25,350.77
			Rather Sensitive	6	0
			Sensitive	4	8,448.41
			Very Sensitive	2	0

The results of the analysis show that the land available for the development of a sustainable cassava *food estate* has the majority of land suitability classifications suitable for the development of a sustainable cassava *food estate* . The appropriate classification has a percentage of 93.19% or 31,496.21 Ha. The highly suitable suitability class is 496.74 Ha (1.47%) and the less suitable class is 1,806.21 Ha (5.34%) (Table 3).

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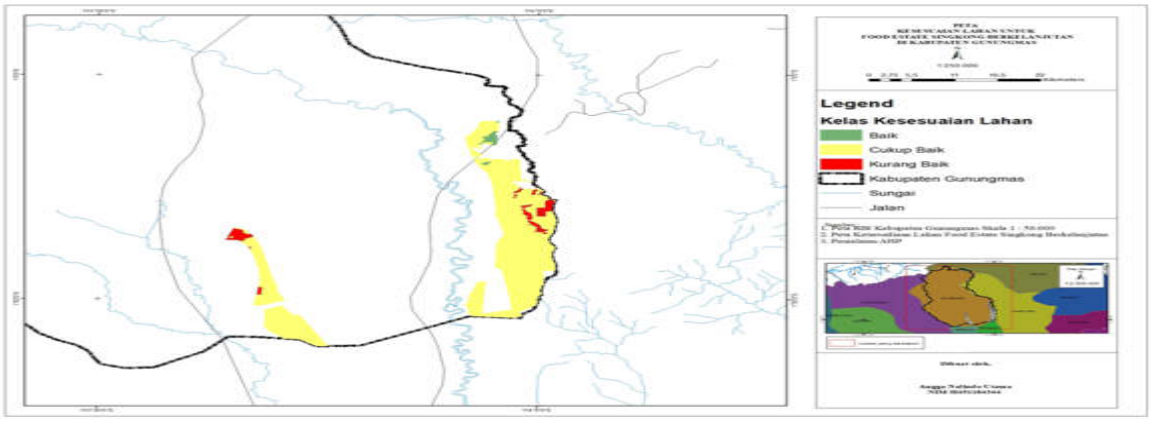

Figure 3. Suitability Map *Food Estate* Cassava Sustainable

Table 3 Conformity Land *Food Estate* Cassava Sustainable

Class suitability Land	Area (Ha)	Percentage (%)
Perfect fit	496.74	1.47
Corresponding	31,496.21	93,19
Less Appropriate	1806.21	5,34
Amount	**33,799.15**	100

4. CONCLUSION

Based on the research results in the discussion, the following conclusions are obtained: In Gunungmas Regency there is land for the development of a sustainable cassava food estate with an area of 33,799.15 Ha. Land suitability classes for sustainable cassava food estate development in Gunungmas Regency are Highly Suitable Classes 496.74 Ha, Suitable 31,496.21 Ha, and Less Suitable 1,806.21 Ha.

REFERENCE

[1] Arif SA. 2011. *Forests and Forestry . Publishing Canisius* . Yogyakarta
[2] Arsyad , S. 2006. *Soil and Water Conservation* . IPB. Bogor
[3] Cengiz T. and C. Akbulak . 2009. *Application of analytical hierarchy process and geographic information systems in land-use suitability evaluation: a case study of Dümrek village (Çanakkale , Turkey)* . International Journal of Sustainable Development & World Ecology 16 (4): 286-294.
[4] [FAO] Food and Agriculture Organization. 2000. *Strategic environmental assessment. An assessment of the impact of cassava production and processing on the environment and biodiversity, 5: 1-136* . Proceeding of the validation forum on the global cassava development.
[5] Handayani D, Soelistijadi R, Sunardi . 2005. *Utilization analysis spatial for information system spatial data processing geography , study case Regency Malang* . J Technol Inf Din. 10(2):108–116.
[6] Ministry of Defense] Ministry Defense . 2020. *Manuscript Cassava Program Policy as a Food Reserve National Strategic* . Jakarta.
[7] Malczewski J. 1999. *GIS and Multicriteria Decision Analysis* . John Willey and Son, Inc. Canada.
[8] Saaty T. 2008. *Decision Making with the Analytic Hierarchy Process* . int. J. Services Sciences 1(1): 83 – 98.
[9] Soemarwoto O. 2005. *Analysis About Impact Environment* . Gadjah Mada UniversityPress . Yogyakarta
[10] Syairozi, M. I., Aziz, K. F., & Taufiqqurrachman, F. PENGARUH LIKUIDITAS, SOLVABILITAS DAN PROFITABILITAS TERHADAP PERTUMBUHAN LABA PERUSAHAAN (Studi Kasus: Terhadap Perusahaan Sektor Percetakan, Periklanan dan Media, Tahun 2016-2020).
[11] Syairozi, M. I. (2017, September). ANALISIS PAJAK DAN VARIABEL MAKROEKONOMI TERHADAP PENERIMAAN PAJAK PERNGHASILAN. In *Seminar Nasional Sistem Informasi (SENASIF)* (Vol. 1, pp. 338-350).
[12] Taridala Y and Adijaya S. 2002. *Pranata People's Forest* . Press debut. Yogyakarta.

[13] Widiatmaka . 2016. *Integrated use of GIS, AHP and remote sensing in land use planning for tropical high altitude vegetable crops* . Journal of Applied Horticulture 18 (1)