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Land Suitability and Proposed Land Utilization of Selaru Island, West Southeast Moluccas Regency for Development Food Crops

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ABSTRACT

The study was conducted in Selaru Island, West Southeast Moluccas Regency in an area of 32,217 ha. The research objective was to determine the land suitability and proposed land utilization of Selaru Island for development of food crops. The results showed that Selaru Island has a rather suitable (S2) and marginally suitable (S3) for six crops (upland rice, corn, peanuts, mungbeans, sweet potato, and caladium) covering an area of 19,330 ha and not suitable permanent (N2) for the six crops covering an area of 3,905 ha, while the area of 8,982 ha partly classified accordingly (S3) to plant upland rice and calladium and partially classified as not suitable (N1 and N2) for corn, peanuts, mungbeans, and sweet potatoes. The main limiting factor to the primary land use for food crops in Selaru Island, West Southeast Moluccas Regency among others are the temperatures (the average annual temperature is high), rooting medium (soil solum is shallow), nutrient retention (soil pH is rather alkaline to alkaline), erosion hazard level is moderate, and terrain (wave, rocks on the surface of the soil, and rock outcrop).The proposed land utilization of Selaru Island for food crops based on land suitability classes are (1) food crops of upland-1 with the main commodities of corn, mungbeans, uwi/kumbili and caladium an area of 5,299 ha, (2) food crops of upland-2 with the main commodities of upland rice, uwi/kumbili and caladium an area of 8,982 ha, and (3) food crops of upland-3 with the main commodities peanuts and mungbean an area of 14,031 ha. Development of food crops in Selaru Island need to consider the priority scale factor, the level of compliance, and social culture of the local community.

Keywords**:** Food crops, land suitability, limiting factor, proposed land utilization, Selaru Island

ABSTRAK

Penelitian dilakukan di Pulau Selaru, kabupaten Maluku Tenggasra Barat pada areal seluas 32.217 ha. Tujuan penelitian adalah untuk mengetahui kelas kesesuaian lahan dan arahan penggunaan lahan Pulau Selaru untuk pengembangan tanaman pangan. Hasil penelitian menunjukkan bahwa Pulau Selaru memiliki lahan yang agak sesuai (S2) dan sesuai marginal (S3) untuk enam jenis tanaman pangan (padi gogo, jagung, kacang tanah, kacang hijau, ubi jalar, dan keladi) seluas 19.330 ha dan yang tidak sesuai permanen (N2) untuk keenam jenis tanaman pangan seluas 3.905 ha, sedangkan lahan seluas 8.982 ha sebagian tergolong sesuai (S3) untuk tanaman padi gogo dan keladi dan sebagian tergolong tidak sesuai (N1 dan N2) untuk tanaman jagung, kacang tanah, kacang hijau, dan ubi jalar. Faktor pembatas utama penggunaan lahan Pulau Selaru, Maluku Tenggara Barat ntuk tanaman pangan antara lain adalah temperatur tinggi, media perakaran (solum tanah dangkal), retensi hara (pH tanah agak alkalis sampai alkalis), tingkat bahaya erosi sedang, dan terrain (berombak, batuan pada permukaan tanah dan singkapan batuan). Arahan penggunaan lahan Pulau Selaru untuk tanaman pangan berdasarkan kelas kesesuaian lahan adalah (1) tanaman pangan lahan kering-1 dengan komoditas utama jagung, kacang hijau, uwi/kumbili dan keladi seluas 5.299 ha, (2) tanaman pangan lahan kering-2 dengan komoditas utama padi gogo, uwi/kumbili dan keladi seluas 8.982 ha, dan (3) tanaman pangan lahan kering-3 dengan komoditas utama kacang tanah dan kacang hijau seluas 14.031 ha. Pengembangan komoditas tanaman pangan di Pulau Selaru perlu mempertimbangkan faktor skala prioritas, tingkat kesesuaiannya, dan sosial budaya masyarakat setempat.

Kata kunci**:** Arahan penggunaan lahan, faktor pembatas, kesesuaian lahan, tanaman pangan, Pulau Selaru

INTRODUCTION

The problem of selecting the correct land for the cultivation of a certain agriculture product is a long standing and mainly empirical issue (Pirbalouti *et al*. 2011). Although many researchers and institution have tried to provide a framework for optimal agricultural land use, it is suspected that much agricultural land used currently is below its optimal capability in different part of the word (Esa 2014). Agricultural development is not only geared for food needs but also as a medium of exchange, so that the emphasis is not only on the production aspect, but more geared towards quality, efficiency, highly competitive, and sustainable. According to Suartha (2002), agricultural development must be laid as the main base in the response to the crisis, in which agricultural development policies should place the people as the centered in development.

Agricultural development is expected to continue to be able to establish self-sufficiency through sustainable agricultural development by utilizing science and technology. In an environment that is more narrow, agricultural development is expected to improve public access of farmers to agricultural production factors, especially the source of funds, technology, seeds, fertilizers, and distribution system, so a direct impact on improving the welfare of farmers.

Hafsah (2005) stated that agricultural development is already time to be implemented using the paradigm that is born from the realization that the management of natural resources that are not controlled because of the encouragement of economic incentives and technologies that are not environmentally friendly can cause environmental damage.

Use and utilization of land resources optimally match the carrying capacity can only be made if the available information regarding the suitability of the land. Potential of a region for an agricultural development is essentially determined by the match between the physical properties of the environment and land use requirements or the requirements of the plants grow. Compatibility between the physical properties of the environment of a region with terms of use or commodities evaluated give an idea or information that the land potential to be developed for these commodities (Department of Agriculture 1997).

Data and information resources of soil and climate are an important component in supporting regional development, especially in the planning area through the selection of potential areas for agricultural development. According Wahyunto *et al*. (1994) to determine the areas that have the potential for agricultural development in an optimal, balanced and sustainable resource data required land acquired through land suitability evaluation.

Land evaluation is a procedure that involves a lot of information which is distinguished by its geographic and multivariate character (FAO 1996). According to Dent and Young (1981), land evaluation is the process of estimating the potential of land for various alternative use; is one of the important components in the process of land use planning (FAO 1976). Continuous utilization of agriculture land in past decades, regardless of land suitability has caused much more destruction than provide the resources (FAO 1976; 1983; 2007). Elsheikh *et al*. (2013) state that proper evaluation based on agriculture land use planning is essensial to solve this problem.

The suitability of land or the suitability of the land is a way of classification of a land suitability for particular uses (FAO 1976). While the land suitability classification is the process of assessment and grouping of units of land according to its suitability for a particular use (Hakim *et al*. 1986). One of the systems used in land suitability study is the framework for land sustainability evaluation of the FAO. Wood and Dent (1983) reported that the land evaluation computer system (LECS) based upon the FAO framework for predicting local crop yiels has been used to assess the land suitability for a variety of crops.

Every agricultural commodities to be able to grow and produce requires a certain growing conditions. According Djaenudin *et al*. (2003), commodities are cultivated on land in accordance with the requirements of the growth will be able to produce optimally with excellent quality and require a relatively low input. Therefore, the potential and suitability of land as well as an inhibiting factor for the development of a commodity to be determined need to know the most appropriate commodities (Rossister and van Wambeke 1997). The potential of land for agricultural use is determined by an evaluation of the climate, soil and topographical environmental components, and the understanding of local biophysical restraints (Ceballos-Silva and Lopez-Blanco 2002).

Selaru Island is one of the central areas of crop production where is located in West Southeast Moluccas Regency. The island is also great potential for the development of crops and tubers (Regional Goverment of West Southeast Moluccas Regency 2004). Food security of the future will be more weight given the level of fertility of agricultural land is diminishing in addition to the environmental quality is declining (Noerwijati *et al*. 2003). Commodity crops is an alternative source of food in relation to the diversification of food, so that the handling of these commodities should be more focused (Hardiningsih *et al*. 2001).

This study aimed to determine land suitability classes and direction of land use of Selaru Island, West Southeast Moluccas Regency for development of food crops.

MATERIALS AND METHODS

Study Sites and Preparation

Land suitability evaluation of Selaru Island, West Southeast Moluccas Regency was performed in an area of 32,217 ha. Geographically of Selaru Island is located at 08°00'- 08°25' South Latitude (SL) and 130°37 '- 131°15' East Longitude (EL).

Materials used are Geological Map sheets of Tanimbar Islands in 1981, Indonesia Systematic Geological Map Sheet (Quardrangle): Tanimbar Island 2807, 2808, 2809, 2907, 2909 scale of 1: 50.000, Joint Operations Graphic scale of 1: 250,000, Topographic maps scale 1: 63,360 in 1946, Map of Forest Areas and Water of Moluccas scale of 1: 250,000, and Map AEZ Sheet Clustered Tanimbar Islands a scale of 1: 250,000. While research tools that were used include Trough pH, Stick pH, alpha-alpha Dipyridyl, hydrogen peroxide, drill ground, Munsell color chart, and other equipment.

Land suitability assessment

Land suitability assessment was carried out by matching the qualities/characteristics of the land by plants growing requirements. Land suitability assessment framework refers to the Framework of Land Evaluation (FAO 1976), while the assessment procedures following the Format Atlas Method (CSR/FAO 1983). Guidelines for land suitability assessment refers to the criteria of land suitability for agricultural commodities (Djaenudin *et al*. 1994; Department of Agriculture 1997). Land quality/characteristics assessed consists of the water availability, rooting media, nutrient retention, toxicity, sodositas, terrain/erosion, flooding or inundation hazard.

Land suitability assessment levels were differentiated as follows, namely the Order, consisting of suitable (S) and is not suitable (N); Class, consisting of very suitable (S1), quite suitable (S2), marginally suitable (S3), it is not appropriate at this time (N1), and is not suitable permanent (N2); and sub-class, differentiated by the limiting factor on each class, ie r = rooting medium; f = nutrient retention; t = temperature; e = dangerous of erosion; m = mechanization; and n = nutrients available.

Land Classification

Observation data were recorded in the field consisting of site information, descriptions horizon, and soil classification (Hoff *et al*. 1994). Land was classified up to the level of a subgroup to follow the system Soil Taxonomy (Soil Survey Staff 1998). The evaluation process was conducted using qualitative land by way of matching that compares the physical factors quality and land on the dominant soil characteristics in each Soil Map Unit (SMU) with the requirements of growing plants (Djaenudin *et al*. 2003).

RESULTS AND DISCUSSION

Condition of Land Resources

The soil in the study area varies considerably with flat area shape, wavy to bumpy, soil solum somewhat deep to deep, whereas in hilly areas generally have shallow soil solum. Based on

Table 1. Classification of land up to the level of a subgroup (Soil Survey Staff 1998).

Ordo	Grup	Subgrup
Entisols	Ustorthents	Lithic Ustorthents
	Udipsamments	Typic Udipsamments
		Aquic Udipsamments
	Udifluvents	Typic Udifluvents
	Hidraquents	Typic Hidraquents
Mollisols	Haplustolls	Typic Haplustolls
		Lithic Haplustolls
	Haprendolls	Lithic Haprendolls
Alfisols	Hapludalfs	Mollic Hapludalfs

Table 2. Number of soil map unit (SMU), soil classification, proportion, landform along with its range in Selaru Island, West Southeast Moluccas Regency.

No. SMU	Soil Classification (Soil Taxonomy, 1998)	Proportion	Landform	Elevation (m asl)	Relief	Slope (%)	Parent material	Area	
								Ha	%
1	*Konsosiasi :* Typic Udipsamments	P	Beach sand flats	0-3	Flat	0 – 2	Marine sediment	1,947	6,04
2	*Asosiasi :* Mollic Hapludalfs Typic Haplustolls	D F	Plain–tectonic hills (terrace force)	50-80	Wavy – hilly	3 – 25	Napal, Limestone/ coral	5,299	16,45
3	*Asosiasi :* Typic Haplustolls Typic Udipsamments	D F	Tectonic plain (terrace force)	20-30	Bit flat – wavy	3 – 8	Limestone/ Coral	3,342	10,37
4	*Kompleks :* Typic Haplustolls Lithic Haplustolls Lithic Usthortents	F F F	Plain–tectonic hills (terrace force)	3-15	Flat – wavy	0 – 8	Limestone/ Coral	7,196	22,34
5	*Asosiasi :* Typic Hidraquents Aquic Udipsamments	D F	Estuarine plains along the coast and estuaries	3-6	Flat	0 – 2	Marine sediment dan coral	1,817	5,64
6	*Asosiasi :* Aquic Udipsamments Typic Hidraquents	D F	Plains along the coast estuarine	0-1	Flat	0 – 2	Marine sediment	141	0,44
7	*Asosiasi :* Typic Udifluvents Typic Udipsamments	D F	Plain	1-2	Flat – bit flat	0 – 3	Marine sediment	1,917	5,95
8	*Asosiasi :* Typic Udifluvents Typic Hidraquents	D F	Estuarine plains along the coast and estuaries	1-4	Flat	0 – 2	Marine sediment	3,723	11,56
9	*Kompleks :* Lithic Usthortents Lithic Haplustolls Lithic Haprendolls	F F F	Tectonic hills	5-10	Wavy - hilly	3 – 25	Limestone/ Coral	6,835	21,21

morphological observations in the field and supported by data from chemical analysis, land in the study area are classified according to Soil Taxonomy (Soil Survey Staff 1998) at the level of orders as follows: Entisols, Mollisols, and Alfisols. The division in more detail at the level of sub-groups are presented in Table 1.

The legend of the soil map review the depth scale 1: 63 360 of Selaru Island, West Southeast Moluccas Regency. Moluccas Province is divided into 9 soil map units, which consists of 4 soil maps units evolved from materials deposition marine form of the sand beaches, plains estuarine along the coast and estuaries, estuarine plains along the coast, the tidal estuary and along the coast and 5 soil map units formed from materials marl, limestone/coral and limestone shells which are plains and hills tectonics. The legend of the soil map depth review the scale of 1: 63 360 are presented in Table 2.

Hydrological conditions in the study area is highly dependent on rainfall. The rivers are very limited and the area is generally dry in the dry season. Rivers generally are narrow and short and empties directly into the sea. The use of river water for agriculture is not there, so that in general farming system relying solely on rainwater.

Based on data from the Saumlaki Meteorological Station, the average rainfall per year between 1,000-2,000 mm with the average temperature is 27.4°C (23.8°C minimum and maximum temperature 31.1°C) (Table 3). According Oldeman *et al.* (1981), the survey area is included in the climate zone C3 with wet months and dry months, each 5-6 months and 4-5 months, respectively.

Land Suitability

The principle of agriculture land suitability evaluation is to predict the potential and limitation of the land for crop production (Pan and Pan 2012). He *et al.* (2011) reported that the agriculture land suitability assessment is defined as the process of assessment of land performance when used for

Table 3. Climate Data in the last 10 years in Selaru Island, West Southeast Moluccas Regency.

Month	Temperature (° C)			Number of Rainfall (mm per month)	Number of rainy day (days)	The humudity relative (%)	Wind speed (Knot)	
	Maximum	Minimum	Average				Average	Maximum
January	32.0	24.6	28.1	252	20	84	7	28
February	31.9	24.2	27.7	337	17	86	5	20
March	31.2	23.6	27.3	259	14	83	6	40
April	31.4	24.4	28.1	82	12	80	5	20
May	30.2	23.6	27.1	384	15	81	6	25
June	29.7	23.7	26.7	230	12	79	7	18
July	29.3	23.3	26.4	46	17	77	8	20
August	29.4	22.9	26.0	14	9	79	7	18
September	30.4	23.2	26.7	0	0	78	8	18
October	32.1	23.8	28.0	0	0	77	4	15
November	33.3	24.7	28.9	8	4	75	5	18
December	32.4	24.1	28.2	188	16	83	5	31

Source: Saumlaki Meteorological Station

alternative kinds of agriculture. Determination of land suitability classes based on quality parameters and characteristics of the land consists of climate or availability of water, rooting media, nutrient retention, terrain conditions, toxicity, and the danger of flooding. According to Sonneveld *et al.* (2010); Martin and Saha (2009), land evaluation is a process of predicting land performance over time according to the specific types of use. These parameters assessed by the growing requirements for some food crops. Below is described the quality and characteristics of the land area of research.

Climate Conditions

Based on data from Saumlaki Meteorological Station which located in Yamdena, Tanimbar Regency, the average annual rainfall of 1,000-2,000 mm per year with air temperature 27.4°C and average dry month of 4-5 months. The rainy season ranged from December to March, then dried in April, and rainfall increased again in May and June. The dry season occured during July to November. Timing and cropping patterns were carefully required to obtain optimum production.

Rooting Media

Characteristics of assessed land were composed of drainage, texture, effective depth, and vertic nature. Drainage as the limiting factor was only found in the coastal plain in the Hidraquents and Aquic Udipsamments soil that had impeded drainage to be severely hampered, and the Typic Udipsamments land that has drainage fast to very fast. While other lands had good drainage and did not have a limiting factor on land use. Textural characteristics as the limiting factor was only found in Udipsamments soil that had textured sand, while the other lands had textured until smooth. While, the effective depth characteristic found in most of the study area was shallow solum which above had limestone/coral. Characteristics of this land will be a major limiting factor for the development of plantation crops that have deep root systems. Characteristics vertic properties were not found in the study site, which was a hazard in the event of significant drought.

Nutrient Retention

Characteristics of the assessed land was composed of cation exchange capacity, base saturation, and ground reaction. The research area is characterized by the value of cation exchange capacity which is moderate to very high, and some shows low values, while the base saturation is very high. The reaction is generally slightly alkaline soil until alkalis. Based on the characteristics of the land, slightly alkaline soil reaction to alkalis and base saturation is too high can be a limiting factor of land use in this area. The content of limestone that is too high (calcareous) also can interfere with the growth of crops.

Nutrient Availability

The availability of N, P, K and Organic-C in the study site was generally included in the category low to very high (average height), and was not a major limiting factor in assessing land suitability classes. This condition caused the value of the soil fertility status among the sites included in the category of medium to high.

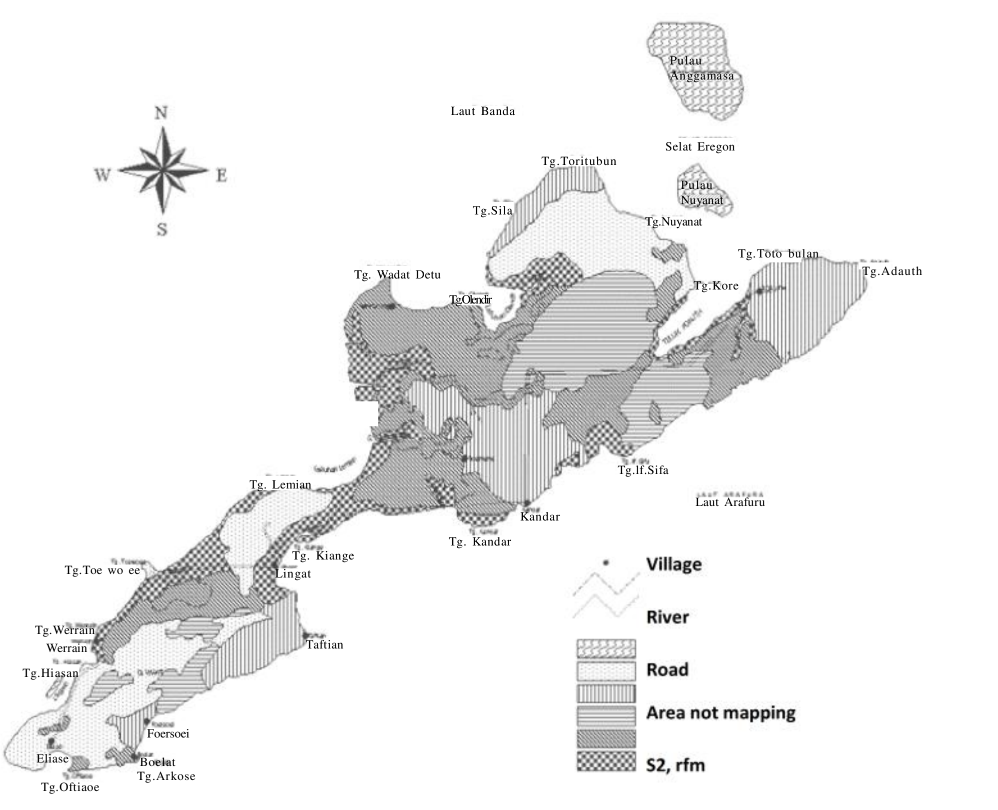

Figure 1. Map of Land Suitability of Selaru Island, West Southeast Moluccas Regency for food crops.

Erosion Hazard

Land characteristics assessed were the relief or the magnitude of the slope. The research location generally had the shape of the area/slope and slope flat to choppy fraction to hilly. Areas with wavy relief to hilly and mountainous had little potential for erosion. Rainfall intensity that occurred in this area was not too high and it was not a serious threat of erosion. Land use adjusted to the relief is needed to be done to get the use of agricultural land in a sustainable manner.

Flood Hazard

Flood hazards in the study area was only caused by tidal sea water, covers the coastal plain. Based on the results of the assessment of land characteristics with the requirements of growing some food crops in each soil map unit with

Table 4. Size and land suitability classes for crops in each soil map unit (SMU) in Selaru Island, West Southeast Moluccas Regency.

No SMU	Area (Ha)	Land Suitability Class					
		Upland rice	Corn	Mungbean	Peanuts	Sweet Potato	Caldium
1	1,947	N2	N2	N2	N2	N2	N2
2	5,299	S3-rf	S2-tfe	S2-tfe	S2-trfe	S3-f	S2-fe
3	3,342	S3-tf	N1-f	N1-f	N1-f	N2	S3-f
4	7,196	S3-rf	S3-r	S3-m	S2-rfme	S3-rf	S3-r
5	1,817	N2	N2	N2	N2	N2	N2
6	141	N2	N2	N2	N2	N2	N2
7	1,917	S3-f	N1-f	N1-f	N1-f	N2	S3-f
8	3,723	S3-f	N1-f	N1-f	N1-f	N2	S3-f
9	6,835	S3-r	S2-t	S2-rfm	S3-rf	S3-r	S3-r

Description: S2 = quite suitable; S3 = marginally suitable; N1 = not appropriate at this time; N2 = not suitable permanent, r = rooting medium; f = nutrient retention; t = temperature; e = hazard of erosion; m = mechanization; n = nutrients available.

Table 5. The area based on land suitability class for each type of food crops.

Land suitability class	Area (Ha)					
	Upland Rice	Corn	Peanut	Mungbean	Sweet Potato	Caladium
S1	-	-	-	-	-	-
S2	-	12,134	12,134	12,134	-	5,299
S3	28,312	7,196	7,196	7,196	19,330	23,013
N1	-	8,982	8,982	8,982	-	-
N2	3,905	3,905	3,905	3,905	12,887	3,905
Total	32,217	32,217	32,217	32,217	32,217	32,217

Table 6. Proposed land utilization for agriculture in the survey area in Selaru Island, West Southeast Moluccas Regency.

Direction of Land Use	Mayor Commoditas	Limiting Factor	No. SMU	Area	
				Ha	%
Dry land of food crop-1	Corn, mungbean, uwi/ kumbili, caladium	Temperatures (average annual high temperature); nutrient retention (soil pH slightly alkaline to alkaline); erosion hazard level (low to moderate)	2	5,299	16.45
Dry land of food crop-2	Upland rice, uwi/kumbili, caladium	Temperatures (average annual high temperature); rooting medium (soil drainage medium); nutrient retention (soil pH alkaline)	3; 7; 8	8,982	27.88
Dry land of food crop-3	Peanut and mungbean	Rooting medium (partially soil solum shallow, the texture is rather heavy); nutrient retention (soil pH slightly alkaline); terraian (slope is wave, rocks on the surface of the soil and rock outcrops); erosion hazard level (low)	4; 9	14,031	43.55
		Total of Food Crops	*2, 3, 4, 7, 8, 9*	*28,312*	*87.88*
Plantation of people coconut	Coconut	Temperatures (the average annual temperature is high); rooting medium (soil drainage fast/very fast); nutrient retention (Soil CEC low, pH of alkaline); available nutrients (K available is very low)	1	1,947	6.04
Coastal border forest/rivers, mangroves and brackish water fisheries	Mangrove, mangrove crabs Mangrove,	Rooting medium (severely hampered drainage)	5; 6	1,958	6.08
		Total of Non Food Crops	*5, 6*	*3,905*	*12.12*
		T o t a l		32,217	100.00

requirements grow several types of food crops, then Selaru Island has four classes of land suitability which are S2, S3, N1 and N2, which lowers the 13 sub-classes: S2-t, S2-rf, S2-fe, S2-tfe, S2-rtf, S2-trfe, S3-f, S3-m, S3-r, S3-tf, S3-rfme, N1 and N2-f. The main limiting factors in the use of land for food crops are (1) temperature (t): average temperature annual high, (2) rooting medium (r): soil drainage fast/very fast, (3) nutrient retention (f): CEC of soil low, soil pH alkaline, (4) nutrient available (n): K availability of land is very low, (5) the level of erosion (e): low to medium, and (6) mechanization (m): slope is wave, the rocks on the surface of soil, and rock outcrops.

Rate of land suitability class for food crops are differentiated according to the level, ie orders, classes and sub-classes. Land suitability assessment results against some types of crops are presented in Table 4 and Figure 1.

Based on Table 4, SMU 1, SMU 5 and SMU 6 has a land suitability classes which are not appropriate (N2) for the six crops (upland rice, corn, mungbeans, peanuts, sweet potatoes and caladium) with an area of approximately 3,905 ha, while SMU 2, SMU 4 and SMU 9 has suitable land suitability classes (S2 and S3) for the six crops with an area of about 19,330 ha. SMU 3, SMU 7 and SMU 8 partially classified accordingly (S3) to plant upland rice and caladium and partially classified as not suitable (N1 and N2) for corn, peanuts, mungbeans, and sweet potatoes with a total area of 8,982 ha.

From the class of land suitability assessment, it appears that the SMU can be classified as appropriate or not appropriate for more than one commodity with land suitability level the same or different, depending on the growing requirements of each commodity (Table 4). Commodities that are most appropriate for development can be selected based on priorities, the level of compliance, and social culture of the local community.

Land suitability classes for some crops are shown in Table 5. The area of the corresponding (S2 and S3) to plant upland rice, corn, peanuts, mungbeans, sweet potato, and caladium, each covering an area of 28,312 ha, 19,330 ha, 19,330 ha, 19,330 ha, 19,330 ha, and 28,312 ha. The total area classified as not suitable permanent (N2) for upland rice, corn, peanuts, mungbeans, sweet potato, caladium, each covering an area of 3,905 ha, 3,905 ha, 3,905 ha, 3,905 ha, 12,887 ha, and 3,905 ha, while those classified as not suitable at this time (N1) for corn, peanuts, and mungbeans, each covering an area of 8,982 ha with nutrient retention as limiting factor (f). Land suitability of N1 classes can be increased to S3 with the input of plant nutrients through the provision of nutrient management, both with inorganic fertilizer or organic fertilizer.

The Proposed Land Utilization for Development of Food Crops

Based on the land suitability class, priorities, and socio-cultural local community, it can be arranged the proposed land utilization for development of food crops. Proposed land utilization for food crops in

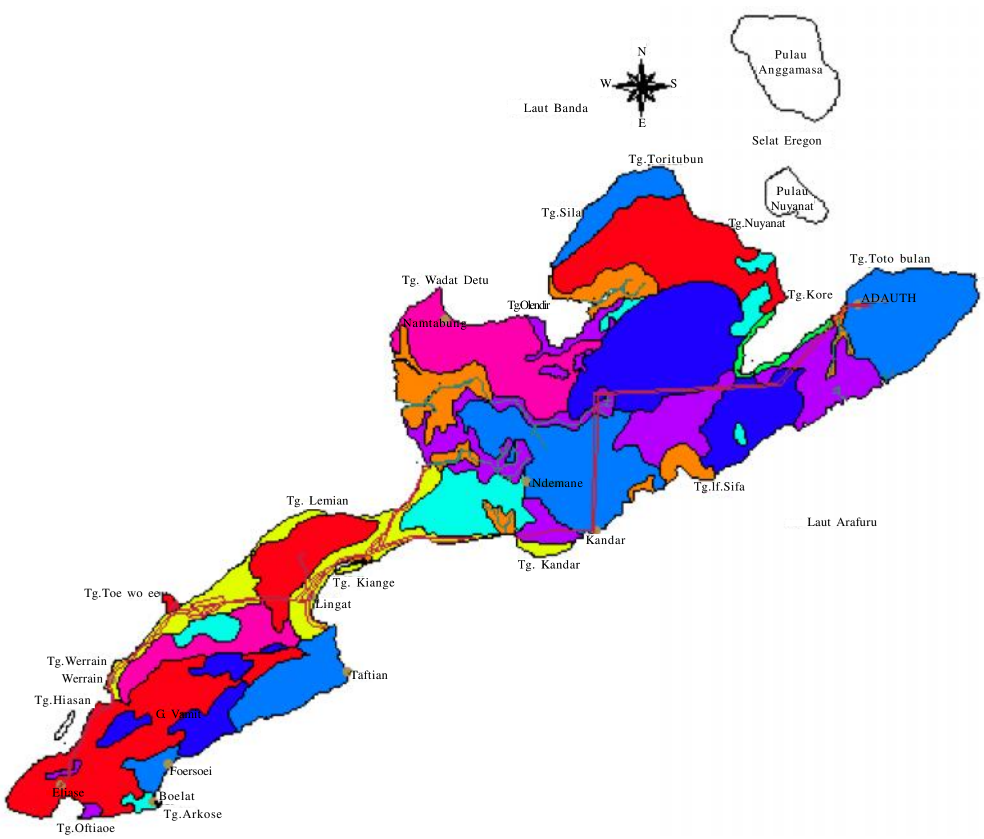

Figure 2. The Proposed Land Utilization of Selaru Island, West Southeast Moluccas Regency for food crops. [red] : Plantation of people coconut, [cyan] : Food crops of upland-1 (corn, mungbeans, uwi/kumbili, caladium), [blue] : Food crops of upland-2 (upland rice, uwi/kumbili, caladium), [magenta] : Food crops of upland-3 (peanuts, mungbeans), [yellow] : Forest tide/river, mangrove and brackish water fisheries.

Selaru Island, Moluccas Southeast Regency presented in Table 6 and Figure 2, with the following description: Food crops of upland-1 area of 5,299 ha (16.45%) with the main commodities are corn, mungbeans, uwi/kumbili, and caladium (SMU 2); Food crops of upland-2 area of 8,982 ha (27.88%) with the main commodities are upland rice, uwi/ kumbili, and caladium (SMU 3, 7, and 8); Food crops of upland-3 area of 14,031 ha (43.55%) with the main commodities are peanuts and mungbeans (SMU 4 and 9).

People coconut plantations covering 1,947 ha with coconut commodity; Forest-tide/rivers, mangroves and brackish water fisheries area of 1,958 ha with the main commodities mangrove and mangrove crabs.

According Chacholiades (1978), the development of agricultural commodities that fit within one zone agroecology to be characterized by: (1) can be developed on a large scale, (2) having the appeal and thrust substantial to spur growth in other sectors, and (3) has comparative and competitive advantages. Further described Conway (1987) that each agro-ecological zone has certain characteristics that include productivity, stability, and sustainability.

CONCLUSIONS

The land was classified as suitable (S2 and S3) for the six crops covering an area of 19,330 ha and was not appropriate (N3) covering an area of 3,905 ha, while land classified as partially suitable (S3) and some did not match (N1 and N2) for some crops being evaluated an area of 8,982 ha. Land suitability of Selaru Island for each type of food crops were as follows: upland rice (28,312 ha), corn (19,330 ha), peanuts (19,330 ha), mungbeans (19,330 ha), sweet potato (19,330 ha), and caladium (28,312 ha). The limiting factors to the primary use of land for food crops in Selaru Island, West Southeast Moluccas Regency among others, were the temperatures (the average annual temperature is high), rooting medium (soil solum is shallow), nutrient retention (soil pH is rather alkaline to alkaline), erosion hazard level is moderate, and terrain (wave, rocks on the surface of the soil, and rock outcrop). Referrals use of land for food crops in Selaru Island, West Southeast Moluccas Regency based land suitability classes were (1) food crops of upland-1 with the main commodities of corn, mungbeans, uwi/kumbili, and caladium an area of 5,299 ha, (2) food crops of upland-2 with the main commodities of upland rice, uwi/kumbili, and caladium an area of 8,982 ha, and (3) food crops of upland-3 with the main commodities of peanuts and mungbean an area of 14,031 ha.

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