

Deployment of Smallholder Cocoa Farms on Various Land Systems in Luwu Regency

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Abstract: *Land System, introduced by Christian and Stewart (1968), is based on ecological principles which consider that a close relationship exists between rock types, hydroclimate, landform, soil, and organisms. Locations categorized in the same land system will have same ecological combinations or similar environment. Therefore, the land system is not something that is unique to one place (specific location), but can be found anywhere with the same characteristics of the environment. This study aims to investigate the deployment of smallholders cocoa plantations on the various land systems based on rePPProt approach on six districts of cocoa production centers in Luwu. 11 land systems were determined spread in six districts in Luwu namely the BBG, BKN, BMS, GJO, KHY, KJP, KNJ, LBS, SMD, TTG and WTE. The BBG (Bukit Balang) is the land system dominates the study sites, it deploys particularly in the district of Bupon, Larompong and South Larompong. Similarly, TTG (Tebing Tinggi) is the land system found in the district of west Suli and Larompong and BMS (Bukit Masung) is the land system that deploys in the district of Suli, Larompong and Bupon.*

Keywords: Cocoa, Land Systems, rePPProt

1. Introduction

As one of the major plantation commodities, cocoa plays an important role in the Indonesian economy. Indonesian cocoa exports (cocoa beans and processed products) in 2012 reached 387.77 thousand tons worth of US \$ 1.05 billion (Directorate General of Plantation, 2013).

Cocoa centres in Indonesia spread in Sulawesi (59.56%), Sumatra (22.24%), Java (5.3%), East Nusa Tenggara, West Nusa Tenggara and Bali (4.05%), Kalimantan (2.450%) and in the region of Maluku and Papua (6.45%). Approximately, 65% of Indonesian cocoa production volume is contributed by Sulawesi. The Sulawesi region, particularly South Sulawesi, is one of the largest smallholder cocoa production centers in Indonesia covered approximately 35% of national cocoa production. Cocoa plantations in South Sulawesi are deployed within 22 regencies including Luwu which one of production centers in South Sulawesi.

Recently, general average productivity of cocoa in Luwu recorded about 938 kg / ha / year (South Sulawesi Plantation Office, 2013). This figure shows a decline in production compared to the previous year production that reached about 1001.92 kg / ha / year (BPS Luwu, 2012) and is outlying below the average of the expected potential, which is equal to 2,000 kg / ha / year (Wahyudi and Rahardjo, 2008). This leads to the need for efforts to increase the production. Therefore, it is necessary to create growing condition to support the cocoa production that take into account the existence of fertile land, good seed and a climate that supports the technology.

A well-planned land use is to use the land in accordance with the capability / supportability. The availability of complete information is a basic requirement of determining the type of land use in accordance with the characteristics of the land, in order to reach sustainable agriculture.

One of the secondary data on land characteristics currently available is data from the RePPProt study results. This data covers the entire territory of Indonesia presented on a scale of 1:250,000. Information obtained includes data on climate and soil chemical properties. This information can be used as consideration in agricultural development plan. The map states that the land system consists of a combination of parent rock, soil, and topography, climate and others that reflects the similar potential and the limiting factors.

The land systems approach or also known as integrated survey means that all physical environment factors are mapped simultaneously (Sitorus, 1985). Therefore, the land system is not something unique to a single place, but can be found anywhere with the same characteristics of the environment. This study aims to investigate the deployment of the smallholder cocoa farms in various land systems according to rePPProt in the Luwu regency.

2. Methodology

The study was conducted in Luwu namely in the district of Ponrang, South Ponrang, Bupon, South Larompong, Larompong and Kamanre. The field research / observation was carried out from December 2013 to January 2015

The research was conducted in two stages: (1) the collection of data and maps including the RePPProt Data and Map (Bakosurtanal) as well as data and maps of sub districts in the regency Luwu during 2012 - 2032. (2) Analysis of data with GIS (Geographic Information System) uses ArcGIS 10.1 software.

The research activities were conducted by overlaying the land system maps and land use maps resulted in the deployment of smallholders cocoa farms in various land systems.

3. Results and Discussion

The land system concept is based on ecological principles which consider that a close relationship exists between rock types, hydroclimate, landform, soils and organisms. Same land system will have the same combination of ecological factors or environment. Therefore, land system is not a unique categorization for one place but also can be found anywhere with same environmental characteristics.

Based on this concept, land system mapping in Indonesia was conducted which results are presented in the RePPPProT maps (1987) including Luwu regency which is the research area. Differentiation of the land systems used in this study referred to the RePPPProT system, grouping of the landscape based on the RePPPProT system was carried out using the reference of land system previously found dominant in other location, therefore determination of the name of the land system is based on the local name of the area where the land system is found.

Based on the Land System Suitability and Environmental map, the land system in the study area according RePPPProT (1987) consisted of 11 land systems spread across several different villages in six districts as presented in Figure 1 (Scale of 1: 250,000).

Figure 1 shows that the BBG (Bukit Balang) is a land system that dominates the study sites; this land system is mainly spread in the districts of Bupon, Larompong and South Larompong. Similarly, land systems of TTG (Tebingtinggi) is found in the districts of West Suli and Larompong, and BMS (Bukit Masung) land system spreads in the districts of Suli, Larompong and Bupon.

A general description of the physiographic types of land systems is presented in Table 1 below.

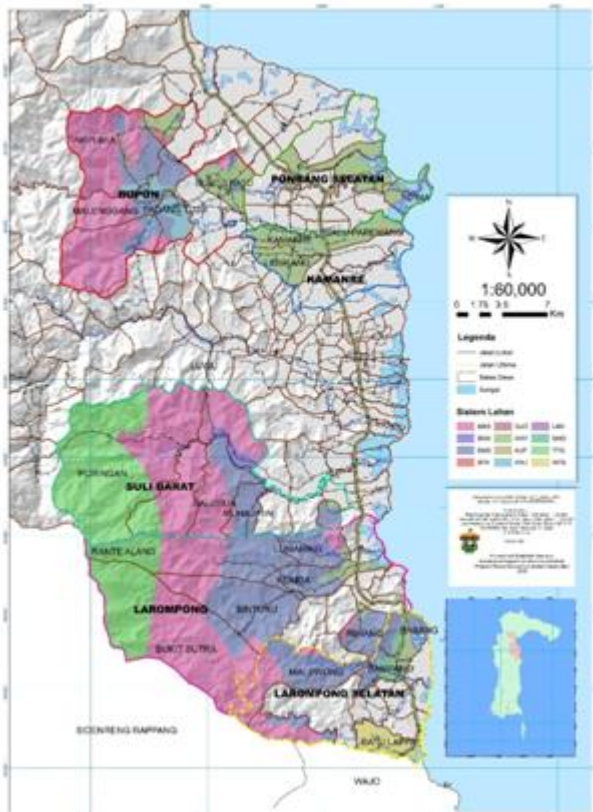


Figure 1: Deployment of land system on six districts of study site in Luwu regency

Table 1: Land System in six districts of research site in Luwu Regency

No.	Land System		Description
	Symbol	Name	
1.	BBG	Bukit Balang	Irregular mountain ridge above the volcanic base / medium
2.	BKN	Bakunan	A small valley plains between the hills with young alluvium parent material from the sediment of the river
3.	BMS	Bukit Masung	The ridge is very steep at the top of the volcanic base
4.	GJO	Gajo	Alluvial fan with medium volcanic ridge
5.	KHY	Kahayan	The combined of estuary and river sediment deposition plains
6.	KJP	Kajapah	Inter-tidal marsh
7.	KNJ	Kuranji	Alluvial fan with medium volcanic ridge on highland
8.	LBS	Lubuk Sikaping	A fan and lava which consists of non-volcanic alluvial fan, which sloping hillside with the slopes of 2-8% with relief <2 m wide peak of 60-200 m wide valley of <25 m. Parent material is alluvium, sediment alluvial fan.
9.	SMD	Sungai Medang	Undulated and wavy alkaline volcanic plains
10.	TTG	Tebingtinggi	-
11.	WTE	Watampone	Alluvial plains, combined estuary and river sediment deposition plains with slope <2% with reliefs of 2-10 m. Parent material consists of young alluvium, estuarine - marin, young alluvium derived from peat river

Deployment of each land system is shown on Table 2 below.

Table 2: Deployment of existing land system in the six districts of research site in Luwu regency

No.	Land System		Land System
	Symbol	Name	
1.	BBG	Bukit Balang	<u>District Bupon</u> : village Buntu Batu, Tanjong, Tampumia, Salu Induk Padang Ma'bud, Noling, Malenggang Balutan and Padang Tuju <u>District South Larompong</u> : village Malewong, La'loa and Gandang batu <u>District West Suli</u> : village Tallang, Kaili, Poringan, Kaladi Darussalam Salubua, Muhajirin
2.	BKN	Bakunan	<u>District Kamanre</u> : village Lumaring <u>District West Suli</u> : village Kaili, Lindajang, Salubua, Muhajirin, Buntu Barana
3.	BMS	Bukit Masung	<u>District Larompong</u> : village Bilante Komba selatan, Binturu, Rante belu, Riwang, Komba, Rante alang, Buntu pasik, Buntu matabbing, Lumaring, Riwang selatan, Bukit sutra, Larompong. <u>District South Larompong</u> : village Salusana, Sampano, Dadeko, Babang Malewong, La'loa dan Gandang batu <u>District South Larompong</u> : village Kaili, Lindajang, Salubua, Muhajirin Buntu barana dan Tallang
4.	GJO	Gajo	<u>District Bupon</u> : village Tampumia
5.	KHY	Kahayan	<u>District Bupon</u> : village Padang Tuju Tampumia, Padang ma'bud, Tanjong, Salu induk, Padang kamburi, Noling Buntu batu <u>District Larompong</u> : village Binturu, Rante Alang, Bukit Sutra <u>District South Larompong</u> : village Bonepute, Salusana, Sampano, Dadeko, Tembo'e, Babang and Batu Lappa <u>District South Ponrang</u> : village Bakti, Pattedong, Paccerakang, Pattedong Selatan, Lampuara, To'balo Jenne Maeja, Buntu Karya, Tarramatekkeng, Bassiang Timur, Bassiang, To'bia and Olang <u>District West Suli</u> : village Buntu Barana, Tallang
6.	KJP	Kajapah	<u>District Kamanre</u> : vllage South Salupare mang, Salu Pare mang, Wara <u>District Larompong</u> : village Larompong, Komba Selatan, Komba, Buntu Matabbing
7.	KNJ	Kuranji	<u>District Bupon</u> : village Padang Ma'bud, Tanjong, Malenggang, Balutan Padang Tuju, Tampumia and Noling
8.	LBS	Lubuk Sikaping	<u>District South Ponrang</u> : Tobia
9.	SMD	Sungai Medang	<u>District South Larompong</u> : Desa Sampano, Dadeko, Babang
10.	TTG	Tebingtinggi	<u>District Larompong</u> : village Binturu, Rante alang, Bukit Sutra <u>District West Suli</u> : village Poringan, Kaladi Darussalam
11.	WTE	Watampone	<u>District South Larompong</u> : village Bonepute, Salusana, Dadeko, Tembo'e, Batu Lappa and La'loa

Deployment of the land system over six districts shows land cover used for human activities (land use) in Luwu (Figure 2). The figure indicates that land use for mixed garden dominates the research area. According to Muttaqin (2008) land use is the appearance of the earth result of human activity or land cover used for human activities.



Figure 2: Map of land use on various land systems on the six districts of research site in Luwu Regency.

Smallholders cocoa farms spread on land used as a mixed garden planted simultaneously with horticulture crops such as cloves, coffee, cashew, hazelnut, durian, rambutan, langsung and so on. The area of the cocoa farm in each districts in the research site of Luwu regency are presented in Table 3.

Table 3: The area of the cocoa farm in six districts of the research site in Luwu regency

No.	District	Area (ha)			Total
		TBM	TM	TT/TR	
1	South Larompong	52.00	2,533.00	47.00	2,632.00
2	Larompong	65.00	1,632.00	306.00	2,003.00
3	West Suli	654.50	3,216.00	255.00	4,125.50
4	Kamanre	128.25	1805.1	389.65	2,323.00
5	South Ponrang	307.00	3828.50	457.75	4,593.25
	Total	1,206.75	13,014.60	1,455.40	15,676.75

Source: Forestry and Plantation Office Regency of Luwu, 2014

4. Conclusion

1. There are 11 land systems spread in six districts in Luwu Regency, namely BBG, BKN, BMS, GJO, KHY, KJP, KNJ, LBS, SMD, TTG and WTE.
2. BBG (Bukit Balang) is the land system that dominates the land in the study site mainly spread in the districts of Bupong, Larompong and South Larompong. Similarly, land system TTG (Tebingtinggi) is found spread in the districts of West Suli and Larompong and land system

BMS (Bukit masung) spreads in the districts of Suli, Larompong and Bupong

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