AN ANALYSIS OF LAND CHARACTERISTICS AND CAPABILITIES IN KUSAMBI SUB-WATERSHED OF BATULICIN WATERSHED IN TANAH BUMBU REGENCY SOUTH KALIMANTAN

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ABSTRACT

The objective of this research was to find out the land characteristics and capabilities for the land stewardship in Kusambi sub-watershed. The characteristics of land unit were obtained from a field survey and a soil analysis at laboratory while the analysis of the land capabilities was conducted by matching per land unit of the overlay result on the land slope map and soil type map. The result showed that Kusambi sub-watershed had five land capability classes and had experienced population pressure. The land stewardship for the suggested land rehabilitation is changing the land use forms of the rainfed rice field, the moor and the plantation at the land capability class II, III, and IV into agricultural land and agroforestry, and at the land capability class V and VI into productive community forests with protection function.

Keywords: Land characteristic, land capability, land stewardship

INTRODUCTION

The land resource of a watershed tends to come under pressure in line with the rapid population growth. An increase in the number of community results in the increasing pressure on the land; the farming activities have been developed in the forest lands in mountainous regions. The physical damage on the watershed results from the exploitation of natural resources and the excessive land pressure (Shrestha et al., 2006). The increase in the number of people accompanied by the increase in the economic needs, especially for the benefit of agriculture and the development of settlement, makes a pressure rate on land resources inevitable that the land change causes an impact on the land degradation and the environmental pollution (Lu et al., 2008; Bai et al., 2008). Even Nandi and Luffman (2012) declared that the inappropriate land management has caused serious land degradation, which increases the soil erosion. Hence, it is necessary to manage the land resources accordingly so that there is no destructive impact on social, psychological and ecological issues. Smith and Poter (2009) the innovative management approach is one of the solutions for behavioral change and social response adaptive for the condition of watershed in long run. The excessive exploitation and the mismanaged system resulted in degradation (George and Leon, 2007).

Human population growth and its activities result in the land use changes. Those changes have impact on the decline in the quality of the environment, such as the increase of critical lands, soil erosion and sedimentation, and the occurrence of floods during rainy season and dryness during dry season (Lin et al., 2011). The environmental impacts resulting from the land use changes are frequently not taken into account because of the limitations in valuing the goods and services of the environment (Bonnieux and Goffe, 1997). According to Sihite (2005), the conflict of the land use mostly occurs due to the differences in interests among stakeholders. These differences cause the conflict of purpose in watershed management between the community living in the upstream and downstream of watershed.

The programs for land and forest rehabilitation and soil conservation are aimed at rehabilitating the critical areas, and protecting, improving, as well as maintaining the land capability to be able to function optimally, either as the element of production, the medium of water management and the protection of natural environment or the environment services resulted from the forests, which are generally indirect benefits (Hartwick, et al., 2001).

According to Palao, et al (2013), soil and water are the most important resources in watershed. The change in the quantity and quality of these resources will not only have an impact on the location but also affect the society. The soil conservation effort is not an effort to suspend or to prohibit the land use, but an effort to adjust the land use to the land capability and to provide the treatments suitable with the conditions that will allow land to function sustainably.

Kusambi sub-watershed in Batulicin watershed is one of strategic areas because there is an integrated economy area (KAPET Batulicin) in that region. It is located in three sub-districts, namely Batulicin, Simpang Empat and Karang Bintang sub-district (BPDAS Barito, 2009). Batulicin and Simpang Empat are the densely populated sub-districts, while Karang Bintang is a developing sub-district where there are a lot of plantations and agricultural lands.

Kusambi sub-watershed requires good land stewardship and management. The land use is an essential component affecting the watershed because it pertains to the hydrology and the water quality in the river areas (Huang, et al., 2013). The utilization of land resources can be optimal and sustainable if the land stewardship is carried out accordingly while still considering the characteristics, the capabilities and the carrying capacity of the land (Brown, et al., 2010; Lin, et al., 2012). The problems are what are the physical characteristics and the capabilities of the land in the watershed? Has the current land use been suitable with the potency of the land capability classes? What efforts can be carried out to make the use of natural resources in watershed optimal and suitable with its land capabilities?

The objective of the research was to find out the land characteristics and the land capability classes for the optimal land stewardship in Kusambi sub-watershed from the ecological and social aspect of the community.

BRIEF DESCRIPTION OF RESEARCH AREA

Kusambi sub-watershed as the research site is administratively located in Simpang Empat, Karang Bintang and Batulicin sub-district, Tanah Bumbu Regency, South Kalimantan province. The width of Kusambi sub-watershed is 5.336 hectares while the other sub-watersheds bordering Kusambi sub-watershed, namely Bening, Amparan Jambu, and Tempurung sub-watershed was 26.787 ha, 25.303 ha, and 5,112 ha, respectively (BPDAS Barito 2009).

Simpang Empat, Karang Bintang, and Batulicin sub-district in Tanah Bumbu regency are included in tropical rainforest. The precipitation data in the last 10 years from 2002-2011 in Tanah Bumbu regency, from Banjarbaru Climatology Station (Agency of Meteorology and Geophysics, Banjarbaru 2012), showed that the highest precipitation occured in April (4.3 cm), while the lowest precipitation was in August (2.5 cm).

Based on the climate classification according to Schmidt and Fergusson, the water catchment area in Kusambi sub-watershed of Batulicin Watershed in Simpang Empat, Batulicin and

Karang Bintang sub-district, with the Q value = 15,73 %, are included in type B climate (Value Q = 15.73 % ranging between 14.3 % - 33.3 % of type B climate category).

The topography of Kusambi sub-watershed is flat to hilly with the slope range between 0 - 40 % and the altitude is 35 m above the sea level (dpl). Based on the landsat image interpretation in 2011, the dominant land use of Kusambi Sub-watershed was the dryland agriculture (46.18 %), brushwood (22.56 %), plantation (12.21 %), secondary forest (11.92 %) and mining (0.77 %). The change in the agricultural land use was rapid and happened in the fertile field, which caused the decrease in the range of the agricultural land and the decline in the land carrying capacity (Zmuda, et al., 2009).

RESEARCH METHODS

The primary data collected in the research were slope, erosion level, erodibility, soil depth, soil texture, permeability, drainage, gravel/ rocks and flood hazard. (Faucette et al., 2003; Tomer and James, 2004; Rayes, 2007; Arsyad, 2010). The secondary data were the data of administrative area of Kusambi sub-watershed, the sub-district administrative boundaries, the amount and the rate of population growth, the income source of the community, the precipitation, the soil type map, the land slope map, the soil erodibility map, the erosion hazard map and the land use map of Kusambi sub-watershed. All those maps and stuff were obtained from the field observations, laboratory analysis, government agencies and secondary data of the research result. The main tool in this research was a set of computer with GIS program.

The first step to analyze the land capability class is determining a land unit. The land unit is used as the smallest unit of land management in evaluating the land capability. The land unit in this research was resulted from the overlay of the land slope map and the soil type map (Alesheikh et al., 2008). The quality and the characteristic of the land unit are obtained from the field survey and the analysis of soil samples in the laboratory.

The classification system of land capability defines and communicates the biophysical limitations in the land use, including the climate, land and topography (Brown, et al., 2010; Price, 2011). The classification of land capability was based on eight characteristics of land unit, namely land slope, texture, structure, permeability, organic substance, and soil erodibility, drainage, and gravel on the land surface. (Arsyad, 2010; Rayes, 2007)

The land slope map, erodibility and erosion level was obtained from Barito BPDAS. The soil erodibility factor (k) was based on the soil texture, structure, permeability and organic substance. The soil texture, permeability, and drainage were the result of soil sample analysis at laboratory. The level of erosion was assessed based on the data at the field survey. The amount of gravel at the surface until 20 cm in the deep was determined based on the percentage of gravel volume to the total of soil excavation.

ANALYSIS TECHNIQUE

Land Capability Classification

The land capability classification was conducted by matching, namely by comparing the characteristics of land unit with the criteria of land capability class using GIS to produce a land unit information layers (Alesheikh et al., 2008). The land capability classes were determined by considering the obstacle factors.

Table 1. Criteria of Land Capability Classification and Obstacle Factors

Obstacle Factors	Land Capability Class							
	I	II	III	IV	V	VI	VII	VIII
Land slope	L_0	L_1	L_2	L_3	(*)	L_4	L_5	L_6
Erodibility	KEI,KE2	KE3	KE4,KE5	KE5	(*)	(*)	(*)	(*)
Erosion level	e0	e1	e2	e3	(**)	e4	e5	(*)
Soil depth	k0	kl	k2	k2	(*)	K3	(*)	(*)
Texture	t1, t2,t3	t1, t2,t3	t1, t2,t3, t4	t1, t2,t3, t4	(*)	t1,t2,t3 ,t4	t1,t2,t3,t4	T5
Permeability	P2,P3	P2,P3	P2,P3,P4	P2,P3	P1	(*)	(*)	P5
Drainage	d1	d2	d3	d4	d5	(**)	(**)	d0
Gravel	b0	b0	b1	b2	b3	(*)	(*)	b4
Flood	O0	O1	O2	O3	O4	(**)	(**)	(*)

Source: (Arsyad, 2010; Rayes, 2007),

Note : (*) = able to have any characteristic, and (**) = not applicable

Suitability of Land Use And Land Use Guidelines

The suitability of the land use was comparatively analyzed by comparing the currently actual land use and the land use potency at each land capability classes (Alemu et al., 2013; Zhou & Liu, 2009). The land use change causes the degradation of forest and watershed. The relation between the land use change and the agricultural growth leads to the increase in the erosion potency. (Solaimani et al., 2009; Im., et al., 2008).

The land use guidelines are based on the spirit of land rehabilitation for soil and water conservation on the capability class potency and population pressure. The relation between the land capability class and the land use potency is presented in Figure 1. The land capability class I had the potency of variety land uses while the land capability class VIII was allocated only to wildlife and protected forest.

Table 2. Criteria of relation between land use potency and land capability class

No.	*Capability Class*	*Land Use Potency*
1.	I	All types of land use
2.	II	All types of land use ecxept Psi
3.	III	Pti, Pit, Ptri,Pmk,Kht,Pkbi
4.	IV	Pt,Ptri,Pmk,Kht,Pkbt
5.	V	Ptri,Kht,Okbst
6.	VI	Ptrs,Kht
7.	VII	Ptrt, Kht,Kons
8.	VIII	HL

Source: (Arsyad 2010; Rayes 2007)

Explanation:

Psi :Very intensive agriculture, Pti :Intensive agriculture, Pt : Limited agriculture, Pit : Limited fishery, Pmk : Settlement, Kht : Forestry crop (with production orientation), Pkbi : Intensive plantation crop, Pkbt : Limited plantation crop, Pkbst : Very limited plantation crop, Ptri : Intensive grass crop, Ptrs : Non-intensive grass crop, Ptrt : Limited grass crop, Kons : Area with special conservation treatment, HL : Protected forest

RESULTS AND DISCUSSION

The land unit and the land capability of Kusambi Sub-watershed were the unit of land mapping from the overlay on soil type map and land slope map. Kusambi sub-watershed had 18 land units from the combination of 7 soil types and 5 slope land classes. The description of each land unit was based on the result of the map analysis, the field observation, and soil sample analysis at laboratory, as well as the land capability analysis by matching, that can be seen in Table 3. The spatial distribution of the land capability classes is presented in Figure 1.

Table 3. Land unit variety, land characteristics, and land capability class

Land unit		*Classification of Land Unit Characteristics*									*KKL*	*FBU*
SL	Luas (ha)	KL	TE	KE	KT	TT	PT	DT	KB	AB		
9-I	1576.18	l1	e1	KE3	k2	t2	P2	d2	b0	O1	III	KT
10-I	776.32	l1	e2	KE3	k0	t2	P2	d1	b0	O1	III	TE,TT
39-I	86.5	l1	e0	KE3	k1	t2	P2	d2	b2	O0	II	KE,KT,DT
39-II	248.19	l2	e2	KE3	k1	t2	P2	d2	b2	O0	III	TE
39-III	98.84	l3	e2	KE3	k1	t2	P2	d3	b2	O0	III	KL.TE,DT
39-IV	19.3	l4	e2	KE3	k1	t2	P1	d2	b3	O0	V	PT
47-I	406.6	l1	e0	KE1	k1	t3	P2	d2	b1	O1	IV	TT
49-I	492.82	l1	e0	KE1	k1	t3	P2	d3	b2	O0	IV	TT
49-II	252.2	l2	e3	KE3	k1	t3	P2	d3	b3	O0	IV	KE,TT
60-I	109.05	l1	e1	KE3	k1	t2	P2	d3	b3	O0	III	DT,KB
60-II	354.24	l2	e2	KE3	k1	t2	P2	d3	b2	O0	III	TE, DT,KB
60-III	100.88	l3	e4	KE3	k1	t2	P2	d2	b2	O0	VI	TE
60-IV	1.93	l4	e3	KE3	k1	t2	P2	d2	b1	O0	IV	KL,TE
69-I	1.24	l1	e0	KE3	k0	t3	P2	d1	b1	O0	IV	TT
69-II	130.2	l2	e3	KE3	k0	t3	P2	d1	b2	O0	IV	TE,TT
69-III	391.74	l3	e2	KE3	k0	t3	P2	d1	b1	O0	IV	TT
69-IV	259.23	l4	e3	KE3	k0	t3	P2	d2	b2	O0	IV	KL,TE,TT,KB
69-V	30.15	l5	e3	KE3	k0	t3	P2	d2	b2	O0	VI	KL

Source: Result of map analysis, field observation, and soil laboratory

Explanation:

KL = Land slope, TE = Erosion level, KE = Erodibility, KT = Soil depth, TT = Soil texture, PT= Land permeability, DT= Land drainage, KB= gravel/rock, KKL= Land capability class, FBU= Major obstacle factor.

It can be seen from Table 3 that Kusambi sub-watershed had 5 land capability classes. The sequences of domination of the land capability classes were the land capability class III (3162,82 ha), class IV (1935,96 ha), class VI (131,03 ha), class II (86,5 ha), and class V (19,3 ha). There was no land capability class I, VII, and VIII. The main obstacle factors at the land capability class were the land slope, erosion level, soil depth, soil texture, soil permeability, soil drainage, and gravel/rock. The very dominant obstacle factors were the soil texture and erosion level, and it could be repaired with the moderate to high level of land stewardship with the basis of watershed (Abaci and Papanicolaou, 2009). The following data is the width of each land capability class.

Table 4. Width of land capability in Kusambi sub-watershed

Land Capability	*Width (Ha)*	*Percentage (%)*
II	86.5	1.62
III	3162.82	59.29
IV	1935.96	36.28
V	19.3	0.36
VI	131.03	2.46
Total	5335.61	100

Based on the result of the land capability class determination above, it could be concluded that class III was the widest (3162.82 Ha or 59.29 %) while class II had the smallest width (86.5 Ha or 1.62%). The data indicated that the land that could be cultivated was wider than the land that could not be cultivated.

Based on the distribution of the land capability, the land capability classes II-IV (Medium-high) at the research area were the cultivable lands for 5185.28 ha or 97.18 % farming land. The land capability classes V-VI (low) as the area with a low potency or less cultivable area were 150.33 ha or 2.82%. Based on the land capability class, Kusambi sub-watershed was classified in the cultivable land for agriculture and settlement but it should adopt the conservative practices (Nowak, 2013).

Table 5. Distribution of land potency

No	*Land Capability*	*Explanation*	*Width(Ha)*	*Percentage*
1	II - IV	The medium-high potency, can be treated as the agriculture or the settlement	5185.28	97.18
2	V - VI	The low potency, cannot be treated as the agriculture or the settlement	150.33	2.82
		Total	5335.61	100

Source: Result of land capability 2012

The land capability classes II - IV are suitable for the agricultural crops, the seasonal crops and the settlement. From the field observation, it indicated that the lands were used mosly for agriculture, plantation and seasonal crops. The land capability classes V-VI which are not suitable for the agricultural crops, seasonal crops, and settlement were used the most for the agricultural land and the settlement. The conservation effort at the land capability classes V-VI should not change it into the production forest, but they should be used for the hard crops or permanent crops to protect the soil from the process of erosion.

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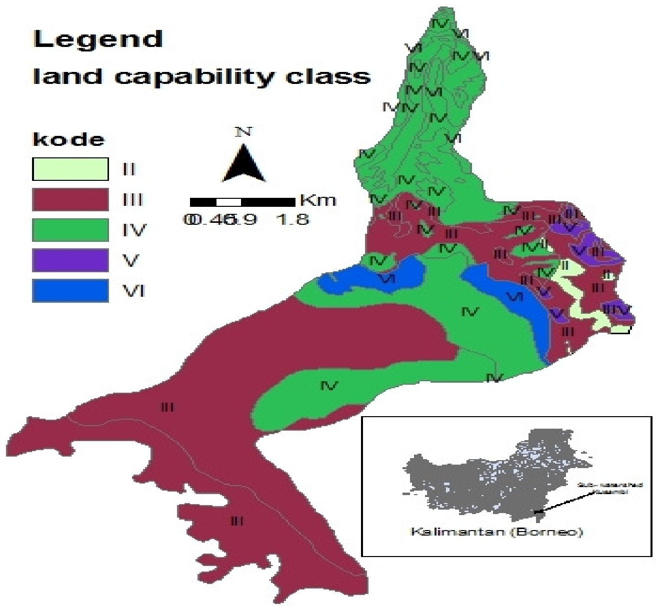

Figure 1. Land capability class of Kusambi sub-watershed

The suitability of the land use and the land capability class, the suitability of the currently actual land use of Kusambi Sub-watershed and the form diversity of the land use potency for each land capability class and the land use are assosiated with the land physic suitability. (Alemu et al., 2013). In Table 6, there were some non-suitability of the currect land use. There were many uses of the field, moor and plantation that were not suitable with the land capability class, and less considered the land characteristics and the population rate. (Bai et al., 2008).

The population pressure resulted in the land use forms less considering the land characteristics and capabilities. (Liu, et al., 2011) There were many uses of the rainfed rice field and the moor which were forced to the marginal land. This situation would have the consequence of degradation which eventually could reduce the land carrying capacity and increase the people's suffering. Therefore, it is necessary to make the concrete steps for a better land management.

The general implication of the condition was that the land stewardship at Kusambi Sub-watershed should be oriented in the land conservation and the improvement of land carrying capacity. Hence, the land use form should be restudied. The land use that is not suitable with the land capabilty class and/or less productive should be reconsidered to be replaced with the other land use or to be mananged intensively. (Sitohang et al., 2013). The land stewardship should be conducted optimally by considering the ecological and social aspects of community.

The land and forest rehabilitation and the soil conservation are intended to rehabilitate the critical land and to protect, increase and maintain the land capability in order to be able to function and to be effective optimally, either as the productive elements or as the media for the water management and the natural environment protection by involving the local community (Njurumana and Prasetyo, 2010). Therefore, the land stewardship in the land rehabilitation of Kusambi sub-watershed should be directed for the soil and water conservation and also for improving the land carrying capacity through the land intensification suitable with the available land capability class.

Table 6. Suitability of land use and land capability class of Kusambi sub-watershed per land unit

Land Unit		KKL	FBU	Form of Land Use		Explanation
SL	Width (ha)			Potential	Currently Actual	
9-I	1576.18	III	KT	Pti, Pit, Ptri,Pmk,Kht,Pkbi	Pti, Pmk, Pkb, Si,Sth, Tk,Tg	Not Suitable Pmk,Si,Tk,Tgl
10-I	776.32	III	TE,TT	Pti, Pit, Ptri,Pmk,Kht,Pkbi	Pti, Pmk, Pkb, Si,Sth, Tk,Tg	Not Suitable Pmk,Tk,Tgl
39-I	86.5	II	KE,KT,DT	All forms of land use, except Psi	Pmk, Pkb,Si,Sth, Tk,Tg	Not Suitable Tk,Tgl
39-II	248.19	III	TE	Pti, Pit, Ptri,Pmk,Kht,Pkbi	Pmk, Pkbi, Sth, Tk,Tg	Not Suitable Tk, Tgl
39-III	98.84	III	KL.TE,DT	Pti, Pit, Ptri,Pmk,Kht,Pkbi	Pmk, Pkb, Si,Sth, Tk,Tg	Not Suitable Si, Tk, Tgl
39-IV	19.3	V	PT	Ptri,Kht,Pkbst	Pmk, Pkb, Si,Sth, Tk,Tg	Not Suitable Tk,Tgl
47-I	406.6	IV	TT	Pt,Ptri,Pmk,Kht,Pkbt	Pmk, Pkb, Si,Sth, Tg	Not Suitable Si,Tgl
49-I	492.82	IV	TT	Pt,Ptri,Pmk,Kht,Pkbt	Pmk, Pkb, Si,Sth,Tg	Not Suitable Si,Tgl
49-II	252.2	IV	KE,TT	Pt,Ptri,Pmk,Kht,Pkbt	Ht,Pmk, Pkb, Si,Sth,Tg	Not Suitable Si,Tgl
60-I	109.05	III	DT,KB	Pti, Pit, Ptri,Pmk,Kht,Pkbi	Pmk, Pkb, Si,Sth,Tg	Not Suitable Si,Tgl
60-II	354.24	III	TE, DT,KB	Pti, Pit, Ptri,Pmk,Kht,Pkbi	Ht,Pmk, Pkb, Si,Sth,Tg	Not Suitable Si,Tgl
60-III	100.88	VI	TE	Ptrs,Kht	Ht,Pmk, Pkb, Si,Sth,Tg	Not Suitable Pkb,Si,Sth,Tgl
60-IV	1.93	IV	KL,TE	Pt,Ptri,Pmk,Kht,Pkbt	Ht,Pmk, Pkb, Si,Sth,Tg	Not Suitable Si,Tgl
69-I	1.24	IV	TT	Pt,Ptri,Pmk,Kht,Pkbt	Pmk, Pkb, Si,Sth,Tg	Not Suitable Si,Tgl
69-II	130.2	IV	TE,TT	Pt,Ptri,Pmk,Kht,Pkbt	Ht,Pmk, Pkbi, Si,Sth,Tg	Not Suitable Si,Tgl
69-III	391.74	IV	TT	Pt,Ptri,Pmk,Kht,Pkbt	Pmk, Pkb, Si,Sth,Tg	Not Suitable Sth,Si,Tgl
69-IV	259.23	IV	KL,TE,TT,KB	Pt,Ptri,Pmk,Kht,Pkbt	Ht,Pmk, Pkb, Si,Tk,Sth,Tg	Not Suitable Si,Tk,Tgl
69-V	30.15	VI	KL	Ptrs,Kht	Ht,Pkb,Tk, Si,Sth,Tg	Not Suitable Tk,Si,Tgl

Source: Result of Spatial Data Basis

Explanation

Psi : Very intensive agriculture, Pti : Intensive agricultute, Pt : Limited Agriculture, Pit : Limited fisher, Pmk : Settlement, Kht : Forestry crops (with production orientation), Pkbi : Intensive plantation crop, Pkbt : Limited plantation crop, Pkbst : Very limited plantation crop, Ptri : Intensive grass crop, Ptrs : Non-intensive grass crop, Ht = Forest, Pkn = Plantation, Si = Intensive wet field, Sth = Rainfed rice field, Tk = Vacant land and Tg = Moor

The land capability classes I until IV are in fact have the potency as the farming land. Unfortunately, considering the land slope and the soil tecture as main obstacle factors have high the potency for the erosion and land degradation (Sefle, 2013). The land conservation is suggested for agroforestry with terracing. The class capability VI exists because the main obstacle factor is the slope of the land. The class capability VII is all of the land units with litosol soil which is in fact the main obstacle factor is the land permeability. The land capability classes VII and VIII have the potency to be let it free naturally or to be a protected forest. Unfortunately, given the high population pressure then the solution can be taken is making it as the community forest (wood plants and fruits) which functions as the protected forest. The guidelines of the form of the more optimal land use from ecological and social aspects is presented in the following table:

Table 7. Guidelines for land use change form for land rehabilitation

Land Unit		*KKL*	*FBU*	*Form of Land Use Change*	
SL	*Width (ha)*			*Currently*	*Guidelines for Rehabilitation*
9-I	1576,18	III	KT	Pmk,Si,Tk,Tgl	Agroforestry
10-I	776,32	III	TE,TT	Pmk,Tk,Tgl	Agroforestry
39-I	86,5	II	KE,KT,DT	Tk,Tgl	Agroforestry
39-II	248,19	III	TE	Tk, Tgl	Agroforestry with Terracing
39-III	98,84	III	KL.TE,DT	Si, Tk, Tgl	Agroforestry with Terracing
39-IV	19,3	V	PT	Tk,Tgl	Productive community Forest
47-I	406,6	IV	TT	Si,Tgl	Community Forest /Agroforestry
49-I	492,82	IV	TT	Si,Tgl	Agroforestry with Terracing
49-II	252,2	IV	KE,TT	Si,Tgl	Agroforestry
60-I	109,05	III	DT,KB	Si,Tgl	Agroforestry
60-II	354,24	III	TE, DT,KB	Si,Tgl	Agroforestry with Terracing
60-III	100,88	VI	TE	Pkb,Si,Sth,Tgl	Productive Community Forest
60-IV	1,93	IV	KL,TE	Si,Tgl	Agroforestry with Terracing
69-I	1,24	IV	TT	Si,Tgl	Agroforestry
69-II	130,2	IV	TE,TT	Si,Tgl	Agroforestry with Terracing
69-III	391,74	IV	TT	Sth,Si,Tgl	Agroforestry with Terracing
69-IV	259,23	IV	KL,TE,TT,KB	Si,Tk,Tgl	Agroforestry with Terracing
69-V	30,15	VI	KL	Tk,Si,Tgl	Productive Community Forest

Source: Analysis of Spatial Data Basis

CONCLUSION

Kusambi sub-watershed could be mapped into 18 land units with 5 land capability classes. The sequences of the domination of the land capabilities were the land capability class III (3162.82 ha), class IV (1935.96 ha), class VI (131.03 ha), class II (86.5 ha), and class V (19.3 ha). The dominant obstacle factors were erosion and soil texture. The pattern of the land management and the population condition in Kusambi sub-watershed resulted in the population pressure. The population pressure was believed as the cause of the land uses that were not suitable with the land characteristics and capabilities. The land stewardship for the land rehabilitation in Kusambi sub-watershed should be oriented in the soil and water conservation and in improving the land carrying capacity for the comminity prosperity through the land intensification suitable with each land capability class. Therefore, it is sugested that the land stewardship be carried out by changing the land use forms of the vacant land, the rainfed rice-field, the moor, and the plantation at the capability class I, II, III, and IV into the agroforestry land, while at the capability land class V and VI into the productive community forest, and at the land capability class VI into the community forest with protection function.

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