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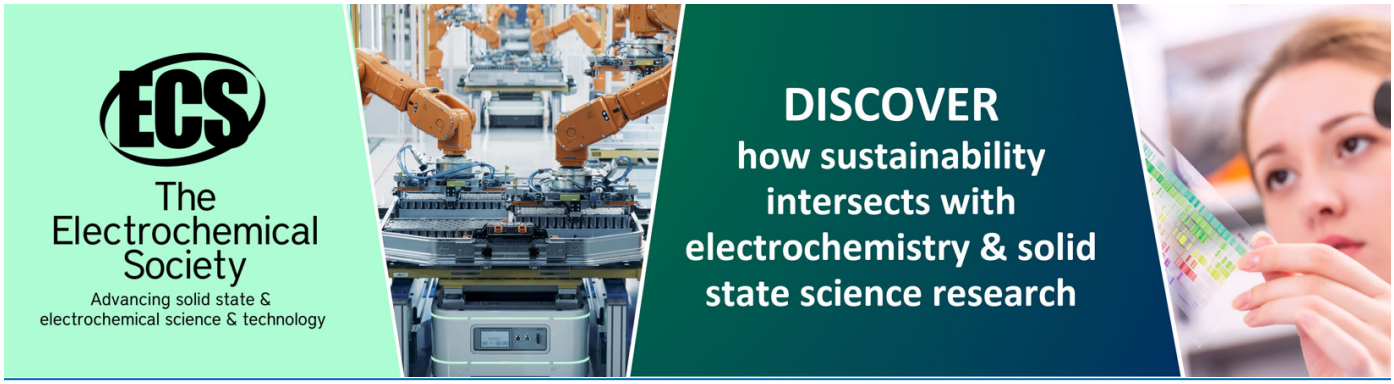

Landscape planning of tea plantation agrotourism area based on agro-based services

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Abstract. The availability of various plantations in Indonesia are potential resource that can be utilized as agro-tourism areas, so that it can expand the spectrum of business not only in tea production but also in agro-tourism businesses. Agro-based service can be developed based on utilization plantation agribusiness system, i.e. on-farm agribusiness, off-farm agribusiness, and additional resources as agrotourism objects and attractions. One of the potential areas is Ciater PTPN VIII Tea Plantation which is managed by a State-Owned Enterprise (BUMN). This plantation area of 983.7 ha, which is dominated by tea plantation land use (61.22%), while the rest is other uses, such as forests and other natural resources. The objective of study is creating landscape plan of tea plantation agrotourism based on agro-based services. The planning method carried out consists of the preparation, inventory, analysis, synthesis, and landscape planning. The analysis was carried out on the biophysical, tourist objects and attractions, as well as aspects of people's preferences and acceptability. Research produces spatial plan, circulation plans, and landscape plans. The landscape plan consists of the main agro-tourism space, agrotourism support space, supporting tourism space, production space, and conservation space.

Keywords: agro-based services, agro-tourism, landscape planning, on-farm agribisnis, off-farm agribisnis, tourism opportunity spectrum

1. Introduction

Plantation is one of agricultural sectoral that acounts for a large share of gross domestic product. It has economic potential that needed to be developed. The potential agro-based services can increase economict growth not only by the comodity. It can be developed agro-based service by utilization plantation agribusiness system, i.e. on-farm agribusiness, off-farm (upstream**,** downstream) agribusiness, and additional resources as agrotourism objects and attractions. According to BPS (2016), West Java Province is the largest tea producing province in Indonesia with production reaching 105.14 thousand tons [1]. As the biggest tea producer, West Java certainly has a very large land area. The land of tea plantations in West Java reaches 89.54 thousand hectares or 75.60 percent of the total area of tea plantations in Indonesia. The vast potential of the tea plantation has an attraction for the community for tourism activities. Agrotourism is a tourism that utilizes landscape services from the agricultural sector [2].

Agrotourism has a function as catalisator development process [3]. According to data from the United Nations World Tourism Organization or UNWTO in its publication in 2018, it is known that

since 2010 the number of international visitors coming to Indonesia has increased. In 2016-2017 Indonesia achieved an increase in the number of international tourists by 16.9%, above the average growth in the number of tourists worldwide at 7% [4]. This is an opportunity for various regions in Indonesia to develop tourism including agrotourism.

Ciater tea plantation is one of the bigest plantation in West Java, Indonesia. It is situated near Bandung, the capital city of it province. This tea plantation has the potential of natural resources that are quite interesting to serve as a tourist area. In addition to the vast expanse of tea plantations, this plantation is located on quite large tourism area such as Tangkuban Perahu Mountain, Ciater hot spring bath, pine forest tourist attractions, and others. This has opportunity to increase the number of visitors to the Ciater Tea Plantation.

Landscape planning for tourism development is needed to maximize the potential of the Ciater Tea Plantation area as a tourist attraction. Therefore, it is necessary to identify and analyze the potential that exists in the Tea Plantation area so that a landscape plan that is appropriate as a reference in the development of a sustainable Ciater Tea Plantation can be produced.

The purpose of this research are to identify and analyze the biophysical potential of landscapes in plantation areas, identify and analyze potential tourism objects and attractions, identify and analyze potential visitors and communities, and develop landscape plans for Tea Plantation Agrotourism.

2. Method

The study area is located at PTPN VIII Ciater Tea Plantation in Subang Regency, West Java, Indonesia (Figure 1). This research was conducted with several stages started from preparation, inventory, analysis, synthesis, and planning.

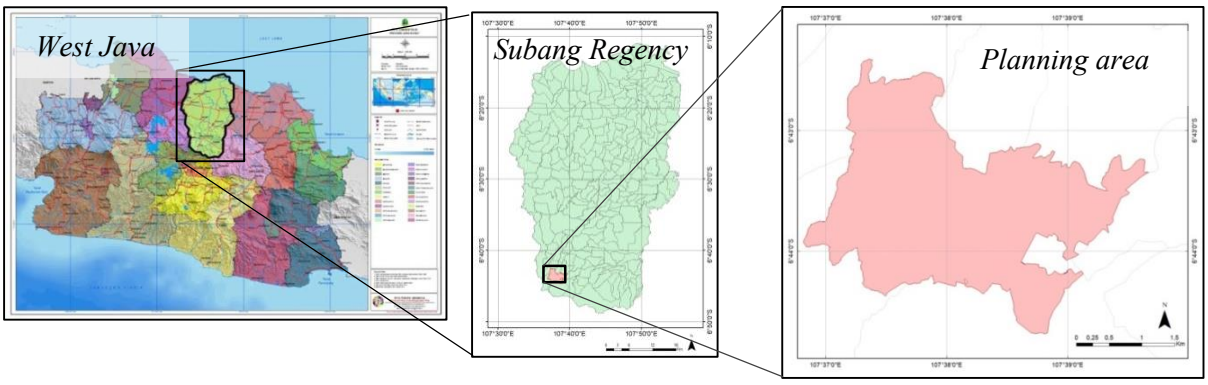

Figure 1. Study area

2.1 Preparation

Preparation is the stage to determine the topic, purpose, and method of research. In addition, the administration is prepared to permit research into some of the parties to obtain the required data.

2.2 Inventory

The inventory phase is the collection of primary and secondary data obtained from the district government of Subang, West Java PTPN VIII, field surveys, and interviews. Data information needed were basic map, thematic (biophysical) maps, tourism data, facilities and infrastructure, stakeholders, such as community, visitor preferences, and corporate of plantation policy as well.

2.3 Analysis

The analysis was carried out on various aspects to determine the potential and constraints to utilized agro-based services for agrotourism. Analysis were conducted to biophysical aspects, tourism objects and attractions, and community preferences in plantation area. Biophysical aspects analysis was carried

out to classify erosion vulnerability maps. Land cover/land use maps are obtained through visual interpretation of satellite images. By integrating the erosion vulnerability map and land cover/land use maps, it can be determined the spatial analysis unit. Base on analysis of tourism objects and attractions on spatial analysis unit determined the tourist opportunity spectrum (TOS). Stakeholder preferences are analyzed to determine the alignment of desires of the managers, visitors, and community of agrotourism.

2.4 Synthesis

This synthesis phase is an overlay of each analysis that has been done so that a composite map is obtained. Spatially, synthesize produce a block plan which are the division of space base on the function (zoning) in tourism.

2.5 Landscape planning

Based on the block plan, the concept of agro-tourism development can be described in the planning stage. By conceptualizing spatial development into tourist objects and attractions, circulation systems, green patterns, and facilities and utilities, a landscape plan for tea plantation agro-tourism can be drawn up.

3. Result

3.1 General condition

The PTPN Ciater plantation is administratively located in 3 (three) sub-districts namely Ciater, Serang Panjang and Sagala Herang, Subang regency, West Java province. Geographically the plantation located between 107°36'49" E - 107°39'39" E and 6°42'24" S - 6°44'41" S. The elevation of plantation lied between altitude of 837.5 - 1437.5 meters above sea level. The total area of Ciater's PTPN VIII Tea Plantation reaches around 3,664.98 Ha. Meanwhile the total target area of the planning is 983.75 ha.

3.2 Biophysic aspect

PTPN VIII Ciater is located in the foot slope area of Tangkuban Perahu Mountain. The landform of this area dominate by a hilly area. Slope in the area has various classes ranged from 0% to above 45%.

According to the Koppen-Geiger classification, the Ciater PTPN VIII area belongs to the Af category which is tropical rainforest with a daily temperature in the average area of 19.50° C. Based on data from BP4D (Regional Development and Research Development Planning Agency) of Subang Regency in 2018, rainfall in the Ciater PTPN VIII area is high. Precipitation in the year reaches 3113 mm.

Soil condition in the planning area dominated by volcanic soil which formed by mountain rocks. The type of soil found in the area based on data from BP4D in Subang Regency are andosol and regosol. The area with andosol soil reached 794.14 ha (80.72%), while the area with regosol soil covered by 189.6 ha (19.27%).

Land cover/use in the area is categorized based on its function in plantation agribusiness system, i.e. on-farm agribusiness, off-farm (upstream, downstream) agribusiness, and additional resources as agrotourism objects and attractions. There are 12 land covers/uses presented in Table 1. The largest area occupied as plantation area reached 602,29 (61,22 %).

3.3 Accessibility and facilities

Access to the plantation location can be reached by using large vehicles or small vehicles. From Jakarta can be reached through Subang Regency, and from the direction of Bandung can be through the Lembang Highway.

Tourism facilities have been supported in the area such as lodging, restaurants, prayer rooms. But for some facilities it still needs to be developed in order to be able to fasilitated and optimalized the used of potential natural resources of plantations area for tourism activities. Those facilities are village hall, restaurants, mosques, guard posts, and commond ground.

3.4 Community preference and acceptability

There were 30 people of visitors interviewed aged 15-60 years. Most visitors come from abroad (90%), while visitors from outside the regency account for 10% and visitors from within the district not found. As many as 90% of visitors are the first visit to the location. Visiting destinations for recreation are 83.3%. The length of visit carried out mostly ranges from 1-3 hours which is 70%.

Table 1. Land cover/use

Land Cover/Use	Categorize	Area (Ha)	Percentage (100%)
Shrubs	Additional resources	59,74	6,07
Forest	Additional resources	295,57	30,04
Plantation	On-farm	602,29	61,22
Settlement	Additional resources	9,96	1,01
Rice field	On-farm	1,72	0,17
Waterfall area	Additional resources	0,92	0,09
Official residence of employees	Off-farm	2,11	0,21
Tea factory area	Off-farm	2,31	0,23
Guest house area	Off-farm	7,56	0,77
Paragliding area	Additional resources	0,08	0,008
Campground area	Additional resources	0,54	0,055
Farm area	On-farm	1,05	0,11
Total		983,85	100

Source: Local Development Research and Developement Planning Agency of Subang Regency and field check

4. Discussion

4.1 Analysis

4.1.1 Erosion hazard level. Erosion hazard level analyzed by scoring area classification of slope, soil type classification, and classification of rainfall. The method refers to S.K Minister of Agriculture No. 837/Kpts/um/11/ 1980 [5]. The area and percentage of the classification of land slope, soil type and rainfall presented in Table 4. There are three categories of erosion hazard level in the region ranged from low level to high level (Table 2). There are three categories of erosion hazard level in the region ranged from low level to high level (Tabel 3).

Table 2. Slope, soil type, and rainfall classification

Slope classification	Class	Score	Area (Ha)	Percentage
0-8%	Flat	20	101,34	10,30%
8-15%	Moderately sloping	40	262,33	26,67%
15-25%	Moderately steep	60	289,32	29,41%
25-45%	Steep	80	227,22	23,10%
>45%	Very steep	100	103,70	10,54%
Soil type classification	Class	Score	Area (Ha)	Percentage
Andosol	Sensitive	60	794,15	80,76%
Regosol	Very sensitive	75	189,60	19,23%
Rainfall classification	Class		Area (Ha)	Percentage
27.7-34.8	High	40	764,68	100%

4.1.2 Analysis of tourism objects and attraction. As a result of compilation on the land cover/use area categorized based on its function in plantation agribusiness system and classification of land erosion sensitivity, a spatial analysis unit can be obtained as shown in Table 4. The spatial analysis unit is a homogeneous space that characterized by land cover/use and erosion sensitivity. Analysis of toursim

object and attraction are applied to the spatial analysis unit. Tourism objects and attractions are dominated in on-farm areas in the form of land cover/use of tea plantations (on land), which are covering an area of 602.28 ha (61.23%) in units 1, 2 and 3.

Tabel 3. Erosion hazard level

Erosion hazard levels	Interval	Area (Ha)	Percentage
Low	(<125)	68,129	6,93%
Moderate	(125-174)	528,77	53,75%
High	(175<)	386,85	39,32%

Table 4. Tourism Objects and Attraction

Spatial Analysis Unit	Land Characteristics	Tourism Objects and Attraction	Area (Ha)	Percentage
Unit 1	Tea plantation - low erosion	On-farm	59,30	6,03%
Unit 2	Tea plantation - moderate erosion	On-farm	379,19	38,55%
Unit 3	Tea plantation - high erosion	On-farm	163,79	16,65%
Unit 4	Tea Factory Area - Medium Erosion	Off-farm	2,30	0,23%
Unit 5	Villa Agrowisa area - Low Erosion	Additional resources	6,13	0,62%
Unit 6	Villa Agrowisa area - high Erosion	Additional resources	1,32	0,13%
Unit 7	Bukit Santiong area - high erosion	Additional resources	0,08	0,01%
Unit 8	"Kampung Terbang"/employee housing area - Moderate Erosion	Additional resources	2,11	0,21%
Unit 9	Waterfall area - moderate erosion	Additional resources	0,82	0,08%
Unit 10	Waterfall area - high erosion	Additional resources	0,10	0,01%
Unit 11	Forest area - low erosion	Additional resources	3,31	0,34%
Unit 12	Forest area - moderate erosion	Additional resources	97,15	9,88%
Unit 13	Forest area - high erosion	Additional resources	195,10	19,83%
Unit 14	Farm area - low erosion	On-farm	1,04	0,11%
Unit 15	Campground - moderate erosion	Additional resources	0,54	0,05%
Unit 16	Shrubs area - low erosion	Additional resources	4,94	0,50%
Unit 17	Shrubs area - moderate erosion	Additional resources	31,13	3,16%
Unit 18	Shrubs area - high erosion	Additional resources	25,38	2,58%
Unit 19	Settlement - low erosion	Additional resources	1,02	0,10%
Unit 20	Settlement - moderate erosion	Additional resources	8,92	0,91%
		Total	983,75	100%

4.1.3 Analysis of visual landscape. Visual landscapes identified to get the value of the tea plantation area. Overall, the area was dominated by tea plantation vegetation. The area with hilly topography has many spots that have wide visibility. In addition to the many scenic spots in the plantation area, there is also a good potential view on the trip to the site. Tourist objects also have interesting views such as tea factory, villas, farms, employee housing, campground, mosques, monuments, and Santiog hills (paragliding area).

4.1.4 Analysis of community preference and acceptability. Based on community preference, they agreed to develop such activites based agro-based services such as picking tea leaves, culinary, tours, handicrafts, and many others related activities. Based on data from visitor interviews, planning for tourism activities agrees to be implemented so that visitors can get more experiences. Activities created must be supported by facilities that will improve tourism and environmental quality. The strong desire

of the manager opinion was development tourism to attract visitor so the lodging facilities can be more useful.

4.2 Synthesis

Considering agro-based services, as represented by biophysical (slope, soil, rainfall) in term of erosion sensitivity and land cover/use in term of categorization based on its function in plantation agribusiness system characteristics which are classified as spatial analysis unit (Table 4), the quality of plantation can be determined for agrotourism development. There are three types of erosion sensitivity qualities. Regions with moderate and low erosion level can be developed as tourism areas. Meanwhile areas with high erosion level is developed with a maximum limit of 10%. Several places that become tourist activities determined by landscape view analysis. The area which has a good view in tea plantation areas, will be developed as stop point on tourism track.

Each spatial analysis unit has certain quality to develope as agrotourism objects and attraction. The TOS (Tourism Opportunity Spectrum) developed from Butler and Waldbrook (2003) applied to analyzed each spatial analysis unit [6]. The results of the analysis produced four tourism zones ranging from the primitive zone, the semi-primitive zone, the intermediate zone, to the semi-modern zone, which applies to 20 spatial units. List of TOS zones and spatial units listed in Table 5.

The determination the spectrum of tourism opportunity zones in each spatial analysis unit is not only a direction in the development of agrotourism, but also requires support from stakeholders. Agrotourism development is supported by the acceptability and preferences of the community, visitors and area managers. Based on the analysis of acceptability and people's preferences, visitor preferences, and manager's preferences, all parties agreed to develop the area become an agrotourism area.

Table 5. Tourism opportunity spectrum zones

TOS Zone	Spatial Analysis Unit	Tourism Objects and Attraction	Land Characteristics
Primitive	Unit 11	Additional resources	Forest area - low erosion level
	Unit 12	Additional resources	Forest area - moderate erosion level
	Unit 13	Additional resources	Forest area - high erosion level
	Unit 16	Additional resources	Shrubs area – low erosion level
	Unit 17	Additional resources	Shrubs area – moderate erosion level
	Unit 18	Additional resources	Shrubs area – high erosion level
Semi primitive	Unit 3	On-farm	Tea plantation - high erosion level
	Unit 7	Additional resources	Bukit Santiong area - high erosion level
	Unit 19	Additional resources	Settlement – low erosion level
	Unit 20	Additional resources	Settlement – moderate erosion level
Intermediate	Unit 1	On-farm	Tea plantation - low erosion level
	Unit 2	On-farm	Tea plantation moderate - erosion level
	Unit 9	Additional resources	Waterfall area - moderate erosion level
	Unit 10	Additional resources	Waterfall area - high erosion level
	Unit 14	On-farm	Farm area – low erosion level
Semi modern	Unit 4	Off-farm	Tea Factory Area - Medium Erosion
	Unit 5	Additional resources	Villa Agrowisa area - Low Erosion
	Unit 6	Additional resources	Villa Agrowisa area - high Erosion
	Unit 8	Additional resources	“Kampung Terbang” (worker settlement) area - Moderate Erosion level
	Unit 15	Additional resources	Campground – moderate erosion level
Modern	-	-	

4.3 Planning Concept

4.3.1 Basic concept. The basic concept of planning that will be developed is an effort to optimize potential of agro-services on the site and minimize modifications and damage to protected the areas. The concept of development is designed by integrating biophysical conditions on tourism objects location and considers the desires of visitors and human resources of the local community. The planned site has a principle of harmony between human needs and the balance of nature to keep sustainability in the area. The tourism activities are planned for sports, recreation, and leasure which utilize agro-based services.

4.3.2 Development concept. The concept of spatial division in planning area was developed based on the results of the synthesis as direction. The Ciater tea plantation area has zones that are centrally located and scattered. Based on the activities to be developed, the primitive zone will be developed as conservation area, semi-primitive zones developed into supporting tourist area, intermediate zones developed into supporting area for tourism and additional tourism, semi-modern zones will be developed as the main agro-tourism and agrotourism support area. For the production area, tea plantations are among all zones as the main area for all agro-tourism activities.

Circulation path in the site has a function as a connector among the area. The concept of circulation is divided into three types; primary circulation, secondary circulation and tertiary circulation (Figure 2). Application of circulation need to be applied based on existing circulation conditions. Furthermore, restrictions on access to certain zones also need to be applied to preserve the environment.

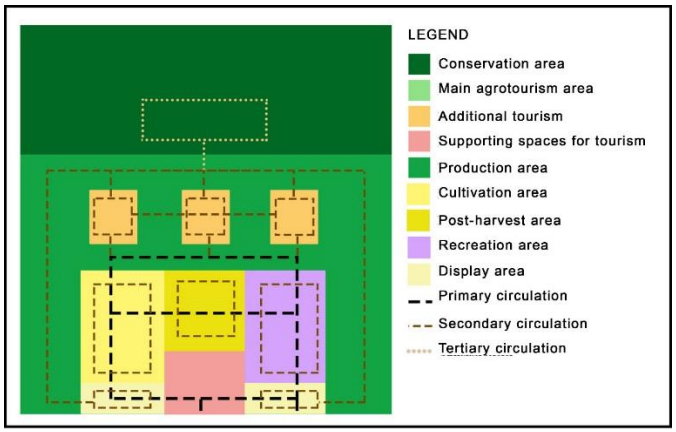

Figure 2. Development and circulation concept

The concept of green arrangement aims to determine the type of vegetation based on its function on the planning site. There are three main types of vegetation that will be applied, namely cultivation vegetation, aesthetic vegetation, and conservation vegetation.

The concept of agro-tourism activities and facilities that will be applied is adjusted to the concept of space that has been created. Each space has two types of activities which are active activities and passive activities. There are also two types of agrotourism activities i.e. primary agrotourism and secondary agrotourism. Primary agrotourism is an activity related to agriculture. Secondary agrotourism is dominated by recreational activities without direct contact with agriculture.

4.4 Landscape planning

4.4.1 Area plan. Area plans are created according to the needs of visitors' activities. The specification of area to be determined by the functions. The results of the space plan mapping can be seen in Table 6.

Table 6. Area Plan of PTPN Ciater Tea Plantation

Area/ Sub-area	Function	Area (Ha)	Percentage (%)
Main agro-tourism area			
Services	Providing convenience for visitors in tourism activities	1,21	0,12
Display	Providing aesthetics and distinctive features of the area	7,08	0,72
Cultivation	Providing agro-tourism activity space in the cultivation process	12,84	1,31
Post-harvest	Providing agro-tourism activity space for the post-harvest process	2,31	0,23
Recreation	Add recreation space in the agrotourism area	7,9	0,80
Supporting area for tourism			
Services (mosque, foodcourt, souvenir store)	A worship and recreation room for group tourists with a long duration	0,16	0,02
Lodging/hotel	Resting room for visitors who stay overnight	7,89	0,80
Production area	As the main production area of plantations for tea leaves	585,94	59,56
Conservation area	As a protected area	355,3	36,12
Additional tourism	As an alternative tourist attraction around the area	3,12	0,32
Total		983,75	100

4.4.2 Circulation plan. The circulation plan consists of inter-space connected lines provided for tourist accommodation. The division of the 3 (three) types of circulation pathways is based on their function. This planning is determined based on the nature of the tourism space. The primary path serves as the main lane connecting the tourist space. This path is in the main agrotourism space, agrotourism support space, and production space. Secondary pathways are pathways that function as circulation in spaces. This line is limited to only one four-wheeled vehicle, two-wheeled vehicles and pedestrians. Tertiary lanes are the least developed pathway for primitive areas in conservation areas.

4.4.3 Greenery plan. The green governance plan is mapping vegetation based on its function. In accordance with the concept of vegetation, there are three types of vegetation functions that will be planned in the area. Aesthetic vegetation is planned in the display area, main agrotourism area, and agrotourism support area. The function of this vegetation is for direction, barrier, and shade. Production vegetation is a cultivated plant that is planted to take advantage. This production vegetation is in the cultivation area. The main vegetation is tea plants (*Camellia sinensis*). The conservation vegetation serves as a protected vegetation that protects the conservation area. This vegetation has a multistrata arrangement ranging from ground covers, shrubs, shrubs, and trees.

4.4.4 Activities and facilities plan. Generally, the activity plan is divided into primary activities and secondary activities. Primary activity is an activity that is directly related to agricultural activities. Secondary activities are activities that occur outside of agricultural activities. Determination of activities is carried out in all areas and sub-areas. Plans for facilities are made to determine a building that needs to be added to support tourism activities. Plans for facilities are arranged based on activities in each area. Facilities must support amenities for visitors, workers and the community.

4.4.5 Landscape plan of agro-tourism. Agro-tourism landscape plans are composed of overall vegetation planning, activities and facilities, circulation, and carrying capacity, which are presented in the form of a plan. This landscape plan is a model of an area that is arranged functionally, aesthetically, and supports its sustainability (Figure 3).

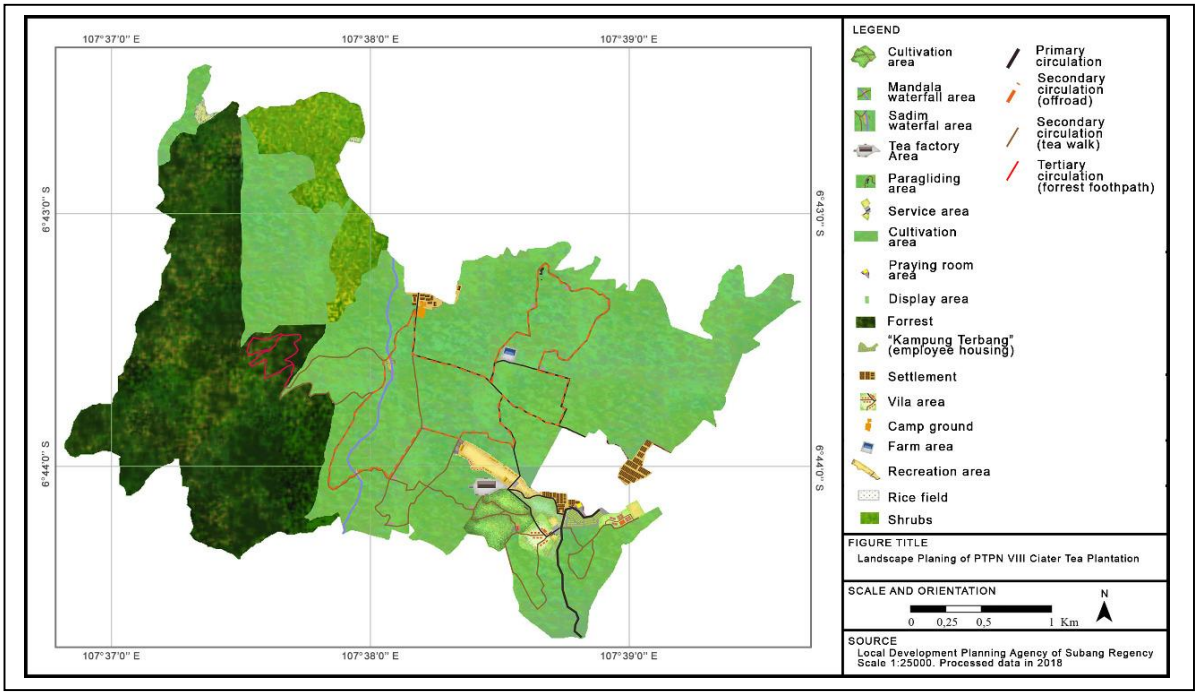

Figure 3. Landscape planning of Ciater Tea Plantation Agrotourism

5. Conclusion

- The biophysical resources which are consist of 12 land cover/use types and erosion hazard level ranged from low (6.93%), moderate (53.75%), and high (39.32%) can be categorized into 20 spatial analysis units. Each spatial analysis unit can be classified into based on agro-based service, into on-farm agribusiness, off-farm agribusiness and additional resources. Moreover, based on agro-based classification can be identified the tourism object/attraction and the tourism opportunity spectrum ranged from primitive, semi-primitive, intermediate, and semi-modern.
- Based on the analysis of potential visitors and community shown that most visitors, communities, and managers agree if the area is planned as an agrotourism area.
- Landscape plans of the tea plantation agro-tourism area can be drawn up based on the concept of optimizing potential on the site and minimizing modifications and damage to protected areas. A total of 3.19% of the area was used as the main agrotourism area, 0.32% as additional tourism, 0.82% as a support for agrotourism area, 59.56% production area, and 36.12% as conservation area.

Acknowledgement

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