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INTEGRATED AGRICULTURE-BASED AGROTOURISM MODEL WITH ECO-FRIENDLY ENVIRONMENTALISM ON CARIK INJEMAN LAND IN CIBODAS VILLAGE

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Abstract

An integrated agriculture-based agrotourism model needs to be implemented in the Carik Injeman area of Cibodas village. To date, Carik Land, with an area of 30 hectares to date, has not been optimally used. Cibodas villagers mostly work as farmers and ranchers. More than 50% of the workforce does not have permanent employment. Some previous researchers have said that with integrated agriculture, independent communities could increase their land resources and farmers would prosper in a sustainable manner. The aim of this study was (1) to identify the factors that determine agrotourism planning in Carik land, (2) study integrated farming systems as support for agrotourism, (3) inventory the various opinions of village groups and community leaders related to agrotourism development (4) formulate an agrotourism model in integrated agriculture. This research uses descriptive, qualitative, observational, and quantitative methods, in particular Likert scales. Data collection uses questionnaires through purposive sampling. The results show that the community response supported by the FGD results on agrotourism planning was very good. SWOT analysis was made to study the agrotourism planning factor. The sustainable agrotourism plan to be located on Carik Injeman's land must have four zones, namely an: 1) integrated farming system area, 2) integrated waste disposal area, 3) environmental area, 4) and recreation and sports area. The study results can be used as a recommendation for agrotourism planning in Carik Injeman land, Cibodas village, Bandung.

Keywords: agrotourism; Carik land; eco-friendly; integrated agriculture; village.

1. Introduction

An integrated farming system is a combination of all the components in an agricultural system. Included is an eco-friendly technology system that optimizes all the energy sources produced. Integrated agriculture is a land-use system integrated between agricultural activities and sustainable animal husbandry activities (Oelviani, 2015). According to (Siswati, et al., 2020), an integrated farming system (IFS) integrates agricultural sub-sectors

(crops, livestock, fish) to increase the productivity of land resources, independence, and the welfare of farmers in a sustainable manner. IFSs should increase land productivity compared to monoculture farming systems. Plant maintenance factors, livestock raising, and waste handling factors are integrated with traditional agricultural development concepts. (Salli et al., 2019). Productivity of dryland agroecosystems and farm income increase when changes are made from monocultural to multicultural farming (Matheus et al, 2017).

In Indonesia, the tourism sector has become one of the main movers in national development. According to the World Tourism Organization, the future of the tourism industry as a travel industry has a very bright prospect. This tourism industry has become an economic opportunity for local people to improve their quality of life. In this case, it is necessary to attempt types of tourism that directly or indirectly involve the local community.

The development of rural agrotourism based on local communities is expected to produce many benefits. It is not only for rural communities but also for urban communities to completely understand, give an appreciation to agriculture, and become an educational medium. According to Imaculata (2017), agrotourism is a type of tourism based on sustainable agriculture with limited inputs. It is an activity of cultivation, processing, and marketing of agricultural products. It is a form of tourism that utilizes agriculture's potential as natural scenery in agricultural regions, the diversity of agricultural production and technology, and the culture of the agricultural community (Palit et al. 2017).

Cibodas village is one of the villages in the Pasir Jambu District, Bandung Regency, located at an altitude of 1000-1200 meters above sea level, with an area of about 1,926.3 Ha. The region includes villages, rice fields, protected forests, and production forests. The population of Cibodas village is 8,591 inhabitants, with the following details:

Table 1. Number of villagers

Citizens	Total
a Male	4270 Inhabitants
b Female	4321 Inhabitants
c Number of Head of Family	2319 Families
d Number of Labor Force	2144 Inhabitants
e Number of Unemployment	1706 Inhabitants
f Number of Non-Permanent Employees	469 Inhabitants

Source: Cibodas village (2018)

Cibodas villagers mostly work as farmers and ranchers. It is the largest milk-producing village in the Pasirjambu Subdistrict. Milk production has been declining year-by-year due to the difficulty of obtaining green feed and the high cost of feed concentrate. In addition to dairy farming, Cibodas villagers are also large producers of vegetables, especially for chayote. Problems found in Cibodas village include:

1. More than 50% of the labor force do not have permanent occupations;
2. Dairy cattle in Cibodas village are the main livelihood for the community. Currently, however, it is difficult to obtain green feed, especially in the dry season; and
3. The manure is neither optimal enough nor sustainable for processing.

The purpose of this study is to: (1) identify the factors determining agrotourism planning, (2) study integrated farming as a support for agrotourism, (3) inventory the opinions of village group and community leaders related to agrotourism development, and (4) formulate a model of agrotourism based on integrated farming. Developing agrotourism activities, either directly or indirectly, will increase the positive perceptions of farmers and the community about the importance of preserving agricultural land resources. Agrotourism is one form of tourism that consists of agricultural products, with a variety of recreational facilities which can reduce the tide of urbanization and advance the economy of rural communities (Khotibul et al., 2019). Agrotourism should include staged or authentic agricultural activities or processes occurring in working agricultural facilities either for entertainment or educational purposes” (Arroyo, Barbieri, & Rich 2013)

2. Methods

This research was conducted in the Carik Injeman land of Cibodas village, Pasirjambu district, Bandung regency, from April to July 2019. Data collected involved four factors—ecological, agricultural, livestock, and community participation—in the form of primary and secondary data, gathered by observation, interviews, questionnaires, and FGD (Table 2). Interviews through questionnaires were conducted on respondents selected based on purposive sampling techniques. The number of respondents was based on the Slovin formula (Sugiono, 2012):

$$n = \frac{N}{1 + N \alpha^2} \quad (1)$$

N is the number of residents of the Cibodas village, n is the number of respondents, and α is the significance level of 10%. With this formula, 98.8 samples will be rounded to 100 respondents. The determination of the respondents is based on these criteria: 1) Cibodas villagers who are active in social activities and have knowledge; 2) Village officials who have an inventory of data and knowledge about environmental, socio-cultural, and economic development; 3) Community leaders in Cibodas village. Questionnaires were distributed to obtain data of (a) community knowledge about agrotourism (b) community perceptions of Carik land transformed into agrotourism destinations, (c) community knowledge about integrated agriculture (d) community readiness to carry out IFS.

Table 2. Types of data collected

Factor	Type data	Source
1) Ecological	Primary & Secondary	Observation
- Position of the village		
- Climate		
- Vegetation		
- Altitude & contours		
- Panorama		
- Environmental Hygiene		
2) Agriculture	Primary	Observation
- Agriculture system		Interview
- Commodity types		
- Water system		
3) Livestock	Primary	Observation
- Type & number of livestock		Interview
- Cattle feed		
- Cattle waste		
4) Community participation	Primary	Interview
- The existence of community Leaders		Questionnaire
- The existence of Bumdes (Agency village-owned business)		FGD
- Knowledge and understanding of the community toward agrotourism		

Source: Authors (2019)

The data obtained will be analyzed descriptively with SWOT (Rangkuti, 2015), to see the current condition by reviewing the strengths, weaknesses, opportunities, and threats to the potential of Carik Injeman land agrotourism. Finally, strategies will be obtained as a direction to determine the agrotourism model that will be planned in Carik Injeman land.

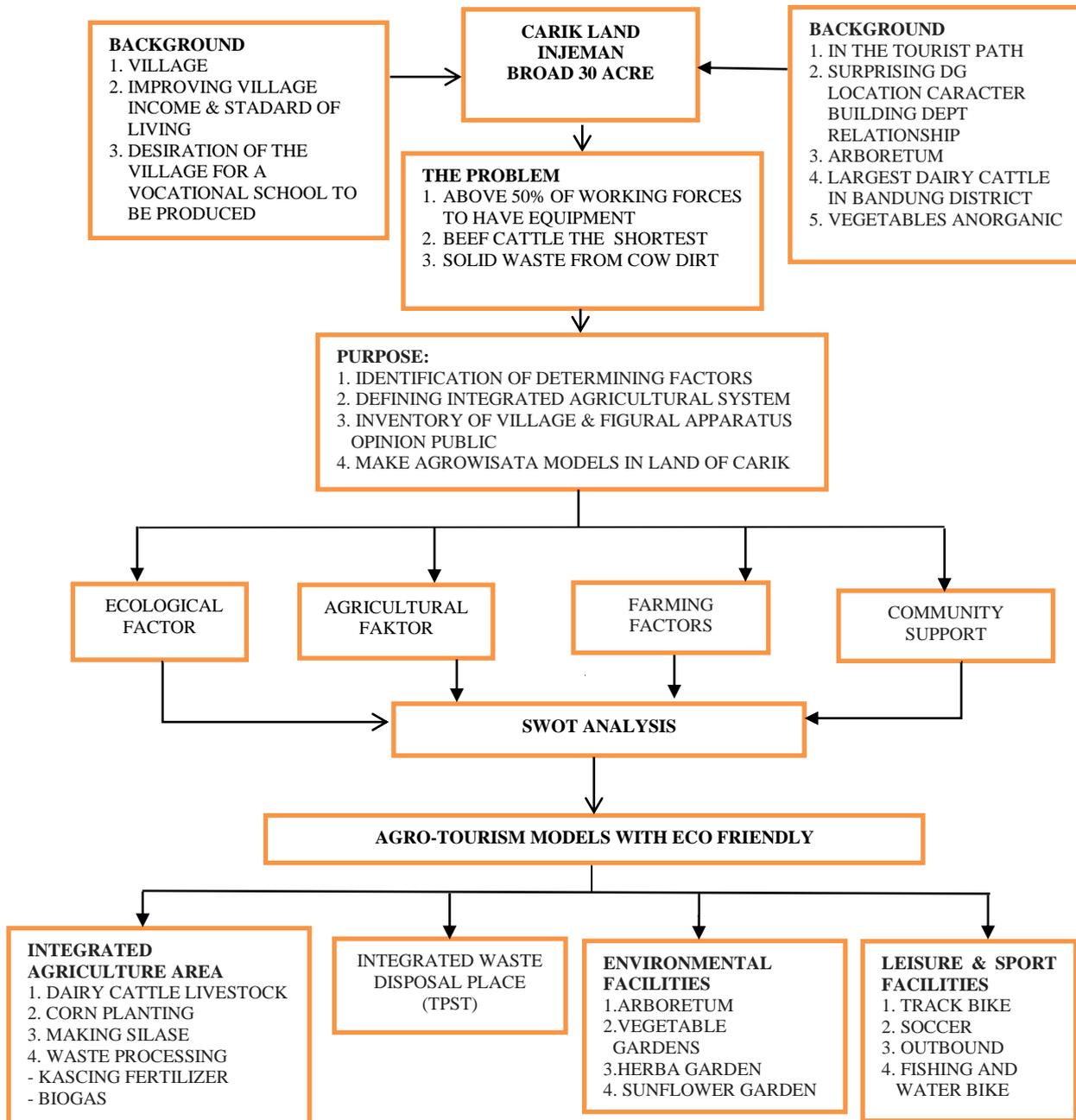


Figure 1. research scheme

Source: Authors (2019)

3. Results and Discussions

The boundaries of the government administration of Cibodas village, Pasirjambu Subdistrict are as follows:

- a. The north side is bordered by Cukanggenteng Village, Pasirjambu Subdistrict;
- b. The east side is bordered by Bandasari village, Canguang Subdistrict;
- c. The south side is bordered by Mekarsari village, Pasirjambu Subdistrict;
- d. The west side is bordered by Cisondari village, Pasirjambu Subdistrict.

Cibodas village, Pasirjambu Subdistrict generally consists of hills, rice fields, and protected forests. Its average temperature ranges from 18°C–28°C. It consists of four hamlets with a total of 17 neighborhoods and 61 community associations. It lies approximately 28.1 km from the center of Bandung, on the tourist route to Gambung and Ciwidey.

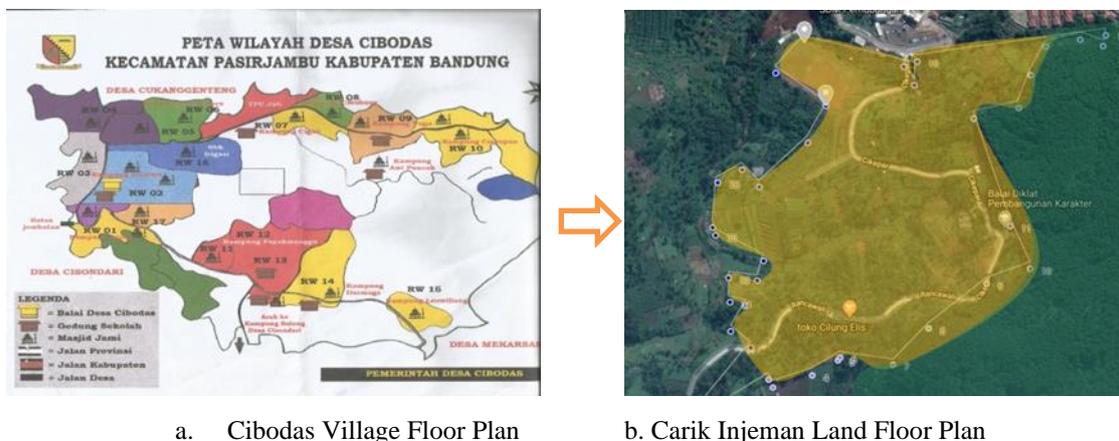


Figure 2. Cibodas village and Carik Injeman land

Source: Authors (2019)

Upon the decision of village officials, community leaders, and the community itself, Carik land can be used as an agrotourism destination. In the planning stages, certain factors must be satisfied. The factors that influenced agrotourism planning in the Injeman strip are:

a. Ecological Factors

Carik land is at S 07° 06" 29' and E 107° 29" 942', with an altitude of 1100–1180 m above sea level. The Carik land boundary is north of the Transportation Ministry's Character-Building Training Center Hall. To the east, it borders a pine forest. At the south, it borders RW 12, and on the west is more pine forest, Perhutani's. Carik Injeman's land in Cibodas

village, Pasirjambu Subdistrict, is village-owned but has not been optimally used. The Carik land, which is being cultivated, is only part of what exists as vegetable gardens, dairy cow sheds, cow dung processing, and rice fields. There are 110 types of forest trees planted in groups, including Jabon (*Anthocephalus Chinensis*), Rasamala (*Altingia exelsa*), and Kayu putih (*Eucalyptus* sp), planted and spread by P. Memed, one of the community leaders known for his conservation practices. The Cibodas river is a water source for the Carik land, which could be developed to support agrotourism activities.

b. Agriculture Factors

The Cibodas villager livelihoods exist primarily in the agricultural and cattle breeding sectors. In the Agricultural part, the main commodities are vegetable crops such as cabbage, broccoli, pakcoy, and chayote (labu siam – Bahasa Indonesia). And the other commodities include rice, corn, and coffee. In general, Cibodas village farmers are still engaged in monocultures and non-organic farming.

There are currently some 30 farmers who work this land as tenants. They rent land from the village (the Carik Land) to be cultivated under the auspices of the Bumdes (Village-Owned Enterprises). Besides being consumed, the vegetable plants are also sold by individually and through Bumdes to distributors. With the existence of the PKM (*Pengabdian Kepada Masyarakat* - Community Service) Grant Program for Higher Education from Trisakti University, an introduction to the Integrated Agriculture System was introduced. The development of an IFS, or Sistem Pertanian Terpadu, directed at rural and peri-urban areas, is expected to build sustainable farmer independence, offering improved economics through social and environmental sustainability (Nurcholis & Supangkat, 2011).

Planting trees in the farmland along with crops diversifies the visual appearance and improves the aesthetics of agricultural landscapes, thus facilitating nature appreciation and supporting various types of recreational activities, such as hiking, cycling, and bird watching (Grala, Tyndall, & Mize, 2010; Lovell et al., 2010; Schultz et al., 2009). The concept of sustainability is a key element in agricultural management, bearing in mind that land conversion continues to threaten the sustainability of the agricultural system in general.

c. Livestock Factors

Cibodas village is the largest producer of cow milk in the Pasirjambu Subdistrict. Currently, the number of cattle has begun to decrease, a trend that is likely to continue. This

is due to the dearth of forage feed and the high cost of feed concentrate. Meanwhile, cow dung is thrown into the river, polluting it. Even though cow pens in Carik land have a capacity for 30 cows, at the moment the pens are filled with just 12 cows. The Dedication Team to the Trisakti Community is now receiving funding from the Directorate of Higher Education research and development research.

Cow manure is made into fertilizer through the process of vermicompost. The vermicomposting process is carried out with the help of earthworms in the decomposition of organic material, partially that decomposed by microorganisms. Solid extraction residue is used as a medium for growing earthworms and a source of nutrition for earthworm growth. The type of earthworm that is kept is the *Lumbricus rubellus*, also called the *redworm*. The result of two weeks of composting is a solid organic fertilizer called vermicompost, a rich, organic mulch for fertilizing vegetable crops and corn plants. Silage derived from corn plants is made to overcome the shortage of green feed. All parts of corn plants can be made into silage by crushing and then fermenting them (Siregar, 2003). Feed in the form of agricultural waste and low-quality grass must be added with high quality concentrates to produce high milk, based on the Indonesian National Standard (SNI). Through IFSs technology, the use of livestock waste in making biogas does not only produce gas, but the sludge that is involved is also liquid compost (Yanti & Rahman, 2015).

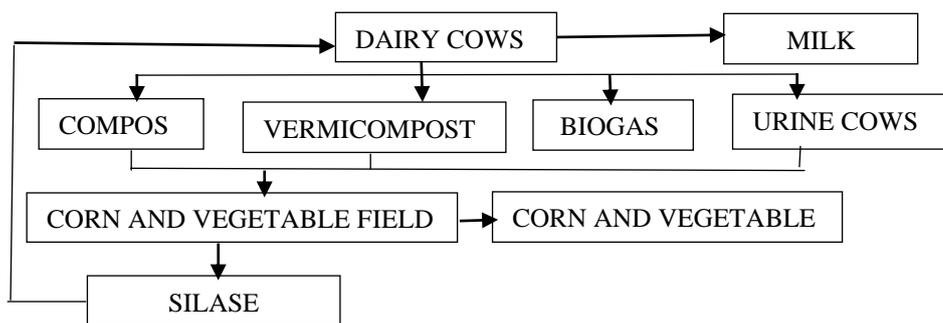


Figure 3. Scheme Integrated agriculture in Ilahan Carik Injeman

Source: Ruhayat, Indrawati, Indrawati, & Siami (2019)

d. Village Officials’ and Leaders’ Response Factor

Village officials and the community strongly support agrotourism planning in Carik Injeman. The opinions of the village head, as well as the chairpersons of various village-owned enterprises, and community leaders were as follows:

Village head: “The development of agrotourism in Carik land is conducted by empowering the community of cultivators to increase income. Currently, agriculture still

focuses on one type of vegetable, namely chayote. For now, waste management is maintained in a temporary shelter in Injeman field in the form of collected materials that can be sold. There are still many other aspects that necessitate investigation.”

Chairman of village-owned enterprises: “The management of Carik Injeman land can be optimized as a developing cattle farm that can be repeatedly improved. Unfortunately, now farmers often encounter difficulties obtaining green feed. Therefore, Mr. Uus, the chairman of several village-owned enterprises, is very supportive of developing corn as a crop choice and make silage as an alternative feed. Corn silage supports and develops the processing and utilization of animal manure into fertilizer.”

Forestry and Environmental Figure (Mr. Memed): “I support the development of Injeman land as ecological-based agrotourism. Currently, there are more than 110 species of rare forest plants that have been developed in our arboretum.”

Table 3. Percentage of survey results of 100 respondents

Indicator	Percentage
The Community opinion about Agrotourism	72
Community opinion about carik injeman land were used as Agrotourism development	78,4
Community knowledge about integrated farming system	78
Community readiness for Integrated farming system development at carik injeman land	84

Source: Analysis results

Table 3 shows that Cibodas villagers are already familiar with the term agrotourism (72%). This is due to the location of Cibodas village on the Bandung-Ciwidey tourism route. To the north of Ciwidey, there is a state-owned plantation. Besides producing tea as an export material; it is also an agrotourism area. In general, Cibodas villagers, especially village

officials and community leaders, have strongly expressed their desire for Carik land to be used for agrotourism (78.4%). They expect that agrotourism will open up employment opportunities, build the town's reputation, and improve people's lives. Cibodas villagers are already familiar with IFSs (78%). Building on the example of IFSs on Carik land, they look to build an environmentally friendly farming system. The people of Cibodas village strongly agree on designing an environmentally friendly integrated agriculture system on Carik land.

Many benefits can be gained by developing eco-agrotourism. Besides exploring the potential of agro-cultivation and tourism objects, it also benefits the environment. Developing agro-cultivation will mean continuous care of the ecosystem, for example by maintaining the soil surface with consistent plant coverage, thus preventing erosion caused by agricultural production and technology activities (Palit et al. 2017). Furthermore, in reviewing the four factors above, a SWOT analysis is used as a reference for planning sustainable agrotourism on Carik Injeman land.

Table 4: Strength, Weaknesses, Opportunity, and Threats Analysis

FACTOR	STRENGTH	WEAKNESSES
1) Ecological	<ol style="list-style-type: none"> 1. village position 2. climate 3. vegetation 4. contour and height of the place 5. panoramic side 	<ol style="list-style-type: none"> 1. environmental cleanliness 2. garbage
2) Agriculture.	<ol style="list-style-type: none"> 1. planting vegetable culture 	<ol style="list-style-type: none"> 1. agriculture system 2. type of commodity 3. water system
3) Cattle	<ol style="list-style-type: none"> 1. dairy cattle 2. dairy cattle culture 	<ol style="list-style-type: none"> 1. number of cattle 2. cattle feed 3. cattle livestock waste
4) Community participation	<ol style="list-style-type: none"> 1. village officials 2. the existence of community leaders 3. existence of village-owned business entities (Bumdes) 	<ol style="list-style-type: none"> 1. high unemployment 2. 50% of the workforce do not have permanent jobs 3. community knowledge 4. no attention from regional government

FACTOR	STRENGTH	WEAKNESSES
OPPORTUNITIES	STRATEGY STRENGTH - OPPORTUNITIES	STRATEGY WEAKNESSES - OPPORTUNITIES
1. Job opportunities	1. Creates an integrated	1. Increases knowledge of
2. Tourists	farming system including	agrotourism through training
3. Animal waste	agriculture and livestock	to the community
4. Regional income	2. Leads to planting of various	2. Increases community
	types of vegetable and animal	knowledge about integrated
	feed plants	farming systems that are
	3. Transforms cow manure	environmentally friendly,
	waste into fertilizer and	using training and field
	biogas	practice
	4. Improves coordination with	3. Make an integrated waste
	other parties related to efforts	treatment site
	to plan environmentally-	4. Ask Bapeda to support the
	friendly agrotourism.	realization of agrotourism in
	5. Optimizes facilities and	the village of Cibodas
	infrastructure in agrotourism	5. Together with the Trisakti
	planning	University PKM Team and
	6. Involves the community in	village officials, the support
	planning eco-friendly agro-	of Bapeda can work
	tourism	together to find funds and
	7. Promotes selling natural	realize the creation of an
	beauty, various forest trees as	environmentally friendly
	attractions	Agro Tourism
THREATS	STRATEGY STRENGTH - THREATS	STRATEGY WEAKNESSES - THREATS
1. The existence of	1. Creating a unique	1. Take a picture of the design
other agrotourism in	agrotourism is the definition	of agrotourism as a whole on a
the Ciwidey area	of an integrated agricultural	typical Carik land parcel
	system	equipped with facilities and
	2. Conducting social media	infrastructure to support
	outreach	education, training, and
		recreation
		2. The Agrotourism Model to

FACTOR	STRENGTH	WEAKNESSES
		be designed includes the Sistandu area, integrated waste treatment facilities, environmental facilities, and recreational and sports facilities

Source: Authors (2019)

In Table 4, the SWOT analysis shows Carik land with beautiful panoramas and 110 types of forest trees. The implementation of integrated farming systems has the potential to become an agrotourist destination.

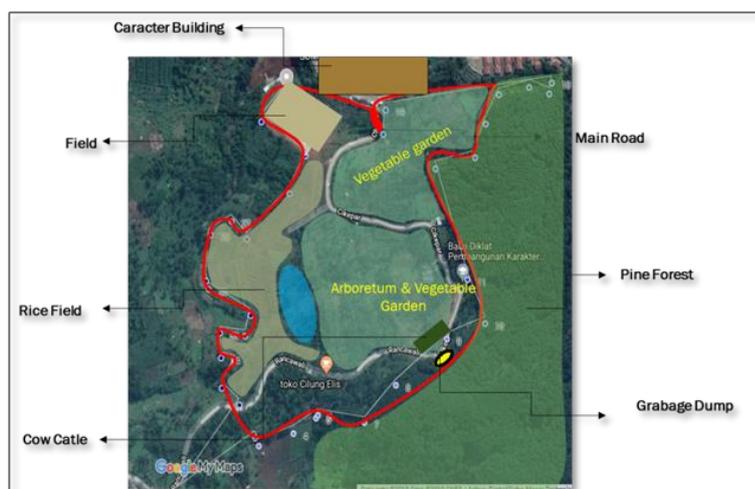
Carik Injeman's land can be used as an agrotourism site with various characteristics from other agrotourism around the Ciwidey area. Integrated agriculture is a characteristic of Carik Injeman's land agrotourism. Integrated agriculture will be applied in Carik land in the form of vegetables, ornamental plants, corn, and grass as ingredients for cattle feed. The crop commodities are planted in multicultural terms. An integrated farming system, in addition to agriculture, also involves the livestock sector. Dairy farming has become a subculture of the Cibodas village community. With an integrated farming system, cow manure is processed into organic fertilizer and biogas.

Organic fertilizer is used to cultivate vegetable gardens, corn gardens, and other crops planted on the Carik land. Biogas produced from processed cow dung waste is used as gas fuel. The existence of an integrated waste treatment facility equipped with several garbage processing machines, BSF cultivation, and making Carik land an environmentally friendly environment. Organic farming (OF) is considered a promising solution for reducing environmental burdens related to intensive agricultural management practices (Nemecek, Dubois, Huguenin-Elie, & Gaillard, 2011). With the development of agrotourism that prioritizes local culture in utilizing the land, farmers' income is expected to rise while preserving land resources and maintaining local culture and technology that hew to the natural conditions of the environment (Sanjaya, 2013).

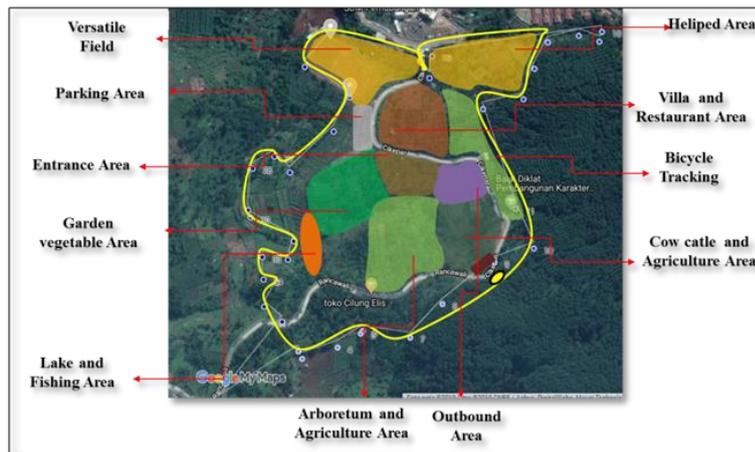
The realization of an agrotourism industry, apart from the existing physical potential, is inseparable from a community involved in managing or using the Carik land. Collaboration with all parties that support the formation of agrotourism is very much needed, especially with the support of the local government, village officials, and the community. The agrotourism model that will be planned for Carik land can be grouped into four zones,

namely: 1) An Integrated Agricultural System Area, with facilities consisting of dairy farming, corn planting, silage making, processing cow dung to be used as fertilizer and biogas; 2) Integrated Waste Disposal Area; 3) The environmental area consists of an arboretum, vegetable garden, Indigofera garden, Herba garden, sunflower garden; and 4) Recreation and Sports Area consists of bicycle tracks, outbound facilities, sports fields, and water recreation. The positive impact of developing agrotourism is that it can increase the sale value of agricultural commodities produced and can be developed into other sources of income that can be enjoyed by the community. Tourism village activities integrate attractions, accommodation and supporting facilities with the structure of community life in certain areas (Marysya & Amanah, 2018).

The development of agrotourism locations as a strategic and leading business unit of Bumdes has a positive impact, which is to open employment and increase the community's income and welfare (Iman et al., 2017). According to Kidd, 2011, in developing the agricultural tourism village model, it is necessary to pay attention to various factors that play a role, including physical, community and socio-cultural factors, economy, technology, the influence of legal and policy aspects, the level of supply and demand for agricultural tourism, and experiences gained by tourists when visiting the area. agricultural tourism. From the result of the analysis above, it is possible to make an agrotourism model developed on Carik Injeman land in the form of a schematic as follows:



a. Existing Condition of Carik Injeman Land



b. Schematic Plan of Carik Land

Figure 4. Schematic Plan of Carik Injeman Land

Source: Authors (2019)

Agrotourism planning and development must involve the community optimally through discussion and local agreement. However, in its implementation, there are internal and external factors affecting community participation (Foster, 2018)

4. Conclusion

Carik Injeman's land in Cibodas village has ecological, agricultural, and animal husbandry potential, that, with community participation, can be expected to become an agritourism destination. An integrated farming system is a characteristic applied to Carik land agrotourism, which is different from other agrotourism models located around the Ciwidey area. The four zones will be: waste processing. 3) The environmental area consists of the arboretum, vegetable garden, Indigofera garden, Herba garden, sunflower garden, and 4) Recreation and sports area consist of bicycle tracks, outbound facilities, sports fields, and water recreation. With agrotourism in operation, the main problems of the workforce that do not have permanent work can be channeled as agrotourism managers.

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Author Contribution

Etty Indrawati conceived of the presented idea. Etty Indrawati, Dwi Indrawati, and Ratnaningsih Ruchiat developed the theory and verified the analytical methods. Shafira Febriyani help in making design drawings. All authors discussed the results and contributed to the final manuscript.

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