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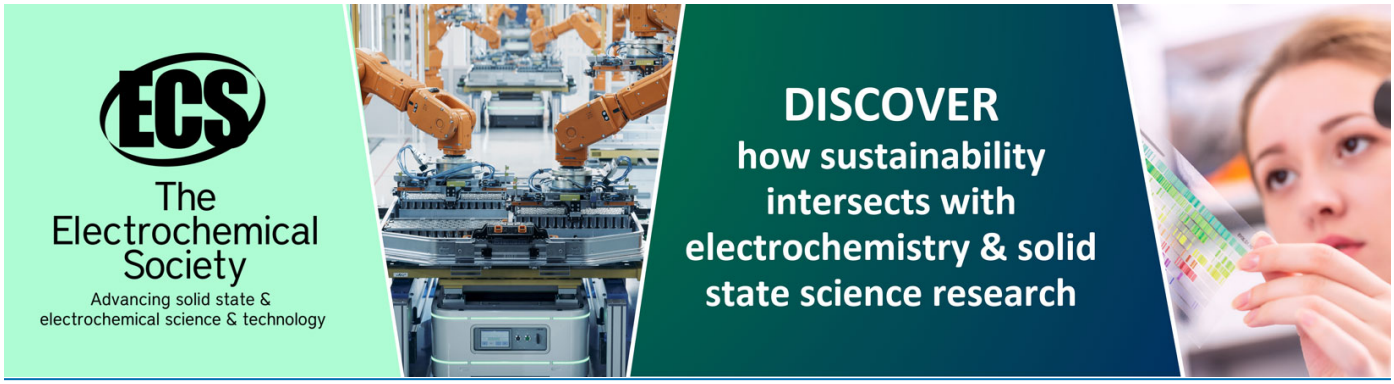

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Climate village program (ProKlim) in Simurugul Sub-Village, Margawati Village, Garut Kota Sub-Regency, Garut Regency, West Java Province, Indonesia

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Abstract. The community-based climate village program (ProKlim) has strengthened the implementation of integrated adaptation and mitigation impact of climate change, reduction of greenhouse gases emission, and recognition of active community participation. This study aimed to analyze the activities in supporting ProKlim of Simurugul sub-village, the benefit of those activities, and the current status of carbon stock. This research used qualitative research and carbon stock estimation. The adaptation scope involved was controlling drought and landslides, enhancement of food security, and controlling of climate-related disease. The mitigation activities scope of waste and solid management, the use of new renewable energy, organic farming, enhancement in vegetation cover, and prevention and controlling of forest and land fire. The benefits of a community of ProKlim to the community were an enhancement of resilience in facing the climate variability and impact of climate change, improvement of quality of the live and socio-economic community, and reduction of greenhouse gases emission which known carbon stock (1,430.50 tons) in Simurugul sub-village. This showed a potential development strategy and further practice of ProKlim at the local level.

1. Introduction

The issue of climate change and the extent and intensity of its impacts globally have been the concern of the international community including Indonesia. It is known that Indonesia, as an archipelago with natural resources and high diversity, has great potential, opportunities and challenges for mitigation and adaptation efforts to the negative impacts of climate change. To support this, the Indonesian government plays an active role in developing policies, legislation, strategies and programs for climate change adaptation and mitigation as well as monitoring and evaluating the control of climate change impacts.

One of the community-based programs, implemented by the Indonesian government (Ministry of Environment and Forestry), in the form of Village Climate Program (ProKlim), is based on the Minister of Environment Regulation No. P.84/MenLHK-Setjen/Kum.1/11/2016 [1]. The program's objectives provide strengthening implementation, community capacity, institutions, including support and facilitation of the parties for climate change adaptation and mitigation efforts. This program aims to support the implementation of ProKlim, the reduction of Greenhouse Gas (GHG) emissions and the recognition of the active participation of communities who have implemented integrated climate change mitigation and adaptation efforts that can further improve the quality of life and welfare of the

community. The success of ProKlim is expected to provide a contribution to improve understanding and ability of the community to adopt climate change adaptation and mitigation technologies, increase access to funding resources and ultimately achieve national-level GHG emission reduction targets by 26% by 2020. ProKlim activities have been conducted on a national scale and will be registered to the National Registry System (SRN) as a system of action for preparing reports and to support the controlling of national climate change.

At the local level, one of the administrative regions that responded to and carried out the ProKlim action was Simurugul sub-village, an administrative village of Margawati, located in the Sub-Regency of Garut Kota, Garut Regency, West Java Province. Based on the information from local community leaders, the declaration of Simurugul village to become ProKlim was intended to become the miniature of Margawati administrative village in terms of village management that had implemented village management principles according to the criteria of the climate village. Considering the general condition of other RWs (Citizens Association) that are not much different from the climate village of Simurugul in Margawati, the village has a great potential as an extension of ProKlim in the future. Citizens Association (RWs) is term division of territory under the village and it formed of minimum 3 RWs dan maximum 10 RWs [2].

Simurugul sub-village has received a certificate and trophy as Climate Village in 2015 from the Ministry of Environment and Forestry. Simurugul sub-village, for approximately 3 (three) years, has been continuously implementing community-based climate change adaptation and mitigation activities.

In this research, the benefit expected is the measurement of potential and contribution of GHG emission reduction in a location / site towards the achievement of national GHG emission reduction targets. Therefore, the calculation of carbon stocks in the Simurugul climate village area is carried out. Besides, the availability of data on climate change adaptation and mitigation activities as well as the potential for development at the local level can be input into policy formulations, strategies and programs related to handling climate change. This research provided data and information about adaptation carried out by Simurugul villagers in supporting ProKlim, as well as the potential for developing the Simurugul climate village by using a SWOT analysis.

The purpose of this study is to 1) examine the activities that have been carried out by the community including adaptation and mitigation in supporting ProKlim and its benefits, 2) measuring the current carbon stock status, 3) analyzing the potential of Proklim development in Simurugul sub-village.

2. Method

2.1. Research site

The research activity was carried out for 5 (five) months, starting from March to July 2018. The geographical location of the Simurugul climate village is between 107° 55' 7.76"- 107° 55' 31.7" E and 7° 15' 33.038"- 7° 15' 56.33" S covering ± 32.40 Ha. The location map of the Simurugul climate village is presented in Figure 1.

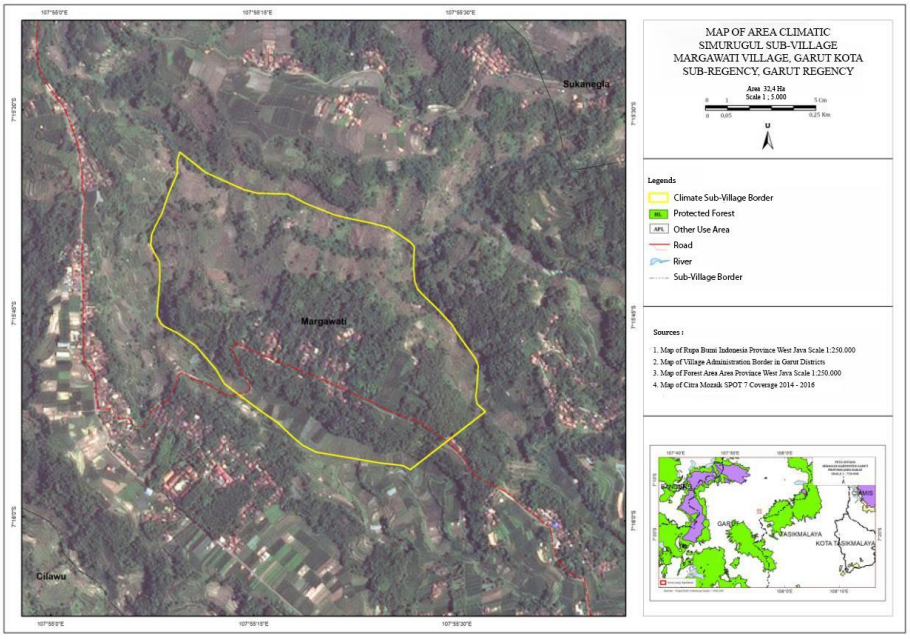

Figure 1. Area map of climate sub-village Simurugul (RW 16), Margawati village, Garut Kota sub-regency, Garut regency.

The included tools were questionnaires and the materials used include village administration map, Rupa Bumi Indonesia map (RBI), SPOT image map 2014-2016 year and land cover map 2017 year. Data and information needed for this research are presented in Table 1.

2.2. Sample selection

Sample selection is done with the principle of non-probability sampling through a purposive sampling method. Purposive sampling is a sampling method with certain considerations [3]. The considerations used were respondents who are residents of the Simurugul sub-village community that had lived in the village before 2015 (since the ProKlim was established). Selected respondents are families in charge (head of the family or housewife), community leaders and village officials.

The number of respondents is determined based on the results of calculations according to Slovin formula [4]:

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

Description: n = number of examples, N = number of population, e = critical value (accuracy limit) used or percent of accuracy due to population sampling error, 5% -10% is a critical value for descriptive research.

The number of heads of family (KK) in the Simurugul climate village as population (51 households) use a critical value of 5%, then obtained a calculation of the number of samples as many as 46 people. The respondents were involved in determining the weight and rating of the SWOT analysis that has previously created by six experts were considered to recognize the condition of the village and could represent the community, i.e the head of administrative village, community leaders, the head of citizens association (RW), the head of neighborhood (RT), Margawati BKM PWK representatives, and representatives of Environment service office of Garut Regency.

Table 1. Data source and method of data collection.

No	Data and information	Method and data analysis	Data source
1	The general condition of ProKlim village such as the aspect of biophysics, human resource and socio-economic and culture	interview, observation, and study of literature Qualitative analysis	Lurah/headman, the head of RW, the head of RT, representatives of Agency of self-reliance paguyuban community of residents sub-district (BKM PWK) Margawati, community leaders and residents; office of village and sub-regency, Agency of Center Statistics (BPS) Garut regency
2	Adaptation and mitigation activities for supporting ProKlim	Interview and observation Qualitative analysis	community leaders and residents, the head of RT, the head of RW, BKM PWK Margawati, representatives of Environment Office Garut regency
3	Land cover ProKlim village	Interview and observation Quantitative analysis	Map of Citra Spot and result of field verification
4	Potential of development ProKlim in the form of internal and external factor	Interview Semi-quantitative analysis	Lurah/headman, community leaders, the head of RW, the head of RT and BKM PWK Margawati, representatives of Environment office Garut regency

2.3. Data analysis

2.3.1. Analysis of estimates of carbon stocks from climate village. Aboveground carbon stocks for dry land and swamp forest types were obtained from the analysis of forest inventory data in the form of Permanent Sample Plots (PSP) in the period 1996-2013 totaling 4,450 repeated measurements throughout Indonesia. The carbon stocks for mangrove forests and plantations above the ground surface use the data from the study of Agency of Forestry Research Center of Research and Development Climatic Change and Policy [4]. The carbon stock figure was obtained using a stock conversion (Biomass Conversion and Expansion Factors / BCEF) of 1.67. The conversion value of biomass to carbon is 0.50 while the conversion value of carbon to CO2-eq is 3.67 [6, 7]. Carbon content in land cover other than the forest is obtained from secondary data sources such as research journals and other publications. Carbon stocks for each land cover type in the form of carbon reserves per hectare for 22 national-scale land cover types and carbon stocks per hectare for seven types of regional (island) forest land cover types refer to Directorate General of Forest Planology and Environmental Management (2015). The estimation of carbon stock was analyzed spatially by using ArcGIS through the following stages (Figure 2).

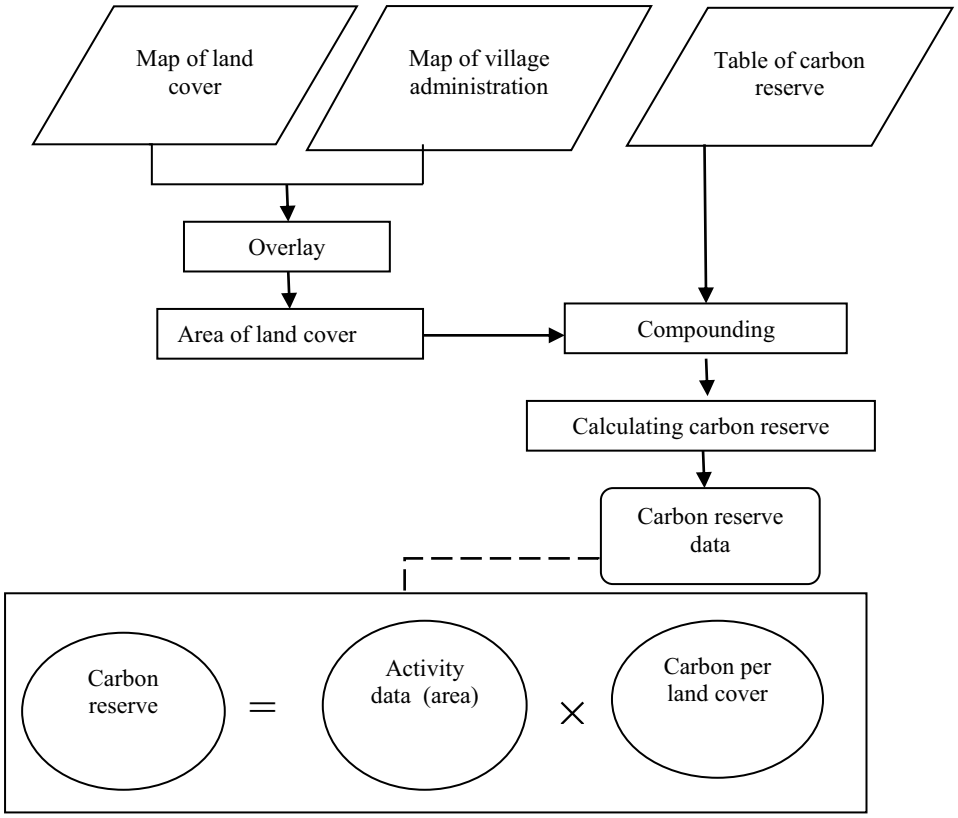

Figure 2. Steps of carbon analysis.

2.3.2. SWOT Analysis. Data analysis for the formulation of the steps for the development of ProKlim Simurugul, was carried out using a SWOT analysis. SWOT analysis is a systematic study of internal strengths and weaknesses with opportunities and threats [8]. The steps taken are: i) Identification of internal and external factors in the Simurugul climate village based on the criteria of the climate village and observations and other information found in the field; ii) Determining the weights for each internal and external factors based on the influence of these factors; iii) Determining the rating for each internal and external factors based on the influence of these factors by giving a scale of 4 (outstanding) to 1 (poor), positive variables (strengths and opportunities) given values ranging from 1 to 4 (very influential) and for negative variables (weaknesses and threats) given the opposite value. If the value of the accumulated results of each internal and external factors is known, then the position in the quadrant in the SWOT diagram can be discovered, as shown in Figure 3; iv).

Performing data analysis to evolve development strategies in the form of a SWOT matrix. This matrix can clearly describe how external opportunities and threats are faced, can be adjusted to the strengths and weaknesses they have. The matrix can produce four possible alternative strategies such as strategy S-O, it's strategy that use strengths to utilize opportunities; its W-O, it's strategy that minimizes weakness to utilize opportunities; its S-T, it's strategy that uses strengths to avoid threats; its W-T, it's strategy that minimizes weakness dan avoid threats.

Figure 3. Diagram of SWOT.

Information:
Quadrant 1: This is a very favorable situation. The object being examined has the opportunity and strength so that it can take advantage of the opportunities that exist. The strategy that must be implemented in this condition is to support an aggressive growth policy (growth-oriented strategy); Quadrant 2: Despite facing threats but still having internal strength. The strategy that must be implemented is to use force to take advantage of long-term opportunities with a diversification strategy (product/market); Quadrant 3: The object of research faces large market opportunities but faces internal weaknesses. The focus of this strategy is to minimize internal problems; Quadrant 4: It is a very unfavorable situation because it faces various internal threats and weaknesses.

3. Results and Discussion

3.1. Biophysical, culture aspects and Characteristics of respondents

3.1.1. Biophysical aspects. The biophysical conditions of the Simurugul climate village are the average elevation/altitude of ±800-900 m above sea level, the typology of the dominant highland area (>700 m asl), the hilly topography of the village making the climate village as water absorption area. Steep slope/topography in the range of 25–40%, air temperature ranging from 18-21 °C. The dominant types of vegetation are agricultural crops in the form of rice fields and secondary crops, trees that produce wood and not wood which are called Multi-Purpose Tree Species (MPTS) such as avocados, jackfruit, mango and cloves, bamboo and forestry plants such as judging / sengon (Paraserianthes falcataria), ganitri (Elaecocarpus sphaericus Schum), suren (Toona sureni) and mahagony (Swietenia mahagoni).

3.1.2. Culture aspects. The culture that is still very attached to the people is mutual cooperation activities. Various arts are also maintained in this village, amongst others are Sundanese art namely calung, angklung ceah and degung.

3.1.3. Characteristics of respondents. The consideration of determining respondents who are representative are families who are in charge of their family that makes the respondents tend to be the head of the family (89%), but among them, there are also as many as 11% of respondents who are women, whose status are as wife in the family. The dominant productive age of respondents is 36-50 years by 39% followed by 51-64 years by 35%. Respondents with productive age become important assets for the development of ProKlim. As for the non-productive age of > 65 years by 4%, the non-productive age group is no longer possible to do a number of jobs.

Most respondents, namely 87% have an elementary/equivalent education level. The level of education is very important because it influences the perspective and lifestyle. Higher levels of education affect the ability of the community to absorb information and implement it in their daily

behavior and lifestyle, especially in terms of health. Formal education forms value for someone especially in accepting new things (novelties). Considering the characteristics of respondents who mostly have primary education level, it is necessary to provide a continuous understanding of ProKlim because to be able to develop this climate village, the participation of the community is needed to implement a lifestyle that can reduce GHG emissions.

The most dominant livelihoods (types of work) are farmers by 83%. Residents generally have arable land in the form of rice fields as a source of fulfillment of needs, but some have limited land, so they can not meet their needs from these agricultural activities. Some work as farm laborers after working on their own land. Husband and wife help each other to cultivate agricultural land. Every farm family has average livestock in the form of cattle and sheep.

3.2. Activities of Proklim

These activities consist of adaptation and mitigation that have been carried out in supporting Proklim listed in Table 2.

Table 2. Kinds of Activities consists of adaptation and mitigation that have been carried out in Proklim in Simurugul sub-village.

No	Activities of Proklim	Description
1	Adaptation activities	
	a. Control of flood and landslide drought with the following activities	
	1) Creating one water reservoir and a small pond in the rice field	That is to provide rainwater for crop irrigation in the dry season, increasing land productivity, cropping patterns and farmers' income in rainfed land, to prevent/reduce runoff in the rainy season and to reduce the risk of flooding and increase the absorption of water into the soil. The size of the reservoir is ±15 m long and ±5 m wide with a depth of ±1.5 m.
	2) Maintain and optimize springs	It has two springs, this spring is located below the rice field at an altitude of ±813 m asl. The settlements are at an altitude of 900-910 m asl, so that the water from the two springs cannot be used directly by the residents of the climate village, but is used by residents in the lower villages, namely Gugunungan, Ciburuy and Buana housing, which is the lower location.
	3) Making clean water reservoirs and drainage channels	Drainage channels have been made in several locations with the purpose of drying up areas that are flooded so that there is no accumulation of water on the ground, controlling soil erosion, damage to existing roads, development and controlling excessive rainwater so that no floods occur. Residents also have the habit of draining rainwater from the house towards the garden to facilitate water uptake. That is channeled through a small ditch.

No	Activities of Proklim	Description
	4) Maintaining the design of the stage house	The stage house designed is partly modified. The initial foundation usually uses flat stones which are usually called batu tatapakan, so that the building can avoid cracks during an earthquake. The building walls are made of woven bamboo collected from bamboo around the climate village. Air circulation at the house on stilts is also good because it is equipped with windows and air-conditioning. The ceiling of a house is usually made of bamboo and at the top can be used for storage of goods. Under the house can be a place for pets like free-range chickens.
	5) Making terraces for rice fields and gardens	That is a pattern or technique of planting crops with terraced systems (terraces) as an effort to prevent soil erosion. Hilly topography makes almost most of the rice fields on the left and right sides of the hill and in the form of terracing.
	b. Increasing food security	That is carried out by applying the cropping system of rotating cropping patterns in the types of rice (*Oryza sativa*) and sticky rice, the pattern of agroforestry namely the land use system (farming) which combines trees with agricultural crops. It was carried out by the community by planting various types of plants such as kapol (*Amomum compactum*), corn (*Zea mays*), ginger (*Zingiber officinale*), sweet potatoes (*Ipomoe batatas*), cassava (*Manihot escalenta*), bananas (*Musaceae)* and papaya (*Careca papaya*) among tree crops and the use of home gardens by planting beneficial crops such as fruits and medicinal plants.
	c. Control of diseases related to climate change	Activities carried out in the form of 3M activities (draining, closing, stockpiling) mosquito nests, making sanitation and clean water in every house, and doing hand washing activities with soap and hygienic and healthy living behavior.
2.	Mitigation activities	
	a. Management of solid and liquid waste	Those are carried out namely by residents who already have a decent trash can in every household, residents manage inorganic waste by burning through stoves in homes so there is no need for landfills that actually lead to accumulation of garbage.

No	Activities of Proklim	Description
	b. The use of new renewable energy	One of energy conservation is by using energy-saving lamps in every house.
	c. Agricultural cultivation by reducing GHG emissions	The activities carried out are the use of organic fertilizers derived from cattle. The potential of livestock in Simurugul village is quite large and is one of the cattle fattening places. There are ±40 cattle owned by residents.
	d. Increased vegetation cover	A number of types of forestry plants such as ganitri, sengon, suren and mahoni have been reforested, which is one of the programs of the Ministry of Environment and Forestry for the development of community forests.
	e. Prevention and control of forest and land fires	Until now there have never been any land fires in the Simurugul sub-village area. Land fire prevention has been carried out by residents even though there is no village regulation regarding the prohibition of banning the burning of crops and forests.

Especially for activities (item 1.a.3) (Table 2), ProKlim is also integrated with the construction of clean water facilities (piping) which are carried out in mutual cooperation by the residents and the water can be divided equally among the residents. For activity (item 1.a.5), even though, there were two indicators of activity that conducted less satisfying i.e. i) activity of water infiltration through making Biopori, ii) less amount of establishment facilities and infrastructure controlling flood and slide. For activity (item 1.c) is also in line with the activity program of the Health Office, namely the launching of hand washing activities in Margawati village. Some activities that are synergistic with ProKlim are the activities of the mothers involved in PKK (Family Welfare Development). In this case, gender is one of the issues that can be attributed to ProKlim activities because the role of mothers in the household is very important.

The result of monitoring refers to [9], that implementation of indicator of adaptation activities) such as (item 1.a.1, 1.a.2, 1.a.4, 1.a.5, 1.b, 1.c) include relevant and considered good. But for (item 1.a.3) include relevant and considered moderate.

For activities (item 2.a) of organic waste management, the community has not done it yet even though there was processing equipment that helping of Environment office Garut Regency. So that it needs intensive counseling for understanding residents in order to separate waste organic and organic in container differently, both will process further to be valuable items and not damaging the environment. As for, processing waste and utilization of liquid waste was done by using biogas from cow urine. But that implementation was not effective because processing equipment having damaged so that not used. The result of monitoring that implementation of that indicator of mitigation activities) such as (item 2.a) include relevant but considered less satisfying. It needs further development of mitigation activities such as handling the solid waste of household to be compost, solid waste of organic and liquid waste of domestic to be biogas [9].

For activities (item 2.b), at the beginning of the declaration of ProKlim in 2015, there were four houses that used biogas by utilizing cow dung as their energy ingredients. But in the last three years, all of this biogas has not been functioning due to the main problem of equipment damage. In this case, increasing public knowledge for the use of renewable energy needs to be improved.

3.3. ProKlim benefits

3.3.1. Increasing community resilience in the face of climate variability and climate change impacts. The existence of this ProKlim for Simurugul residents is to initiate the process of water piping from a spring in the upstream village. Basically, one village is interdependent with one another, because the source of the spring to flow the village comes from a higher area. Likewise, the existence of the Simurugul climate village provides benefits as a reservoir of water reserves so that it becomes a source of water for the lower regions. The linkages between the needs of each other between villages make social relations established and maintained, public awareness continues to increase to maintain the presence of protective trees around the area of water absorption (springs).

3.3.2. Improve the quality of life and socio-economic community. The community can utilize forest products in the form of wood for building materials as well as branches/tree branches that are used as firewood which can be used for domestic purposes because the dominant citizens still use stoves for cooking, thereby reducing the cost of purchasing gas in the form of gas. An oversupply of firewood can be sold and can be an additional family income. In addition, there are non-timber forest products in the form of bamboo. Its use can be used to support agricultural activities, materials for the house and also for sale.

3.4. Estimating carbon reserves

The initial stage is to determine the area of land cover through spatial analysis, which is to overlay the Simurugul climate village area with a map of land cover and high-resolution spot images equipped with the results of checking (verification) the field to ensure the area being mapped. The results of the analysis revealed that land cover in the Simurugul climate village consists of secondary dryland forests, plantations, settlements, and rice fields. The distribution of land cover composition is presented in Figure 4.

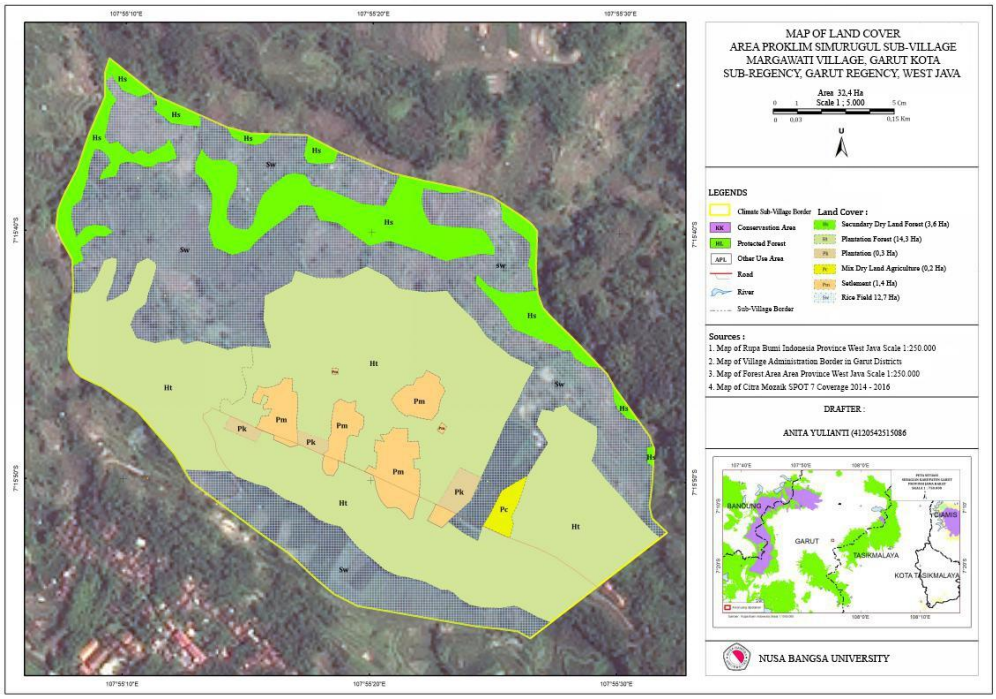

Figure 4. Map of land cover the area of Simurugul climatic village.

Explanation of the results of the interpretation of land cover is as follows: referring to [10] i.e. i) The portion of the study area categorized as having secondary dryland forest, namely the area overgrown with natural trees, is predominantly on the left and right side of the river flow, covering ±3.6 ha (11.11%); ii) The portion of the study area categorized as plantation forest is the area planted by the community with forestry plants of the same type. This area is part of a community forest program, some of which receive assistance from the government in the form of seeds. The types of plants grown are ganitri, jeungjing, suren and mahogany. The community forest is a forest that grows on land that is burdened with property rights and other rights outside the forest area with the provision of a minimum area of 0.25 (twenty-five percent) hectares, a canopy cover of woody plants and other crops of more than 50% (five thirty percent). Planted forest area in the study area is ±14.3 ha (43.83%); iii) The portion of the study area categorized as plantations island that is used for agricultural activities without changing crops for two years. There is an area planted by the community with a clove plant area of ±0.3 ha (0.93%); iv) The portion of the study area categorized as mixed dryland farming is an area planted by trees but not too much and at the bottom planted with crops such as cassava, ginger and tubers covering ±0.2 ha (0.62%); v) The portion of the study area categorized as settlement is the area or land that is used as a residential area or residential environment and a place of activity that supports people's lives. This area consists of houses, yards, cages for livestock and public facilities in the form of mosques, meeting, field, and Posyandu (integrated health service centers) covering ±1.4 ha (4.32%); vi) The portion of the study area categorized as rice fields is that rice fields that get water from the river are not rainfed, most of them use terracing patterns covering ±12.7 ha (39.20%). As for, calculation of the carbon reserve value of the climate village after calculating the area per land cover as in the following Table 3.

Table 3. The result of the calculation of estimating carbon reserves .

No.	Types of land cover	Area (± ha)	C (ton /ha)	C (ton)
1	Secondary dryland forest	3.60	85.25	306.90
2	Plantation forest	14.20	75.19	1 067.70
3	Plantation	0.30	63.00	18.90
4	Mixed dryland farming	0.20	30.00	6.00
5	Settlement	1.40	4.00	5.60
6	Rice fields	12.70	2.00	25.40
	Sum	32.40		1 430.50

In Table 3, the largest carbon stock value is produced from plantations, which is 1,067.70 tons. The contribution of an area in storing carbon means that the greater the carbon stock above the soil surface, the more emissions in the air and the greenhouse effect can be reduced. Based on the results of field observations in several locations that there are still areas that are prone to landslides which are caused by a large number of rice fields in hilly locations (39.20%). To be able to minimize the occurrence of landslides and to optimize and increase carbon stocks can be done by planting and enriching various types of trees in several locations of rice fields without reducing the value of the function of the rice fields as the main source of livelihood for villagers of the climate village Simurugul.

As comparison in other Proklim location, land cover of forest-based estimating carbon reserves is range 204.81 - 870.8 (ton CO2- e), cattle biogas and composting are range 4.74 - 56.43 (ton CO2- e), utilization of the yard is 605.23 (ton CO2- e), agriculture is 0.05 - 79.28 (ton CO2- e), tree planting water barrier (overlay of carbon sequestration) is 9.63 (ton CO2- e) [11]. Meanwhile on a forest of secondary dry land in Mountain Gede Pangrango National Parks has carbon sequestration of 17.25 - 113.2 ton/ha [12], [13]. Plantation forest of agroforestry with Paraserianthes falcataria stand and coffee 5 - 20 years age in Wonosobo area and Kertayasa, Ciamis Regency, has carbon sequestration of 45.39 - 112.25 ton/ha [14]. Protection forest in Wain River, East Kalimantan Province with dbh (diameter

breast height) 5.0 - 40.0 cm has carbon sequestration of ±211.86 ton C/ha. On forest of the secondary highland of agathis mix with other species in Mountain Gede Pangrango area in Nagrak, Sukabumi Regency, West Java Province has carbon sequestration of 38.48 - 113.20 ton C/ha (Dharmawan 2010) [15]. As for, The study [15] reported that carbon sequestration P. falcataria stand is 28.9 (dbh-biomass equation) and 28,05 (dbh2H-biomass equation). The carbon sequestration of vegetation marked baseline has 10.96 (dbh-biomass equation) and 9.05 (dbh2H-biomass equation). The carbon sequestration in understory on P. falcataria stand has 2.06 and baseline vegetation 1.9. Known, the increment of carbon fixed on P. falcataria stand has 18-19 ton C/ha or equivalent 66-70 ton CO2/ha (density 1,300 trees/ha) [15]. Generally, plantation forest of P. falcataria in East Jawa and West Jawa Province has carbon sequestration of 112.8- 122.7 ton C/ha [16].

3.5. ProKlim Development in Simurugul sub-Village

The results of the calculation (matrix) of the internal factors of ProKlim in Simurugul village (Table 3) and the external factor matrix (Table 4).

Table 4. ProKlim internal factor matrix in Simurugul sub-village.

No	Strength	Weight (B)	Rating (R)	Score (BxR)
1	The first and only climate village in Garut Regency	0.09	4	0.36
2	The habit of community-cooperating in carrying out activities	0.09	4	0.30
3	Adjacent to Karacak Valley tours	0.08	3	0.27
4	Community's desire to participate directly	0.07	3	0.20
5	High public awareness not to damage the environment	0.08	3	0.27
6	Has excellent products (wood, cloves, glutinous rice) and typical Sundanese specialties (calung, angklung ceah)	0.09	4	0.33
7	Become a source of springs for the surrounding village	0.09	4	0.33
8	There is no fallow land in Simurugul sub-village	0.06	2	0.13
	Total	0.65	27	2.21
No	Weakness	Weight (B)	Rating (R)	Score (BxR)
1	Few people are aware of the existence of the village climate program	0.04	2	0.07
2	Community institutions that have not been supportive	0.05	2	0.08
3	There are no regulations (village regulations) governing agricultural, livestock or forestry activities	0.03	1	0.04
4	Inadequate human resources and a low level of education	0.03	1	0.03
5	The lack of funds in the development of the climate village program	0.04	2	0.07
6	Lack of community knowledge regarding the village climate program	0.04	2	0.07
7	Lack of direction to the community regarding the climate village program	0.04	2	0.07
8	Facilities and infrastructure that do not support	0.04	2	0.06
9	Farmers' income is still low	0.04	2	0.49
	Total	0.35	14.00	0.98
	Strength-Weakness	1		1.23

Table 5. ProKlim external factor matrix in Simurugul sub-village.

No	Opportunity	Weight (B)	Rating (R)	Score (BxR)
1	Increased public knowledge and insight	0.13	4	0.49
2	Can be developed as a village climate pilot program area	0.11	3	0.33
3	Can be developed into agrotourism area	0.12	3	0.40
4	Moral support from the village government to make this village a climate village	0.12	3	0.40
5	There are agricultural extension workers to help develop agricultural activities	0.11	3	0.36
6	There are Agricultural Schools in Garut Regency and Universities in agriculture / Forestry and environmental observer NGOs in West Java Province	0.12	3	0.40
	Total	0.72	20	2.38
No	Threat	Weight (B)	Rating (R)	Score (BxR)
1	Coordination between sectors is still weak	0.05	2	0.08
2	Limited budgets from local governments for the development of climate villages	0.05	2	0.08
3	Changing patterns of rainy and dry seasons.	0.06	2	0.10
4	Infrastructure facilities are still limited in supporting agricultural, animal husbandry, plantations and forestry activities	0.05	2	0.08
5	The difficulty of accessibility to the climate village (the damaged, narrow road with hilly contours)	0.06	2	0.10
	Total	0.28	8	2.22
	Opportunity – Threat	1.00		0.16

In Table 4, the internal factor value (IFAS) is a reduction from 2.21 to 0.98=1.23, so that it is located in quadrant 1. Means that in terms of internal climate this village is strong so formulating its strategy relies on existing strengths. In Table 5, the value of external factors (EFAS) is a reduction from 2.38 to 2.22=0.16, so that it is located in quadrant 1. The EFAS value is almost negative, meaning that in this situation, it can be indicated that in order to take advantage of the opportunities that exist, should anticipate threats that might occur so that utilization can go as expected according to the opinion of [17]. The accumulated value of the results of the SWOT matrix analysis, by adding up the value of internal and external factors is 1.39 indicating that the development of the climate village is in the quadrant position 1, which supports aggressive strategies. According to [17], this is a very good situation where the development of ProKlim Simurugul has the power so that it can take advantage of the opportunities that exist. The strategy that must be implemented in these conditions is to support an aggressive growth policy, which means that it has a large enough force to make the best of opportunities.

The next step in the formulation of the village climate development strategy after knowing the position of the results of the SWOT matrix analysis is to determine the recommended alternative utilization strategies. This considers the results of the SWOT matrix analysis with a combination of internal factors and external factors that are owned and faced by the Simurugul climate village that is faced in quadrant I. By examining the considerations between strengths and opportunities on

resources, they provide a specific strategy for the form of use as an ecotourism area that is done by aggressive strategy - SO (Strengths and Opportunities) that creates strategy by using power to take advantage of opportunities. Other activities that are relevant to the development of ProKlim can be carried out according to the needs and conditions faced. Details of activities in accordance with the strategy can be seen in Figure 5.

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Internal factors / Eksternal factors	Strengths (S) factors: The first ProKlim and the only one in Garut regency; The community habit of co-operating in some activity; Adjacent to Karacak Valley tourism; Community need to participate directly; The high of community awareness to not damage the environment; Having featured product (wood, clove, glutinous) and of typical art Sundanese (calung, angklung ceah); To be springs for village around; There is unprocess land in Simurugul village.	Weakness (W) factors: The least community that knowing existence of ProKlim program; The community institutional is not supporting; There is no village regulation that set activities of agriculture, livestock, and forestry; The least human resources and the low education level; The minimal fund in developing ProKlim; The least community knowledge about ProKlim, The lesat direction to the community related ProKlim; The facilities and infrastructures are not supporting; The avenue community is still low
Opportunities (O) factors: The increase community of insight and knowledge, It can be developed as a pilot project area ProKlim and agrotourism; There is supporting morally from village government for that is as agrotourism area and pilot project of Proklim village; There are agricultural extension for helping develop its activity; There are Agricultural school in Garut regency and high education of agriculture/forestry and LSM of environmental observer in West Java Province.	Strategy S-O: Create its strategy that use strengths for utilization opportunities; The need publication about ProKlim and superior product on some media (S1, S2, S3, S6, S7- O1,O2, O4); The need held of training for add insight and knowledge of village community about agrotourism management in developing ProKlim by involving SMK of agricultural, and student activities such as field practical (PKL) or field working lecture (KKN) (S4, S5- O6); Training to utilize agricultural product, livestock, plantation and forestry in increasing of community avenue (S6, S8- O5).	Strategy W-O: Create its strategy that minimalize weaknesses for utilize opportunities; Making of use community leaders as role (W1-O1); The need regeneration in community institutional by involving youth and students (W2, W3, W5, W8,W9-O1, O4,O6); Involving educational activity such as PKL, SMK of agricultural or KKN (W4, W6, W9 – O6, O3), Supporting involve of NGO/LSM environment observer for community assistance (W7-O2, O5,O6).
Threats (T) factors: Coordination between sectors is still weak; The limited fund of government for developing ProKlim; Rainy dan dry season pattern that charge; The limited facilities and infrastructures in supporting activities of agriculture, plantation and forestry; The difficult accessibility toward Climate village (the road is broken, narrow with contour hilly).	Strategy S-T: Create a strategy that use strengths to avoid threats; Community must increase creativity in order to maintain ProKlim sustainability (S1, S3, S6 –T1, T2, T3, T4, T5); Revamping infrastructure use materials environmentally friendly that available in ProKlim (S2, S4,S5 – T4, T5); Strengthening the commitment of community residents to study continuously do cooperate (S2, S4,S5 –T2, T4, T5).	Strategy W-T: Create strategy that minimalize weakness and avoiding threats; The need of Focus Grup Discussion (FGD) between local government (Environment office), Village government, community leaders and residents ProIklim related problems encountered (W1,W2, W3, W4, W5, W6, W7, W8,W9 - T1, T2, T5); Making pilot demplot in order to be place of learning (W1, T3); Revamping infrastructures and accessibility that support ProKlim aligned of village fund (W8-T4, T5).

Figure 5. Strategy of alternative metrics for developing ProKlim.

4. Conclusions

In Simurugul sub-village, activities of Proklim consists of adaptation and mitigation. Adaptation activities such as a) Control of flood and landslide drought with the following activities i.e 1) creating one water reservoir and small pond in the rice field, 2) maintain and optimize springs, 3) making clean water reservoirs and drainage channels, 4) maintaining the design of the stage house, 5) making terrace; b) Increasing food security; c) Control of disease. Mitigation activities such as a) Treatment of solid and liquid waste, b) The use of new renewable energy, c) Agricultural cultivation, d) Increased vegetation cover, e) Prevention and control of forest and land fires.

The result of measuring the current carbon stock was obtained 1,430.50 tons in Simurugul sub-village.

The specific strategy of Proklim development in Simurugul sub-village as the local level is to form of use as an ecotourism area. It is done by aggressive strategy - SO (Strengths and Opportunities).

5. Recommendations

It will need to develop activities related of adaptation and mitigation that was carried out before i.e increasing capacity of clean water reservoirs and intensity of drainage channels, treatment of solid and liquid waste, the alternative of the use of new renewable energy.

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