



# Social, Economic, and Environmental Impacts of Sentul Rain Forest Tourism Development

Khairunnisa Luthfiah, Bramasto Nugroho\*

(Received June 2023/Accepted December 2024)

## ABSTRACT

Sentul Rain Forest Tourism (SRFT) is one of the ecotourism objects developed in a forest area managed by Perhutani Public Company in collaboration with a private company. This study examined the social, economic, and environmental impacts of SRFT on the surrounding community before and after SRFT development. The study used quantitative descriptive analysis methods, with interviews and questionnaires. Respondents were divided into two groups: community groups receiving direct and indirect impacts. The results showed that SRFT had a positive social impact, namely increasing social accessibility, which can increase people's mobility. Economically, SRFT created jobs and increased people's income in community groups with direct and indirect impacts. Environmentally, it increased the tree covering and positively changed people's attitudes towards forest management. However, the development of SRFT also has a negative impact. Socially, increasing conflict between tourists and the community, both in the community groups receiving direct and indirect impacts. Economically, it increased the externality costs to community groups that receive direct impacts.

**Keywords:** economy impact, ecotourism, environmental impact, rain forest, social impact

## INTRODUCTION

Indonesia has the potential for natural beauty and cultural wealth that is highly valued in the tourism industry market (Dadi 2022). This potential is valuable capital that can be managed and utilized to improve the sustainable development of the Indonesian economy and, as much as possible, improve people's welfare. Several areas in forest areas have the potential for natural beauty for the development of tourism that can increase state revenue, absorb substantial labor, and improve community welfare (Ramadani and Navia 2019).

In principle, forest tourism is selling destinations and local science and philosophy or ecosystem and socio-system philosophy (Puspitawati *et al.* 2016). Sentul Rainforest is one of the natural tourist attractions developed in a forest area managed by Perum Perhutani (a public company) in collaboration with a private company. Sentul Rainforest Tourism (SRFT) is a camping ground that also provides a trekking arena that displays the beauty of the Sentul pine forest. The wisdom of the forest ecosystem around the tourism area must be

maintained to create harmony and dynamism in community life so that villagers can have their own ways or habits of preserving their environment (Nuraini 2015).

The development of the SRFT business is also at risk of causing positive and negative impacts on the surrounding community regarding social, economic, and environmental aspects. This research was conducted so that managers and decision-makers know the social, economic, and environmental impacts of the development of the SRFT business. This research examined the social, economic, and environmental impacts of tourism development on the surrounding community before and after the development of tourism.

## METHODS

### Time and Place

The study was carried out from February 2023 to March 2023. Data processing was carried out from March to April 2023. The research was carried out in the SRFT area, Babakan Madang Forest Management Resort (RPH), Bogor Forest Management Unit (BKPH) Section, Bogor Forest Management Unit (KPH).

Karang Tengah Village is in Babakan Tengah District, Bogor Regency, West Java Province. Geographically, Karang Tengah Village is located at the coordinates of

Department of Forest Management, Faculty of Forestry and Environment, IPB University, IPB Campus Darmaga, Bogor 16680, Indonesia

\* Corresponding Author: Email: [bramastonu@apps.ipb.ac.id](mailto:bramastonu@apps.ipb.ac.id)

106°54'00.00"–106°56' 39.99" E and 06°33'50.00"–06°36'29.99" LS at an altitude of 200–800 m above sea level with a slope of 0–40%. Demographically, the population of Karang Tengah Village in 2014 was 4,507 people, with 2,870 males and 1,637 females.

SRFT is in the administrative area of Bogor Regency with an altitude of 300–500 m above sea level with a sloping to undulating topography with a slope of 15–40%. It occupies 26 hectares of pine forest in Cigobang Village, Karang Tengah Village, Sentul, Bogor Regency (Figure 1). This tourism destination was established in 2021 in collaboration with Perhutani as a forest land provider, the private sector as the owner or core manager, and the village community as the workforce.

### Types and Data Sources

Social impact indicators were focused on changes in the level of cooperation, changes in social access, changes in the level of conflict among residents, and changes in people's lifestyles (Hakim and Faisol 2024). The economic impact indicators explored in this study were changes in livelihoods, income, and expenditure on external costs. Environmental impact indicators included changes in the number of trees cover, changes in forest management systems, and waste management.

Respondents were divided into two groups, namely, people who were directly and indirectly affected. The people who were directly affected were people who work and earn income directly from the existence of tourist attractions and live in a radius of 0–800 m from tourist sites. Alexander (2012) stated that the optimal

development of an open space tourist area is to have a range of 800 m from the settlement. Not directly affected respondents lived within a radius of >800 m to 1 km from the research site. Pradani *et al.* (2017) mentioned that the farther the settlement distance from the area, the less impact will be felt. Based on this, it is assumed that 1 km is the farthest ratio to determine the effect of distance on the impact of tourism development.

The respondents were selected using the purposive sampling method or deliberate selection with the criteria of communities directly or indirectly affected by the development of the SRFT. The number of respondent samples was determined based on the number of populations following the Slovin formula (Amin *et al.* 2023).

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

where:

- $n$  = sample
- $N$  = population
- $e$  = tolerable error level

Using the Slovin formula, it is necessary to determine the error tolerance limit in advance. The percentage of errors in social research generally used is 5% to 10% of the total population. Research with fewer errors can be selected when sufficient time and resources are available (Budiastuti and Bandur 2018). This study used an error tolerance level of 10%. The total population in a radius of 1 km from the SRFT, namely 334 people of RT 001 RW 014 Karang Tengah Village. Based on the Slovin formula,

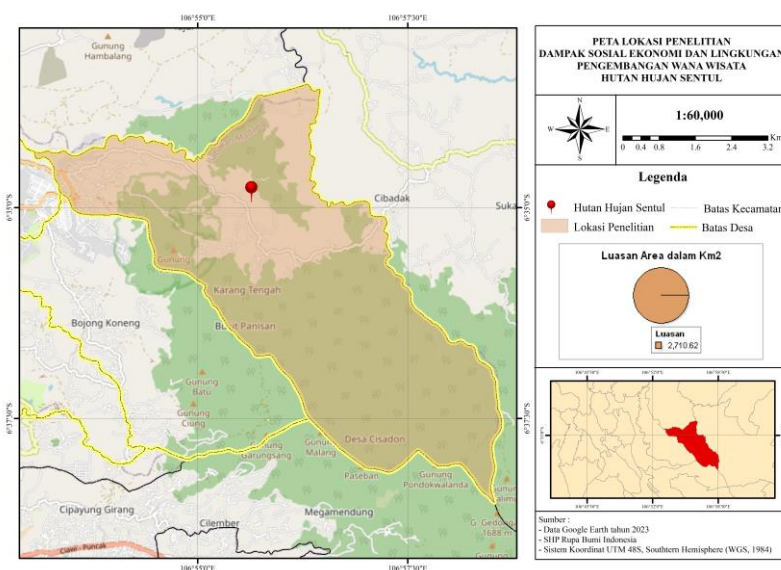


Figure 2 Research site.

the number of samples was 77 people, with the distribution of respondents for directly and indirectly affected communities presented in Table 1. The research data was explored by direct interviews using questionnaires to all selected samples.

### Data Analysis

Data was analyzed using a quantitative descriptive method. Using the Minitab application, quantitative descriptive data analysis was conducted using a statistical test to find the average difference between two independent variables. The statistical  $t_{\text{test}}$  will show the value of  $t_{\text{table}}$  and  $t_{\text{calc}}$ . The  $t_{\text{calc}}$  was obtained using the formula (Tanjung *et al.* 2023):

$$t_{\text{calc}} = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2} - 2x \left( \frac{s_1}{\sqrt{n_1}} \right) \left( \frac{s_2}{\sqrt{n_2}} \right)}}$$

where:

- $\bar{x}_1$  = average of sample 1
- $\bar{x}_2$  = average of sample 2
- $n_1$  = number of samples 1
- $s_1^2$  = variance of sample 1
- $S_1$  = standard deviation of sample 1
- $S_2$  = standard deviation of sample 2
- $n_2$  = number of samples 2
- $s_2^2$  = variance of sample 2

The hypothesis used in this study were

- H0: there was no significant difference between social/economic/environmental variables before and after the existence of the SRFT
- H1: there is a significant difference between social/economic/environmental variables before and after the existence of the SRFT.

The hypothesis was tested using the  $t$ -test with a confidence level ( $\alpha$ ) of 5%. The test criteria were that if the  $p$ -value is higher than  $\alpha$ , then accept H0, and if it is less than  $\alpha$ , then reject H0 (Anisa and Rifai 2022).

## RESULTS AND DISCUSSION

### Respondent Characteristics

The study involved 77 respondents, who were grouped into 51 directly affected and 26 indirectly affected. The respondents' characteristics included age, gender, marital status, last education, and main job. Table 2 shows the characteristics of the respondents in the study.

### Social Impact

#### • Level of cooperation

The level of community cooperation at the research site is high both before and after the establishment of the SRFT (Table 3). The cooperation carried out by the community around the tourist area has been going on for generations. This cooperation initiative arose because of close population relations. In general, people have kinship, work, and togetherness. Darung (2019) stated that the people who apply the tradition of cooperation are primarily people in the countryside. The community is working on development for the common good. Cultural events in the countryside are also prepared and worked together to establish a sense of brotherhood and close family.

The results of the  $t_{\text{test}}$  with an  $\alpha$  value of 0.05 produced a significant value ( $P$ -value) of 1 and  $t_{\text{calc}}$  of 0 in both direct and indirect impact calculations (Table 3). There is no significant difference in the level of community cooperation before or after the SRFT Workshop. This fact is supported by an impact calculation that results in a calculated  $t_{\text{value}}$  higher than the  $t_{\text{table}}$ . As stated previously, cooperative activities have been carried out for generations and continue after tourism has started.

Respondents still perceive community cooperation at the research site as low, both before and after the development of tourism facilities, allegedly caused by some people who do not care about and understand the development of tourism facilities. This is by what Wulandari (2019) said that one of the problems in efforts to develop tourism villages is the need for more public understanding of tourism and the absence of attention from government agencies and non-governmental institutions (NGOs) to provide understanding to the public

Table 1 Distribution of the number of respondents

Radius	Respondent	Number of respondents
0–800 m	$2/3 \times 77$	51
>800 m–1 km	$1/3 \times 77$	26
Total		77

Table 2 Characteristics of respondents

		Number	Percentage (%)
Age	20–35	25	32.47
	36–50	40	51.95
	>50	12	15.58
Gender	M	52	67.53
	F	25	32.47
Marital status	Married	69	89.61
	Not married	8	10.39
Last Education	Elementary school	52	67.53
	Junior high school	4	5.19
	High school	21	27.27
Job	Farmer	23	29.87
	Homemaker	15	19.48
	Laborer	6	7.79
	Craftsman	4	5.19
	Guide	5	6.49
	Entrepreneur	5	6.49
	Tour manager	5	6.49
	Others	14	18.18

Table 3 Changes in cooperation in communities that are directly and indirectly affected

Cooperation level	Before		After		t-test		
	Number	%	Number	%	$T_{calc}$	$T_{table}$	Sig (2-tailed) $P$ -value
Directly affected							
Low	6	11.76	5	9.80	0	2.008	1
High	45	88.24	46	90.20			
Total	51	100	51	100			
Indirectly affected							
Low	5	19.23	5	19.23	0	2.056	1
High	21	80.77	21	80.77			
Total	26	100	26	100			

about tourism. If this is left unchecked, it is feared that it will hinder tourism development.

#### • Conflict level

Social conflicts are part of social change, which is a way to form a social order (Ruman 2009). This order often comes from the coercion carried out by the holders of power against the individuals under them with the issue of maintaining order in society so that a conflict is created (Nulhaqim *et al.* 2019). Conflicts can occur if there is a conflict regarding the development of the SRFT Area. Table 4 presents conflicts that occurred in the community due to the development of tourism. Conflicts often occurred between the community and tourist visitors. The trigger for conflict was the noise caused by visitors. Visitors camping in tourist areas were often active until late at night, disturbing people who wanted to rest. In addition, visitors who tracked through people's houses also often made noise. There were changes in the level of conflict in communities that were directly and indirectly affected. This fact is supported by the results of the  $t$ -test with an  $\alpha$  value of 0.05, which shows a

significance value ( $P$ -value) of 0.001 and 0 on both types of impacts, and the second value of  $t_{calc}$  value is higher than the  $t_{table}$ . The  $P$ -value is less than the  $\alpha$  value of 0.05, and the  $t_{calc}$  is higher than the  $t_{table}$  showing that there is a significant difference in the level of community conflicts that are directly and indirectly affected before and after the SRFT.

Prolonged conflicts will give rise to public apathy and rebellion towards activities developed by outsiders (Septemuryanto 2020). Tourism managers tried to resolve conflicts in a family way to get closer to the community and prevent sustainable conflicts. Conflict resolution was carried out by providing compensation as a sign of apology for disturbing the community's peace. As a form of self-approach to the community, the management also tried to involve the community by inviting and distributing food when the tourism community had a celebration.

#### • Social access

Karang Tengah Village, especially RT 001 RW 014, was dominated by land still covered with forests and rice

fields, which makes social access and infrastructure in the location still need to be improved. Until now, people still must walk approximately 20 minutes to the nearest clinic and more than 30 minutes to the nearest elementary school. The road to the location before there was a tourist attraction was inadequate. The road was in the form of unpaved soil, narrow, steep, rocky, and muddy in the rainy season, which did not allow two- and four-wheeled vehicles to access it. Road conditions did not allow public transportation, making it more difficult for people to mobilize, especially the elderly, who do not have private vehicles.

The existence of tourism is perceived to increase social access. The results of the *t*-test with an  $\alpha$  value of 0.05 showed a significance value of 0 and  $t_{\text{calc}}$  higher than  $t_{\text{table}}$  in both directly and indirectly affected communities (Table 5). The *P*-value lower than the  $\alpha$  value of 0.05 and the  $t_{\text{calc}}$  value higher than the  $t_{\text{table}}$  shows a significant increase in community social access before and after the existence of the SRFT.

Changes in social access were felt by people who are directly affected by the development of tourist areas. After the tourist attraction was built, the roads in the village began to be paved and repaired so that they were not too slippery during the rainy season. The wooden bridge to cross the river was also repaired so that it could be passed by two-wheeled vehicles. The construction of roads by the tourism authorities was carried out to facilitate tourists' access. Aradiansari *et al.* (2015) stated

that inadequate access would reduce tourists' interest in visiting.

#### • Lifestyle

The presence of ecotourism can result in changes in people's lifestyles in terms of clothing, culture, and mindset (Wangu *et al.* 2021). Tourists with various customs, environmental differences, education levels, and backgrounds can influence the people. The influence can be direct or indirect. Interaction between local communities and tourists can change the pattern or value of people's lives (Sudiarta *et al.* 2021).

The facts on the ground show the difference with the literature above. The community around the SRFT area, which is directly or indirectly affected by the development of tourism areas, did not feel any changes in lifestyle due to the development of tourism. It is because the average person does not have a high income, so people only focused on working to support their families and fulfill their daily lives without being able to follow the lifestyle trends of tourists. This is in line with Fadilla's statement (2017) that the higher a person's income, the more spending budget can be used to satisfy their lifestyle. A person with a high income can buy branded and expensive goods better than those with a relatively low income. Economic conditions are closely related to the ability to meet the community's needs in terms of clothing, food, board, education, health, and others (Imron and Aka 2018).

Table 4 Changes in conflicts in communities directly and indirectly affected

Level of conflict	Before		After		t-test		
	Number	%	Number	%	T <sub>calc</sub>	T <sub>table</sub>	Sig (2-tailed) P-value
Directly affected							
Low	44	86.27	32	62.75	3.48	2.008	0.001
High	7	13.73	19	37.25			
Total	51	100	51	100			
Indirectly affected							
Low	26	100.00	16	61.54	5.72	2.056	0
High	0	0.00	10	38.46			
Total	26	100	26	100			

Table 5 Changes in social access of directly and indirectly affected communities

Level of social access	Before		After		Hasil uji t		
	Number	%	Number	%	$T_{\text{calc}}$	$T_{\text{table}}$	Sig (2-tailed) $P$ -value
Directly affected							
Low	51	100.00	18	35.29	7.02	2.008	0
High	0	0.00	33	64.71			
Total	51	100	51	100			
Indirectly affected							
Low	25	96.15	9	34.62	5.78	2.056	0
High	1	3.85	17	65.38			
Total	26	100	26	100			

## Economic Impact

### • Changes in livelihoods

Tourism development can positively impact the community's economy by expanding employment, increasing business opportunities, and increasing people's income (Soewarn *et al.* 2019). The increase in the number of visitors is directly proportional to the increase in services. Tourists' needs, desires, and expectations will increase absorption and employment opportunities, increase income, and accelerate the equitable distribution of people's income. This can also result from the tourism multiplier effect (Febrina *et al.* 2017). Changes to people's livelihoods directly affected by developing tourism areas in the SRFT are presented in Table 6. After the existence of ecotourism, no respondents had a job, and 9 respondents (18%) had a new side job. The development of tourism also provided

new livelihoods for homemakers. Previously, 12 homemaker respondents did not have formal jobs. After the existence of SRFT, two of the 12 respondents had jobs as restaurant chefs in SRFT to increase household income. People who felt the immediate impact choose to join the tourism party to get additional family income.

The livelihoods of people not directly affected by tourism development had changed slightly due to the presence of workers and the unemployed recruited by tourism managers. In contrast, other livelihoods had not changed (Table 7). The management of the tourism area preferred to hire the nearest community to help manage the tourism area because the management wanted to help the residents' economy with the tourism area's existence. Wowor *et al.* (2018) stated that the tourism sector provides business opportunities due to the arrival of tourists. These business opportunities help regional

Table 6 Changes in livelihoods in directly affected communities

Job type	Before				After			
	Main job		Side job		Main job		Side job	
	Number	%	Number	%	Number	%	Number	%
Farmer	14	27.45	0	0	14	27.45	0	0
Homemaker	12	23.53	0	0	10	19.61	0	0
Laborer	8	15.69	0	0	4	7.84	0	0
Craftsman	2	3.92	0	0	2	3.92	0	0
Guide	0	0.00	0	0	5	9.80	2	3.92
Entrepreneur	4	7.84	0	0	4	7.84	0	0
Tour manager	0	0.00	0	0	3	5.88	7	13.73
Trader	1	1.96	0	0	2	3.92	0	0
Parking attendant	0	0.00	0	0	1	1.96	0	0
Waitress	0	0.00	0	0	2	3.92	0	0
Ojek	1	1.96	0	0	1	1.96	0	0
Private employee	1	1.96	0	0	1	1.96	0	0
Chef	0	0.00	0	0	2	3.92	0	0
Not working	8	15.69	0	0	0	0.00	0	0
Total	51	100	0	0	51	100	9	18

Table 7 Changes in livelihoods in communities that are indirectly affected

Job type	Before				After			
	Main job		Side job		Main job		Side job	
	Number	%	Number	%	Number	%	Number	%
Farmer	9	34.62	0	0	9	34.62	0	0
Homemaker	5	19.23	0	0	5	19.23	0	0
Laborer	3	11.54	0	0	2	7.69	0	0
Craftsman	2	7.69	0	0	2	7.69	0	0
Guide	0	0	0	0	0	0	0	0
Entrepreneur	1	3.85	0	0	1	3.85	0	0
Tour manager	0	0.00	0	0	2	7.69	1	3.85
Trader	2	7.69	0	0	2	7.69	0	0
Parking attendant	1	3.85	0	0	1	3.85	0	0
Waitress	0	0	0	0	0	0	0	0
Motorcycle taxis driver	1	3.85	0	0	1	3.85	0	0
Private employees	0	0	0	0	1	3.85	0	0
Chef	0	0	0	0	0	0	0	0
Not working	2	7.69	0	0	0	0	0	0
Total	26	100	0	0	26	100	1	2

economic development by providing opportunities for local people to work to increase household income.

#### • Income

Before the existence of the tourism areas, village people living around tourism areas had a low monthly income (Table 8). The average income of respondents before the SRFT was Rp1,768,800 per month, with the highest income being Rp5,000,000 and the lowest being zero rupiah. There were 25 respondents with the lowest and two with the highest. The respondents with the highest income worked as entrepreneurs, and the lowest were homemakers without income. Respondent's income was classified into three levels that represent the income of all respondents and are given a score based on income level, namely 1 as the minimum score or for a very low-income level and 4 as the maximum score or very high-income level.

Very low =	Rp $0 \leq x \leq$ Rp 1,500,000
Low =	Rp 1,500,001 < $x \leq$ Rp 2,500,000
High =	Rp 2,500,001 < $x \leq$ Rp 3,500,000
Very high =	>Rp 3,500,000

People who were directly affected by the development of tourism facilities felt changes in income levels. After the tourism area was built, many business opportunities and new jobs existed. People directly affected and working in tourism areas got a minimum income of Rp3,000,000 per month and the highest income of Rp5,000,000 per month. There were 27 respondents with the lowest income and five with the highest.

There was a change in the number of respondents with very low to very high-income levels before and after the tourism sector (Table 8). The results of the t-test with an  $\alpha$  value of 0.05 in both types of research of respondents who were, directly and indirectly, affected showed a significance value of 0 and  $t_{\text{calc}}$  higher than  $t_{\text{table}}$ . The  $P$ -value is lower than the alpha ( $\alpha$ ) value of 0.05, and the  $t_{\text{calc}}$  is higher than the  $t_{\text{table}}$ , showing a significant difference in the level of community income before and after the existence of the SRFT facilities.

The number of respondents with very high incomes was higher than that of respondents with very low incomes, in contrast to those before the existence of tourism. It shows a positive change in the community's income level that is directly or indirectly affected by tourism development. This is in line with the results of

Table 8 Changes in income in communities directly and indirectly affected

Income level	Before		After		t-test		
	Number	%	Number	%	$T_{\text{calc}}$	$T_{\text{table}}$	Sig (2-tailed) $P$ -value
Directly affected							
Very low	28	54.90	8	15.69	7.22	2.008	0
Low	10	19.61	11	21.57			
High	7	13.73	22	43.14			
Very high	6	11.76	10	19.61			
Total	51	100	51	100			
Indirectly affected							
Very low	7	26.92	4	15.38	2.54	2.008	0.018
Low	8	30.77	8	30.77			
High	10	38.46	11	42.31			
Very high	1	3.85	3	11.54			
Total	26	100	26	100			

Table 9 Changes in external costs on communities directly and indirectly affected

External cost level	Before		After		t-test		
	Number	%	Number	%	$T_{\text{calc}}$	$T_{\text{table}}$	Sig (2-tailed) $P$ -value
Directly affected							
Low	40	78.43	14	27.45	4.66	2.008	0
High	11	21.57	37	72.55			
Total	51	100	51	100			
Indirectly affected							
Low	16	61.54	10	38.46	1.27	2.056	0.215
High	10	38.46	16	61.54			
Total	26	100	26	100			

Widiari *et al.*'s research (2022), which concluded that tourism plays a positive role in advancing the quality of the village economy.

#### • External costs

Tourism development can cause the emergence of external costs for village communities. Costs incurred include environmental cleanliness costs, environmental maintenance costs damaged by tourism activities, and other opportunity costs (Aryunda 2011). At the research location, the community did not feel enormous external costs before tourism (Table 9). Villagers did not incur routine costs for maintenance or environmental cleanliness every month. After the tourism sector, the percentage of respondents who felt that external expenses were high increased. Based on the statistical test of  $t$  with an  $\alpha$  of 0.05, a significance value of 0 with a  $t_{\text{calc}}$  (4.66) higher than  $t_{\text{table}}$  (2.088) was obtained. In line with the results of the statistical test of 0 greater than  $\alpha$  of 0.05, meaning that there is a significant difference between external costs before and after the existence of tourism.

In contrast to the directly affected communities, the indirectly affected communities only felt a slight change in the level of external cost expenditure. It is known based on the  $t$ -test results with an  $\alpha$  value of 0.05, which shows a significance of 0.215. The  $P$ -value of 0.215 is lower than the  $\alpha$  value of 0.05, and the  $t_{\text{calc}}$  (1.27) is lower than the  $t_{\text{table}}$  (2.056), showing that there is no significant difference in the level of external expenditure of the community before and after the existence of the SRFT.

Changes in external costs are felt by people directly affected by tourism development, especially the additional congestion cost. After the tourist area was established, the roads in the village began to be paved and repaired. The large number of visitors resulted in congestion around people's residences to the main road, which is the access in and out of the community and visitors to the SRFT. This follows the research of Hutasuhut *et al.* (2022), stating that the existence of SRFT can increase the expenditure of each family in a household living around the tourism area.

#### Environmental Impact

##### Changes in the amount of tree cover

Reforestation is an effort to plant trees and plants in places considered suitable for plant growth and development (Fahmi and Abtokhi 2020). Reforestation activities in Karang Tengah Village have not been carried out for a long time. Trees cover directly and indirectly affected areas before and after tourism development is presented in Table 10. The development of the SRFT had a positive effect on the number of trees and plants in and around the location of people's residences. The  $t$ -test with an  $\alpha$  value of 0.05 produces a significant value less than 0.05 and  $t_{\text{calc}}$  higher than  $t_{\text{table}}$ . It shows a significant difference in the number of trees and plants growing before and after the SRFT.

Before establishing the tourist area, reforestation had been carried out several times in the Perhutani forest area and by the villagers. After the SRFT, reforestation became more frequent with the aim of beautifying the tourist area. As stated by Ginting and Zainal (2020), reforestation is intended to provide a sense of coolness and beauty, resist erosion, and store water supplies in the soil. The selection of plant types was adjusted to the conditions of the SRFT area in the pine production forest area. In addition to planting pine trees, annual crops such as rice, corn, strawberries, and blueberries were planted around forest areas to add value to the beauty of tourism.

##### Changes in attitudes in forest management

Local communities are an essential element in sustainable forest management. The state of the forest is determined by the community's perception and attitude toward diverse forest resources (Masria *et al.* 2015). Work is a factor that affects people's attitudes towards forest management. The people who live around the SRFT were, on average, farmers, so most people understand the impact of forest damage and aspects of forest protection.

Table 11 shows the increase in forest management attitudes felt by the community before and after the existence of tourism. The  $t$ -test with an  $\alpha$  value of 0.05 produced a significance lower than the  $\alpha$  value of 0.05

Table 10 Changes in tree cover in directly and indirectly affected areas

Tree cover level	Before		After		t-test		
	Number	%	Number	%	$T_{\text{calc}}$	$T_{\text{table}}$	Sig (2-tailed) $P$ -value
Directly affected							
Low	28	54.90	5	9.80	4.92	2.008	0
High	23	45.10	46	90.20			
Total	51	100	51	100			
Indirectly affected							
Low	15	57.69	7	26.92	3.28	2.056	0.003
High	11	42.31	19	73.08			
Total	26	100	26	100			

and a  $t_{calc}$  higher than the  $t_{table}$  in the directly and indirectly affected communities. This proves that there is a significant difference in community attitudes toward forest management before and after the existence of the SRFT. It is following Safei *et al.* (2021), who said that understanding, activities, and new faces present in the community can increase community knowledge and participation in realizing sustainable community forest management.

### Changes in volume levels and waste management systems

The people of Karang Tengah Village, especially RT 001 RW 014, who were directly or indirectly affected by the development of tourism resorts, processed their household waste by burning it and disposing of it in the river before and after the tourism resorts. Few people still understood the consequences of littering, but mostly they still threw garbage into the river. In addition, no community sorted the waste based on organic and inorganic waste-type. Tourism development did not make people change the waste management system they did or the volume of waste. Community habits related to waste management have remained the same, and there has been no synergy between the community and tourism managers. Throwing garbage into the river has also become a habit of residents, both those who live on the edge and those far from the river. Dumping garbage in rivers is considered more practical, easy, and free of charge (Penny *et al.* 2012). The absence of direct supervision from the government also supports the community in littering (Fathurachmi and Halidsyam 2022).

### Impact of the SRFT Development

The expansion of the SRFT area is exceptionally influential on people's lives, especially those who lived within a radius of 0–800 m from the tourist area or who felt the direct impact. The variable that had the most influence on the life of village people was the economic

variable. However, because economic development was still new and on a small scale, it had not been able to have a major impact on all social and environmental aspects.

The management of the SRFT also promised cooperation to the village community other than growing new jobs. The impact of tourism development on the community occurred without planning and empowerment. Tourism development should be a shared responsibility between FMUs, Perhutani, local governments, and communities around tourism areas that are directly or indirectly affected to have a more significant positive impact and minimize negative impacts. The impact of tourism development on the community's social, economic, and environmental life is presented in Table 12.

## CONCLUSION

The development of the SRFT has a positive impact on the community's social, economic, and environmental aspects, especially those directly affected. The SRFT has a positive impact from a social perspective, namely increasing social access to facilitate community mobilization. In the economic aspect, tourism can open job vacancies and increase people's incomes directly and indirectly. Another positive impact comes from the environmental aspect, namely an increase in the number of trees covered and a change in the attitude of people directly or indirectly affected by forest management. However, the development of the SRFT has also posed a negative impact. From a social perspective, negative impacts include the increase in conflicts that occur in communities that are directly or indirectly affected. Conflicts occur due to noise made by visitors to tourist areas, which interferes with the community's comfort. In the economic aspect, there is also a negative impact, namely the increase in external costs felt by the directly affected people.

Table 11 Changes in the attitude of forest management of communities directly and indirectly affected

Forest management attitude level	Before		After		t-test		
	Number	%	Number	%	$T_{\text{calc}}$	$T_{\text{table}}$	Sig (2-tailed) $P$ -value
Directly affected							
Low	23	45.10	21	41.18	2.47	2.008	0.017
High	28	54.90	30	58.82			
Total	51	100	51	100			
Indirectly affected							
Low	17	65.38	15	57.69	3.14	2.056	0.004
High	9	34.62	11	42.31			
Total	26	100	26	100			

Table 12 Impact of the development of Sentul Rainforest Tourism

Radius	Variable		
	Social	Economy	Environment
0–800 m	a. Does not cause a change in cooperation b. Escalate conflicts c. Improve social access d. Does not cause lifestyle changes	a. Absorbing labor b. Increase revenue c. Increase external cost expenditure	a. Increase the amount of tree cover b. Causing a change in attitudes in forest management c. Does not cause changes in volume and waste management system
800 m–1 km	a. Does not change in cooperation b. Escalate conflicts c. Improve social access d. Does not cause lifestyle changes	a. Absorbing labor b. Increase revenue c. Does not increase external expense expenditure	a. Increase the tree cover b. Causing a change in attitudes in forest management c. Does not cause changes in volume and waste management system

## REFERENCES

- Alexander Z. 2012. The impact of a volunteer tourism experience, in South Africa, on the tourist: The influence of age, gender, project type and length of stay. *Tourism Management Perspectives*. 1(4): 119–126. <https://doi.org/10.1016/j.tmp.2012.07.002>
- Amin, Nur F, Sabaruddin G, dan Kamaluddin A. 2023. Konsep umum populasi dan sampel dalam penelitian. *Jurnal PILAR* 14(1): 15–31.
- Anisa L, Rifai NAK. 2022. Analisis regresi logistik biner dengan metode penalized maximum likelihood pada penyakit Covid-19 di RSUD Pringsewu. *Jurnal Riset Statistika*. 2(2): 129–136. <https://doi.org/10.29313/jrs.v2i2.1425>
- Aridiansari R, Elih E, Puji K. 2015. Pengembangan agrowisata di Desa Wisata Tulungrejo Kota Batu, Jawa Timur. *Jurnal Produksi Tanaman*. 3(5): 383–390.
- Aryunda H. 2011. Dampak ekonomi pengembangan kawasan ekowisata Kepulauan Seribu. *Jurnal Perencanaan Wilayah dan Kota*. 22(1): 1–16. <https://doi.org/10.5614/jpwk.2011.22.1.1>
- Budiastuti D, Bandur A. 2018. *Validitas dan Reliabilitas Penelitian*. Jakarta (ID): Mitra Wacana Media.
- Dadi. 2022. Ekonomi dan ekologi: Dampak terhadap pembangunan ekowisata. *Journal of Management and Bussines*. 4(1): 137–153. <https://doi.org/10.31539/jomb.v4i1.3662>
- Fadilla. 2017. Hubungan antara pendapatan dan gaya hidup masyarakat dalam pandangan islam. *Jurnal Ilmu Syariah FAI Universitas Ibn Khaldun BOGOR*. 5(1): 39–50.
- Fahmi H, Abtokhi A. 2020. Penanaman pohon pada daerah aliran sungai di Desa Torongrejo Kota Batu dalam mendukung program Brantas Tuntas. *JRCE (Journal of Research on Community Engagement)*. 2(1): 01–06. <https://doi.org/10.18860/jrce.v2i1.9708>
- Fathurachmi E, Halidsyam W. 2022. Sosialisasi Sanimas, pengolahan sampah menjadi kompos dan pengolahan sampah menjadi ecobrick serta reaktivasi fasilitas rumah kompos untuk pelestarian lingkungan. *Dinamisia: Jurnal Pengabdian Kepada Masyarakat*. 6(5): 1195–1202. <https://doi.org/10.31849/dinamisia.v6i5.10866>
- Febrina RP, Suharyono, Maria NP. 2017. Dampak pengembangan objek wisata Ndayung Rafting terhadap sosial budaya dan ekonomi masyarakat (Studi pada masyarakat Desa Gubugklakah Kecamatan Poncokusumo Kabupaten Malang). *Jurnal Administrasi Bisnis*. 45(1): 179–187.
- Ginting AH, Zainal Z. 2020. Strategi pemerintah daerah dalam pengembangan objek wisata alam Teluk Jering di Kabupaten Kampar Provinsi Riau. *Jurnal Ilmiah Wahana Bhakti Praja*. 10(1): 211–219. <https://doi.org/10.33701/jiwbp.v10i1.874>
- Hakim, Faisol. 2024. Analisis perubahan sosial dan budaya masyarakat pegunungan sebagai dampak dari globalisasi. *Journal of Social Sciences and Social Science Education*. 2(1): 60–74. <https://doi.org/10.55210/xprkh245>
- Hutasuhut MIA, Martunis M, Dahlan D. 2022. Dampak ekonomi dan lingkungan di kawasan Ekowisata Tangkahan Taman Nasional Gunung Leuser. *Jurnal Ilmiah Mahasiswa Pertanian*. 7(1): 808–818. <https://doi.org/10.17969/jimfp.v7i1.18064>
- Imron IF, Aka KA. 2018. *Pembelajaran Fenomena Sosial Paling Mutakhir*. Banyuwangi: LPPM IAI Ibrahimy Genteng Press & Erisy Syawiril Ammah, M. Pd.
- Masria M, Golar G, Ihsan M. 2015. Persepsi dan sikap masyarakat lokal terhadap hutan di Desa Labuan

- Toposo Kecamatan Labuan Kabupaten Donggala. *Jurnal Warta Rimba*. 3(2): 57–64.
- Nuraini C. 2015. Kearifan lingkungan dalam pengelolaan hutan, tanah dan sungai di Desa Singengu, Kecamatan Kotanopan Kabupaten Mandailing Natal, Sumatera Utara. *Jurnal Manusia dan Lingkungan*. 22(1): 100–105. <https://doi.org/10.22146/jml.18730>
- Pradani DP, Rahayu MJ, Putri RA. 2017. Klasifikasi karakteristik dampak industri pada kawasan permukiman terdampak industri di Cemani Kabupaten Sukoharjo. *Arsitektura*. 15(1): 215–220. <https://doi.org/10.20961/arst.v15i1.12166>
- Penny L, Bijaksana U, Yunita R, Itta D. 2012. Kajian perilaku masyarakat membuang sampah di bantaran Sungai Martapura terhadap lingkungan perairan. *Enviro Scienteae*. 8(3). 117–126.
- Puspitawati, Indah R, Anang S. 2016. Potensi usaha pariwisata alam di Kawasan Wanawisata Waduk Pondok Kabupaten Ngawi. *Jurnal Agri-Tek*. 16(2).
- Ramadani R, Navia ZI. 2019. Pengembangan potensi ekowisata hutan mangrove di Desa Kuala Langsa Kecamatan Langsa Barat Kota Langsa Aceh. *Biologica Samudra*. 1(1): 41–55.
- Safe'i R, Kiswandono AA, Prayitno RT, Maulana IR, Arwanda ER, Rezinda CFG, Puspita EN, Doria C. 2021. Pelatihan pembibitan di KWTH Kartini dalam menunjang keberlanjutan hutan rakyat pola agroforestri. *Jurnal Pengabdian Kepada Masyarakat (JPKM) TABIKPUN*. 2(3): 223–232. <https://doi.org/10.23960/jpkmt.v2i3.60>
- Septemuryantoro SA. 2020. Pengembangan Potensi Budaya Ekowisata melalui Pemberdayaan Masyarakat Desa Wisata Candirejo Borobudur Jawa Tengah. *Media Wisata*. 18(2): 210–222. <https://doi.org/10.36276/mws.v18i2.101>
- Soewarni I, Sari N, Santosa EB, Gai AM. 2019. Dampak perkembangan pariwisata terhadap ekonomi masyarakat di Desa Tulungrejo, Kecamatan Bumiaji Kota Batu. *Jurnal Planoeearth*. 4(2): 52–57. <https://doi.org/10.31764/jpe.v4i2.874>
- Sudiarta IM, Suharsono N, Tripalupi LE, Irwansyah MR. 2021. Analisis dampak perkembangan pariwisata terhadap kondisi sosial ekonomi masyarakat. *Business and Accounting Education Journal*. 2(1): 22–31. <https://doi.org/10.15294/baej.v0i1.42765>
- Tanjung, Arfatussalamah, Nefri HS, dan Abdal RM. 2023. Kajian tentang uji hipotesis penelitian perbandingan menggunakan statistika non parametrik dalam penelitian satatistik sosial. *Jurnal Bakti Sosial* 2(1): 87–97
- Wangu M, Nonci N, Maidin MR. 2021. Perubahan perilaku pada masyarakat di sekitar industri pariwisata di Labuan Bajo Kab. Manggarai Barat Provinsi Nusa Tenggara Timur. *Jurnal Sosiologi Kontemporer*. 1(1): 33–45.
- Widiari NKAS, Widiati IAP, Suryani LP. 2022. Pelaksanaan Pengelolaan Objek Wisata Mandala Suci Wenara Wana oleh Desa Adat Padangtegal, Kecamatan Ubud, Kabupaten Gianyar. *Jurnal Preferensi Hukum*. 3(1): 223–228. <https://doi.org/10.22225/jph.3.1.4688.223-228>
- Wowor MH, Kapantow GHM, Ruauw E. 2018. Dampak objek wisata Bukit Kasih terhadap pendapatan masyarakat di Desa Kanonang Dua Kecamatan Kawangkoan Barat. *Agri-Sosio Ekonomi Unsrat*. 14(3): 355–364. <https://doi.org/10.35791/agrsosek.14.3.2018.22766>