

# Mangrove conservation efforts with the ecotourism development in the Cengkong Mangrove Ecotourism, Trenggalek District, East Java, Indonesia

BELLA KURNIAWATI<sup>1</sup>, NUNIK SULISTYANINGRUM<sup>1</sup>, GILANG DWI NUGROHO<sup>2</sup>, SUNARTO<sup>1</sup>,  
LIA KUSUMANINGRUM<sup>1</sup>, YOHANES Y. RAHAWARIN<sup>3</sup>, ANDRIE BON FLORES<sup>4</sup>, CHEE KONG YAP<sup>5</sup>,  
AHMAD DWI SETYAWAN<sup>1,6,\*</sup>

<sup>1</sup>Department of Environmental Science, Faculty of Mathematics and Natural Sciences, Universitas Sebelas Maret. Jl. Ir. Sutami 36A Surakarta 57126, Central Java, Indonesia. Tel./fax.: +62-271-663375, \*email: volatileoils@gmail.com

<sup>2</sup>Biodiversitas Study Club, Faculty of Mathematics and Natural Sciences, Universitas Sebelas Maret. Jl. Ir. Sutami 36A, Surakarta 57126, Central Java, Indonesia

<sup>3</sup>Faculty of Forestry, Universitas Papua. Jl. Gunung Salju, Amban, Manokwari 98314, West Papua, Indonesia

<sup>4</sup>Department of Biological Sciences, College of Arts and Sciences, University of Southern Mindanao. Kabacan, 9407, North Cotabato, Philippines

<sup>5</sup>Department of Biology, Faculty of Science, Universiti Putra Malaysia. 43400 UPM Serdang, Selangor, Malaysia

<sup>6</sup>Biodiversity Research Group, Universitas Sebelas Maret. Jl. Ir. Sutami 36A, Surakarta 57126, Central Java, Indonesia

Manuscript received: 17 August 2022. Revision accepted: 22 December 2022.

**Abstract.** Kurniawati B, Sulistyaningrum N, Nugroho GD, Sunarto, Kusumaningrum L, Rahawarin YY, Flores AB, Yap CK, Setyawan AD. 2022. Mangrove conservation efforts with the ecotourism development in the Cengkong Mangrove Ecotourism, Trenggalek District, East Java, Indonesia. *Intl J Bonorowo Wetlands* 12: 75-81. For mangrove conservation efforts, it is necessary to develop ecotourism so that people can also take advantage of the existence of mangrove forests. Analysis of the role mangrove ecosystem is carried out to develop a mangrove conservation strategy and the concept of sustainable development. This research examined conservation and ecotourism efforts by the community around the Cengkong Mangrove Ecotourism and social perceptions of ecotourism based on mangrove development. The research was conducted in June 2022 at Mangrove Cengkong Ecotourism, Karanggandu Village, Watulimo Sub-district, Trenggalek District, East Java, Indonesia, by conducting interviews with 50 respondents. Data was collected through field observations and interviews with ecotourism administrators and residents around the location. The results of this study indicate that the conservation efforts carried out are protecting, conserving, and utilizing mangroves by seeding, planting, managing, and monitoring mangroves. The POKMASWAS or the Community Monitoring Group manages the Cengkong Mangrove Ecotourism area. However, the utilization of mangrove forest resources that have economic value by the community around the Cengkong Mangrove Ecotourism area is still low because it is only limited to the cultivation of crabs, shells, making mangrove syrup, cakes and chips. In addition, the place is quite crowded with tourists. Indeed, area development still lacks preservation, utilization, and conservation for the management, surrounding communities, and tourists. Limited facilities and infrastructure are a challenge for the sustainable development of mangrove ecotourism. In addition, increasing community involvement and collaboration with institutions and the government in mangrove management must also be improved so that all the surrounding communities can also benefit. With the increasing economic benefits of mangrove ecotourism management, the community around the mangrove forest will participate in maintaining and preserving the mangrove forest ecosystem.

**Keywords:** Cengkong, community, conservation, development, ecotourism, mangrove

## INTRODUCTION

Mangrove forests are typically found along the coast, or river estuaries affected by tides, located in tropical and subtropical biosphere areas, and have economic and social benefits (Kainuma et al. 2013; Junk et al. 2014). In addition, mangroves have a high productivity role compared to other ecosystems, thus making mangrove ecosystems necessary for the life of living things (Li et al. 2015). A mangrove forest is a tropical coastal vegetation community dominated by several types of mangrove trees that can grow and develop from the influence of seawater (Rahmila and Halim 2018). Therefore, only a few species of plants can usually adapt to the conditions.

The natural resources found in mangrove forests are very abundant. Mangrove forests provide various environmental functions, such as providing surfaces and

shelters for land and water animals and general improvement of coastal ecosystems (Hakim et al. 2017). Mangrove forests also provide environmental services in carbon storage that positively impact the environment and humans (Pricillia et al. 2018). Most of the mangrove forests are found in developing countries, which have recently experienced several problems that can eventually lead to the extinction of the mangrove ecosystem (Purwaningrum 2020). Sustainable management of mangrove forests will guarantee many benefits for the environment and surrounding communities. Forest management and protection challenges in Indonesia often come from forest communities (Setiawan et al. 2017).

The low utilization of mangroves can be a threat as Qurniati et al. (2017) revealed that the community around the forest has limited capital, so it can reduce conservation efforts by the community. Therefore, mangrove

conservation efforts must be balanced with sustainable use by developing ecotourism that focuses on mangroves. Ecotourism activities in mangrove areas, in principle, are the use of mangrove areas while maintaining the biological/ecological functions of mangrove areas that have social and economic value for the local community (Irwansyah et al. 2021). Mangrove forest has the potential to be used for ecotourism because it is a very good place even though it is on the beach (Rahmila and Halim 2018). Mangrove forests that are used for ecotourism will increase conservation and reduce things that damage mangrove areas, such as (i) felling of mangrove trees, (ii) conversion into fish and shrimp ponds, clearing land for settlements or agricultural areas, and (iii) final disposal or toxic waste. The use of mangrove forests for the concept of tourism (ecotourism) is in line with the shift in tourist interest from old tourism, namely tourists who only come to do tours without any education and conservation elements, to new tourism, namely tourists who come to do tours in which there are elements of education and conservation (Umam et al. 2015).

The Cengkong mangrove area is one of the ecotourism located in Karanggandu Village, Watulimo Sub-district, Trenggalek District, East Java, Indonesia. As an ecotourism area, the Cengkong mangrove area has an important role, not only in the natural balance of the coastal area but also in the economy of the people living around the mangrove area (Faizal et al. 2017). Ecotourism is one of the uses of mangrove forests from an economic point of view for the welfare of the community by paying attention to environmental factors and preserving the surrounding nature. This can effectively overcome environmental problems in the mangrove forest ecosystem, such as the

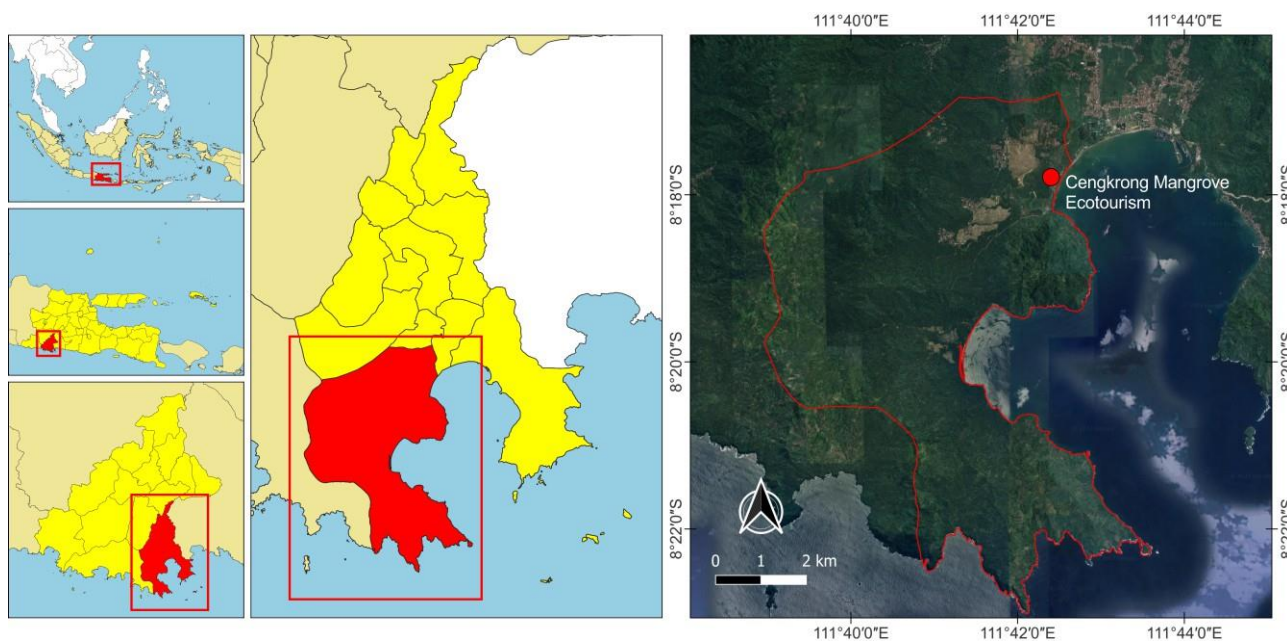
level of overexploitation by the community, by creating an economical alternative for the community.

The Cengkong Mangrove Ecotourism is located approximately 500 meters from the coast of the Cengkong area and faces east towards the waters of Prigi Bay which goes directly to the ocean off the Indian Ocean. The Cengkong mangrove area, in developing its territory as an ecotourism place, still has various shortcomings. The surrounding community's participation is considered minimal in managing, conserving, and utilizing mangrove areas. Therefore, This research examined conservation and ecotourism efforts by the community around the Cengkong Mangrove Ecotourism and social perceptions of ecotourism based on mangrove development.

## MATERIALS AND METHODS

### Study area

The study was conducted in June 2022 at the Cengkong Mangrove Ecotourism located in Karanggandu Village, Watulimo Sub-district, Trenggalek District, East Java, Indonesia ( $8^{\circ}29'778''-111^{\circ}70'2692''$ ) (Figure 1). It is located on the Kalisongo River and empties directly into the Cengkong beach and faces east towards the waters of Prigi Bay which directly leads to the ocean off the Indian Ocean. Some of the panoramas and ecotourism activities at Cengkong Mangrove Ecotourism can be seen in Figure 2. This location is chosen because the Cengkong Mangrove Ecotourism is always crowded with tourists, especially on weekends. However, in terms of its development, it still lacks preservation, utilization, and conservation for the management, surrounding communities, and tourists.



**Figure 1.** Map of the research location in Cengkong Mangrove Ecotourism, Karanggandu Village, Watulimo Sub-district, Trenggalek District, East Java, Indonesia

### Data collection and analysis

Data was collected using field observations, structured and in-depth interviews, and literature studies. Observations and in-depth interviews were used to collect data on community conservation efforts. Interviews using questionnaires were conducted to determine the perception of the people of Karanggandu Village regarding the development of ecotourism in the Cengkong Mangrove Forest. The literature study was used to collect data about the general description of Karanggandu Village and the mangrove forests in the Cengkong Mangrove Ecotourism. The snowball sampling technique determines six key aspects of the sample in conservation efforts (Setiawan et al. 2017). Sampling with the snowball sampling technique is a non-probability sampling technique that starts with a small population of known individuals and then expands the range of the sample by asking the initial participants to identify other people who should participate in the study. Respondents for ecotourism development are 50 respondents who live around the Cengkong Mangrove Ecotourism. Respondent profiles can be seen in Table 1. Conservation efforts were then analyzed descriptively. Public perception of ecotourism development is carried out using a screening method to identify the level of community perception in the development of mangrove-based ecotourism. The conservation efforts were analyzed descriptively based on Indonesian Government Regulation No. 5 of 1990 concerning Conservation Efforts. The public perception of ecotourism development is categorized by the scoring method to determine the level of public perception of the development of mangrove-based ecotourism.

**Table 1.** Respondent profile (n = 50)

Profile	Category	Number	Percentage (%)
Gender	Male	21	42
	Female	29	58
	Amount	50	100
Age	20-30	5	10
	31-40	11	22
	41-50	16	32
	51-60	14	28
	61-70	4	8
	Amount	50	100
Education	Elementary School or below	32	64
	Junior High School	10	20
	Senior High School	8	16
	Amount	50	100
Occupation	Trader	37	72
	Housewife	3	6
	Fisherman	6	12
	POKMASWAS staff	4	8
	Amount	50	100

### RESULTS AND DISCUSSION

Based on the Government Regulation of the Republic of Indonesia No. 5 of 1990 and research by Setiawan et al. (2017), conservation efforts manage and utilize natural resources wisely to ensure their current and future existence. It includes three main activities: protection, preservation, and sustainable utilization of natural resources.

#### Protecting mangrove forests in Cengkong Mangrove Ecotourism

One of the efforts to protect mangroves is carried out by the people of Karanggandu Village, namely prohibiting residents from entering the mangrove core area, cutting down mangrove trees, and littering with garbage and waste. The protection of mangrove forests in the Cengkong Mangrove Forest is carried out by POKMASWAS, also known as the Community Monitoring Group. The Community Monitoring Group comprises the Karanggandu Village community around the Cengkong Mangrove Forest. POKMASWAS is in charge of the caretaker of the Cengkong Mangrove Forest and charge of the protection and management of the area. The POKMASWAS consists of about 19 people. Reports regarding damage to the mangrove area must go through the POKMASWAS management, and then they will be forwarded to the PSDKP of Trenggalek District. The *Pengawasan Sumber Daya Kelautan dan Perikanan* (PSDKP), or Supervision of Marine and Fishery Resources, is one of the priority programs/activities of the Ministry of Maritime Affairs and Fisheries as one of the steps to support the realization of sustainable management of marine and fisheries resources for the welfare of the community. Sidik et al. (2018) said that the mangrove forest ecosystem benefits the ecosystem and society. Therefore, the community around the area must not damage the existing mangroves and must follow the existing rules so that mangrove conservation activities run properly.

#### Preservation of mangrove forest resources in Cengkong Mangrove Ecotourism

At first, around 1998, the Cengkong mangrove area was damaged. Then in 2006-2007, the Department of Fisheries and Marine Affairs of Trenggalek District took the initiative to hold a restoration or conservation program in the tidal sea area by replanting damaged mangrove plants to be returned to their previous condition. The area of the Cengkong mangrove forest is about 165 hectares. In the past, the damage that occurred was mostly done by the surrounding community to meet their daily needs. In the past, communities around mangrove forests cut down mangrove trees to be traded or used for community animal feed. In addition, the community's buffaloes also entered the mangrove forest area and consumed the mangrove plants which caused the decline of the mangrove forest in size. Then with the mangrove conservation movement, management, and supervision by POKMASWAS and related agencies, the surrounding community has never again cut down the mangrove trees there.

The growth of mangrove plants that tend to take a long time has made the conservation program run for quite a long time until now. Mangrove plants every year can only grow about 30-40 cm. According to Alwidakdo et al. (2014), several environmental factors affect the growth of mangroves in a location, including coastal physiography (topography), tides (length, duration, range), waves and currents, climate (light, rainfall, temperature, wind), salinity, oxygen dissolved, soil, and nutrients. The Department of Fisheries and Marine Affairs of Trenggalek District provided free lessons and seeds to residents who wanted to participate in conservation activities at that time. The conservation program has been running until now along with its protection and preservation efforts. Communities that previously participated in mangrove planting in 2006-2007 became members of the POKMASWAS management. However, not all POKMASWAS members are actively participating at this time.

Currently, the Cengkong mangrove forest area is also developing nurseries and planting mangroves. The price of seeds offered is 35 million for 1000 seeds. Cengkong Mangrove Forest is currently also able to supply mangrove plant seeds to other areas in East Java. Usually, the order for mangrove seeds is made 1 week before planting activities are carried out. In the Cengkong Mangrove Forest, an event is sometimes held regarding planting mangrove plants that all levels of society can attend. In addition to planting, cleaning activities are also carried out around the mangrove forest area. According to Setiawan et al. (2017), one of the factors driving the willingness to plant and develop mangrove nurseries is the economic factor.

#### **Utilization of mangrove forests in Cengkong Mangrove Ecotourism**

The utilization of mangrove forest resources by the community around the Cengkong Mangrove Ecotourism area is limited to cultivating crabs, shellfish, mangrove syrup, cakes, and chips. The manager carries out crab and shellfish cultivation activities as one activity carried out to increase the economy and income in the Cengkong mangrove ecotourism area. The results from cultivating mangrove crabs and shellfish can be sold to visitors as souvenirs. Currently, the local community can no longer produce mangrove syrup, cakes and chips because there are rarely interested buyers. One example of successfully utilizing mangrove fruit from the *Avicenna marina* species to make cakes is in the Baros area, Bantul, Yogyakarta, Indonesia (Ikawati and Primasari 2019). Meanwhile, the cultivation of crabs and shellfish is the thing that people are most interested in. Crab and shellfish cultivated can be made into dishes to be eaten by visitors at tourist attractions or used as souvenirs. In addition to cultivation, the community often carries out activities for catching crabs and shellfish in mangrove areas. People can hunt for crabs or shellfish if they do not damage the mangrove forest area

or take it excessively. The price of mud crab (*Scylla* spp.) can range from IDR 50,000 to IDR 158,000 per kg.

The surrounding community also uses mangrove plants as medicine for itching, ulcers, and healing wounds. The parts of the mangrove plant used as medicine by the community are young roots, bark, leaves, and fruit. According to Das et al. (2016) and Nugroho et al. (2020), mangrove species do have chemical compounds that have the potential to become plants that cure various diseases experienced by humans.

Not all communities in Karanggandu Village participate in the management of the Cengkong Mangrove ecotourism area. Only people who are members of the Community Monitoring Group (POKMASWAS) participate in the management and supervision of the Cengkong mangrove area. Ecotourism development in the Cengkong Mangrove Forest is still not going well. Many facilities are inadequate, the tenants of the sellers are not well organized, and the cleanliness of the area is still very lacking. Damaged facilities also make it difficult and endanger the safety of tourists who want to visit. Lack of maintenance is one of the factors that damage the available facilities. As has been explained, Cengkong Mangrove Ecotourism is still developing, so in various aspects, it is still not optimal (Figure 2).

#### **Community perception of ecotourism development**

Tourism is the activity of traveling to a place to relax. Tourism or vacation can also refer to a vacation activity and visits to places of interest and want to visit. Ecotourism is a special tourism category concerned with nature conservation and maintaining the well-being of local people (Bandara and Vlosky 2016). Tourism activities that are governed by a conservation strategy are called ecotourism. Suppose conservation is an effort to maintain the continuity of using natural resources for the present and the future. In that case, ecotourism is the management of nature and community culture that prioritizes sustainability and profit (Mustaqim 2018). Almost 100% of the people of Karanggadu do not understand the concept of ecotourism. They think that ecotourism is the same as tourism in general. Community members who understand the concept of ecotourism are people who participate in ecotourism management, know about ecotourism from extension programs and are active in community group activities. This finding is in line with Setiawan et al. (2017), who found that the people of Margasari consider ecotourism to be ordinary tourism.

According to Setiawan et al. (2017), community views regarding ecotourism development are divided into several aspects, which include aspects of community knowledge about ecotourism; community willingness to participate in ecotourism development; government intervention in ecotourism development; the economic benefits felt by the community by the existence of ecotourism; damage to ecotourism caused by visitors; and sustainable development and ecotourism development in the Cengkong Mangrove Forest. These perceptions are listed in Table 2.





**Figure 2.** Several panoramas and ecotourism activities in Cengkong Mangrove Ecotourism, Trenggalek District, East Java, Indonesia

**Table 2.** Community perception of ecotourism development (n = 50)

Behavior	Agree/ willing (%)	Not agree/ willing (%)
<i>Willingness to participate in ecotourism development</i>		
Planning activities	38	62
Tour guide activities	38	62
Souvenir activities	82	18
Providing homestay	36	64
<i>Community perception of ecotourism group</i>		
Manager	42	54
Businessmen	80	20
<i>Government intervention in Cengkong Mangrove Ecotourism</i>		
Partial intervene	10	90
Full intervene	90	10
<i>Ecotourism impact on economic benefits</i>		
Increase economic benefit for community	72	28
Economic benefit only for some participants	28	72
<i>Visitors effect the environment damage</i>		
Garbage in forest area	0	100
Garbage in village	0	100
Damaging the mangrove trees	0	100
Damaging the ecotourism facilities	0	100
<i>Willingness to develop sustainable mangrove ecotourism</i>	100	0

The first aspect is the willingness of the community to participate in the management of the Cengkong Mangrove Ecotourism. There are 4 sub-aspects: activity planners, activity tour guides, making souvenirs and providing homestays. Based on structured interviews with 50 respondents, the sub-aspects of activity planners and tour guides have the same percentage, which is 38% of the community willing or agreeing to plan and tour guide activities in the Cengkong Mangrove Ecotourism. The management of natural tourism objects is influenced by the service quality of officers (Hartati et al. 2021). The existence of planning and a tour guide will greatly help visitors and the community how important the mangrove forest is. Moreover, it is known that many visitors are still unfamiliar with mangroves and their benefits. Furthermore, the percentage of community participation in making souvenirs and souvenirs typical of the Cengkong Mangrove Ecotourism is 84%. The use of the Cengkong Mangrove Forest has been at the stage of making souvenirs or souvenirs made by the community. The typical souvenirs of Cengkong Mangrove Forest are mangrove fruit syrup, cake and chips. While the people who want to make lodging as much as 36%. Most people are still unsure about making lodging because the mangrove forest and Cengkong Beach, which are right in front of the mangrove forest, often have high tides, which causes residents' houses and stalls to be often submerged by the tide. For this reason, making lodging around the Cengkong Mangrove Ecotourism area is still too difficult to realize.

An ecotourism group is an institution established by villagers around the ecotourism area who have a concern and responsibility for managing tourism and the environment. The second aspect is people's perception of ecotourism groups. In Cengkong Mangrove Ecotourism area, there is already an ecotourism group responsible for

the management and protection of the Cengkong Mangrove forest area, commonly called POKMASWAS. The Community Monitoring Group or POKMASWAS consists of about 19 people. There are 2 sub-aspects consisting of the willingness of the community as the manager of the Cengkong Mangrove Ecotourism and the availability of the community to carry out ecotourism support activities as business actors. The availability of the community in carrying out mangrove management has a percentage of 42%. At the same time, the availability of the community to support ecotourism activities as business actors have a percentage of 80%. Most people have education between an elementary and high school which causes them to lack the confidence to participate as managers. So most people choose to support ecotourism as a business actor.

The third aspect is the public's perception of government intervention or intervention in managing the Cengkong Mangrove. Based on the data obtained, most people agree that the management of the Cengkong Mangrove Ecotourism requires a governmental intervention with percentage of 90%. The community recognizes that management with government intervention is more profitable than without government intervention. Mangrove management is more structured and controlled, making it easier for the community to carry out their activities as business actors. In addition, the management of the Cengkong Mangrove Ecotourism area is only carried out by POKMASWAS, whose members consist of several participating communities. However, there are still many members who are not active. So, community participation is considered still less than optimal. However, most people agree more with government intervention in its management so that all levels of society can feel the benefits. Idajati et al. (2016) also discussed the management of mangrove forest ecotourism in Wonorejo and explained that management was carried out with the principle of "Deleged Power" so that certain representative groups only carried out management. Collaboration is a key principle in community-based tourism approaches in most developing countries. Stone (2015) points out that participation in ecotourism brings mixed results on biodiversity conservation and community livelihoods due to the involvement of multiple stakeholders in the design, planning, and implementation of ecotourism projects.

The fourth aspect is the impact of ecotourism on the community's economy. The impact of ecotourism brings economic benefits to the surrounding community. There are 36 respondents with a percentage of 68% who agree that ecotourism activities can improve the economy for the whole community. For example, with the Cengkong Mangrove Forest, people from various regions can participate in trading around the ecotourism area. The fishermen can also sell the fish they catch in the mangrove ecotourism area. In addition, not far from there, there are several ponds owned by residents that contain crabs and shrimp that can be sold to visitors. These results align with the ecotourism goal that ecotourism develops community welfare, providing additional livelihoods and increasing family income (Faizal et al. 2017).

The development of mangrove ecotourism needs to consider the possibility of disturbance from visitors. For this reason, the fifth aspect is the environmental damage caused by visitors to the Cengkong Mangrove Ecotourism. There are 4 sub-aspects consisting of the presence of waste in the ecotourism area, the presence of garbage in the area, damage to mangrove trees, and damage to existing facilities in the Cengkong Mangrove Ecotourism area. Currently, disturbances caused by visitors, such as environmental damage to mangrove forest ecosystems, ecotourism facilities, or waste in ecotourism and village environments, are low. However, the garbage in the ecotourism area occurs due to the lack of trash cans, so many visitors throw garbage carelessly. This makes the aesthetic value or beauty of the Cengkong Mangrove Ecotourism decline. Visitors who throw garbage in the village or its surroundings are also not justified because it can cause inconvenience to the surrounding community. For damage to mangrove trees themselves, as long as they do not cause mangrove trees to die or decrease, the manager will impose no sanctions on visitors. Meanwhile, damage to facilities rarely occurs in the Cengkong Mangrove Ecotourism area. However, if this happens, there will be sanctions that must be carried out by visitors who have caused damage. These sub-aspects have the same result with a percentage of 100%. This means that both the community and the manager of the Cengkong Mangrove Ecotourism agree that visitors should not cause damage or waste in the Cengkong mangrove area. The loss of mangrove ecosystems means the loss of vast ecological niches for foraging, breeding, and hatching fish, marine creatures, and migratory species (Hakim et al. 2017). The loss of mangroves also contributes significantly to the negative impact on the coastal economy, where many coastal populations depend on marine resources and the fishing industry.

The desire of the community to manage mangrove ecotourism areas sustainably is very large. The utilization of mangrove areas to be developed into an ecotourism area is an alternative that is very rational to be applied in coastal areas because it can provide economic benefits and environmental services without exploiting mangroves. Ecotourism brings many benefits from economic, socio-cultural, and environmental aspects. The economic benefits felt by the community are that it can improve the economy by providing employment opportunities in the form of managers and business actors (Umam et al. 2015). Ecotourism has many advantages as a place for fun and nature tourism as well as study and development material that can be used for educational and cultural support activities (Mustaqim 2018). Socio-cultural aspects include cleaning activities for the Cengkong Mangrove Ecotourism area, which are routinely carried out once a week and preserving marine anchoring activities as a form of gratitude to the Almighty. Ecotourism is an activity that provides opportunities for tourists to gain experience in nature and culture to learn and understand how important the conservation of biodiversity and local culture is (Fahrian et al. 2015). While the ecological benefits are the existence of a mangrove forest that functions as a breakwater so that at high tide, the waves are not felt too

big; places where animals shelter and breed, conduct nurseries to expand mangrove forest areas, and much more (Li et al. 2016; Harahab and Setiawan 2017; Irwansyah et al. 2021; Wiraatmaja et al. 2022).

The conclusion of this study is that as one of the protection efforts, the POKMASWAS group as the manager has the policy to preserve the mangrove ecosystem. Mangrove restoration activities have been carried out since 2006 until now by POKMASWAS. Protection efforts in the form of a ban on entering the mangrove area are considered effective in preserving mangroves and reducing environmental damage. However, the prohibition has limited efforts used by the community. Institutional protection should provide greater space for communities to utilize forest resources (Hidayat 2017). Currently, the utilization of mangrove forest resources by the community around the Cengkong Mangrove Ecotourism area is very low, even though this place is quite a place visited by tourists. However, in terms of area development, it still lacks preservation, utilization, and conservation for the management and tourists. Limited facilities and infrastructure are a challenge for the sustainable development of mangrove ecotourism. In addition, increasing community involvement and collaboration with institutions and government in mangrove management must also be increased so that all communities around the area also benefit. With the increasing economic benefits of mangrove ecotourism management, the community around the mangrove forest will participate in maintaining and preserving the mangrove forest ecosystem.

## ACKNOWLEDGEMENTS

The authors want to thank the POKMASWAS of Cengkong Mangrove Ecotourism and the entire community of Karanggaduh Village, Watulimo Sub-district, Trenggalek District, East Java, Indonesia, for the information provided to complete this research.

## REFERENCES

- Alwidakdo A, Azham Z, Kamarubayana L. 2014. Studi pertumbuhan mangrove pada kegiatan rehabilitasi hutan mangrove di Desa Tanjung Limau Kecamatan Muara Badak Kabupaten Kutai Kartanegara. *Agrifor: Jurnal Ilmu Pertanian dan Kehutanan* 13 (1): 11-18. [Indonesian]
- Bandara WARTW, Vlosky R. 2016. Forest-based tourism in Sri Lanka: Market segmentation on traveler pre-trip external information search behavior. *Intl J Agric For Plantation* 2: 153-163.
- Das G, Gouda S, Mohanta YK, Patra JK. 2015. Mangrove plants: A potential source for anti-cancer drugs. *Indian J Geo-Mar Sci* 44 (5): 666-672.
- Fahrian HH, Putro SP, Muhammad F. 2015. Potensi ekowisata di kawasan mangrove, Desa Mororejo, Kabupaten Kendal. *Biosaintifika: Journal of Biology & Biology Education* 7 (2): 105-111. DOI: 10.15294/biosaintifika.v7i2.3953. [Indonesian]
- Faizal MI, Hakim L, Harahap N. 2017. Factors affecting level of participation in the management of mangroves as ecotourism attraction: Lesson learned from Cengkong Watulimo, Trenggalek. *J Indon Tour Dev Stud* 5 (1): 1-19. DOI: 10.21776/ub.jitode.2017.005.01.03.
- Hakim L, Siswanto D, Makagoshi N. 2017. Mangrove conservation in East Java: The ecotourism development perspectives. *J Trop Life Sci* 7 (3): 277-285. DOI: 10.11594/jtls.07.03.14.
- Harahab N, Setiawan. 2017. Suitability index of mangrove ecotourism in Malang Regency. *ECOSOFIM: J Econ Soc Fish Mar* 4 (2): 153-165. DOI: 10.21776/ub.ecsofim.2017.004.02.05.
- Hartati F, Qurniati R, Febryano IG, Duryat D. 2021. Nilai ekonomi ekowisata mangrove di Desa Margasari, Kecamatan Labuhan Maringgai, Kabupaten Lampung Timur. *Jurnal Belantara* 4 (1): 1-10. DOI: 10.29303/jbl.v4i1.449. [Indonesian]
- Hidayat S. 2017. The use by local communities of plants from Sesaot Protected Forest, West Nusa Tenggara, Indonesia. *Biodiversitas* 8 (1): 238-247. DOI: 10.13057/biodiv/d180130.
- Idajati H, Pamungkas A, Kukinul SV. 2016. The level of participation in Mangrove ecotourism development, Wonorejo Surabaya. *Proc Soc Behav Sci* 227: 515-520. DOI: 10.1016/j.sbspro.2016.06.109.
- Ikawati R, Primasari IA. 2019. Analisis kelayakan finansial brownies siapi-api sebagai produk oleh-oleh dari hutan mangrove Baros Bantul. *Gorontalo Agriculture Technology Journal* 2 (2): 79-87. DOI: 10.32662/gatj.v2i2.726. [Indonesian]
- Irwansyah RM, Azzahra SIN, Darmastuti SA, Ramadhandi AR, Firdaus O, Daeni F, Safitri N, Fajri OPA, Nugroho GD, Naim DM, Setyawan AD. 2021. Crab diversity and crab potential as support ecotourism in Teleng Ria, Grindulu and Siwil Beach, Pacitan, East Java, Indonesia. *Intl J Bonorowo Wetlands* 11: 75-83. DOI: 10.13057/bonorowo/w110204.
- Junk WJ, Piedade MTF, Lourival R, Wittmann F, Kandus P, Lacerda LD, Bozelli RL, Esteves FA, da Cunha CN, Maltchik L, Schöngart J, Schaeffer-Novelli Y, Agostinho AA. 2014. Brazilian wetlands: Their definition, delineation, and classification for research, sustainable management, and protection. *Aquat Conserv Mar Freshw Ecosyst* 24: 5-22. DOI: 10.1002/aqc.2386.
- Kainuma M, Baba S, Oshiro N, Kezuka M, Chan HT. 2013. Current status of mangroves worldwide. *Middle East* 624: 0-4.
- Li W, Cui L, Zhang M, Wang Y, Zhang Y, Lei Y, Zhao X. 2015. Effect of mangrove restoration on crab burrow density in Luoyangjiang Estuary China. *For Ecosyst* 2 (1): 1-9. DOI: 10.1186-s40663-015-0046-3.
- Mustaqim M. 2018. Pengembangan ekonomi kreatif desa (Studi Atas Pengembangan Ekowisata Cengklik, Bloro). *Jurnal Perspektif* 2 (2): 267-283. DOI: 10.15575/jp.v2i2.32. [Indonesian]
- Nugroho GD, Wiraatmaja MF, Pramadaningtyas PS, Febriyanti S, Liza N, Naim DM, Ulumuddin YI, Setyawan AD. 2020. Review: Phytochemical composition, medicinal uses and other utilization of *Nypa fruticans*. *Bonorowo Wetlands* 10: 51-65. DOI: 10.13057/bonorowo/w100105.
- Pricillia CC, Patria MP, Herdiansyah H. 2021. Environmental conditions to support blue carbon storage in mangrove forest: A case study in the mangrove forest, Nusa Lembongan, Bali, Indonesia. *Biodiversitas* 22: 3304-3314. DOI: 10.13057/biodiv/d220636.
- Purwaningrum H. 2020. Pengembangan ekowisata hutan mangrove Pantai Baros Desa Titihargo Kecamatan Kretek Kabupaten Bantul. *Journal of Tourism and Economic* 3 (1): 31-40. DOI: 10.36594/jtec.v3i1.52. [Indonesian]
- Qurniati R, Febryano IG, Zulfiani D. 2017. How trust influence social capital to support collective action in agroforestry development? *Biodiversitas* 18 (3): 1201-1206. DOI: 10.13057/biodiv/d180344.
- Rahmila YI, Halim MAR. 2018. Mangrove forest development determined for ecotourism in Mangunharjo Village Semarang. *E3S Web Conf* 73: 04010. DOI: 10.1051/e3sconf/20187304010.
- Setiawan W, Harianto SP, Qurniati R. 2017. Ecotourism development to preserve mangrove conservation effort: Case study in Margasari Village, District of East Lampung, Indonesia. *Ocean Life* 1: 14-19. DOI: 10.13057/oceanlife/o010103.
- Sidik F, Supriyanto B, Krisnawati H, Muttaqin MZ. 2018. Mangrove conservation for climate change mitigation in Indonesia. *Wiley Interdiscip Rev Clim Change* 9 (5): 1-9. DOI: 10.1002/wcc.529.
- Stone MT. 2015. Community-based ecotourism: A collaborative partnerships perspective. *J Ecotour* 14 (2-3): 166-184. DOI: 10.1080/14724049.2015.1023309.
- Umam K, Sudiarto S, Winarno ST. 2015. Strategi pengembangan ekowisata mangrove Wonorejo Surabaya. *AGRARI: Journal of Agribusiness and Rural Development Research* 1 (1): 38-42. DOI: 10.18196/agr.116. [Indonesian]
- Wiraatmaja MF, Hasanah R, Dwirani NM, Pratiwi AS, Riani FE, Hasnaningtyas S, Nugroho GD, Setyawan AD. 2022. Structure and composition molluscs (bivalves and gastropods) in mangrove ecosystem of Pacitan District, East Java, Indonesia. *Intl J Bonorowo Wetlands* 12: 1-11. DOI: 10.13057/bonorowo/w120101.