



### THE IMPACT OF PLASTIC WASTE IN THE MANGROVE COASTAL AREA, THE SERVICE AREA OF THE FISHERMAN GROUP "SEGARA GUNA BATU LUMBANG", SOUTH DENPASAR BALI, AND HOW TO HANDLE IT

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#### ABSTRACT

The "Segara Guna Batu Lumbang" Fisherman Group Denpasar is one of the fishermen groups that traditionally manages an area of the Ngurah Rai Mangrove Forest Park Tourism Conservation Area, South of Denpasar. The mangrove forest area has problems related to waste

sent from several rivers, namely Tukad Badung, Tukad Mati, and Denpasar Estuary Dam. This condition causes a reduction in the beauty of the mangrove forest. The shipping waste that is quite dangerous is plastic waste which can cause serious disruption to the growth of mangrove seedlings. This study is conducted to determine the impact caused by the flow of plastic waste on the growth of mangrove forests, activities that can be carried out to minimize environmental problems, and the benefits for the environment and fishermen in the mangrove forest area in South Denpasar to support sustainable tourism development. The method used in this research is a qualitative method through Data Collection Procedures which includes qualitative observations, qualitative interviews, and qualitative documents. Data collection focused on the perceptions and motivations of the management and members of the fishermen's group, and visitors, accompanied by in-depth interviews to find out the strengths, weaknesses, opportunities, and threats faced by fisherman management in overcoming the impact of plastic waste shipments. Through this research, it is hoped that the Segara Guna Batu Lumbang Fisherman Group can develop strategies for its conservation programs and can take part as an education center for the community, especially students to learn about the importance of mangrove forest conservation, attract voluntourism tourists to visit and carry

out activities to clean mangrove areas and planting mangrove seedlings. Besides that, this research is also expected to give a model for organizing voluntourism activities in the mangrove forest area with local fisherman groups.

**KEYWORDS:** Perception, motivation, voluntourism, mangrove conservation, sustainable tourism development.

## INTRODUCTION

World tourism before the outbreak of the Covid-19 pandemic showed positive growth, especially with the birth of new tourism products such as voluntourism. Bali as one of the world's tourism destinations is one of the most important tourism destinations, especially in the Asia and Pacific region. The number of tourism visits in the last five years before Pandemi Covid-19 shows an increasing number of tourists (BPS Bali, 2000). Construction of facilities and infrastructure along with facilities that are continuously being carried out, among others, improving the development of airports, is intended to be able to anticipate the growth in the number of tourist visits that continue to increase. The readiness of the destination with all forms of infra and supra structure, prepared attractions, and facilities prepared by the government and all components of Bali tourism stakeholders is to attract an increasing number of tourist visits. Efforts to develop tourist destinations in Bali are carried out through various diversification of tourism products, including making mangrove forest areas a tourist attraction as part of education tourism.

In some coastal areas in Bali, there are many mangrove trees which are often referred to as Mangrove Forests. One area that is easily found is along the Ngurah Rai Bypass road from Denpasar to Ngurah Rai Airport. The area is known as the "Ngurah Rai Forest Park and Tourism Conservation Area", which is located in Suwung Kauh Village (UPT Ngurah Rai), Denpasar, Bali. The cooperation of UPT Tahura Ngurah Rai with various fishing groups has been well developed. These fishing groups take good care of their growth and environmental cleanliness, as well as full support from the local community who have realized the importance of conserving mangrove forests, and one of these areas is the "Segara Guna Batu Lumbang Fishermen Group", Denpasar. As an area that is being developed, this area gets tourist visits, both local, national and international. Cooperation that is built in the form of community participation in community service activities is based on the aim of providing positive benefits to the recipient community through various forms of activities based on the real needs of the community (Wearing, 2001). The benefits obtained by the beneficiary

community must be based on a broad scope and sustainable scale (Holmes, et. all, 2009). Hawkins (2005) mentions that the results of the activity should contribute in various ways to the community in the destination of the activity as an effort to improve the image and quality of the appearance of the area in that place. Lamoureux (2017) emphasizes that activities at a destination are not only beneficial for certain community groups but stakeholders.

The steps taken in realizing service activities need to be carried out in an integrated manner. Callanan, et al, (2007) emphasize that all forms of activities that will support environmental improvement in tourist destinations are to deconstruct activities by including activities that promote social tourism, cultural tourism, eco-tourism, responsible tourism. While Hooloway, et al, (2009) emphasize social activities of whatever form, especially those carried out by educational institutions so that they are arranged with planning and are not spontaneous. WTO (1993), OECD (2001) in the WTTC Report Agenda 21 emphasizes that activities that aim to assist certain community groups in minimizing the problems that arise must look thoroughly at several issues such as environmental, socio-cultural, economic, climate change, security, health, and others.

The mangrove forest area receives water from several rivers, namely Tukad Badung, Tukad Mati, and Denpasar Estuary Dam. They bring various types of waste, including plastic waste. The flow of water from Tukad Mati, Tukad Badung, and Estuary Dam to the mangrove forest is mostly household waste, traditional markets, hotels, and very little from industrial factories (most of these factories are home industries). The lack of awareness of the community is one of the reasons why plastic waste is still thrown into the river for quick, practical reasons, and besides that, the garbage service by the city planning office is still not optimal. This condition causes a decrease in the beauty of the South Denpasar mangrove forest area as a tourist object and attraction which is the service area of the "Segara Guna Batu Lumbang Fishermen Group".

## METHOD

This study was designed using a qualitative approach through the stages of collecting and analyzing data with observations, questionnaires, interviews, and literature studies. The data were analyzed to understand the relationship between the impact of plastic waste in the mangrove coastal area in the south of Denpasar City, Bali. This research is based on sustainable tourism. These theories were used in explaining the research concept clearly and

measurably about the impact of plastic waste in the mangrove coastal area, the service area of the fisherman group “Segara Guna Batu Lumbang” South Denpasar, Bali.

To overcome this impact, community service activities are carried out with the aim of (1) supporting fishing groups to overcome the problem of plastic waste in mangrove forest areas; (2) supporting the expansion of mangrove forest areas through mangrove tree planting activities; (3) environmental education learning that can be applied by educational institutions as a form of sustainable tourism development activities in the mangrove forest area of South Denpasar.

The method used in maximizing the implementation of these activities is carried out by (1) discussing with the management of the fishing group to discuss the problems they are facing; (2) conducting field observations and planting the steps for field activities starting from the preparation of equipment, implementation time, coordination of implementation, the process of handling plastic waste storage; (3) delivery of educational lectures by the head of the fishermen's group to students about the conservation of mangrove forest waters in the work environment of the "Segara Guna Batu Lumbang Fishermen Group" Denpasar; (4) carry out field activities directly by using the equipment and facilities prepared by the fishermen group management under the guidance of the fishermen who serve as companions; (5) Conduct environmental clean-up campaigns through mass media, and petition the government to handle the handling of household and industrial waste more optimally, as well as apply legal sanctions.

## STUDY RESULTS

### Observation, Conversation, and Interview

The results of discussions, conversation, and interviews with the management and members of the fishing group combined with educational lectures delivered by the chairman of the management of the fishing group, some information was obtained that how important is to provide a deeper understanding of the function of mangrove forest coastal for the environment and water conservation for the public, community and students. The mangrove forest area along the Ngurah Rai Bypass road from Denpasar to Ngurah Rai Airport is known as the Ngurah Rai Forest Park Tourism Conservation Area which is located in Suwung Kauh Village, Denpasar, Bali has an important role in managing the grand forest park wisely to ensure the optimal and sustainable functioning of the forest park ecosystem (mangrove forest) through community empowerment to support the preservation of culture and tourism

destinations, oriented to the ecological, social and sustainable use of forests. Ecosystems in mangrove areas have very important ecological, socio-economic, and socio-cultural roles; for example maintaining coastal stability from abrasion, sources of fish, shrimp, and other biodiversity, sources of firewood and building wood, and has the function of conservation, education, ecotourism, and cultural identity (Setyawan, 2006). Mangrove forest is a tropical coastal vegetation community, which is dominated by several species of mangrove trees that are possible to grow and develop in muddy coastal tidal areas. This vegetation community generally grows in intertidal and subtidal areas that receive adequate water flow, and are protected from large waves and strong tidal currents. Therefore, mangrove forests are found in shallow bay beaches, estuaries, deltas, and protected coastal areas (Kenish, 1990).

The cooperation of UPT Tahura Ngurah Rai with various fishing groups has been well developed. These fishing groups take good care of their growth and environmental cleanliness, as well as full support from the local community who are aware of the importance of conserving mangrove forests and one of the groups that manage the place, is the "Segara Guna Batu Lumbang Fisherman Group Denpasar in collaboration with the Denpasar City Marine Service. The area of the main mangrove forest which is a direct service area for fishermen groups is approx 288 hectares of the approximately 800 hectares of mangrove forest area around the north and west sides of Benoa harbor to the Tuban area. The mangrove forest area in southern Denpasar is a small part of the world's mangrove forest, about 3% of the total forest area and 25% of all mangrove forests in Indonesia (Saparinto, 2010).

Broadly speaking, mangroves have several linkages in human needs as a provider of food, shelter, and health so that the environment is divided into five, namely: physical function, chemical function, biological function, economic function, and other functions (Dixon, 2001). Tomlinson (1986), the word mangrove means tropical plants and their communities that grow in intertidal areas. Intertidal areas are areas under the tidal influence along coastlines, such as lagoons, estuaries, beaches, and river banks. Bengen (2002) states that the impact of waste is one aspect of human behavior (especially the community around mangrove forests) that directly causes problems in the environment. The results of interviews with fishermen show an understanding that mangrove forest areas need to be minimized from the impact of plastic waste. Mangroves are specific ecosystems that are generally only found

on beaches with relatively small waves or even protected from waves, along deltas and estuaries which are influenced by water and mud input from the mainland.

During its journey, the Segara Guna Batu Lumbang Fishermen Group received various types of training and related mentoring support, including Mammal Rescue Training, Mangrove Area Security Supervision Training, Main and Supporting Area Rescue Training, Mangrove Forest Fire Management Training, Training on the use of FADs in mangrove forest areas, Environmental development at Estuary Dam, training on planting mangrove seedlings, training on handling shipping waste, especially plastic from Tukad Badung and Tukad Mati.

As the front line in preserving the environment of the mangrove forest area, this group of fishermen has a very difficult task as a consequence of the utilization of the mangrove forest area for the fisherman group, namely preventing illegal logging in the mangrove forest area, preventing fishing with chemicals or electricity, preventing smuggling carried out by dark ships, Maintaining the beauty of the mangrove forest coastal area by maintaining the cleanliness of the area, together with patrol officers from the Mangrove Forest Park UPT carrying out periodic surveillance tasks that can disrupt the security and safety of the mangrove forest area which is directly adjacent to the Benoa port, Ngurah Rai toll road, Ngurah Rai Airport and the coastal environment of Tuban and Nusa Dua.

The results of the study show that tourists, local communities, and fisherman groups want conservation activities in the mangrove forest is essential to improve the quality of tourism development in the coastal area along the Bali beaches because tourism is the main industry in Bali and is expected to be sustainable. The perspective of tourists, communities, and fisherman groups shows that conservation and environment activities must have a wide scope of depth as authentic activities describe the needs of the local community, tourists feel the natural beauty of the culture of the local community, communication that exists between the community and tourists creates a sense of confidence for both parties, developing conservation and environment activities based on sustainable principles while for tourists the satisfaction obtained can strengthen support for fisherman groups in these tourist destinations. Tourists and fisherman groups also emphasize the importance of a tourist security and safety approach, structuring access to adequate infrastructure, providing tourist objects and attractions based on environmental conservation principles. Sidhi Turker (2021) mention for fisherman groups, the process of organizing conservation, and environmental activities, and all forms of administrative-technical links require special preparations starting from tourist

arrivals, health protocols standards, use of digital technology, community participation, policy on limiting activities in the wild, cultural activities, the environment, and socialization with the community. All forms of these new restrictions are a concern for all stakeholders because these activities in the Covid-19 Pandemic era must be able to describe the combination of forms of education, contributions of tourists and the community, holiday activities, and community empowerment in new normal. Conservation and environment programs as part of education tourism in this new era are able to integrate quality tourism which emphasizes safety and security, hygiene, accessibility, transparency, authenticity, harmony.

Conservation and environmental activities provide real and positive benefits to the community and the green of mangrove forests. The experiences of the fisherman group show that activities have a positive value not only for fisherman and community but also strong support for advancing and developing the tourism industry in Bali. The experience of fisherman groups as motivators and communicators in building relationships between the community and tourists makes tourists have confidence that social work activities in the mangrove forest will be successful and efficient for the benefit of the green environment. The multi-effect benefits that people get from the activities are not only in the form of activity but a variety of benefits in the economic, social, cultural fields, cultural exchange experiences, and communication.

In the long term, the benefits of the conservation and environmental program will add better value to the quality of the sustainable development of the Bali tourism industry. The results of the discussion show that activities in the mangrove forest can be developed as an option and a potential opportunity to be held in Bali. There are several steps that were recommended by fishing groups and tourism stakeholders. Coordination was done with the management of the fishing group regarding the steps for implementing the activities with the administrators and members of the fishing group. Observations were made to determine the area where the activities will carry out according to the time of the tides considering the vast area of mangrove forest. To overcome the impact of waste especially plastic waste, community service activities are carried out with the aim of (1) supporting fishing groups to overcome the problem of plastic waste in mangrove forest areas; (2) supporting the expansion of mangrove forest areas through mangrove tree planting activities; (3) environmental education learning that can be applied by educational institutions as a form of sustainable tourism



development activities in the mangrove forest area of South Denpasar. Maximizing the implementation of these activities is carried out by (1) discussing with the management of the fishing group to discuss the problems they are facing; (2) conducting field observations and planting the steps for field activities starting from the preparation of equipment, implementation time, coordination of implementation, the process of handling plastic waste storage; (3) delivery of educational lectures by the head of the fishermen's group to students about the conservation of mangrove forest waters in the work environment of the "Segara Guna Batu Lumbang Fishermen Group" Denpasar; (4) carry out field activities directly by using the equipment and facilities prepared by the fishermen group management under the guidance of the fishermen who serve as companions; (5) Conduct environmental clean-up campaigns through mass media, and petition the government to handle the handling of household and industrial waste more optimally, as well as applicable legal sanctions.

The program can be used as a new strategy to complement the Bali tourism industry development strategy in supporting quality improvement and providing added value for the sustainable development of Bali's tourism industry. This strategy is further strengthened by the findings of the above guidelines which can be used as a reference and further developed by stakeholders, especially the fisherman groups.

## **2. Field Implementation**

In several trials of the implementation based on the above guidelines with D4 Hospitality Management students of the Dhyana Pura University, some achievements were obtained. During the trial field implementation, there are no serious accidents and all went according to plan and guidelines. Of all the plastic waste collected, about eight to ten plastic bags were collected, with a total of about one hundred and eighty-five kilograms consisting of various types of plastic, starting from the most plastic bags, food boxes, ropes, cork, and foam. All the garbage was obtained from mangrove trees, either stuck in branches or trapped in tree trunks. The collected waste is tamped in the main container box which is then taken by the Denpasar City DKP to be taken to the Denpasar city waste bank for further processing.

The evaluation results show that students are increasingly understanding the serious field situation regarding the dangers of plastic waste for the growth of mangrove trees and the impact on the conservation process, especially the impact on the waters because the mangrove forest area is an important place for the growth process of various types of fish, a destination for birds migration, local birds, monitor lizards, snakes and certain types of



monkeys. By minimizing the impact of waste, especially plastic, the water quality in the waters of the mangrove forest area will also be better and allow all conservation processes to be even better. For students, this field activity gave a deep impression because during the collection of garbage into the mangrove tree paths they could see firsthand several types of birds, monitor lizards, snakes, and fish. Community service activities with students in mangrove coastal areas provide a new experience for students and are very useful to support community service activities with fishermen groups in a sustainable manner because activities such as taking plastic waste can be carried out continuously at any time, especially for study programs with a large number of students so that they can be shared into small groups. Service activities in mangrove waters are very useful in providing educational learning about the environment in theory and practice which will increase the awareness of students or students to understand the importance of protecting the environment as a form of environmental campaign, especially in tourism destinations in support of sustainable tourism development.

Community service activities in the area do not require large costs because the equipment used can be used many times and can be entrusted to the fisherman's post which can also be used by students or students from other educational institutions. Moreover, the support from fishing groups is very good and encouraging. Therefore, activities like this can be carried out more frequently in each semester of learning.

## CONCLUSION

The implications of community service carried out in the waters of the Denpasar mangrove forest park can be used as a permanent activity from the University through existing study programs and outlined in a collaboration which can also be followed by lecturer research by their respective fields related to environmental conservation. And most importantly, this activity can provide a direct answer to the problem of plastic waste through a direct collection of plastic waste at the location so that it has a positive impact on the health of mangrove forests and waters in the area.

The results of this service have described an exploration of the form of service activities in seeing the phenomenon of waste problems in the mangrove forest waters in the form of activities that are profitable and provide benefits to the community, in this case, the fishermen's group through an activity that applies the principles of sustainable environmental activities through real activities that are the needs of the community in that place although

there are still limitations due to limited time and resources in these activities. These service activities provide strength as an activity that is beneficial to the community and provides new experiences for students.

The implications for the world of education provide space to support planning and development in tourist destinations that put forward the principles of sustainable tourism development with a focus on environmental activities by providing tangible benefits for the community and increasing the quality of mangrove waters in supporting tourist destinations as a whole. And educational institutions can continue various integrated activities to strengthen conservation planning and development in various forms of research and activities that can provide economic and environmental benefits for local fishing communities.

Efforts to make mangrove forest areas a place for tourism activities, especially through conservation and environmental programs with the community, are a good opportunity to improve the quality of tourist destinations but are still accompanied by various restrictions to maintain the beauty of the mangrove forest area.

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