Coastal Waste Management Strategy to Support Beach Tourism: A Case Study of Banjar Tourism Village, Banjar District, Buleleng Regency, Bali.

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ABSTRACT

Buleleng Regency has a coastal beach with great tourism potential. The cleanliness of the beach in northern Bali is very concerning; garbage is scattered and often causes an unpleasant odor. To address the waste problem, an effective waste management model is needed to reduce landfill waste volume. This research aims to determine the model for the waste management system in Banjar Tourism Village to develop an educational tour on waste collection. This study uses a qualitative approach. Data were collected by direct observation, documentation, and interviews. The data will be analyzed using qualitative methods. The results of this research are expected to be considered by relevant stakeholders to manage waste in the coastal area of Banjar Tourism Village. Effective waste management policy directions can minimize pollution in coastal areas and their surroundings resulting from tourism activities, thereby making coastal tourist areas sustainable destinations that provide significant benefits to local communities and regional economies.

Keywords: Waste Management, Coastal Area, Tourism, Bali.

INTRODUCTION

Coastal areas have a strong appeal for tourism development in Indonesia. The attractiveness of this coastal area is a great opportunity not only for the tourism sector but also for the economy, where coastal communities have extraordinary potential for community activities, with the revival of various sectors in real life. Various kinds of community activities on the coast provide significant economic benefits for the area, serving as a basis for community development and integrated resource management within sustainable regional regulations to create sustainable development and society for coastal areas [1].

The cleanliness of the beach in northern Bali is very concerning; garbage is scattered and often causes an unpleasant odor. The coastal area's position at the meeting point of land and sea [3] often leads to it receiving garbage shipments from other areas. The phenomenon of natural events in the west wind between October and March affects the volume of garbage shipments carried by sea waves, and many stop along the coast. Garbage is generally carried by sea waves from the Bali Strait that blend in from various directions in the open ocean [4]. In addition, human activities in the land and marine environments are the main drivers of marine waste [5]. The problem arises during the holiday season, when the waste generated by visitors causes garbage to accumulate in tourist areas. Waste cannot be processed in situ because there are no local waste-processing facilities. To overcome the waste problem, an appropriate waste management model is needed that can reduce the volume of waste transported to the landfill.

Photos of the current condition on the beach of Banjar Village can be seen below.

Picture 1. Beach of Banjar village in North of Bali

Source : Author documentation (2024)

The authors took a picture of the coastal area in Banjar Village on March 30, 2024. The documentation shows that the beach tourist area receives little attention from the village and local community, which disturbs the environment and damages the beautiful scenery around the beach. Along the coast of Banjar Village, there are actually many villas and tourists who visit to enjoy the beautiful rural atmosphere. However, the garbage on the coast spoils the scenery and negatively impacts the growth of tourist visits to Banjar Tourism Village.

Therefore, it is important to plan the waste management system for the Banjar beach tourist area to understand the potential waste generated in tourist areas, so that it can be utilized or managed, and to reduce the amount of residue brought to the Final Processing Site (TPA). This research aims to determine the model for the waste management system in Banjar Tourism Village to develop an educational tour on waste collection.

In order to achieve the research aims, this article structured into four research questions, such as:

(1) What is the composition of waste at the source of tourism activities in the form of accommodation, stalls, and restaurants as well as marine garbage from Banjar tourist villages?

(2) How can the potential for waste reduction be done?

(3) What is the right waste management model for coastal areas in Banjar Tourism Village?

(4) How can the role of tourism stakeholders in Banjar Village support a clean and beautiful Banjar Village beach area?

study provides results on waste generation volumes and models the waste management system for tourism activities in the coastal area of Banjar Village. The results of this research are for relevant stakeholders to manage waste in the coastal area of Banjar Tourism Village. Effective waste management policy directions can minimize pollution in coastal areas and their surroundings resulting from tourism activities, thereby making coastal tourist areas sustainable destinations that provide significant benefits to local communities and regional economies.

2) The results of this study are expected to add references to the same topic on different problems about waste management in coastal areas

Research Urgency

Waste can degrade the quality of tourist attractions. The waste problem not only pollutes coastal environments but also damages marine ecosystems. Waste can damage coral reefs and, in turn, worsen the impacts of climate change. Seeing the urgency of the waste problem in coastal areas, a sustainable waste management model is needed to reduce environmental damage to beach tourism.

LITERATURE REVIEW

Coastal Area Management

According to Law number 27 of 2007 concerning the management of coastal areas and small islands, the scope of regulation of coastal areas and small islands includes transitional areas between land and sea ecosystems affected by changes in land and sea, towards land covering sub-district administrative areas and towards the sea as far as 12 (twelve) nautical miles measured from the coastline at the time of the highest tide towards the open sea and/or towards the waters of the archipelago. The regulation of space utilization in the terrestrial area of coastal areas is set out in the applicable Regional Spatial Plan (RTRW) and/or the Detailed Spatial Plan (RDTR). With the birth of the law, it is clearer to recognize the marine and fisheries sector, as well as the management of coastal areas and small islands, as part of the national development agenda [7].

Coastal areas and their natural resources are important to Indonesia's economic development. According to [8] The value and importance of the coast and sea for the Indonesian nation can be seen from at least two aspects, first, socio-economically the coastal and marine areas have an important significance because around 120 million (50%) of Indonesia's population lives in coastal areas (with an average growth of 2% per year), most of the cities (provincial and district cities) are located in coastal areas. Second, biophysically, Indonesia's coastal and marine areas are important because it has the longest coastline in the world after Canada (about 81,000 km), and about 75% of its territory is water [9]. Indonesia is the world's largest archipelagic country, with about 17,508 islands and high biodiversity.

Buleleng regency must fully realize the potential of coastal areas for the tourism sector and other industries. Marine tourism in the coastal area of Buleleng Regency needs to be improved and developed again, not only with existing tourist attractions but also by developing other alternative tourism activities that are in accordance with the conditions and potential of existing natural resources and synergizing with tourism activities that already exist, such as the development of marine tourism mines [10].

The distribution of the level of ecotourism potential in the coastal area of Buleleng Regency, where the eastern area of Buleleng Regency (Air Sanih) still needs to be increased, while the central coastal area (Lovina) and western part (Pemuteran) of Buleleng Regency have high potential for ecotourism development [11]. In the development of Coastal Tourism, Villages must involve community participation to meet tourists' needs and improve community welfare, and be supported by the government and relevant stakeholders.

Waste Management Model for Beach Tourism Areas

Coastal areas are prone to high levels of pollution because most human activities occur there [12]. According to a report by the Indonesian Institute of Sciences (LIPI), as many as 400,000 tons of plastic waste enter Indonesia's coastal and marine environments every year [13]. Globally, the amount of plastic waste entering the sea reaches 8 million tons per year [14]. Sources of waste in coastal tourist areas are generally divided into two categories: tourism-related waste and marine garbage.

In this study, waste from tourism activities includes hotels, restaurants, and beach stalls [15]. The factors that cause garbage piles in 3 coastal tourist locations are household waste dumped into the river flow, which is carried away by sea currents; inadequate garbage cans; and inaccurate use of waste management methods [16].

The government regulates waste management through Law Number 18/2008, which states that it is not only the government's obligation. Community and business actors, as waste producers, are also responsible for creating a

clean and healthy environment [16]. Coastal residents play an important role in helping to keep the coastal environment clean from waste pollution [17]. Therefore, coastal residents need to be informed about the dangers posed by coastal and marine environmental waste.

In terms of waste management in coastal areas, it is necessary to provide garbage bin facilities and appropriate waste management innovations, with stakeholder cooperation, supported by a memorandum of cooperation agreement [18]. Research by [19] found that the optimal waste management system model must address operational and legal aspects. The technical aspects of operations include containerization, collection, processing, transportation, and final processing. Meanwhile, the legal aspects of waste management in coastal areas need to be addressed, including the institutional and financing frameworks, as well as the role of local tourism stakeholders.

RESEARCH METHOD

Research Location

The research was conducted in the coastal area of Banjar Tourism Village, Buleleng Regency, Bali Province, Indonesia. This location was chosen because it has a coastal area with high tourism potential but has not been managed optimally.

Types and Sources of Data

Data Types

Data is divided based on its type into two, namely quantitative data and qualitative data [20], with the following description: (1) Quantitative data is data in the form of numbers and can be calculated with units of calculation. Quantitative data in this study are in the form of tourist visits to Bali, data on tourist visits to Buleleng Regency, and data on Tourism Villages in Buleleng Regency; (2) Qualitative Data are data in the form of images, schemas, words, and sentences. The qualitative data in this study are descriptive information about the general picture and profile of Banjar Village. The data mentioned in the data type explanation are not the data analyzed and used to provide the research results, but instead supporting data for preparing a waste management model for Banjar Tourism Village.

Data Source

Data is divided into two types based on source: primary and secondary [18]. The description is as follows:

1. Primary Data

Primary data is original information obtained directly from first-hand sources or respondents. Primary data will be collected, including observations and interviews with the Village Head and related stakeholders.

2. Secondary Data

Secondary data is data obtained not directly from information sources but from third parties. Researchers obtain ready-made data collected by other parties through various methods. Secondary data includes data from the Buleleng Tourism Office on the number of tourists and tourist villages in Buleleng Regency, as well as documents related to this discussion.

Research Instruments

This study used several research instruments to collect data from informants, including cameras, stationery, recording devices, and interview guides. Cameras are important for documenting the situation and the tourism potential, as well as for researchers' activities in gathering information. Stationery was used to record the results

of interviews with several informants. A recording device is essential for recording the interview results. The interview guidelines were prepared for interviews with the village head, tourism actors, academics, and the community.

Informant Determination Techniques

The technique for determining informants uses purposive sampling. Purposive sampling is a sampling technique with specific considerations [20]. Informants are selected based on the importance of assessing the village's tourism potential and the appropriate strategy for planning a tourist village. Based on these considerations, the following informants can be determined: village heads, tourism actors, and the community.

Data Collection Techniques

The data collection techniques used in this study are observation, in-depth interviews, and document analysis, as explained below.

1. Observation

Observation is a systematic, logical, objective, and rational process of recording various phenomena, both in actual and artificial situations, to achieve specific goals [21]. Faisal in [22] mentioned that one of the observation techniques is participatory observation, which involves observing the daily activities of the person being observed or used as a source of research data.

2. In-Depth Interviews

An interview is a conversation with a specific purpose, conducted by two parties: the interviewer, who asks the questions, and the interviewee, who provides the answers [23]. In this study, an in-depth interview technique was used to gather complex information, most of which contained personal opinions, attitudes, and experiences [24]. In-depth interviews are conducted by asking key informants questions.

3. Documentation Studies

Documentation studies are information derived from important records, such as documents, library materials, records, books, and reports, from institutions, organizations, and individuals. This technique is used to obtain written data in the form of documents.

Data Analysis Techniques

Data analysis is the process of systematically finding and compiling data from interviews, field notes, and other materials so that it is easy to understand and the findings can be communicated to others [22]. The initial stage of data analysis involves collecting raw data through interviews, observations, and documentation. The next step is to interpret existing data or information, also known as interpretative analysis [25]. To obtain interpretation results with a high level of confidence, the interpretative analysis method is assisted by triangulation techniques. Through the application of triangulation techniques in the form of triangulation methods and triangulation of information sources, it can be determined that information is less biased towards the subjectivity of the respondent, which is unfavorable or unreliable information.

The results of information interpretation are presented qualitatively, in accordance with the research's focus problems. Qualitative descriptive research is intended to describe and analyze individual and group phenomena, events, social activities, attitudes, beliefs, perceptions, and people [26]. Therefore, the results of this study are presented in a descriptive form that describes the object's actual state, presenting facts and meanings in an integrated manner that can serve as a basis for drawing conclusions and recommendations.

FINDINGS AND DISCUSSION

Composition of Waste in Banjar Village

The cleanliness of the beach in Banjar Village is very concerning; garbage is scattered and often causes an unpleasant odor. The coastal area's position at the meeting point of land and sea often leads to it receiving shipments of garbage from other areas. The phenomenon of natural events in the west wind between October and March affects the volume of garbage shipments carried by sea waves, and many stop along the coast. Garbage is generally carried by sea waves from the Bali Strait that blend in from various directions in the open ocean. The problem arises during the holiday season, when the waste generated by visitors causes garbage to accumulate in tourist areas. Waste cannot be processed in situ because there are no local waste-processing facilities.

The composition of waste in Banjar Village consists of organic waste and inorganic waste. Organic waste is waste that decomposes naturally, such as leftover vegetables, fruits, and leaves. This waste accounts for the largest share of household waste (+70%). Next, inorganic waste is waste that cannot decompose naturally and takes a very long time to decompose, such as paper, plastic, wood, glass, fabric, and metal. In terms of waste sources, the most significant proportion comes from household waste.

Banjar Village and Dencarik Village, as coastal areas in Banjar District, have people who make a living as fishermen. The location of fishing community settlements on the coast results in beach garbage being mixed with household waste. The composition of sewage along the coast is as follows:

waste from households: 50%

waste from villas along the beach: 20%

waste carried from coastal currents: 10%

Waste source from the rest of the religious ceremonies: 10%

waste source from local tourism: 10%

From the source of the collected waste, after being sorted, it turns out to have the following composition:

Organic waste such as wood, leaves, fruit and coconut shell fragments is about 60%

Plastic waste is about 30%

Waste fabric 5%

5% glass chip waste

Picture 2. Coastal area condition

Potential Waste Reduction That Can Be Done

In coastal areas, waste management requires the provision of garbage bins and appropriate waste management innovations, supported by stakeholder cooperation. In an effort to reduce waste in coastal areas in Dencarik Village and Banjar Village, several times activities have collaborated with Ganesha Education University. In early 2024, a beach cleanup was held, attended by around 50 people, including the LPPM Undiksha team, students, a team from FHIS Undiksha, the fishing community, and village officials. The activity was carried out in Dencarik Village and Banjar Village. Some photos of the activity can be seen below:

Picture 3. Beach cleaning activities

The following is a link to a video of beach cleanup activities in Banjar District. https://youtu.be/uVYUon0okxM?si=_mk-mD38dKpIRCim

The next activity was beach cleaning in August, with around 50 participants, including the LPPM Undiksha team, students from Scout UKM, fisherman communities, and village officials. In this activity, the Undiksha team assisted with garbage collection to reduce waste in the coastal areas of Banjar District.

The following is the documentation of the activity.

The following is a video link to the publication of beach clean-up activities in Banjar District: https://youtu.be/zoMyBdAJk08

However, these activities are still events rather than regular activities, so the potential for waste reduction in coastal areas remains suboptimal. The FGD was conducted on the potential to reduce waste and develop waste management models in the coastal area of Banjar District. Photos of FGD activities can be seen below:

Local government can use several strategies to reduce waste in the Banjar sub-district area.

1. Sorting waste at the source. In this case, wet organic waste can be collected and composted. This activity is supported by distributing ecobags to communities in coastal areas, which can be collected regularly by village waste officers and composted.

2. Processing organic waste into biobriquettes.

Waste scattered on the beach actually has high economic potential. Waste bamboo, coconut shells, scalp, and wood can be processed into briquettes as an alternative energy source. In this case, assistance from the local government and universities is essential, as the community does not understand the technology required to produce biobriquettes.

Construction of TPS3R in Banjar Village and Dencarik Village

Establishment of a Waste Bank as a new business unit in the village.

In coastal areas, waste management requires waste banks and appropriate innovations, supported by stakeholder cooperation and a memorandum of cooperation [18]. Research by [19] found that the optimal waste management system model must address operational and legal aspects. The technical aspects of operations include collection, processing, transportation, and final processing. Meanwhile, the legal aspects of waste management in coastal areas need to be addressed, including the institutional and financing frameworks, as well as the role of local tourism stakeholders.

Waste Management Model for Coastal Areas in Banjar Village

Waste management is a key entry point for achieving sustainable development targets, as it is multi-sectoral and impacts various aspects of society and the economy. Waste management is related to health issues, climate change, poverty reduction, food and resource security, and sustainable production and consumption (UNEP, 2015). Improperly managed waste will have several negative impacts. Therefore, sustainable waste management is needed to achieve various targets, especially sustainable development.

In achieving sustainable development from an environmental perspective, an environmentally sound waste management system can contribute to the realization of a sustainable city by creating a healthy environment. This shows that sustainable waste management can affect the achievement of SDGs targets, especially SDGs 3, 7, 13, 14, and 15.

Integrated Sustainable Waste Management (ISWM), according to Van de Klundert and Anschutz (2001) in Wilson et al (2013), is a concept of sustainable waste management by integrating three main dimensions, namely (1) stakeholders, (2) waste system elements, and (3) strategic aspects. In addition to these three dimensions, waste management policies in each country also form the foundation for a sustainable approach.

Chart 1 explains the waste management model adopted by Banjar Village.

1) Construction of TPS3R in Banjar Village and Dencarik Village

2) Establishment of a Waste Bank as a new business unit in Bumdes

3) Once every two days, garbage is transported from the villa by means of a pick-up. The villa manager pays the garbage officer. The amount of villa waste is not excessive because the villa manager has sorted it. Organic waste has been stored and prepared for composting and use in the villa's gardens.

1) Waste from the market is transported by sub-district garbage trucks because the volume is quite large. Waste from the market is transported daily to prevent the volume of waste from swelling.

2) Household garbage is transported by village garbage trucks with a frequency of every two days.

3) Waste from the three sources is then sorted, organic waste is processed into compost, and non-organic waste is collected and then sent to the waste bank at the Buleleng Regency Environment Office. The processed waste is used as compost for gardens and becomes a source of income for the village treasury. Sorting waste at the source. In this case, wet organic waste can be collected and composted. This activity is supported by distributing ecobags to communities in coastal areas, where village waste officers regularly collect and process them into compost.

4) Non-organic waste is sorted and then sent to the waste bank, which also produces revenue for the village treasury.

Chart 1. Waste Management in the Village

From the model above, it can be seen that organic waste, such as wood and coconut shells, scattered in coastal areas, is still not properly managed. Waste in coastal areas has not been appropriately managed, and a roadmap is needed to serve as a reference for activity planning and budget planning. Chart 2 explains the roadmap for waste management in the coastal area of Banjar Village.

1. In 2025, it is planned to create a model of processing coastal biomass waste to become biobriquettes. Waste scattered on the beach actually has high economic potential. Waste bamboo, coconut shells, scalp, and wood can be processed into briquettes as an alternative energy source. In this case, assistance from the local government and universities is essential, as the community does not understand the technology required to produce biobriquettes. Efforts to process biomass waste into biobriquettes will indirectly help clean up beaches in northern Bali and create new jobs for local communities. To serve as a model for waste management in coastal areas, a

roadmap was prepared as a reference for future implementation. This processing effort in the roadmap has been scheduled for 2025.

2. Then for the processing of plastic waste, in 2026 a follow-up research is needed that can help the village government to process plastic waste into biodiesel. This activity requires support from the local government and funding from the central government. After carrying out organic and non-organic waste management activities, in 2027 it is hoped that waste management educational tourism can be developed in coastal areas. At this stage, Banjar Village can become a reference/model of a village that is clean from waste by managing waste to have high economic value.

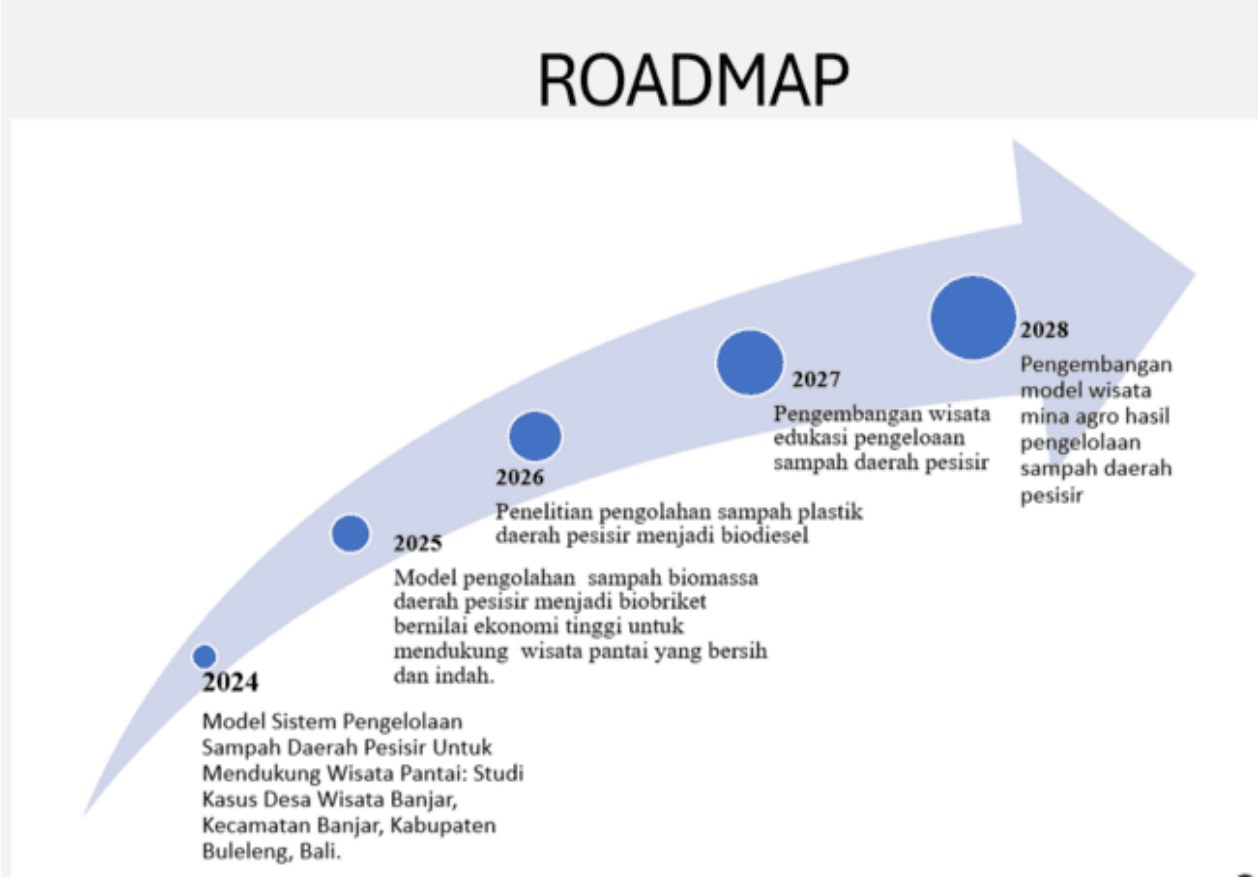

Chart 2. Roadmap for Waste Management in Banjar Village

The Role of Tourism Stakeholders in Banjar Village in Supporting the Cleanliness of Beach Area

In an effort to dynamize tourism development, the government has so far undertaken various initiatives to foster cooperation among sectors, including the private sector, other government sectors, and the community. Cooperation with various private sectors, namely the private sector, government organizations, and the community. Tourism awareness groups (Pokdarwis) need to expand their roles further and be more inviting, nurturing, and encouraging of community participation in the development of Banjar Tourism Village. The community awareness group (henceforth referred to Pokdarwis) can collaborate with the private company on its CSR initiatives. The provision of facilities is essential because they support the development of Tourism Villages.

The coastal area of Banjar Village has been filled with villas that mostly employ local people. To ensure the local community feels the tourism sector's impact, waste management should be a priority for the village to support the development of village tourism. In line with Law Number 18 of 2008 on Waste Management, waste management is not only the responsibility of the local government but also an obligation for the community. The community serves as a manager, processor, user, and fund provider, and at the same time as a supervisor. The community is obliged to reduce waste at its source through the 3R approach (Reduce, Reuse, Recycle). The community can reduce pollution of the coastal environment by not throwing waste directly into the sea, but by using it for economic activities, carried out individually, in groups, or in collaboration with a private company.

Local governments and village governments in terms of waste management play an important role in terms of budget planning to carry out various activities that have been planned. The government's role includes providing regulatory tools on waste management, the development of waste management technology, management financing and other necessary things, including providing education about waste for all levels of society.

The role of the village head as a facilitator creates conducive conditions for the implementation of village development. As a facilitator in waste management, the government is engaged in the field through funding to encourage progress in the development of waste disposal sites (Herlina, 2019). Local government will outline waste management as an activity program in the RPJMDes (Village Medium-Term Program Plan. This village development planning document outlines the village's vision and mission, along with a 6-year action plan.

Pokdarwis play an important role in village waste management. In terms of waste management, CSR funds from companies can also be accessed by Pokdarwis through the submission of activity proposals to maintain coastal areas sustainably.

CONCLUSIONS

Based on the results of the research, the conclusions can be drawn as follows:

(1) The composition of waste at the source of tourist activities in the form of accommodations, stalls, and restaurants, as well as marine waste from Banjar tourist villages. The composition of waste along the coast is as follows: (1) Source of waste from households: 50%; (2) Waste source from villas along the beach: 20%; (3) Source of waste carried from coastal currents: 10%; (3) The source of waste from the rest of religious ceremonies and their pitrayad: 10%; (4) Waste source from local tourism: 10%.

The potential for waste reduction in the coastal area of Banjar Tourism Village lies in sorting organic and non-organic waste. Villagers can put organic waste from each house or villa's backyard into compost, which is very useful for the garden.

The right waste management model for coastal areas in Banjar Tourism Village is resource-based waste management, which is then further managed at a TPS3R by the village.

The role of tourism stakeholders in Banjar Village can help maintain a clean, beautiful coastal area. The community, pokdarwis, and village governments are obliged to support the creation of beautiful, clean coastal areas.

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