



The role of community-based tourism for mangroves conservation in Banten, Indonesia

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Abstract. *Mangroves provide multiple ecological functions, such as connectors and balancers of land and sea ecosystems. The presence of mangroves in coastal areas is very important for reducing the impact of tsunamis and tidal flooding. The role of local communities in the form of community-based tourism models, in conserving mangrove forests has not been extensively studied. This study aims to fill the gap in evaluating local communities' involvement, particularly under the tourism-based communities' model, in conserving mangroves and, at the same time, gaining economic benefits. This study was conducted in Lembur Mangrove Patikang, Citeureup Village, Pandeglang Regency. This study applied mixed methods that combine both quantitative and qualitative approaches. Primary data were obtained directly from the local community through using questionnaires, interviews, and field observations. Secondary data was collected through a literature review of mangrove conservation and community development in coastal areas. Our study found that local community-based tourism namely "Putri Gundul" played a very important role in increasing community awareness to conserve mangrove forests. The community has gained more knowledge on the biology of mangrove species and the ecology of mangroves for mangrove restoration. Furthermore, the involvement of local communities in mangrove conservation and restoration can increase the economy of communities by producing various products from mangroves.*

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INTRODUCTION

Mangroves are coastal ecosystems, in addition to coral reefs and seagrasses (Saru 2014). Mangrove forests, or mangroves, are vegetation composed of trees and shrubs that are salt-tolerant. According to Saru (2014), mangroves can function in maintaining ecosystem stability or balance as a source of nutrients, nursery grounds, feeding grounds, and spawning grounds. Economically, the mangrove ecosystem can be used as an area for cultivation, fishing, tourism destinations, and as a source of wood for coastal communities. Mangroves act as connectors and balancers in land and sea ecosystems, where plants, animals, and various nutrients are transferred to land or sea through mangroves. Mangroves have important ecological functions in coastal areas (Lee et al. 2014; Carugati et al. 2018). Furthermore, mangroves are also important in reducing the impact of tsunamis and tidal flooding (Daoudouh-Guebas et al. 2005).

Currently, the utilization of mangroves by coastal communities is not sustainable. Anthropogenic activities in coastal areas for agriculture, plantations, fish, and shrimp ponds, as well as residential development, cause mangrove degradation. According to Sifleet et al. (2011), damage to coastal ecosystems is estimated to reach 340,000–980,000 hectares annually, 35% of which occurs in mangroves. The most dominant cause of mangrove degradation in Indonesia is the conversion into fishery areas, such as salt ponds and shrimp ponds, as well as infrastructure development, such as ports and tourist attractions (Arifanti et al. 2021). The physical degradation of this ecosystem requires immense effort for restoration (Effendi 2009).

The total area of mangroves in Indonesia is estimated over 3.3 million hectares, which is approximately 20% of the total mangrove area in the world (Nurbaya et al. 2020; Spalding et al. 2021). Pandeglang Regency is one of the regencies in Banten Province with a coastal area of about 76 hectare (ha) spreading from Panimbang Beach, Tanjung Lesung, north coast of Ujung Kulon National Park, Panaitan Island and Peucang Island (DKPPB 2018). Currently, mangroves in this area continue to deteriorate in terms of coverage and conditions. The condition of mangrove forests, especially in the coastal area of Pandeglang Regency, many of which are experiencing degradation, is being converted into a coastal tourism area. Utilization of mangroves is not in accordance with their function and has caused massive damage to the mangrove ecosystem. The conservation of mangroves is very important to prevent the danger of tsunamis and tidal flooding in coastal communities.

Several studies have reported the success of mangrove conservation with the participation of local communities, such as those in Probolinggo, East Java (Pribadiningtyas et al. 2013), Tiwoho-North Sulawesi (Nurrani et al. 2015), Bekasi-West Java (Yuliani and Herminasari 2017), Pasawaran-Lampung (Alfandi et al. 2019), and in Mempawah-West Kalimantan (Roslinda et al. 2021). However, other than their participation in conservation, the economic benefits of mangroves have not been explored much. Thus, this study aims to fill the gap in evaluating local communities' involvement, particularly under the scheme of the community-based tourism model, in conserving mangroves and simultaneously gaining economic benefit.

METHOD

This study was conducted in Lembur Mangrove Patikang, a hamlet in Citeureup Village, Pandeglang Regency, Banten Province (Figure 1). The hamlet has mangroves and a swamp of approximately 4 ha (MTCE 2019).

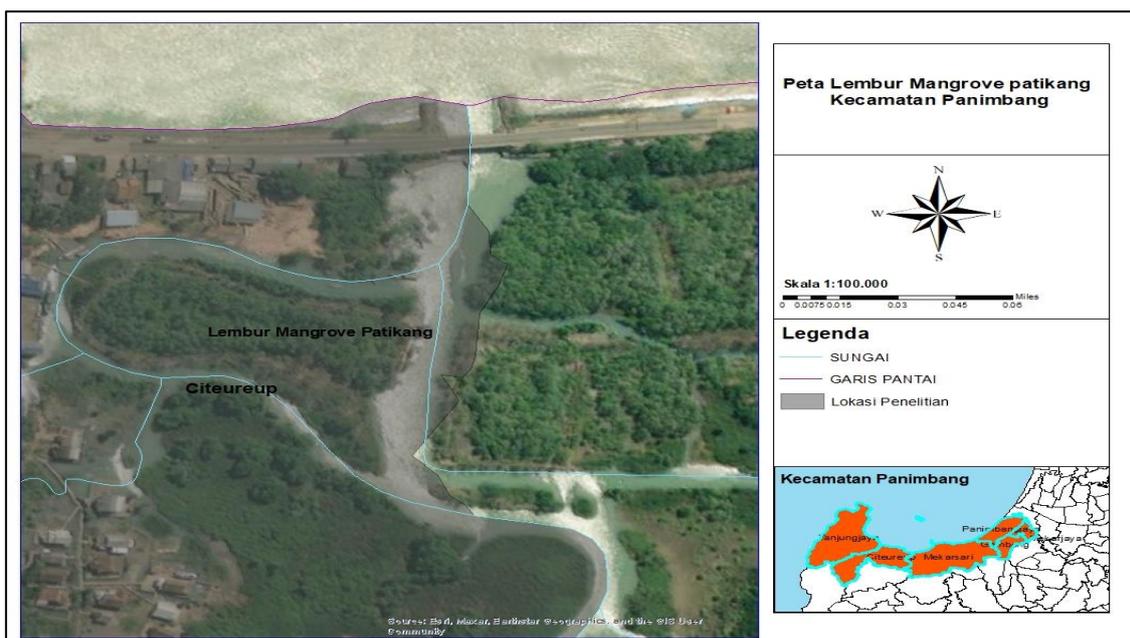


Figure 1 Location of mangrove forest managed by local community-based tourism “Putri Gundul”

This research activity was carried out for four months, from January to April 2022, using mixed methods that combine quantitative and qualitative approaches (Creswell and Clark 2011). The population in this study consisted of heads of families living in Lembur Mangrove Patikang (35 households). The respondents were randomly selected with a sampling intensity of 85% (30 families). Primary data were obtained through questionnaire and semi-structured interviews. We also observed directly in the field the current condition of mangroves, hamlets, and the activities of local residents relate to mangroves. Secondary data was obtained by conducting a literature review regarding mangrove conservation and community development in the study area, partially those contained in the documentation of activities carried out by the local group “Putri Gundul”. The results of the study were analyzed using descriptive and qualitative approaches.

RESULTS AND DISCUSSION

Current Condition of The Mangroves

Mangroves in Lembur Mangrove Patikang, Citeureup Village consist of several species, namely *Rhizophora mucronata*, *R. stylosa*, *Sonneratia alba*, *Avicennia marina*, *A. alba*, *Ceriops tagal*, and *Nypa fruticans* (Figure 2). *Avicennia marina* and *A. alba* are the local mangrove species found in Lembur Mangrove Patikang. The other species were planted by villagers.



Figure 1 Species of mangroves in Lembur Mangrove Patikang



Figure 2 Damage to mangrove forests in Lembur Mangrove Patikang

They planted species that could withstand abrasion and tidal flooding, such as *Rhizophora mucronata* and *R. stylosa*. Both species have aerial roots that grow above the soil surface and stick out of tree trunks. However, mangroves around Citeureup Village are not in good condition, some areas are damaged, and others have been converted into fish and shrimp ponds (Figure 3). Such conditions are very dangerous to the community because during extreme weather, residential areas will be vulnerable to tsunamis and tidal flooding.

Villagers' Perceptions on The Mangroves

Generally, the community in Citeureup Village claimed to have certain knowledge about mangroves. Based on our study, approximately 94% of them said that they knew about the habitat of mangroves, 100% understood the current condition of the mangroves surrounding their neighborhood, 97% claimed to understand the benefits of mangroves, and approximately 88% of them knew what kind of factors interfered with the mangrove ecosystem.

Our study also showed that 94% of the community said that public awareness regarding the benefits of mangroves was often carried out by the government, however there were few implemented programs currently undertaken. The community is interested in managing the mangroves indicated by our study, which showed that around 47% of the community is eager to collaborate with government and non-governmental organizations (Table 1). Thus, the existence of social groups established by the community plays an important role. A local group for tourism awareness namely “*Putri Gundul*” is one of community-based tourism models that was initiated by the community themselves. “*Putri Gundul*” was formed by the villagers of Citeureup Village, focusing on mangrove ecotourism. Mangroves under the supervision of “*Putri Gundul*” cover only about four hectares.

“Putri Gundul” Roles in Conservation of Mangroves

In December 2018, this area was affected by a tsunami (Solihuddin 2020). Mangroves acted as a barrier protecting the Citeureup Village from the devastating tsunami. Therefore, the impact felt by the community is not severe. This shows that mangroves are important for the village, and it is necessary to restore the degraded mangroves to prevent potential tidal flooding and abrasion in the future. Approximately 1.5 ha of mangroves in the village were degraded. “*Putri Gundul*” helps the Citeureup community improve their knowledge of mangrove silviculture and management and bridges the community with the local government to conserve the mangroves. This group carried out educational activities such as training with the aim that local communities directly participate in conserving and protecting the mangroves. Our study showed that approximately 94% of the community understood mangrove management techniques, particularly in silviculture (Table 1). Approximately 50% of the mangroves (1.5 ha) were successfully restored. This indicates the successful efforts of “*Putri Gundul*” in conserving mangroves in Lembur Mangrove Patikang area.

To achieve this, “*Putri Gundul*” used a persuasive, educative, and facilitative strategy. A persuasive strategy was implemented by researching the importance of mangroves to prevent tidal flooding and abrasion. The educational strategy used by this group was to provide training to local communities on how to nurse, plant, and tend mangroves (Figure 4). The community was also trained to gain economic benefits from conserving and protecting the mangroves by processing the fruits of mangrove species into drinks, food, and crafts (Figure 5). The role of the community in mangrove conservation efforts is highly correlated with the knowledge possessed by the local community (Hamdhani 2022), thus, the involvement of this group is important in providing counselling and training about mangroves in the community.

The facilitative strategy carried out by “*Putri Gundul*” is to provide financial assistance for the processing of mangrove fruit as well as to provide promotional media assistance. This is done to help the community's business, so that it can improve the economic welfare of the community and reduce unemployment. The involvement of “*Putri Gundul*” was not limited to mangrove conservation and preservation. Mangrove ecotourism was also initiated. Mangrove ecotourism in Lembur Mangrove Patikang is nature-based tourism

that specifically serves as an educational and recreational place. Mangrove ecotourism can be used by students, students, teachers, and lecturers as a means of research. Public visitors can also enjoy this place. Ecotourism has improved the livelihoods of communities. On average, the monthly income of the community increased up to 45.5%. Mangrove ecotourism is expected to create an integrated management regime to prevent coastal disasters and improve the economy of the community.

Table 1 Results of the analysis of local people's perceptions of mangrove forests in Patikang

Questionnaire topic	Percentage of local people			
	High knowledge	Average knowledge	Less knowledge	No knowledge
Mangrove habitat	6	94	0	0
Condition of mangrove forest	0	100	0	0
Knowledge of the benefits of mangrove habitat	3	97	0	0
Public awareness to socialize the benefits of mangrove forest management	0	94	3	3
Interest in managing mangrove forests	100	0	0	0
Factors that disturb the mangrove ecosystem	3	88	6	3
Mangrove forest management carried out in Lembur Mangrove Patikang	0	94	6	0
Local community involvement in mangrove forest management	3	94	0	3



Figure 3 Mangrove nursery and mangrove restoration activities by “Putri Gundul”



Figure 4 Processed products from the use of mangrove fruit by “Putri Gundul”

CONCLUSION

The coastal area of Citeureup Village is an area in Panimbang Sub-district, Pandeglang Regency which is prone to tidal flooding and abrasion, this is seen from the condition of the area which is directly opposite of the beach. The condition of the mangrove forest in this area is concerning. Many mangrove forests have been converted into ponds and damaged by tidal flooding. The existence of a local group namely “*Putri Gundul*” plays an important role in increasing local community awareness and participation in mangrove forest conservation. “*Putri Gundul*” helps the community of mangrove villages in Citeureup have sufficient knowledge of mangrove planting and maintenance techniques. In addition, the creativity of local communities is also needed to develop mangrove forest conservation. It can be seen from the large number of Citeureup communities involved in tourism activities, as well as in processing food and beverage products derived from mangrove fruit and leaves, to improve the monthly income of the community.

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