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Local tourists' perception towards mangrove forest conservation and regeneration in the Guang-guang Mangrove Park and Nursery, Davao Oriental, Philippines

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ABSTRACT

Mangroves are crucial for preserving and safeguarding coastal communities and the ecosystems along the shore. This study focused on determining the perception of local tourists towards the importance of current efforts and initiatives for mangrove forest conservation and regeneration in Guang-Guang, Dahican, City of Mati, Davao Oriental, Philippines. Using in-depth interviews with ten local tourists, major themes relating to the difficulties facing conservation and regeneration programs, as well as the ecosystem services and functions of mangrove forests, were investigated. The local tourists perceived that mangroves operate as storm barriers, prevent coastal erosion, and serve as essential habitats for aquatic organisms. However, anthropogenic activities like the establishment of shrimp ponds, plastic pollution, land reclamation, and illegal logging were documented to threaten the mangrove forests. The study also highlighted the government's efforts to implement regeneration programs and engage local communities and stakeholders in tree planting and coastal clean-up activities. The significance of mangrove forest conservation and regeneration was underscored, considering their roles in providing habitats, protecting coastlines, promoting biodiversity, and supporting livelihoods. The implications of the study emphasized the need to raise public awareness, improve environmental education, involve communities indecision-making, and implement regenerative conservation initiatives.

Keywords: Conservation, perception, Philippines, regeneration, tourism

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INTRODUCTION

A mangrove is any tree, shrub, palm, or ground fern that typically grows higher than the mean sea level in the intertidal zone of marine coastal habitats and estuarine edges and has a height greater than half a meter. A mangrove ecosystem is a tidal habitat that comprises trees and shrubs (Kathiresan, 2012). On the world's tropical coasts, mangroves are a distinctive ecosystem made up of the intertidal marine plant community. They provide a range of vital functions to both human communities and the biosphere, including flood control, water filtering, conservation of wildlife habitat, minimizing the consequences of climate change, and upholding cultural values (Hariram et al., 2023). According to Su et al., (2021), mangroves provide habitat and breeding grounds for a variety of species, including fish that are caught for commercial purposes. Numerous bird species find refuge in this ecosystem, and hundreds of shorebirds and migratory bird species use them as important breeding and resting locations (Aloysius et al., 2023). They offer cultural ecosystem services, including ecotourism and education (Kumar, 2022). They further help coastal communities sustain their way of life by supplying food and other necessary commodities and services, such as to prevent erosion, maintain water quality, and we sequester carbon (Su et al., 2021). According to Quevedo et al., (2019), human exploitation, habitat loss, marine pollution, coastal degradation, and climate change threaten mangrove ecosystems. These factors lead to a reduction in biodiversity and negatively affect ecosystem goods and services (Abreo et al., 2020).

One of the prevailing threats to mangrove forests is anthropogenic disturbance. Some of the things that damage mangrove areas are the felling of mangrove trees, conversion into fish and shrimp ponds, clearing land for settlement and agricultural activities, and disposal of toxic waste in the community (Kurniawati et al., 2022). Mangrove areas are threatend with anthropogenic activties despite efforts to attract local tourists for eco-tourism and the environmental sector's efforts to conserve the mangrove park. It was noted that the majority of local tourists were having issues with the mangrove forest's deterioration in some areas. According to Loss (2019), tourism is one of the most significant economic engines for growth and development in a particular location. It also generates income and cultural wealth.

The Guang-Guang mangrove park and nursery is a protected mangrove forest spanning 21,000 hectares. The study of Yap et al., (2018) documented nine mangrove species in the area: *Ceriops tagal, Rhizophora stylosa, Rhizophora apiculata, Bruguiera gymnorhiza, Sonneratia alba, Avicennia officinalis, Pemphis acidula, Aegiceras corniculatum,* and *Avicennia alba*. This huge mangrove forest provides a refuge marine life and reasonable yielding grounds. This is also one of the major ecotourism sites in Davao Oriental, which local visitors visit consistently (Pototan et al., 2020).

The biological health and integrity of these valuable coastal ecosystems depend on mangrove forest conservation and regeneration activities. However, Buot et al., (2022) note that although the nation has undertaken several mangrove conservation and rehabilitation initiatives, some have been highly effective while others have failed as well. A few institutional issues that impact the growth and preservation of mangroves in the Philippines were also discussed by Quevedo et al., (2019).These include inefficient government management, conflicting policies, low economic rent for mangroves, and the promotion of aquaculture as a development strategy.

This study was undertaken to learn about the local tourists' perceptions towards mangrove forest conservation and regeneration in Guang-Guang, Dahican, City of Mati, Davao Oriental. This study aims to determine the perception of local tourists toward the importance of current

efforts and initiatives for mangrove forest conservation and regeneration. Since the area is a popular tourist destination, this study will help the community, educators, and local environmental sectors promote awareness about safeguarding and preserving the mangrove ecosystem. Mangrove ecosystem management broadens the range of tourist sites, which may enhance local eco-tourism.

METHODOLOGY

Description of study site

The Pujada Bay Protected Landscape and Seascape, which includes the Guang-guang Mangrove Park and Nursery, was designated a marine protected area within Pujada Bay's boundaries under Proclamation No. 431 of July 31, 1994, issued by then-President Fidel Ramos. The Mangrove Park and Nursery has an estimated 850 ha of generally planted mangroves along its shoreline (Bersaldo etal., 2023). This huge mangrove forest provides a refuge for marine life and reasonable yielding grounds and is one of the eco-tourism sites in Davao Oriental.

Research design

This study is qualitative as it aims to comprehend a research topic from an idealistic or humanistic perspective. This method is employed to understand the attitudes, relationships, behaviors, and beliefs of individuals (Pathak et al., 2013).

Researchers play an important role in the situated activities of qualitative research as a means of data collection. In-depth interviews are typically conducted with research participants, gathering information that is usually described extensively using words and images. Researchers also consider how people behave and participate in activities and the environments in which those behaviors take place (Creswell, 2016). The researchers conducted in-depth interviews (IDIs) with

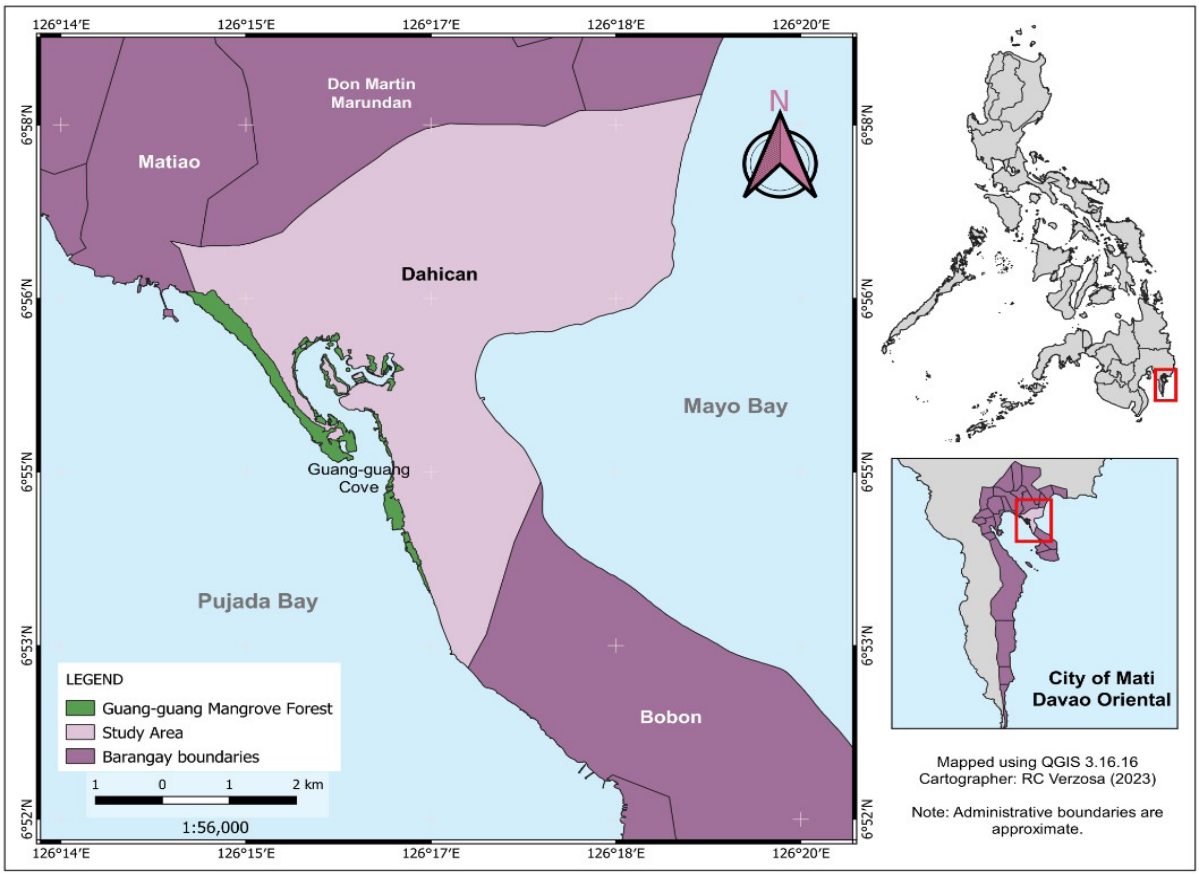

Figure 1. Map of the study area in Guang-guang, Dahican, City of Mati, Davao Oriental.

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ten (10) local tourists who are residents of the City of Mati, at least 18 years old, and are in high school.

Data analysis

This study utilized thematic analysis to generate findings based on the participants' responses. Thematic analysis is an adaptable method that may be used for many different types of research (Clarke et al., 2015). It is often used with a collection of texts, such asinterview transcripts or survey results. The study addressed the subjectivity of the research and provided a qualitative, methodical, thorough, and user-friendly approach to coding and theme development (Stark et al.,2019). In addition, it changed to reflect the researcher's evolving connection with the data (Brawn and Clarke 2013). The data is carefully analyzed by the researcher to uncover recurring themes, subjects, concepts, and patterns of meaning. Six phases are commonly involved in the analysis process: familiarization, coding, generation of themes, review of themes, defining and naming of themes, and writing up the analysis of the data (Linneberg et al., 2019). Researchers eliminated confirmation bias in the construction of their analyses by adhering to this protocol.

Ethical consideration

Prior to collecting data, the researchers sent a communication letter to Barangay Dahican in the City of Mati, requesting permission to conduct a survey and interview. The respondents received a letter before we conducted the interview. Health precautions and social etiquette were strongly followed to prevent the spread of COVID-19. Additionally, all participants agreed to take part voluntarily, and any personal information collected in the study was kept confidential.

Interview guide

Ten questions were used to obtain responses from the participants. These include: (1) What do you think are the ecosystem functions and services of mangrove forests? (2) What do you think are the main functions of mangroves? (3) What are the changes in mangrove species composition (i.e., increasing or decreasing) over the last 10 years? (4) What are the conservation threats and challenges to mangrove forests? (5) What do you think are the main threats to mangrove forests? (6) What mangrove forest regeneration programs have been implemented in your community? (7) Why do you think mangrove forests should be conserved and regenerated? (8) What do you think are the challenges in conserving and regenerating mangrove forests? (9) What do you think are the benefits of mangrove regeneration? (10) What should be done to restore or regenerate degraded mangrove forests?

RESULTS

Table 1 summarizes the participants' responses. They perceive that mangrove forests are essential for a number of ecosystem services and processes. Mangrove habitats are extremely important, as they play an important role in maintaining ecological balance and supporting diverse livelihoods. These coastal areas provide important breeding and nesting habitat for a variety of aquatic species, including fish and birds. In addition to their ecological importance, mangroves also play an important role in the social, cultural, and economic structure of local communities. This relationship highlights how important mangrove habitat is to maintaining environmental and human health. The respondents in the interviews regularly noted a decline in the composition of mangroves in their area over the past ten years.

The research also emphasized how mangrove trees preserve the environment by preventing coastal erosion and acting as a barrier during severe weather occurrences. This role is especially important in light of the growing problems brought on by climate change since it

does not only protects coastal settlements but also provides protection from storm surges.

The investigation revealed the mangrove wood's numerous uses, from building materials for homes to a supply of lumber and coal. Additionally, these forests have spiritual and cultural importance and are a source of folk remedies. Lastly, mangroves offer vital resources to nearby people, including firewood, charcoal, paddles, and timber for building boats. These features emphasize their crucial role in meeting the daily demands of the local population. Table 2 highlights significant threatsand challenges that endanger the survival of mangrove ecosystems. Residents in the vicinity were seen converting mangrove areas into shrimp ponds, highlighting the tension between economic growth and environmental preservation. The difficulties of marine pollution inside the environment are shown by the prevalence of trash, such as plastics, diapers, and wrappers, caught in the mangrove trees. Mangrove forests are also directly threatened by the cutting of mangrove trees to be sold as lumber and wood sticks, among other domestic uses. The local tourists also perceive that species inhabiting the mangrove ecosystems are at risk from overfishing, illegal fishing, and resource overharvesting.

Table 1. Themes and core ideas on the ecosystem functions and services of mangrove forests in the Guang-guang Mangrove Park and Nursery, City of Mati, Davao Oriental, Philippines.

Major themes	Core ideas
Functions and services of mangrove forests	Provide habitat for fishes and other aquatic organisms. Breeding and nursery habitat for birds, fishes and other aquatic organisms. Help control coastal erosion and salt water intrusion. Serve as barriers from storm surge during extreme weather events. Recreational and tourism; people spend leisure time swimming in the area. Mangrove habitats are used for aquaculture and for commercial fisheries. Mangrove wood is used to build houses, source for timber and coal Source for medicine (Spiritual and cultural heritage). Supply of firewood, charcoal, and paddle sticks as well as wood for local boats' construction.

Table 2. Themes and core ideas on the conservation threats and challenges to mangrove forests in the Guang-guang Mangrove Park and Nursery, City of Mati, Davao Oriental, Philippines.

Major themes	Core ideas
Conservation threats to mangrove forests	Residents converted some mangrove areas to Vannamie shrimp ponds. Plastics, cellophanes, diapers and others are thrown and trapped in the branches of mangrove trees. Documented plastic bottles and cellophanes and sort of wrappers in the residence area and in the mangrove park.
Conservation challenges to mangrove forests	Cutting of mangrove trees is evident. Mangrove wood is used to build houses, source for timber and coal. Threats to species in the mangrove environments include overfishing, illegal fishing, and overharvesting. Mangrove conservation policies are poorly implemented. The coastal community is not well-informed about the advantages of mangroves. A lack of coordination between organizations responsible for managing and regulating mangrove habitats. Conflict of interest and land use changes. Poverty and livelihood issues of the residents in the area. Lack of understanding about how to prevent marine pollution.

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DISCUSSION

Changes in mangrove species composition

The results shown in Table 2, which emphasized several conservation issues observed in the community, provided evidence for this decline. These threats, such as land reclamation and other human-made activities carried out by locals, have significantly contributed to the declining species diversity of magroves. These results are further supported by a study done in 2022 by Audu, which shows that both direct and indirect human activities are responsible for the disappearance of mangrove ecosystems. The mangrove ecosystem has been shownto be negatively impacted by directactivities such as deforestation, marine pollution, land-based pollution, agricultural and aquaculture practices, industrialization, and urbanization. The use of chemicals and fertilizers in agriculture that leach into the environment and affect mangrove forests, overexploitation of mangrove resources, coastal reclamation for unsustainable aquaculture, and infrastructure development are examples of human activities.

The study by Ferronato and Toretta (2019), who claimed that homes in the majority of coastal towns directly dispose of domestic trash into the marine environment, emphasized the occurrence of incorrect waste disposal in a mangrove forest. Furthermore, coastal inhabitants confirmed that mangrove was a supply of building materials, according to Katsanevakis and Katsarou (2004), who made this claim (for fencing in particular). The presence of unauthorized residents adds to anthropogenic elements that harm mangrove habitats. Mangroves have historically experienced high rates of deforestation, pollution, and habitat loss (Fontaine et al., 2022).

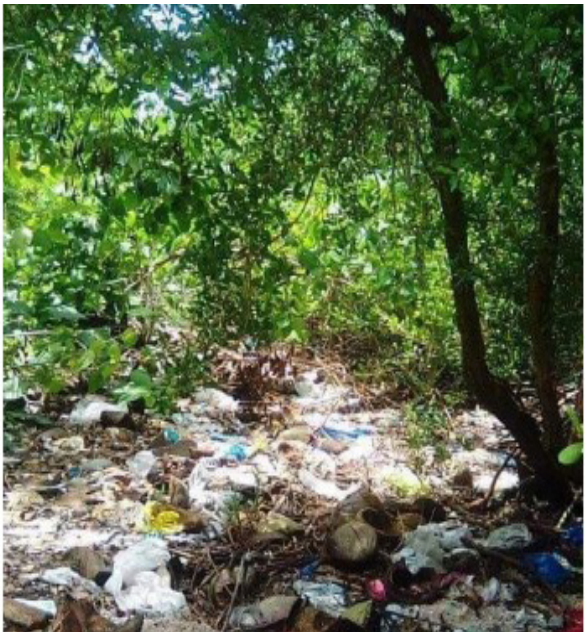

Figure 2. Macroplastic pollution in Guang-guang, Dahican, City of Mati, Davao Oriental, Philippines.

Regeneration program for mangrove forest

The government has implemented a program aimed at regenerating mangrove forests, such as the Guang-guang Mangrove Park and Nursery. This initiative involves the provision of seedlings and saplings of mangrove trees. Mangrove ecosystem restoration and protection depend on mangrove regeneration efforts. Mangrove restoration and rehabilitation may be thought of as a flexible management strategy for mangroves (Ellison et al., 2020). In addition, students from various schools in the City of Mati, along with NGOs and other stakeholders, actively participate in tree planting activities within the community to support the mangrove regeneration efforts. Furthermore, coastal clean-up initiatives are undertaken in the area to aid in the restoration of the mangrove forest. According to the study by Friess et al. (2022), in order to meet ambitious mangrove restoration goals, a trans-disciplinary strategy for restoration must be built on sound scientific concepts. The effectiveness of various mangrove regeneration strategies, such as planting

and natural regeneration, relies on a variety of elements, including the site circumstances and the degree of human intervention (Sasmito et al., 2023).

In 2020, the City of Mati bested all other coastal towns in Davao Oriental and cities in the Davao region to bag the Malinis at Masaganang Karagatan Award from the Bureau of Fisheries and Aquatic Resources (BFAR). The winning prize was used to continue mangrove protection in park and for an additional budget for the fisherfolk in the City of Mati (Palicte, 2021). Recognitions like this popularize the conservation and regeneration programs of the local government, which serves as an open invitation for collaboration among multiple stakeholders. This is aligned with the regenerative futures agenda proposed by Ponce and Villegas (2022), indicating a change of perspective from sustainable use of resources into the active pursuit of restoration and regeneration of damaged ecosystems.

Importance of mangrove forest conservation and regeneration

As shown in Table 1, the respondents have shared their perspectives on the functions and services of mangrove ecosystems. They emphasize that mangroves provide habitats for fish and other aquatic organisms, serving as nesting, breeding, and spawning grounds for various species. Su et al., (2021) claim that mangroves provide a habitat and breeding ground for a variety of species, including fish that are caught for income. They serve as essential breeding and resting grounds for hundreds of shorebirds and migratory bird species, among others (Getzner and Islam, 2020). Additionally, they function as natural barriers, protecting coastlines from storm surges during extreme weather events. Mangroves hold significance in terms of spiritual and cultural heritage, being sources of traditional medicine. Mangrove ecosystems play vital functions that are integral to human communities. They help in flood control, water filtration, biodiversity conservation, climate change mitigation, and the cultural preservation (Hariram et al., 2023) Moreover, they contribute to recreational and tourism activities, with people often leisurely swimming in these areas. Mangrove habitats also have practical applications in aquaculture and commercial fisheries (Cuenca et al., 2019).

Furthermore, Damastuti et al., (2022) affirm that mangrove forests play essential socio-ecological roles, such as the production of timber and other forest products, coastal protection against erosion and sea level rise, promotion of biodiversity, and support of thriving fisheries. Local livelihood may be negatively affected by the dwindling population of organisms, such as *Pegophysema philippiana*, that are dependent on a healthy mangrove ecosystem (Bersaldo et al., 2019; Palma Gil et al., 2023). Considering these findings, it is evident that mangroves play a crucial role in human-environment systems. Therefore, the conservation and regeneration of mangrove ecosystems are imperative.

Implication for public awareness and community education

In order to develop a positive attitude toward mangrove forest conservation and regeneration, the community and local tourists need to be aware of the significance of mangrove forest functions and services in the ecosystem. Public awareness and community education initiatives were deemed essential to inform local communities and motivate them to participate in conservation initiatives. Governments and policymakers need to look into how environmental education affects local tourists' attitudes and increase awareness of the importance of the mangrove ecosystem.

The conservation of coastal and mangrove habitats significantly depends

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on public perception and appreciation. Knowledge, awareness, and accountability among local tourists should all greatly improve as a result. Using mangrove parks as an income-generating facility and a conservation site has been known to be effective in Java, Indonesia (Afifah et al., 2023). The Guang-Guang Mangrove Park and Nursery, as an ecotourism site, provides a habitat for marine wildlife and is an important recreation site for tourists. As suggested by Jimenez et al., (2015), there is a need to develop a sustainable tourism plan in ecologically critical seascapes. The results of this study can also be used to develop long-term management strategies for mangrove ecosystems. For the management of mangrove forests, they are creating cooperative management initiatives that will involve the local population more in decision-making. The local tourists argued that non-government organizations (NGOs) and academic institutions must routinely provide workshops and seminars to educate the community on the value of the environment and raise awareness about its protection, management, and conservation.

CONCLUSION

This study highlights the importance of conserving and regenerating mangrove forests. The study results emphasize the urgency of addressing conservation threats and challenges, such as land reclamation, microplastic pollution, illegal mangrove cutting, and other anthropogenic activities. The study also found ongoing initiatives and plans for regeneration in the study area. Programs like the establishment of mangrove nurseries and coastal clean-up initiatives have been launched by the government, engaging local communities, schools, NGOs, and other stakeholders. These initiatives seek to revive mangrove forests and educate local people about their significance. The study emphasizes the value of mangrove forests in supporting livelihoods through fisheries and tourism, functioning as natural barriers against coastal erosion and storm surges, and providing habitat for aquatic organisms. The government's regeneration programs and community involvement in restoration activities showcase positive initiatives. The study results could be utilized as a basisfor raising public awareness, enhancing environmental education, involving communities in decision-making, and implementing regenerative conservation initiatives for the long-term management of mangrove ecosystems. The long-term conservation efforts and regenerative management of mangrove ecosystems can be achieved by putting these strategies into practice. The overarching interests of biodiversity protection, sustainable development, and climate resilience are all aided by protecting and regenerating mangrove forests, which also protect coastal human populations and marine wildlife.

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