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# VALUE OF MANGROVE AND CRAB CULTIVATION DEVELOPMENT PATTERNS IN KALIWLINGI VILLAGE, INDONESIA

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**ABSTRACT**

Both mangroves and crab cultivation contribute to sustainable development and positively impact local communities and ecosystems. Here are some of the values associated with their product. The advantage of this mangrove crab cultivation business can be maximal if the cultivated crabs achieve normal growth and maximum results. The demand for crabs is currently very large in domestic and international markets. Determination of alternative patterns value in aquaculture analysis can be identified in Kaliwlingi Village. The socio-economic value has a new concept between characteristics cultivation with income production costs, a major achievement step in realizing Indonesia's best just and prosperous society.

**Keywords: Mangrove; Crab cultivation; Kaliwlingi village; Value of interest**

## INTRODUCTION

Mangrove and crab cultivation development patterns hold significant value regarding environmental, economic, and social benefits (Opa et al., 2021; Solihin et al., 2020). Both mangroves and crab cultivation contribute to sustainable development and positively impact local communities and ecosystems. Here are some of the values associated with their product.

Environmental benefits such as the conservation of mangrove ecosystems are valuable for coastal protection, as they act as natural buffers against erosion, storms, and tidal surges (Aspiany et al., 2019; Prasetya et al., 2018). They also help mitigate the impacts of climate change by sequestering carbon and reducing greenhouse gas emissions. Mangroves support a rich diversity of flora and fauna, including various species of birds, fish, crustaceans, and other marine life. They provide vital breeding and nursery grounds for many marine species.

Water quality such as mangroves filter and purify water, improving water quality and preventing sediment runoff and pollution from reaching coastal waters (Kong et al., 2012; Macale et al., 2019). Crab as Indicator Species: Crab populations can serve as indicators of the health of the coastal ecosystem. Their presence and abundance can provide insights into the overall environmental condition.

Economic benefits such as sustainable fisheries with crab cultivation and mangrove conservation contribute to sustainable fishing, ensuring a steady supply of crabs and other marine products for local communities and markets (Pathak et al., 2021; B. Wibawa et al., 2020).

Livelihoods and income crab cultivation can provide a source of income for local communities, especially in coastal areas where traditional livelihoods may be limited, and ecotourism such as well-managed mangrove areas can attract ecotourism, providing additional income and job opportunities for locals involved in tourism-related businesses. Some countries participate in carbon trading schemes where mangrove conservation projects can generate revenue through carbon credits for their role in carbon sequestration (February 2021; Ujianti et al., 2018).

Social benefits such as community development with crab cultivation and sustainable mangrove management can empower local communities by providing job opportunities, reducing poverty, and improving the overall quality of life(Fithor et al., 2018, 2020). Knowledge transfer, which develops sustainable crab cultivation practices and mangrove conservation techniques, involves knowledge-sharing and capacity-building within communities, fostering a sense of ownership and stewardship.

Cultural significance with mangroves often holds cultural significance for coastal communities, providing

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spiritual and traditional values passed down through generations(Lamya et al., 2020; Lestari et al., 2021). Community resilience with healthy mangrove ecosystems enhances the strength of communities against natural disasters and climate-related events, reducing vulnerability and strengthening adaptability.

For these values to be fully realized, it is essential to adopt responsible and sustainable practices in crab cultivation and mangrove management. Balancing economic development with ecological conservation ensures these valuable ecosystems' long-term benefits and viability (Amir et al., 2022; Pongponrat, 2022). Collaboration between stakeholders, including local communities, governments, NGOs, and researchers, is vital in developing and implementing effective and sustainable development patterns for mangroves and crab cultivation. The research will confirm to continue for another reason.

## MATERIALS AND METHODS

### Determination of Research Area

The research area is determined purposively (deliberately), meaning that the research area is selected based on the research objectives. The research area is Kaliwlingi Wetan Village, Brebes District, Brebes Regency, where in this village, there is a cultivation of mangrove crab, which is one of the commodities that has increased production (Fig. 1).

### Determination of Research Sample

The census method is used in determining the sample, i.e., the entire population is the subject of this study (Bakogiannis et al., 2020; Kibtiah et al., 2023). The people in this study were all cultivators of mud crabs as well as in the mangrove forest area in Kaliwlingi Village, Brebes District, Brebes Regency.

### Data collection

The data to be taken in this study consists of primary data and secondary data. Preliminary data were obtained from direct observation and interviews with shrimp pond farmers using a list of questions (questionnaires) prepared in advance (Chouchene et al., 2021; Vuorre et al., 2020). Secondary data related to the research were obtained from the Department of Marine Affairs and Fisheries of Brebes Regency and the Statistics Agency of Brebes Regency, related agencies and institutions in the research area.

The strategy uses the value of all about this mechanism, such as explaining without internal and external, as the procedure default [1], [21].


Figure 1. Map of sampling in Kaliwlingi village

## RESULTS AND DISCUSSION

The Kaliwlingi Mangrove Tourism Village is the spirit of the community's hard work against abrasion and coastal damage on the north coast, with data from 1963 -2017 erosion and abrasion of 2,115.39 hectares and accretion/sedimentation of 2,905.29 by planting mangroves for more than 10 years and has grown more than 10 years—310 Ha of mangrove forest for abrasion prevention (Hakim et al., 2022).

From the results of planting and rehabilitating mangroves, there is potential for developing mangrove tourism and a mangrove nursery. Culinary and typical coastal crafts are also the main attractions of the menu regular of Kaliwlingi Village. The surrounding community makes food from the results of mangrove biota, namely soka crabs (Macale et al., 2019).

The potential and prospects for fisheries development, especially mangrove crabs, are currently increasing in demand. The mangrove crab is one of the prima donnas of brackish water cultivation, and the increasing demand for mangrove crab cultivation is closely related to many market demands for seafood fans in restaurants and traditional markets. Kaliwlingi Village is a tourist destination with mangrove forest icons, selfies, fish and crab seafood stalls, and other street food. Unfortunately, the need for market demand is not accompanied by the level of productivity from aquaculture, supplying the needs of most of the results from the catch (Bakti Wibawa et al., 2021).

Problems for the sustainability of the mangrove crab population can research is needed on developing mangrove crab cultivation to meet seafood stalls in the mangrove forest ecotourism area. However, it needs to be studied in depth so that the preservation of the mangrove crab population in the Kaliwlingi mangrove forest area can be maintained and its habitat can be maintained so that the population does not decrease (Pratiwi et al., 2022).

Community empowerment aims to develop a superior commodity business in the form of mangrove crabs based on land/water suitability and socio-economic conditions of Kaliwlingi Village. Community empowerment is directed at efforts to increase the production and productivity of mangrove crabs and the systems that support it, namely the mangrove forest area as a conservation area, preservation of mangrove crab habitat, and Site Plan for the Crab Cultivation area.

### Crab Cultivation Pattern to Development Plan Value

Decision-making strategies are always related to the background, potential, and existing problems internally in the form of strengths and weaknesses and externally in the form of opportunities and threats that can make the development pattern of mangrove crab cultivation in Kaliwlingi Village, Brebes(Jiang et al., 2019). In preparing the plan, it is necessary to study internal and external factors obtained from the analysis of operational activities and the results of aquaculture production. The methodology for determining weights and ratings in assessing internal and external strategic elements can be seen in the matrix of internal strategic factors in the form of strengths and weaknesses for developing mud crab cultivation, presented in Table 1.

As an effort to optimize internal factors, more solid consolidation efforts are still needed between governments, in this case, the Marine and Fisheries Service of Brebes Regency and mud crab cultivators in maximizing strengths and reducing internal weaknesses to obtain the best solution in aquaculture development patterns with mangrove crabs in Kaliwlingi Village, Brebes District, Brebes Regency.

The total value of external factors is 3.42, indicating that the development pattern of mangrove crab cultivation in Kaliwlingi Village, Brebes Regency, in responding to existing external factors is quite optimal. However, more solid consolidation efforts are still needed between governments, in this case, the Fisheries and Marine Service of Brebes Regency and mud crab cultivators, in taking advantage of

Table 1. The total value of internal and external strategic factors

| Value of research | Internal | 3-4 | 2-3 | 1-2 |
|---|---|---|---|---|
| **External** | | **Strong** | **Median** | **Weak** |
| **3-4** | **High** | **Maximal growth** | Minimum growth | Refreshment |
| **2-3** | **Medium** | Careful stabilization | Normal growth | Decrease the population of crab |
| **1-2** | **Low** | Increase the population of crab | Diversification growth | The threat to the crab population |

Source: Result analysis, 2023

opportunities to face threats and the sustainability of mangrove crabs.

The biggest problem in the cultivation of mud crabs is the decline in the coastal environment's carrying capacity due to improper management (Dewi et al., 2022). Mangrove forests are the main habitat for crabs to grow and develop (Nursery ground). In mangrove forests, there are natural foods. Mangrove crabs consume various types of feed, such as algae, rotting leaves, roots and nuts, snails, frogs, shellfish, shrimp, and carrion fish(Fithor et al., 2018). The natural habitat of mangrove crabs is brackish waters with muddy bottoms.

And along the shoreline overgrown with mangrove trees (mangroves) (Hadiyanto et al., 2021). The problems faced by mangrove crab farmers are currently very complex, including decreased production caused by various diseases that attack mangrove crabs, environmental pollution and security that is not guaranteed due to waste disposal activities from chicken farms that are dumped into waterways, and the increase in the price of the means of production (Irsadi et al., 2019). The high cost of mangrove crab seeds still relies on natural catches.

Mangrove and crab cultivation development patterns hold significant value in terms of environmental, economic, and social benefits. Both mangroves and crab cultivation contribute to sustainable development and positively impact local communities and ecosystems. Here are some of the values associated with their product:

1. Environmental Benefits (Aju, 2019):

a. Mangrove Conservation: Mangrove ecosystems are valuable for coastal protection, as they act as natural buffers against erosion, storms, and tidal surges. They also help mitigate the impacts of climate change by sequestering carbon and reducing greenhouse gas emissions.

b. Biodiversity: Mangroves support a rich diversity of flora and fauna, including various species of birds, fish, crustaceans, and other marine life. They provide vital breeding and nursery grounds for many marine species.

c. Water Quality: Mangroves filter and purify water, improving water quality and preventing sediment runoff and pollution from reaching coastal waters.

d. Crab as Indicator Species: Crab populations can serve as indicators of the health of the coastal ecosystem. Their presence and abundance can provide insights into the overall environmental condition.

2. Economic Benefits (Wagey et al., 2020):

a. Sustainable Fisheries: Crab cultivation and mangrove conservation contribute to sustainable fisheries, ensuring a steady supply of crabs and other marine products for local communities and markets.

b. Livelihoods and Income: Crab cultivation can provide a source of income for local communities, especially in coastal areas where traditional livelihoods may be limited.

c. Ecotourism: Well-managed mangrove areas can attract ecotourism, providing additional income and job opportunities for locals involved in tourism-related businesses.

d. Carbon Trading: Some countries participate in carbon trading schemes where mangrove conservation projects can generate revenue through carbon credits for their role in carbon sequestration.

3. Social Benefits (Møller Jensen et al., 2019):

a. Community Development: Crab cultivation and sustainable mangrove management can empower local communities by providing job opportunities, reducing poverty, and improving the overall quality of life.

b. Knowledge Transfer: Developing sustainable crab cultivation practices and mangrove conservation techniques involves knowledge-sharing and community capacity-building, fostering a sense of ownership and stewardship.

c. Cultural Significance: Mangroves often hold cultural significance for coastal communities, providing spiritual and traditional values passed down through generations.

d. Community Resilience: Healthy mangrove ecosystems enhance the resilience of communities to natural disasters and climate-related events, reducing vulnerability and strengthening adaptability.

For these values to be fully realized, it is essential to adopt responsible and sustainable practices in crab cultivation and mangrove management. Balancing economic development with ecological conservation ensures these valuable ecosystems' long-term benefits and viability. Collaboration between stakeholders, including local communities, governments, NGOs, and researchers, is vital in developing and implementing effective and sustainable development patterns for mangroves and crab cultivation. Please confirm this in Figure 2.

Based on Figure 2, a zoning site plan for the management area of the Dewi Mangrove Sari Tourism Village has been formed, starting from the tourist zoning, mangrove trekking, pier zone, fishing and catch location, cultivation zone, to conservation zone, nature school zone, camp zone, fruit garden zone,

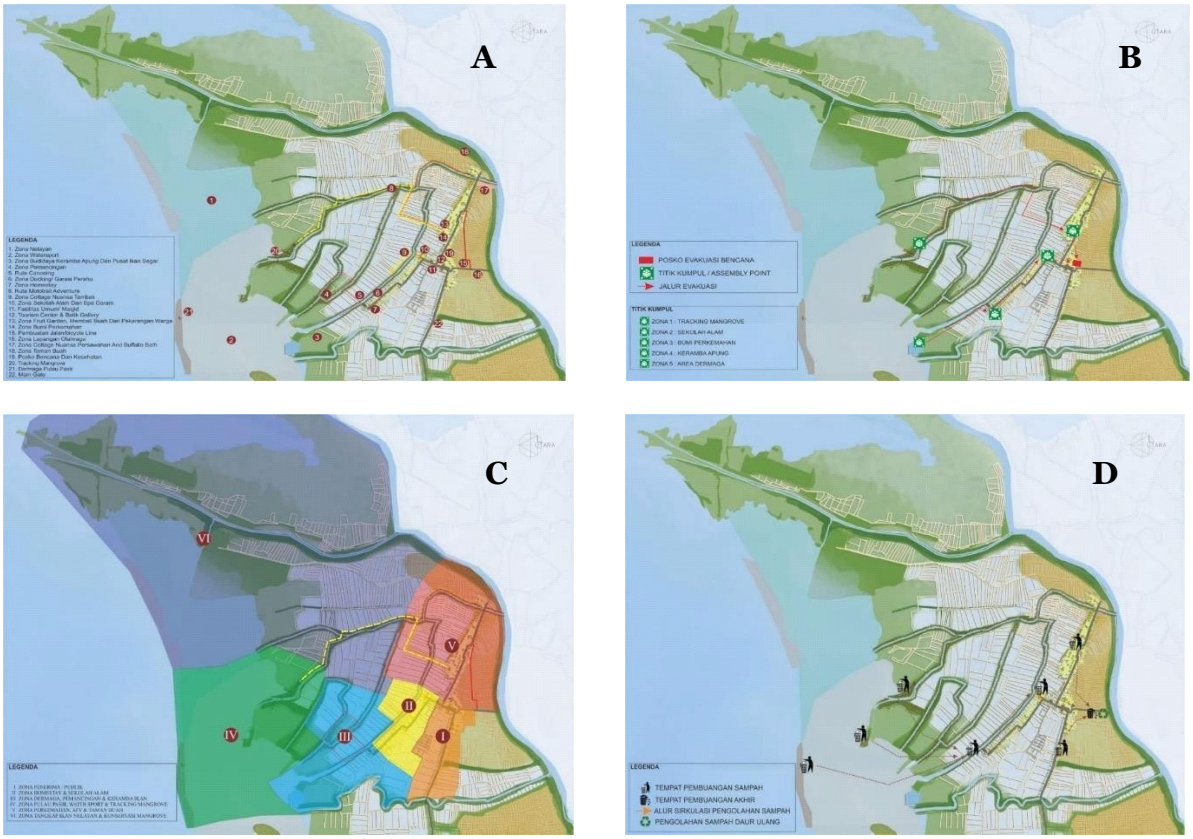


Figure 2. 2A. Site Plan for Kaliwlingi Tourism Village, District Brebes; 2B. Dewi Mangrove Sari Area Zoning; 2C. Mangrove Area Utilization Zoning; 2D. Zoning Waste Management in the Dewi Mangrove Sari area.

zone water sport, public reception zone, waste management zone.

## CONCLUSIONS

Value utilization is a common element for the sustainability of ecosystems and life needed as a first step to segregating value from the mangrove ecosystem at the best opportunity with a major achievement step in the framework of realizing the best just and prosperous society for Indonesia.

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