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Davao region mangrove clam (*Pegophysema philippiana*) conservation and management strategy

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ABSTRACT. Mangrove clam or imbao (*Pegophysema philippiana*) is an economically important bivalve species that is very common in the vast mangrove forest in the Davao region. This marine mangrove resource is subject to overexploitation and indiscriminate gleaning. Small clams are frequently gleaned in the provinces of Davao Oriental, Davao Occidental, and Davao del Sur negatively impacting the supply of imbao in the market. A size regulation policy was established in which gleaners were prohibited from collecting sexually immature clams (below 4 cm). After several years of implementing size regulation policy, the mangrove clam stock continuously declined. A rotational harvest strategy was introduced. A cyclical closure of the subdivided plots in each province was imposed. After a year of closure, the wild population of mangrove clams increased especially in Davao Oriental and Davao Occidental. While in Davao del Sur no significant enhancement was observed. The policy change to conserve mangrove clam is a vital step in sustaining this species in the region. However, cooperation, awareness, and adherence to the policy being implemented in the province are factors that influence the effectiveness of the policy.

Keywords: *Conservation, management strategy, mangroves, mangrove clam*

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Mangrove clam as a food resource

Figure 1. Mangrove clams (*Pegophysema philippiana*) collected in Baganga, Davao Oriental (A), and a gleaner taking mangrove clams in the vicinity of the mangrove forest (B).

Mangroves are a vital ecosystem in the Davao region. They provide ecological and economic benefits to the marginalized sector living in the coastal zones. They act as barriers to storm surges, filter land-based pollutants, and act as carbon sink which aids in mitigating climate change among others (Friess et al., 2020; Salang and Macusi 2019; Primavera et al., 2016). Mangroves also provide habitat to various marine organisms like fishes, crabs, shrimps, and bivalves (Huang et al., 2020; Yap et al., 2018; Baderan et al., 2019). In the provinces of Davao Oriental, Davao del Sur, and Davao Occidental, which are located in the southern part of Mindanao, mangrove clams (*Pegophysema philippiana*) known locally as "imbao" is an economically valuable bivalve species that burrows in the vast mangrove forest of the region. Mangrove clam is one of the favorite shellfish of Davaoeños because of its taste, size, and aphrodisiac properties (Cuneca et al., 2019). It is harvested

Davao regions mangrove clam fishery

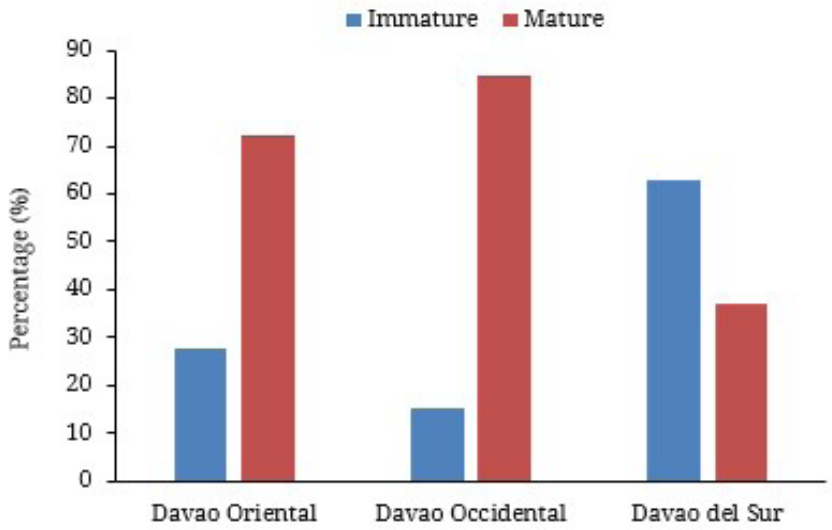

Figure 2. The percentage of imangrove clam gleaned in the three provinces in relation to their sexual maturity before implementation of Rotational Harvesting Strategy (RHS).

regularly by gleaners for food and livelihood. To highlight, in Baganga, Davao Oriental some of the gleaners can collect at least 5 kg of mangrove clam daily which is sold for U$ 6-10 (Bersaldo et al., 2022). In previous years, a decrease in thesupply of mangrove clam in the market was observed in the region due to overexploitation and indiscriminate harvesting which resulted in decreased income of gleaners (Bacaltos et al., 2010).

Davao region gleaners are living below the poverty threshold which drives them to exploit mangrove clam resources to sustain their needs. In Davao del Sur, smaller clams were gleaned frequently though they have cheaper market value compared to larger sized clams. Moreover, in Davao Oriental and Davao Occidental, bigger or sexually mature clams dominated their catch, but smaller clams were also collected during the gleaning. A study in 2010 concluded that market supply of mangrove clams were affected by the high level of exploitation. A size regulation policy was then established to sustain the mangrove clam wild stock. This policy prohibits gleaners from collecting mangrove clam with size below 4.0 cm. Nine years after the establishment of the size regulation policy, a follow up study was conducted and determined that smaller mangrove clams were still gleaned regularly. The ineffective implementation of the size regulation policy pushed the team from Southern Philippines Agri-Business and Marine and Aquatic School of Technology (SPAMAST) to conserve and improve the mangrove clam stock in the Davao region. A CHED DARE TO funded project entitled, "Enhancing mangrove clam fisheries in Davao Region" was implemented.

Management strategy

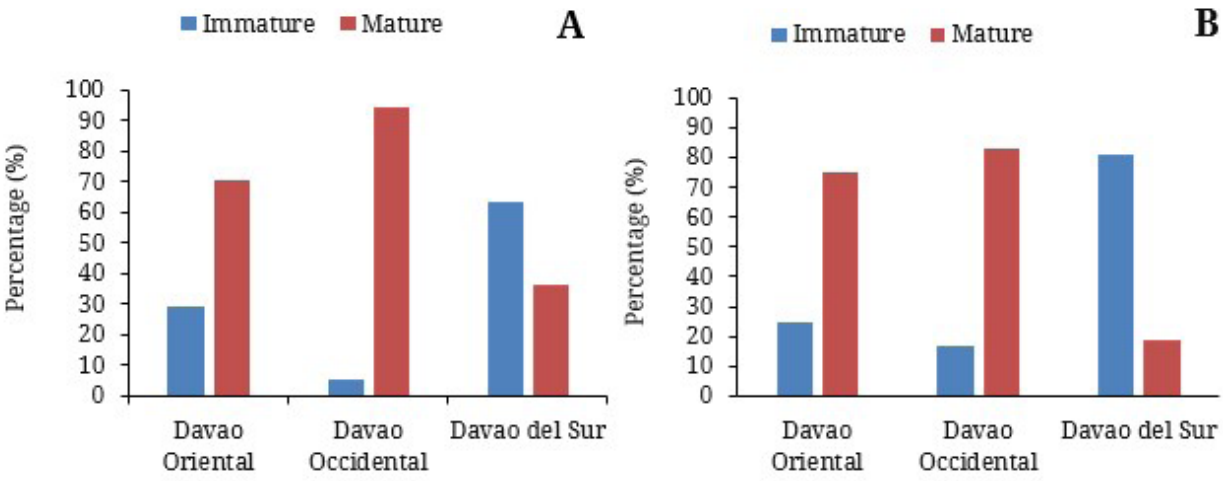

Figure 3. The stock enhancement from pre-closure survey (A) to post-closure survey (B) of the mangrove clam collected in the study areas.

To address the declining stock of mangrove clams due to over exploitation and indiscriminate gleaning, a rotational harvesting strategy Rotational Harvesting Strategy (RHS) was introduced to the three Davao provinces. The Rotational Harvesting Strategy (RHS) are a spatial management strategy in which the whole gleaning areas were subdivided into several plots and a cyclical closure was applied (Purcell et al., 2016). The area that was closed for gleaning activities was given enough time to recover from gleaning pressures. This would allow mangrove clam population to replenish their stock naturally for a year. However, the effectiveness

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of RHS were evaluated based on the resilience of the species being protected (Purcell et al., 2015). The rotational harvesting scheme were very effective for fast growing species like mangrove clams (Dolorosa and Dangan-Galon, 2014). Following the implementation of the Rotational Harvesting Strategy (RHS), notable improvements in stock levels were observed in Davao Oriental and Davao Occidental, reflected in mean length and weight measurements. In Davao Oriental, shell length increased from 3.9 cm to 4.2 cm, and weight from 32.5 g to 44.6 g. In contrast, Davao Occidental saw an increase from 4.1 cm to 4.3 cm in shell length and from 37.3 g to 47 g in weight. Conversely, in Davao del Sur, there was no improvement in mangrove clam wild stock condition, with shell length decreasing from 3.2 cm to 2.9 cm and weight from 20.7 g to 16.6 g. The success and failure of Rotational Harvesting Strategy (RHS) were influenced by gleaners' awareness and cooperation with the new policy, highlighting the importance of community involvement in sustaining mangrove clam stocks. Furthermore, rotational harvesting proved effective in conserving and enhancing wild populations of this fast-growing species.

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