

Socialization of Sustainable Crab Fishing Methods in Fanamo and Omawita Villages, Far East Mimika District

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Abstract

Mangrove crab (*Scylla* spp.) fisheries constitute an important livelihood source for coastal communities in Far East Mimika District, Indonesia. However, increasing market demand has led to unsustainable fishing practices, including the capture of egg-bearing females, harvesting of undersized crabs, and the use of nonselective fishing gear that damages mangrove habitats. These practices threaten crab stock sustainability and the long-term welfare of fishing communities. This study aims to evaluate the implementation of a socialization and training program promoting sustainable mangrove crab fishing methods in Fanamo and Omawita Villages. The program applied a community-based approach consisting of awareness campaigns, hands-on training in eco-friendly fishing gear (*folding traps with escape gaps* and *selective gillnets*), introduction of minimum catch-size regulations, establishment of *no-catch zones*, and implementation of a simple catch logbook system. The activities were conducted through participatory discussions, field demonstrations, workshops, and mentoring. The results indicate increased awareness among fishermen regarding conservation principles, adoption of environmentally friendly fishing gear by participating fishers, and initial use of catch logbooks for monitoring productivity. Despite challenges such as limited literacy and time constraints, the mentoring approach strengthened behavioral change and local acceptance of sustainable practices. The study concludes that integrating *socialization*, technical training, and community-based monitoring effectively supports sustainable resource management while maintaining fishers' productivity. This initiative provides a practical model for strengthening coastal governance and ensuring the ecological and economic sustainability of mangrove crab fisheries.

INTRODUCTION

Mangrove crab (*Scylla* spp.) is an important fishery commodity with high economic value and increasing market demand, both domestically and for export (Winestri et al., 2014). In Indonesia, mangrove crab production reached 28,929 tons in 2019 (Ministry of Marine Affairs and Fisheries [KKP], 2019). This demand has encouraged an increase in fishing intensity, often without adequate consideration of sustainability principles.

Environmentally harmful fishing practices, such as the use of illegal fishing gear, the capture of egg-bearing crabs, and the disregard for minimum catch-size regulations, have contributed to the decline of mangrove crab stocks in the wild (Shelley & Lovatelli, 2011). In addition, the degradation of mangrove ecosystems, which serve as natural habitats for mangrove

crabs, further exacerbates the threat to their populations (Barman et al., 2024).

Based on the Better Management Practices (BMP) compiled by the WWF Indonesia Foundation (2023), sustainable mangrove crab fishing includes the use of selective fishing gear (such as folding bubu traps and spiked gill nets), the release of egg-bearing crabs and undersized crabs (<12 cm carapace width), and systematic catch recording.

In Fanamo and Omawita Villages, Far East Mimika District, mangrove crab fishing activities are one of the main sources of livelihood for the local community. However, existing traditional fishing practices still need improvement in terms of understanding sustainable techniques to ensure the continued availability of resources for future generations (Carugati et al., 2018). Therefore, socialization and training activities on sustainable fishing practices are essential to be implemented in this region (Hamelin et al., 2024).

The primary purpose of this research is to evaluate the implementation of a socialization and training program promoting sustainable mangrove crab fishing methods in Fanamo and Omawita Villages, Far East Mimika District. Specifically, the study aims to: (1) assess changes in fishermen's knowledge and awareness regarding sustainable fishing principles following socialization activities; (2) evaluate the adoption rates of eco-friendly fishing gear and techniques; (3) examine the feasibility and effectiveness of simple catch logbook systems for monitoring; (4) identify challenges and barriers to the adoption of sustainable practices; and (5) generate recommendations for program improvement and replication.

The contribution of this research is both theoretical and practical. Theoretically, it contributes to the literature on community-based resource management by documenting the process and outcomes of an integrated intervention program in a previously understudied context (Barman et al., 2024; Bhanja et al., 2024). The findings provide empirical evidence on the effectiveness of combining multiple intervention components and highlight the importance of ongoing mentoring for sustained behavior change (Hamelin et al., 2024). Practically, the research generates actionable recommendations for government agencies, non-governmental organizations, and community leaders seeking to promote sustainable fisheries management. The program model, including training materials, monitoring tools, and implementation strategies, can be adapted for use in other coastal communities facing similar challenges (Humphries et al., 2019; Mehvar et al., 2019). Ultimately, this research aims to support the dual goals of maintaining fishermen's livelihoods while ensuring the ecological sustainability of mangrove crab resources for future generations.

Mangrove crab fishing activities (*karaka*) in Fanamo and Omawita Villages, Far East Mimika District, are facing serious challenges in terms of sustainability. As market demand increases, fishing practices tend to become exploitative, often neglecting the principles of natural resource conservation. Some of the main problems identified include the capture of egg-bearing female crabs, the harvesting of crabs that have not reached the minimum legal size, and the use of fishing gear that damages mangrove habitats—which are critical ecosystems for crab survival (Fisheries Research and Development Center, 2017; Directorate General of Marine Space Management, 2020). In addition, limited public knowledge regarding environmentally responsible fishing practices is exacerbated by the lack of socialization activities from the government and related institutions. The socialization that has been conducted has not fully incorporated a local culture-based approach, making it less effective in changing community behavior. As a result of these unsustainable practices, communities have begun to experience

declining catches, disturbances in the balance of mangrove ecosystems, and increasing threats to their future livelihoods.

Solution

To address these problems, efforts are needed to promote mangrove crab fishing practices that are more systematic, intensive, and community-based (Adibrata et al., 2024; Hamelin et al., 2024). The primary solution proposed is the development of guidelines for sustainable fishing practices, which include provisions prohibiting the capture of egg-bearing female crabs, establishing a minimum catch size of at least 15 cm carapace width, and encouraging the use of selective fishing gear that does not damage the ecosystem (Directorate of Conservation and Marine Biodiversity, 2021). In addition, technical training should be conducted directly in the field using practical demonstration methods so that community members can observe and practice environmentally responsible fishing techniques.

In the implementation of socialization activities, the involvement of traditional leaders, village heads, and religious leaders is key to increasing social acceptance of sustainability principles. This approach is consistent with the principles of Community-Based Resource Management (CBRM), which have been proven effective in coastal resource management in Indonesia. As a follow-up step, it is recommended that a Village Regulation (Perkam) be established to regulate mangrove crab fishing practices in a sustainable manner, along with the creation of a community-based monitoring mechanism to ensure compliance. Finally, regular mentoring every six months is essential to evaluate the effectiveness of socialization efforts and improve strategies that are not yet optimal. With the implementation of these measures, it is expected that mangrove crab populations can recover, the mangrove ecosystem can be preserved, and the long-term welfare of the Fanamo and Omawita communities can be ensured.

METHOD

The activity began with counseling for the fishing communities in Fanamo and Omawita Villages. The counseling materials included the importance of maintaining the sustainability of mangrove crab resources, with emphasis on the prohibition of catching egg-bearing crabs, the establishment of a minimum catch size for crabs, and the designation of no-catch zones around mangrove habitats. This approach was intended to build collective awareness of the importance of maintaining the sustainability of coastal resources.

After the socialization phase, the program was followed by training on environmentally friendly crab-catching techniques. Fishermen were given direct practical instruction on the use of fishing gear such as folding *bubu* traps equipped with escape gaps for small crabs, as well as spiked gill nets that are more selective and do not damage the habitat. Through this direct practice method, fishermen were expected to be able to apply the new techniques effectively in their daily activities.

At this stage, participants were introduced to the use of daily catch logbooks. This workshop aimed to equip fishermen with the ability to document their catches in a simple but systematic manner. Such recording was important for monitoring catch trends, evaluating the success of the newly introduced techniques, and providing a basis for data-driven management recommendations.

As a follow-up to the training, field assistance was provided. The team conducted initial

monitoring of the application of the fishing techniques and the recording of catches by participating fishermen. This assistance aimed to identify technical obstacles faced by fishermen and to provide direct guidance to ensure that the adoption of the technology and the catch-recording process proceeded as expected.

Activities Output:

- 1) Pocket Book “*A Practical Guide to Catching Sustainable Mangrove Crabs*”: As reference material, a practical pocket book containing simple guidelines on sustainable fishing techniques, no-catch zones, and methods for recording catches was compiled and distributed.
- 2) Adoption of Eco-Friendly Fishing Gear by 20 Fishermen: A total of 20 fishermen from Fanamo and Omawita Villages were targeted to adopt environmentally friendly fishing gear such as folding *bubu* traps with escape gaps and spiked gill nets.
- 3) Logbook of Initial Catches from Participating Fishermen: The initial results of catch recording were collected from participants and served as a database for analyzing productivity and changes in fishermen’s behavior toward sustainable practices.
- 4) Local Policy Recommendations Based on Activity Evaluation: Based on the results of monitoring and the analysis of logbook data, local policy recommendations were prepared and proposed to the village government as part of strengthening community-based coastal resource governance.

RESULTS AND DISCUSSION

The socialization carried out in Mimika Far East District showed that local fishermen have a high interest in sustainable fisheries practices if given a simple understanding, supported by written guidelines, and accompanied by field demonstrations. This activity also emphasized the importance of a participatory approach, where fishermen not only receive information but also participate in discussions, simulations, and the preparation of local policy recommendations. Thus, this socialization activity can be the initial foothold for strengthening the sustainable and community-based management of mangrove crab resources in the coastal area of Far East Mimika.

The implementation of socialization in this activity is related to the time and place of implementation, as well as the results of the implementation of the activity are as follows:

Day/Date : 03 – 04 July 2025

Time : 08.00 WIT - Finished

Location : Far East Mimika District Village Hall, Mimika Regency

1) Early Stages of Activity

In the Early Stage, the Service Team conducted initial coordination with the Head of the Remote Mimika District regarding the Goals and Intents of the service activities, as well as requesting permission and making an agreement on the implementation of service activities. This activity is targeted to provide understanding and participation of socialization partner members about the sustainable management of mangrove crab resources. There are two (2) villages that are targeted for implementation, namely Fanamo Village and Omawita Village. These two villages were chosen because the majority of people make a living as crab fishermen.

2) Stages of Implementation

At the implementation stage, several methods are carried out:

Socialization (Presentation of Crab Catching Pattern Material)

The activity will begin with counseling to the fishing community in Fanamo and Omawita Villages. The counseling material includes the importance of maintaining the sustainability of mangrove crab resources, focusing on the prohibition of catching crabs laying eggs, the provision of the minimum size of crabs that can be caught, and the establishment of no-catch zones around mangrove habitats. This approach is expected to build collective awareness to maintain the sustainability of coastal resources. From the results of the question and answer with the participants, it was found that the community was still practicing crab catching in the wrong way. Many catch crabs laying eggs, crabs with a minimum size, and after being exposed to the material, they become aware of good and correct fishing patterns so that the preservation of crabs and the environment can be maintained.

The fishing gear used is still very simple, so when it comes to how to use Bubu. Catch, the community is very interested and very enthusiastic in using this environmentally friendly fishing gear.

Fishing Techniques Training

After socialization, it was followed by training on environmentally friendly crab catching techniques. As explained above, fishermen are very interested when they get training on crab catching techniques with a folding bubu tool. In the training, fishermen are given direct practice of using fishing gear such as folding bubu equipped with escape gaps for small crabs, as well as spiked gill nets that are more selective and do not damage the habitat. Through this direct practice method, it is hoped that fishermen will be able to apply new techniques effectively in their daily activities.

Capture Logbook Logging

As a follow-up, the catch was recorded (logbook) by the participants. The logbook serves to document the number, size, and type of crabs caught. From the results of the socialization, fishermen began to get used to recording their catches even though several obstacles were still found, such as limited writing skills and recording time in the midst of sea activities. Nevertheless, the initial data collected is an important basis for analyzing catch trends and monitoring changes in fishermen's behavior towards sustainable practices. Initial data obtained by the community, in this case fishermen have never recorded catches. And the recording taught is a new thing for the worksop/socialization participants.

Mentoring

Assistance will still be carried out as a follow-up to this socialization and training activity. Socialization activities that are integrated with direct assistance in the field have proven to be more effective than one-way counseling. Mentoring allows fishermen to obtain practical guidance, reduce technical errors, and foster a sense of ownership of the program. In Mimika Far East District, this assistance also strengthens fishermen's belief that sustainable practices can improve the sustainability of their businesses without reducing productivity.

Final Stage

In the final stage of the activity, a discussion and question and answer were held. The participants were very enthusiastic about this activity, the village community asked for training

in the future on how to assemble folding bubu. In addition, there are several obstacles in the field which are also conveyed that farmers have begun to have difficulties in catching crabs, to catch fishermen crabs need to travel a long distance, and the catch is only small because they use very simple response tools. The results of the response were also rewarded with low scores. This must be influenced by the wrong catch pattern.

CONCLUSION

The implementation of sustainable mangrove crab fishing practices through socialization, intensive mentoring, the use of environmentally friendly fishing gear, and systematic catch recording through logbooks demonstrated positive and comprehensive impacts on fishermen in Mimika Far East District. The program enhanced fishers' capacity and skills in responsible fisheries practices while providing practical guidance to support business sustainability and evaluate productivity through structured documentation, thereby promoting more stable and sustainable incomes. Environmentally, the initiative helped reduce damage to mangrove habitats, allowed egg-bearing and juvenile crabs to grow and replenish stocks, and encouraged the establishment of no-catch zones to protect coastal ecosystems. In addition, logbook data and monitoring results supported village governments and communities in developing evidence-based local policies, strengthening community-based coastal resource governance, and increasing collective awareness of sustainable management. Overall, the program produced mutually reinforcing economic and environmental benefits by maintaining fishermen's livelihoods while safeguarding coastal ecosystems for future generations. Future research is recommended to examine the long-term ecological and socioeconomic impacts of these interventions, particularly the effectiveness of community-based monitoring systems and policy implementation in sustaining mangrove crab populations and fisher incomes.

REFERENCE

- Adibrata, S., Lingga, R., & Nugraha, M. A. (2024). Unlocking mangrove potential: Sustainable crab fisheries in Selindung Sub-watershed, Bangka Island – Indonesia. *Coastal and Marine Journal*, 2(2), 81–90.
- Barman, S. K., Hossain, M. J., Shesir, M. A. R., Hossain, S., & Barman, P. P. (2024). Stock status and spawning potential ratio of orange mud crab (*Scylla olivacea*, Herbst 1796) in the southwestern coastal waters of Bangladesh. *Heliyon*, 10(20), e39283. <https://doi.org/10.1016/j.heliyon.2024.e39283>
- Bhanja, A., Payra, P., & Mandal, B. (2024). A study on the selectivity of different fishing gear. *Indian Journal of Pure and Applied Biosciences*, 12(2), 8–19. <https://doi.org/10.18782/2582-2845.9072>
- Carugati, L., Gatto, B., Rastelli, E., Lo Martire, M., Coral, C., Greco, S., & Danovaro, R. (2018). Impact of mangrove forests degradation on biodiversity and ecosystem functioning. *Scientific Reports*, 8, 13298. <https://doi.org/10.1038/s41598-018-31683-0>
- Directorate General of Marine Space Management, Ministry of Maritime Affairs and Fisheries. (2020). *General guidelines for sustainable mangrove crab management in Indonesia*. Jakarta: KKP.
- Directorate of Marine Conservation and Biodiversity. (2021). *Responsible mangrove crab catching practices*. Jakarta: KKP.

- Fisheries Research and Development Center. (2017). *The impact of harvesting egg-bearing crabs on crab populations*. Australia: FRDC.
- Hamelin, K. M., Charles, A. T., & Bailey, M. (2024). Community knowledge as a cornerstone for fisheries management. *Ecology and Society*, 29(1), 26. <https://doi.org/10.5751/ES-14552-290126>
- Humphries, A. T., Gorospe, K. D., Carvalho, P. G., Yulianto, I., Kartawijaya, T., & Campbell, S. J. (2019). Catch composition and selectivity of fishing gears in a multi-species Indonesian coral reef fishery. *Frontiers in Marine Science*, 6, 378. <https://doi.org/10.3389/fmars.2019.00378>
- Lowitt, K., Levkoe, C. Z., Spring, A., Turlo, C., Williams, P. L., Bird, S., Sayers, C. D., & Simba, M. (2020). Empowering small-scale, community-based fisheries through a food systems framework. *Marine Policy*, 120, 104150. <https://doi.org/10.1016/j.marpol.2020.104150>
- Mehvar, S., Filatova, T., Dastgheib, A., de Ruyter van Steveninck, E., & Ranasinghe, R. (2019). Quantifying economic value of coastal ecosystem services: A review. *Journal of Marine Science and Engineering*, 7(1), 5. <https://doi.org/10.3390/jmse7010005>
- Ministry of Maritime Affairs and Fisheries. (2019). *Indonesian capture fisheries statistics 2019*. Jakarta: KKP.
- Ministry of Maritime Affairs and Fisheries of the Republic of Indonesia. (2022). *Regulation of the Minister of Maritime Affairs and Fisheries No. 16 of 2022 concerning sustainable management of crabs and crabs*.
- Pollnac, R. B., Crawford, B. R., & Gorospe, M. L. (2001). Discovering factors that influence the success of community-based marine protected areas in the Visayas, Philippines. *Ocean & Coastal Management*, 44(11–12), 683–710. [https://doi.org/10.1016/S0964-5691\(01\)00075-3](https://doi.org/10.1016/S0964-5691(01)00075-3)
- Pomeroy, R. S., Pollnac, R. B., Katon, B. M., & Predo, C. D. (1997). Evaluating factors contributing to the success of community-based coastal resource management: The Central Visayas Regional Project-1, Philippines. *Ocean & Coastal Management*, 36(1–3), 97–120. [https://doi.org/10.1016/S0964-5691\(97\)00016-7](https://doi.org/10.1016/S0964-5691(97)00016-7)
- Shelley, C., & Lovatelli, A. (2011). *Mud crab aquaculture: A practical manual*. FAO Fisheries and Aquaculture Technical Paper No. 567.
- Suman, A., Amin, E. M., Haluan, J., & Boer, M. (2018). Population characteristics of mud crab (*Scylla serrata*) in the waters of Kendari Bay and surrounding areas. *Indonesian Fisheries Research Journal*, 24(2), 117–124. <https://doi.org/10.15578/ifrj.24.2.2018.117-124>
- Winestri, J., Rachmawati, D., & Samidjan, I. (2014). The effect of vitamin E addition on the growth of mangrove crabs. *Journal of Aquaculture Management and Technology*, 3(4), 40–48.
- WWF Indonesia Foundation. (2023). *Better management practices (BMP) of mangrove crabs: A guide to catching and handling* (Edition 2). Jakarta: WWF-ID.