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Exploring women's participation in mangrove crab aquaculture: The case of farmers' wives in Capalonga, Camarines Norte, Philippines

John Christopher C. Nolial*

*Institute of Fisheries and Marine Sciences, Camarines Norte State College, Mercedes,
Camarines Norte, Philippines*

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Abstract

Mangrove crab aquaculture is a vital economic activity in many coastal regions worldwide. However, the role of women in this sector remains understudied. This study investigated women's participation in mangrove crab aquaculture in Capalonga, Camarines Norte, Philippines. A mixed-methods approach was employed, combining qualitative and quantitative data collection such as interviews and focus group discussions. Results indicated that while women participate in various aquaculture activities, they are primarily responsible for post-harvest tasks and have limited decision-making power. Key challenges women face include time constraints due to domestic responsibilities, limited access to financial resources, societal norms restricting women's participation in aquaculture, and limited decision-making power. To promote gender equality and empower women in mangrove crab aquaculture, the study recommends implementing strategies to provide women with access to training and education, support women-led enterprises, and promote gender-sensitive policies within the industry.

*Corresponding Author: John Christopher C. Nolial ✉ johnchristophernolial@cncs.edu.ph

Introduction

Mangrove crab aquaculture has emerged as a lucrative business and a significant source of livelihood in the Philippines, particularly for marginalized coastal and mangrove-residing communities in Southern Luzon and Visayas (Gabiota, 2017). The country boasts an aggregate annual production of 7,221,162.36 metric tons (MT) (Philippine Statistics Authority, 2023), with the Giant Mud Crab or Mangrove Crab being the most sought-after species due to its high-income potential and export value (Raghavan and Nair, 2016). In the Bicol Region, approximately about 93,182.81 MT has been contributed to the country's production with Camarines Norte province having 28.43% or 26,443.71 MT contribution in 2023 (Philippine Statistics Authority, 2023). Notably, Camarines Norte has a long history of supplying crab seeds and live crabs (Fortes, 1999; Ladra and Lin, 1992) and is known for its extensive coastal waters, including brackish water and mangrove zones which are suitable for mangrove crab aquaculture.

Despite the growing economic significance of this sector, there remains a significant gap in understanding the specific roles and contributions of women, particularly the wives of farmers, within this industry. Existing literature highlights that while men typically dominate the more labor-intensive aspects of aquaculture, women often engage in critical support roles such as marketing and processing, which are essential for the overall success of crab farming operations (Mutia *et al.*, 2020; Chepkirui *et al.*, 2023).

Women's involvement in aquaculture is often undervalued, with societal norms dictating their roles primarily in domestic spheres rather than in productive activities (Kruijssen *et al.*, 2018). This gender disparity affects not only women's economic empowerment but also the sustainability and growth of the aquaculture sector. Understanding the dynamics of women's participation is crucial for developing inclusive policies that recognize and enhance their roles in this industry. Moreover, there

are significant gaps in the literature regarding the specific challenges faced by women in crab aquaculture in the Philippines. While research from other regions, such as Brazil and Bangladesh, has documented women's roles in crab production and processing, similar studies in the Philippine context including the municipality of Capalonga remain scarce (Magalhães *et al.*, 2007; Ferdoushi and Xiang, 2009). This lack of localized studies hinders the ability to formulate targeted interventions that could improve women's livelihoods and participation in the mangrove crab industry.

Hence, this study aims to fill this knowledge gap and explore the socio-demographic condition, participation, and challenges met by farmers' wives in mangrove crab aquaculture in Capalonga, Camarines Norte.

Material and methods

Study area

The study was purposively conducted in mangrove crab aquaculture communities in Capalonga, Camarines Norte (14°10' to 14°22' latitude and 122°20' to 122°35' longitude), from October 2022 to January 2023. The area is known for its extensive coastal waters, including brackish water and mangrove zones covering 2,649 hectares, which are suitable for mangrove crab aquaculture.

Research design

A mixed-methods case study was conducted to comprehensively explore the multifaceted experiences and challenges of crab farmers' wives in Capalonga, Camarines Norte. The quantitative component involved a descriptive survey, administered to a sample of registered crab farmers' wives, to gather demographic data and assess their participation in aquaculture activities. To understand the qualitative aspects of their experiences and their quantitative responses, focused group discussions were conducted with various stakeholders, including local government officials, community leaders, and other relevant individuals, to gain insights into cultural, social, and economic factors influencing the lives of crab farmers'

wives. As Creswell and Plano Clarke (2018) explain, a mixed methods case study combines quantitative and qualitative data to provide a deep understanding of a specific case or to compare multiple cases.

Participants

The study purposively selected all crab farmers’ wives in the municipality of Capalonga, Camarines Norte. A total of 41 farmers’ wives were interviewed in the survey. Although there were 42 registered crab farmers, one of them was widowed, resulting in a sample size of 41 wives only.

Research instrument

The questionnaire was adapted from the Gender Dimension Framework (United States Agency for International Development, 2014) with some modifications, particularly in the socio-demographic profile, women’s participation, and challenges components. The items in the instrument were focused on the socio-demographic profiles of crab farmers’

wives, their participation in aquaculture operations and activities, and the challenges they faced in crab farming. Qualitative data was collected through focused group discussions involving crab farmers, municipal agriculturists, and representatives from women’s organizations. This approach allowed for an in-depth assessment of the issues and concerns related to women’s participation and challenges in crab farming.

Data analysis

The collected data was encoded, tabulated, and analyzed using thematic analysis to identify and rank the key challenges (Clarke and Braun, 2017; Nolial, 2024). Descriptive statistics and graphical presentations were also employed to analyze other collected data.

Results and discussion

Socio-demographic profile of crab farmers’ wives

The socio-demographic profile of mangrove crab farmers’ wives in Capalonga, Camarines Norte, is shown in Table 1.

Table 1. Socio-demographic profile of crab farmers’ wives (n=41)

Profile	Min	Max	Mean (±SD)
Age (years)	24	67	46.88 (±12.66)
Years of residency in the community	7	66	39.66 (±14.66)
Household size	2	14	7.20 (±2.75)
Number of Children	0	12	4.80 (±2.81)

Profile	Category	Frequency	Percentage (%)
Highest educational attainment	Elementary level	7	17.07
	Elementary graduate	13	31.71
	High school level	1	2.44
	High school graduate	19	46.34
	College graduate	1	2.44
	Total	41	100.00
Marital status	Single	0	0
	Married	39	95.12
	Common Law/Live-in	2	4.88
	Total	41	100.00

Results revealed that crab farmers’ wives tend to be older, with a mean age of 47 years old, with 67 years old being the oldest and the youngest being 24. Most interviewed wives were married (95%), and the rest were of live-in status. In terms of residency years, the participant resides in the municipality for 40 years. Their educational attainment primarily falls within primary (49%) and secondary levels (49%), and they lived in extended family households with a mean size of 7.19, which is higher than the 2015 regional

household size of 4.8 (Philippine Statistics Authority, 2021) and the 2015 provincial household size of 4.7 (PhilAtlas, 2024). The mean number of children is 4, with 12 as the highest number reported, higher than the national average of 1.9 (Philippine Statistics Authority, 2022) and the regional average of 5.24. According to Labayo and Preña (2021), extended families are consistently prevalent in coastal communities; this is because, in addition to the father, mother, and their children, the spouses, as

well as the daughters and sons of their children, reside within the same household. Moreover, Etuk *et al.* (2015) assert that households with five or more members were more likely to experience poverty. This issue is a cause for concern as fishermen experience the second-highest poverty incidence (26.2%) in the country, following farmers in the Philippines (Philippine Statistics Authority, 2020).

Farmers’ wives participation in mangrove crab aquaculture

The participation of crab farmers’ wives in mangrove crab aquaculture activities in Capalonga, Camarines Norte, is shown in Table 2. Results revealed a clear division of labor within the mangrove crab farm activities in the study area. While wives contribute to numerous crab aquaculture activities, a significant source of income and livelihood for their families, husbands dominate many tasks. Thus, these gender divisions of labor frequently lead to the overburdening of women with reproductive responsibilities, which in turn severely restricts their involvement in aquafarming by limiting their available time (Tran *et al.*, 2021; Omeje *et al.*, 2020).

In a day, 72% of wives reported spending between 1 to 1.5 hours on aquaculture activities, while the

remaining 28% spent less than an hour. Husbands are predominantly responsible for the technical aspects of crab farming, such as pond preparation (92.68%), feeding and monitoring (85.37%), and maintaining good water quality (95.12%). Conversely, wives are more involved in post-harvest activities, including preparing crabs for the market (68.29%) and selling products (39.02%). This division of labor reflects the traditional gender roles often observed in aquaculture settings, where men typically engage in technical tasks while women focus on processing and marketing (Kruijssen *et al.*, 2018; Chepkirui *et al.*, 2023; Veliu *et al.*, 2009). In a few cases, it is the wives who are fully responsible for these male-dominated tasks, especially when their husbands are not around due to other work-related concerns, such as working outside the province for extra income. This situation is consistent with findings from various studies that emphasize how women’s roles in aquaculture can expand when men are unavailable, highlighting their adaptability and resourcefulness in managing aquaculture activities (Food and Agriculture Organization, 2020; Chepkirui *et al.*, 2023). Research also indicates that women frequently take on these roles due to socio-economic constraints and the need to contribute to household income (Olufayo, 2012).

Table 2. Participation of crab farmers and their wives in mangrove crab aquaculture activities (n=41)

Crab aquaculture activities and other-related activities	Both husband and wife		Husband only		Wife only	
	f	%	f	%	f	%
1. Collection of mangrove crab seeds in the wild.	23	56.10	17	41.46	1	2.44
2. Pond preparation (e.g. fertilization, liming, pest elimination, etc.)	3	7.32	38	92.68	-	-
3. Collection and preparation of wet feeds (e.g. snails, trash fish, etc.) for mangrove crabs.	6	14.63	20	48.78	15	36.59
4. Feeding and monitoring of mangrove crab stocks.	35	85.37	6	14.63	-	-
5. Maintaining good water quality in mangrove crab-rearing ponds.	2	4.88	39	95.12	-	-
6. Monitoring and repairing of damaged ponds	1	2.44	40	97.56	-	-
7. Harvesting of mangrove crabs from aquaculture ponds.	35	85.37	6	14.63	-	-
8. Post-harvest preparation of mangrove crabs for market.	7	17.07	6	14.63	28	68.29
9. Marketing and selling of mangrove crab products.	23	56.10	2	4.88	16	39.02
10. Decision-making processes related to mangrove crab culture.	9	21.95	32	78.05	-	-
11. Attended training or education related to mangrove crab culture.	10	24.39	10	24.39	21	51.22

While both husbands and wives participate almost equally in wild seed collection and harvesting, decision-making processes related to mangrove crab culture are primarily performed by husbands. The limited involvement of wives in decision-making could hinder their capacity to participate in the industry and contribute to knowledge gaps fully. The gender division of labor within the mangrove crab aquaculture industry has potential implications for gender inequality. Wives' dependency on their husbands for income might make them vulnerable to economic downturns or family disruptions, as the financial influence of husbands often dictates their level of access to resources and opportunities (Adams and Fisher, 2021; Khan and Ali, 2019; Santos and Carrero, 2022). Furthermore, the imbalanced allocation of power and decision-making authority may sustain gender stereotypes and restrict women's prospects for progress within the sector. This indicates a traditional gender hierarchy within the industry, where men hold greater authority and control, and women are often invisible and undervalued (Rose, 2021; Chepkirui *et al.*, 2023; Byrd *et al.*, 2021). Gender bias is caused mainly by long-standing gender disparities in social, economic, and cultural domains, commonly known as gender practices and norms (Weeratunge-Starklo and Pant, 2011; Gbigbi, 2021; Omeje *et al.*, 2021). In addition, while women provide labor for aqua-farming activities, the men who control and own the ponds usually have the most influence over the decisions regarding aquaculture activities (Kruijssen *et al.*, 2018; Adebo and Alfred, 2008).

Despite the gender division of labor, both husbands and wives have similar levels of participation in training or education related to mangrove crab culture, indicating a shared commitment to improving their knowledge and skills in this field (Chepkirui *et al.*, 2023). However, in many cases where crab farmers were invited to support government initiatives, mainly training and technical seminars on aquaculture, husbands may ask their wives to attend on their behalf. They often do not attend due to the time-consuming nature of these

activities, which can hinder income-generating opportunities. By having their wives attend, husbands aim to balance their participation in community development activities with their household economic responsibilities. This shared commitment to skill development is imperative for the sustainability of crab farming and highlights the importance of inclusive training programs that engage both men and women.

Challenges faced by mangrove crab farmers' wives in participating in mangrove crab aquaculture

The multi-faceted challenges that crab farmers' wives face in participating in mangrove crab aquaculture in Capalonga, Camarines Norte, are shown in Fig. 1. The challenges faced by farmers' wives are (a) time and energy-consuming household and caregiving tasks, (b) limited access to financial and other aquaculture-related resources, (c) cultural and societal norms that aquaculture is a male domain, (d) limited decision-making power, and (e) limited technical knowledge and educational opportunities.

Almost all the interviewed fishers' wives (98%) in Capalonga responded that they are often loaded with multiple responsibilities, particularly household and caregiving tasks, which consume most of their time and energy for other related tasks such as aquaculture. According to the participants, they start their day cooking for their children and husband, bathing the children and preparing their things and sending them to school, cleaning the house, washing clothes and dishes, and these activities repeat the whole day. If they have spare time, they prepare food for their husband, bring it to the farm, and help them in aquaculture activities such as collecting live feeds (e.g. snails and frogs) and feeding the crabs. In some cases, they rarely go to the farm and are obliged to participate only during the harvesting and marketing of crabs to avoid post-harvest losses, but most of the time, they are in their household during chores. These household-centered tasks hinder their time and energy for aquaculture activities, affecting their ability to engage fully in the aquaculture industry (Khan and Ali, 2019). The resulting work-life

imbalance further complicates their participation and limits the potential for significant economic contributions to household incomes.

Of the 41 interviewed fishers' wives, 95% reported difficulties in investing in aquaculture inputs like feed, equipment, land, and crab seeds due to limited financial resources, as it should be noted that their husbands often provide for the family's finances and needs. This contestation is aligned with the findings

of Khan and Ali (2019) and Choudhury *et al.* (2017), which highlight that women frequently struggle to obtain land rights, water resources, and necessary technology as they often rely on male family members for resources, which can restrict their autonomy and decision-making power in aquaculture operations. This gap in access affects their productivity and limits their ability to compete effectively in the market, perpetuating economic vulnerability (Egna *et al.*, 2012; Elias *et al.*, 2023).

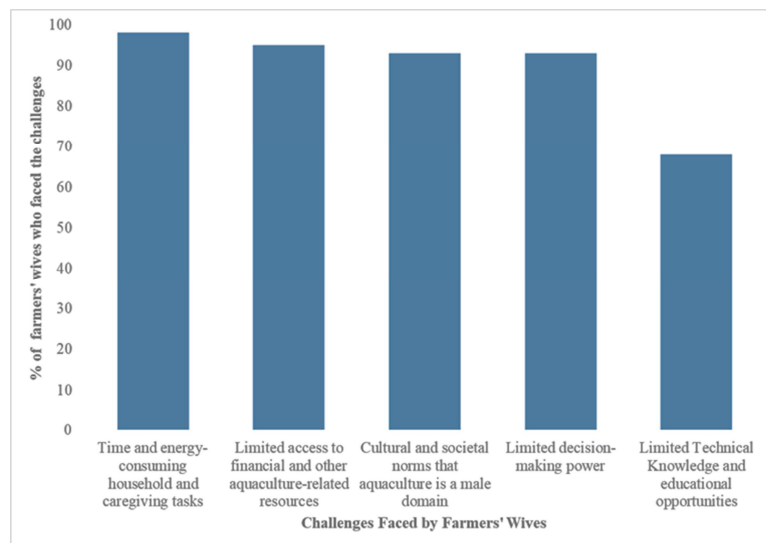


Fig. 1. Challenges faced by mangrove crab farmers' wives in participating mangrove crab aquaculture in Capalonga, Camarines Norte

According to 93% of the interviewed wives, societal norms that assign domestic responsibilities to women limit their economic opportunities, including the ability to explore aquaculture and other alternative income sources. These norms also influence the perception that venturing into aquaculture might disrespect their husbands' role as primary providers. Cultural and societal norms often relegate women to lower-status roles within family aquaculture businesses, reinforcing gender stereotypes that aquaculture is primarily a male domain (Islam, 2024; Githukia *et al.*, 2020; Bosma *et al.*, 2019). This, in turn, limits access of women to training and advancement opportunities (Awuor, 2021).

Another challenge 93% of the farmers' wives face is limited decision-making power. Many interviewed

wives reported needing their husbands' permission before participating in mangrove crab aquaculture activities or accessing resources. This is often due to patriarchal norms that place the husband as the head of the household, responsible for making decisions and leading family activities. Research indicates that such gender dynamics are prevalent in many aquaculture settings, where women often lack autonomy in decision-making processes (Khan and Ali, 2019). Additionally, the economic dependence of wives on their husbands, who are typically the primary breadwinners, further limits their ability to make independent decisions in crab culture. Studies show that economic reliance on male partners reinforces traditional gender roles, constraining women's participation in aquaculture and limiting their empowerment (Byrd *et al.*, 2021). This situation

is exacerbated by cultural norms that prioritize male authority in family decisions, as highlighted in a review of gender inequality in aquaculture, which emphasizes that women's contributions are often undervalued and their voices marginalized (Weeratunge and Pant, 2011). Furthermore, a study on decision-making in farming households reveals that women frequently have less influence over income-related decisions, further entrenching their subordinate position within the family structure (Awuor, 2021).

Lastly, 68% of the interviewed wives mentioned limited technological knowledge and educational opportunities as challenges in participating in aquaculture matters. Due to their household and caregiving responsibilities, many women reported needing more time and availability to study aquaculture. Often, they only attend government-sponsored seminars when directed by their husbands to represent them. This aligns with findings from the Food and Agriculture Organization (2020), which highlight that women in aquaculture often have limited access to training and extension services, restricting their ability to gain the necessary skills and knowledge. Additionally, women often learn about aquaculture solely through their husbands. This dynamic is further complicated by patriarchal norms that view aquaculture as primarily a male domain, leading to perceptions that learning about aquaculture wastes women's time (Chepkirui *et al.*, 2023). Many husbands believe they are the primary operators of the business, which reinforces these gendered expectations and limits women's engagement in decision-making processes (Kruijssen *et al.*, 2018). Furthermore, a study indicates that women face significant barriers, including time constraints and limited educational opportunities, which hinder their participation in aquaculture (Egna *et al.*, 2012). These sociocultural norms not only suppress women's rights and opportunities but also contribute to their marginalization within the aquaculture sector. As a result, women's roles are often undervalued, and their contributions to

aquaculture remain largely invisible (Weeratunge and Pant, 2011; Mutia *et al.*, 2020).

Conclusion

While women contribute significantly to mangrove crab aquaculture activities, there is an evident division of labor among genders, with men often dominating technical tasks and women focusing on post-harvest activities. Although women can expand their roles when men are unavailable, they are still subject to traditional gender roles and limited decision-making power. To address these issues and promote gender equality, it is essential to implement strategies that empower women and challenge traditional gender roles. This could involve providing women with access to training and education, supporting women-led enterprises, and promoting gender-sensitive policies within the industry.

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