



RESEARCH ARTICLE

Women's Participation in Mangrove Conservation in Pantai Bahagia Village, Muara Gembong Regency, Bekasi

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ABSTRACT

Women's participation in mangrove forest management is vital for effective planning policies, increasing women's empowerment, and better forest governance. Despite their central role in coastal livelihoods, women's involvement in mangrove management remains poorly understood and often marginalized. This study aims to assess the roles of women and men in mangrove forest management and analyze the extent of women's participation in Pantai Bahagia, Bekasi, Indonesia. The research employed qualitative methods, including in-depth and structured interviews, participant observation, and analysis using Arnstein's Ladder of Citizen Participation. Data were collected from 54 respondents, comprising women from the KEBAYA group and key stakeholders, and analyzed using NVivo 11 for thematic coding. The results indicate that while women play essential roles in nursery and maintenance activities, their participation in planning, decision-making, and information access remains limited. Gender norms and socio-economic constraints, such as limited confidence, restricted mobility, and lower education levels, contribute to this disparity. Men remain dominant in decision-making and physically demanding tasks like planting. The study underscores the need for targeted interventions, including capacity-building programs, transparent information dissemination, inclusive decision-making forums, and strong multi-stakeholder partnerships. Enhancing women's participation in mangrove conservation could improve forest governance and contribute to more inclusive and sustainable resource management.

1. Introduction

In 125 littoral countries across five intertropical continents, mangrove forests span 152,000 km² (Spalding et al. 2010). Over a third of the world's mangroves are found in Southeast Asia. Indonesia's mangroves cover 30,000 km² of coastline, making up 21% of the globe's mangroves (Giri et al. 2011; Bryan et al. 2020). Mangroves are recognized for playing a crucial role in mitigating climate change. Capacity to sequester and store carbon, securing coastal communities by diminishing storm surge levels, and providing beneficial territories for different species (Middleton et al. 2024).

The livelihood of people near this forest depends on harvesting forest resources and other related activities such as fishing, collecting firewood, collecting chips, collecting honey, and collecting Nypa leaves (Roy 2016). However, despite their recognized importance, mangroves are quickly destroyed due to shrimp agriculture's conversion, soil restoration, firewood, and fishing expansion (Husain et al. 2010). Low literacy and lack of knowledge about forest conservation among the local population also negatively affect forest health (Liu et al. 2015).

The existence of communities around mangrove forests plays a vital role in the sustainability of the function and role of mangrove forests. The Participatory Approach, which exists in various forms, has been actively promoted in developing countries to conserve natural resources, promote sustainable development, and empower local communities (Baker and Chapin 2018). Many empirical studies have examined varying degrees of local community participation in conservation and sustainable development programs, identifying some common themes (Agarwal 2009).

Participatory and collaborative strategies effectively catalyze sustainable forest management and support local communities (Park and Yeo-Chang 2021). The United Nations (UN) has observed that successful community-based forestry necessitates the active participation and equal representation of both women and men in decision-making processes (United Nations 2015). Certain global frameworks (e.g., sustainable development goals) have likewise stressed the importance of women's involvement and gender integration in the conservation of forest resources (Agarwal 2009).

Coastal communities in the Muara Gembong Bekasi area strongly depend on the sea for livelihoods (fishermen, fish farmers, and marine biota collectors) and daily necessities. Women play a role in meeting their families' needs by working to increase their family's income. Women work as retailers, fish collectors, wholesalers, wage laborers, and fishery product processors. However, in the last 5 years, several women in Muara Gembong have had the initiative to develop businesses from processing mangrove products, increasing women's role in maintaining the sustainability of the function of mangrove forests.

Women's groups are one of the most important elements in resource management. From a gender perspective, women also have the same rights and obligations as men in utilizing these resources. In many cases, especially in rural areas, women actively participate in natural resource management. However, women's participation has received less attention and adequate explanation. That often results in gender bias that leads to inequality, in which women are the disadvantaged party. However, despite the limitations, women still play an essential role in natural resource management. The involvement of local people, especially women, in forest co-management has helped to address sustainable forest resource management and improved livelihood outcomes (Manandhar and Shin 2013). Engaging women in managing forest resources can enhance governance by inspiring others to adhere to rules and regulations, diminishing the likelihood of violations and fostering sustainable forest usage and management (Agarwal 2009; GIZ 2018). When women participate in decision-making regarding forest management activities, numerous advantages will improve livelihoods and opportunities (Nhem and Lee. 2019). Therefore, this study analyzes women's participation in forest management and mangrove forest conservation in Muara Gembong, Bekasi, West Java.

2. Materials and Methods

2.1. Study Area

This research was conducted from November to December 2023 in Pantai Bahagia Village, Muara Gembong District, Bekasi Regency, located approximately 80 km from the capital city of Bekasi Regency, lies in the lowlands bordering the Java Sea to the north, Pantai Bawah Village to the south, Jakarta Bay to the west, and Pantai Bakti Village to the east. The topography of this village is relatively flat, with a height of around 2 meters above sea level. Alluvial soil type, the dominant soil material in mud and sedimentation, is found around the Citarum River (Fig. 1).

2.2. Sampling Method

This study used a survey method, and respondents were selected using a purposive sampling approach with the criteria of communities that routinely interact with mangrove forests. From the survey results, 30 families in Gobang sub-village, Pantai Bahagia village, were identified who actively interact with mangrove forests, and 15 women from KEBAYA (*Kelompok Bahagia Berkarya*), who agreed to be interviewed, were responsible for the mangrove management activities carried out. The selected respondents were interviewed using a semi-structured questionnaire to identify women's involvement in mangrove forest management from the planning stage to mangrove forest maintenance. In-depth interviews also involved key figures aimed at identifying the views of the stakeholders regarding women's involvement in forest management in Pantai Bahagia Village, namely 5 village officials, 2 KEBAYA group administrators, 1 Family Welfare Empowerment (*Pemberdayaan dan Kesejahteraan Keluarga/ PKK*) person, 1 Environmental Service person, for a total was 54 respondents.

2.3. Data Collection

This study collected qualitative data through direct field observations, in-depth interviews, and structured interviews with residents. The researcher conveyed “informed consent” to ask for their willingness. Each respondent had an interview duration of 20-45 minutes, and researchers recorded the interview results to create interview transcripts, which were processed in the NVivo application. Questions submitted to respondents include: how is the division of roles carried out by men and women in mangrove forest management, the forms of activities carried out and the basis for this division of roles and what are the obstacles in women carrying out and including the steps of the activities carried out; how to respond to information, women's involvement in planning, planting, and maintenance activities. After distributing the questionnaire for the trial, the results obtained were analyzed for validity and reliability tests using the SPSS program. The validity test calculations showed that all questions showed a table *r* value with a significance of 5%. Furthermore, the reliability put forward by Guilford (1956) means that the caring attitude instrument compiled by the researcher is interpreted as very high or very good; in other words, the questionnaire used in this study is very reliable in measuring women's participation in mangrove management.

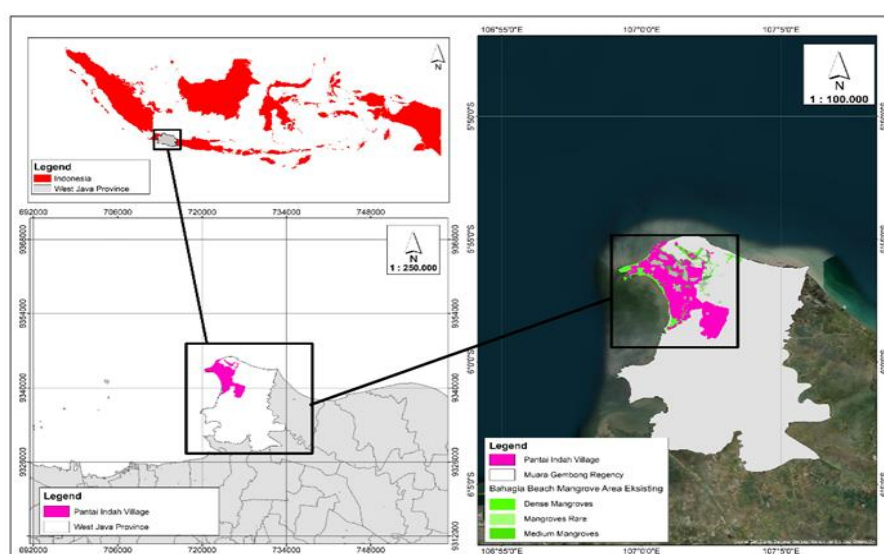


Fig. 1. Research location: Pantai Bahagia Village Bekasi.

2.4. Data Analysis

Triangulation techniques are used in this analysis. Data collection and analysis results are carried out simultaneously to clarify how data from various sources can be triangulated directly. Field notes are transcribed from each interview, and the researcher then copies the transcript's contents into the NVivo application and selects thematic codes for manual coding. The researcher reads all transcripts. NVivo 11 software is used to display the interview results to reveal the variables of women's roles in mangrove management and their level of participation. The interview results have been coded by the application in the form of sentence quotes from the interview results, which are the main and dominant points conveyed by the respondents. Sentence quotes are displayed in the results and discussion. To help present the results of in-depth interviews, key informant coding was created as shown in **Table 1**.

Table 1. Encoding of informant identity

No	Informant	Encoding
1	Village head	P1
2	Village secretary	P2
3	RW head	P3
4	RT head 1	P4
5	RT head 3	P5
6	Kebaya Chairman	KB
7	Kebaya Member	AB
8	Secretary of PKK	SP
9	Environmental Service Staff	SL

Data analysis using the participation ladder by [Arnstein \(1969\)](#) (**Table 2**), carried out using quantitative descriptive analysis techniques with the frequency table percentage method, namely analyzing data by describing or depicting the data that has been collected and presenting data in the form of numbers (percentage of women's involvement) which are then classified based on indicators of each participation ladder.

Table 2. Calculation of participation ladder scores ([Arnstein 1969](#))

Participation Ladder		Indicator	Power level
1	Manipulation	The public hears that the goal of the program is to raise awareness	No participation
2	Therapy	The community runs the program, and the goal is the preparation	
3	Informing	The community is present, sees, pays attention to ideas, and voluntarily implements programs	Tokenism: Just a justification for the community to agree
4	Consultation	The community is present and provides ideas, and its ability is needed to make decisions	
5	Placation	Almost all public thoughts and suggestions that do not conform to the design that has been made are ignored	
6	Partnership	Communities are invited to work together and involve traditional powers (customary law) in designing and implementing programs	Citizen: The level of power in society
7	Delegated Power	The community as an agent of change has the same power as the government/program provider; men and women are already involved in social groups and can conduct their problem analysis	
8	Citizen Power	The community can manage social organizations and carry out social control, build programs independently, solve problems, lead projects, and minimize obstacles to the distribution of benefits	Power

The instrument used to obtain primary data is a questionnaire (survey) based on the Likert scale. According to [Sugiyono \(2017\)](#), the Likert scale is a scale used to measure the attitudes, opinions, and perceptions of a person or group of people about social phenomena (**Table 3**). The Likert scale has a gradation from very positive to very negative.

Table 3. Score based on Likert scale

Question/statement	Score
Strongly agree	4
Agree	3
Somewhat agree	2
Disagree	1

Using Arnstein's ladder of participation, measuring the level of community participation consists of 8 levels: Manipulation, Therapy, Informing, Consultation, Placation, Partnership, Delegated Power, and Citizen Control. The level of community participation for each indicator is determined as a percentage of the answers given for each indicator (**Table 4** and **Table 5**). Arnstein's ladder of participation is then grouped based on the degree of authority and responsibility, showing the category of the level of quality of participation. Female participation at the therapy level is very low, as concluded by the combined score table of research results, which reached 170 or was in the interval of 0 – 170.

Table 4. Levels of participation quality

Power sharing level	Size participation
No participation	Low
Tokenism	Medium
Citizen power	High

Table 5. Therapy variable interval score

Ideal score interval	Participation level	Combined result score
0 – 170	Very low	170
171 – 340	Low	-
341 – 510	Tall	-
511 – 680	Very high	-
Percentage of combined research score against the ideal combined score		$\frac{170}{680} \times 100 = 25\%$

3. Results and Discussion

3.1. General Conditions of the Research Location

Muara Gembong is a sub-district located in Indonesia's West Java Province. The Muara Gembong District is between latitudes 6°00' and 6°05' south and longitudes 106°57' and 107°02' east. Muara Gembong District encompasses an area of 140.09 km² and has a population of 35,503 residents. This district comprises 6 villages: Jayasakti, Pantai Harapan Jaya, Pantai Sederhana, Pantai Bahagia, Pantai Bakti, and Pantai Mekar. Pantai Bahagia is a village spanning approximately 3,021 ha, predominantly consisting of ponds that cover around 509 ha.

Pantai Bahagia Village is situated in a low-lying area delineated by the following regional borders: Pantai Bakti Village to the east, Pantai Bakti Village to the west, Kampung Pantai Sederhana to the south, and the Java Sea to the north. This village, which is composed of three distinct hamlets, encompasses an approximate area of 3,020 ha. The Citarum River, which discharges into the Java Sea adjacent to Pantai Bahagia Village, traverses this community. The expanse of mangrove forest within Pantai Bahagia Village experienced a reduction from 312.93 ha to 245.35 ha during the period from 2009 to 2014; however, it subsequently increased to 390.36 ha between 2014 and 2019 (Maulani et al. 2021). Pantai Bahagia Village is known for having the largest mangrove ecosystem in the area.

The mangrove forest region situated in Muara Gembong is designated as a management area under Perum Perhutani, KPH Bogor, RPH Muara Gembong, and BKPH Ujung Karawang, classified as a productive forest encompassing an area of 5,170 ha, under the Decree issued by the Minister of Forestry No. 475/Menhut-II/2005 dated December 16, 2005, which pertains to the modification of the function of a portion of the Ujung Krawang protected forest area (Muara Gembong) covering an expanse of approximately 5,170 ha within Muara Gembong Regency in the Bekasi District, West Java Province, thereby converting it into a Permanent Production Forest Area. The natural mangrove forest in Muara Gembong covers an area of 10,481.15 ha. The amount has been significantly decreased by ± 93.5%, unaffected by tides. Most of this area has been encroached into pond areas and agricultural land. The Muara Gembong Protected Forest area is still necessary for the ecological and utilization functions (Salampessy et al. 2023).

Mangrove conservation and rehabilitation efforts have been running since 2015. Mangrove planting was initially initiated by various programs carried out by the government and various parties in the form of Corporate Social Responsibility (CSR). Currently, it is starting to be actively carried out by the community because it has realized the important role of mangroves in their environment. Most respondents have an elementary school education (66%) and fall within the productive age group. Low education is shown in the characteristics of this community. Low education also affects the participation of women. Women have not dared to express their opinions or provide input for mangrove management activities and tend to avoid being asked for their opinions. The age shown from the characteristics of the respondents shows that the community is an age group that is mature in thinking, acting, and learning. Maturity in thinking of a person can affect both knowledge, attitudes, and practices, including the role of participation in mangrove forest management activities. This is shown by the beginning of the formation of the KEBAYA group, where women were initiated to process various processed mangrove products for the family's economic needs. Economic needs and available opportunities encourage these efforts.

On average, they have 1–2 dependents, typically with 1–4 children. The primary occupation of the husbands includes farming, fish farming, and fishing. Most women (76%) work outside the home to support the household economy. In families where the husbands are laborers, 50% of the family income

is supplemented by the wives' earnings. Among women's productive activities, trading is the most prevalent, accounting for 21% of their work.

Additionally, 68% of male respondents have jobs related to mangroves, which include roles such as fish farmers (owners, cultivators, and laborers). In contrast, only 28% of women engage in productive work directly related to mangroves. Women's productive activities in this area primarily involve collecting Pidada fruit, harvesting oysters, and peeling crabs. Inadequate socio-economic life that affects women's participation. Women take advantage of available opportunities. For example, to be involved in the search for mangrove seeds to be planted or pidada fruit as raw material for dodol and syrup. Mangrove seeds collected are subject to a certain fee according to the activities carried out by the relevant party. The Kebaya group also values the pidada fruit collected by each person, and the wage per kg is IDR 25,000.

3.2. Division of Roles in Mangrove Forest Management

Gender roles are specific characteristics encompassing appearance, clothing, attitudes, personality, sexuality, and work responsibilities (Mosse 1996). These roles are highly relative and can vary significantly from person to person. Differences in work responsibilities are evident across various settings and periods. Factors such as social status and the socio-cultural context greatly influence these roles. Below is a breakdown of work responsibilities based on gender observed in mangrove conservation at the research location (Table 6).

Table 6. Gender-based role division in mangrove conservation

No	Role	Men	Women
1	Looking for information	√	√
2	Attending counseling	√	
3	Attending meetings	√	
4	Attending community service	√	
5	Planning nursery activities	√	
6	Nursery	√	√
7	Looking for seedlings	√	
8	Filling polybags	√	
9	Planting mangrove seedlings	√	
10	Maintaining mangrove seedlings	√	√

In the community, men predominantly play a key role in the division of tasks related to mangrove management, taking responsibility for all stages of these activities. In contrast, women's contributions to mangrove conservation are largely limited to technical tasks, such as nursery operations and managing mangrove plants. There is a noticeable disparity in the responsibilities of men and women concerning productive work; men generally have more free time than women. This difference arises from the community's belief that mangrove management requires significant physical strength predominantly associated with men. However, women desire to be actively involved in these activities.

Overall, the cultural norms established by the local community create a clear image of how men and women should behave. Typically, men are perceived as stronger and more active, driven by a strong desire to achieve dominance, autonomy, and aggressive goals. This is evident in the mangrove management activities, which men predominantly regulate. The mangrove forest area continues to be utilized by the community, with men holding autonomous rights to manage it. In contrast, women are often viewed as weaker and less active. They tend to focus on technical aspects, such as the nursery process and typically follow the directions given by men. Therefore, encouraging women to progress requires a social transformation, respecting their rights and responsibilities.

Women have good social capital in building cooperation among women. Social capital includes organizations and networks within a particular community, which encourage a sense of belonging and bonding between people (Jacobs 2011). Throughout the interviews and participant observations, it was clear that collecting mangrove crabs looking for pidada fruit, and other resources were common socialization activities for women because they often went out in groups for these activities and spent time together looking for them. For example, a female participant from Pantai Bahagia Village stated that:

“That is our tradition. We women usually do activities in the mangrove forest together, we go fishing, looking for pidada fruit, always together. Sometimes, we go with children or husbands to the mangrove forest to work together to find fish or shrimp for the family's needs”. -KB-

In addition, women will share information and help each other when collecting resources from the mangrove forest. Another stated,

“I have shared what I know about the mangrove forest with other women and even men, for example, where there are many pidada fruits or shrimp to be utilized.”. -AB-

According to (Agarwal 2009), involving both men and women in forest management is expected to yield significant benefits for forest management policies. Additionally, Garekae et al. (2023) highlight that community participation is essential for sustainable natural resource management, emphasizing the importance of fair relationships and improved livelihoods. Various countries have implemented co-management approaches as a participatory governance model for forest resource management to enhance conservation outcomes (Mukul and Quazi. 2009). This co-management strategy is particularly valuable in developing countries for effectively managing protected areas (Gamarra et al. 2022).

3.3. Women's Participation in Mangrove Forest Management

Fig. 2 shows that men's active participation is still dominant in the planning of mangrove management activities (75%). This is because men actively secure group activities as the main decision-makers and actively organize these activities. Women have not been involved in the planning and decision-making process. Women have not been significantly involved in the planning and decision-making process. For seedling search activities, women's participation is quite high, 77%, especially in searching for *Rhizophora apiculata* seedlings because these seedlings are easily found around settlements and *Sonneratia caseolari*.

In planting seedlings, men dominate participation due to safety concerns; the high mud deposits in the planting areas are considered unsafe for women, and it has been decided that only men will do this. In contrast, women show a high level of involvement in maintenance activities, with participation at 54%. This is attributed to their understanding that the planted seedlings are expected to grow well and will ultimately serve as a source of raw materials for producing mangrove products with commercial value. Over the past five years, the community has been actively managing various mangrove products, such as Dodol (traditional Indonesian sweet toffee-like confection made from coconut milk, glutinous rice flour, and palm sugar) and syrup, particularly through the efforts of the KEBAYA group. The presence of the KEBAYA group is an important strategy that can function as an entry point to strengthen the role of women structurally in natural resource management. Assistance for the KEBAYA group, especially in efforts to increase women's knowledge about mangrove forest management and increase motivation for women to participate actively, can be done through this group.

Access to information about mangroves is still significantly limited for women, with only 5% having access compared to 95% of men. This disparity arises because information and counseling on mangrove conservation often reach communities through group settings, where men have more opportunities to participate in training sessions. Additionally, women's limited access to this information is compounded by societal expectations that assign them the responsibility of educating children about mangrove conservation. This belief reinforces the idea that “household affairs,” including child education, are primarily women's duties. In productive activities and the public sector, men typically have greater roles, access, and control over resources than women. Conversely, in the domestic sphere, women tend to have a more dominant role, access, and control than men.

Women often do not participate in group activities such as meetings and counselling due to a lack of self-confidence. This is evident in the absence of women's representation in meetings and decision-making related to nursery activities, even though they are provided with the same opportunities. Creating a comfortable environment for women to encourage their participation in decision-making (Ravaoarinosihoarana et al. 2023).

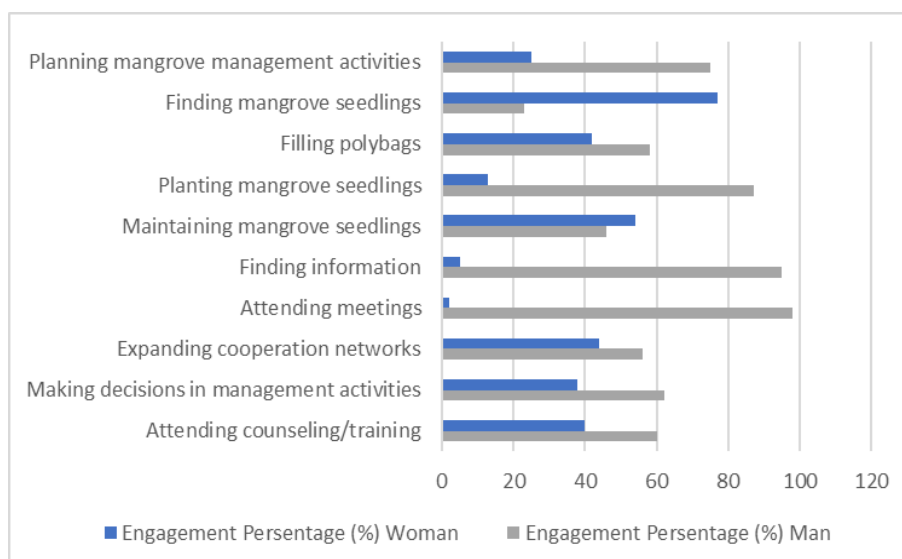


Fig. 2. Comparison diagram of the forms of women's participation in mangrove conservation in Pantai Bahagia Village.

Additionally, women are frequently marginalized in community decision-making processes (FAO 2016). Their participation is crucial for ensuring the success and sustainability of projects, particularly because they are significant users of mangrove resources. Restrictions on access to mangroves adversely affect their livelihoods. Therefore, ongoing capacity-building programs for women must involve them in mangrove conservation efforts. Women possess valuable knowledge about plant species and methods for extracting forest products, which can contribute to improving forest conditions (Agarwal 2018). Furthermore, according to Agarwal (2009), collaborative forest management can enhance rural livelihoods by empowering women through increased economic independence, improved confidence, and enhanced decision-making capacity while providing opportunities for their involvement in conservation initiatives.

Women's groups are crucial to resource management. From a gender perspective, women have the same rights and obligations as men when utilizing these resources (Rahayu 2019). In many cases, particularly in rural areas, women actively participate in natural resource management. However, their contributions often go unrecognized and are insufficiently acknowledged, leading to gender bias and resulting in inequality, with women becoming the disadvantaged group. Despite these limitations, women play a vital role in managing natural resources. Recognizing this potential, it is important to provide motivational support and promote a better understanding that, if given the opportunity, women can make significant contributions to various development programs, particularly in mangrove conservation.

According to Arnstein's Participation Ladder, women's involvement is structured as follows: therapy (25%), informing (42%), consultation (2%), and partnership (21%), with an additional 10% not participating at all. This data indicates that 65% of female respondents have not truly engaged in resource management. In comparison, the remaining 35% demonstrate only a very low level of participation, categorized as tokenism. This highlights that overall female participation in mangrove conservation in Pantai Bahagia Village is very low. To increase women's participation in therapy to citizen power, the following efforts can be made: (1) create transparency in the information provided to women's groups to ensure that women have easy access to relevant information about policies, programs, and forest management plans that affect them. Information must be presented, easily understood, and available for easy access (for example, through social media) and form Two-Way Communication: in addition to providing information, create a forum to listen to women's opinions, questions, and concerns. This can be done through meetings with them or by conducting surveys; (2) involve women in the decision-making process: create meaningful consultation. Do not just ask for input, but also involve women in constructive discussions and negotiations. Ensure their opinions are heard and considered in decision-making and involve women in formulating policies and forest management plans. This can be done through discussions with existing groups and deliberation processes with men; (3) develop strong

partnerships between the government, communities, and stakeholders. This partnership must be based on equality, mutual trust, and a shared commitment to achieving mutually beneficial goals.

Indicators in the therapy ladder involve the communication between the KEBAYA group, the community, and the government. Currently, communication between community groups and the government is limited and predominantly one-directional, flowing mainly from the government to the community, with little to no feedback from the community. As a result, the information delivery process is not functioning optimally, and group members primarily receive suggestions without the opportunity to respond. Additionally, information is often controlled more by men. The presence of the KEBAYA group in Pantai Bahagia village has played a crucial role in empowering women. The women in this village have become more organized and actively engaged. [Espada and Kainer \(2023\)](#) emphasize that building women's groups and associations within co-management institutions creates a supportive environment for discussing and addressing various family and social influences. Such organizations provide a safe space for women to develop self-confidence, empowering them to recognize their expertise and accomplishments.

Community coordination is vital for implementing mangrove planting activities on the informing ladder. Currently, initiatives primarily come from the government or supporting parties involved in rehabilitation efforts. Women's groups are generally only tasked with preparing the seeds used for planting. Community participation involves finding mangrove propagules, filling planting media into polybags, and inserting propagules into the planting media. Although women have initiated the activity of finding propagules, it tends to be performed more by men due to the physical exertion required. However, women play a significant role in filling planting media into polybags, and there is a general perception in the community that women should manage mangrove nurseries because they are seen as more careful than men.

The partnership ladder indicator represents the network of cooperation the community has built with various parties involved in mangrove rehabilitation. While the community has established multiple activities in collaboration with these parties, external stakeholders often initiate such cooperation. Women in the community primarily focus on forming partnerships aimed at processing and marketing mangrove products, which provide additional income for their families. Furthermore, the women participating in rehabilitation activities are typically those whose husbands are also involved rather than acting on their initiative. Women's involvement in forest management leads to significant environmental benefits, including improved forest governance, which is directly linked to the successful and sustainable conservation of forest biodiversity ([Islam et al. 2017](#)).

On the other hand, the non-participation ladder indicates that community involvement in rehabilitation may come with certain conditions, such as receiving wages. While some community members are allowed to participate in these activities under a daily wage system, many women are reluctant to engage unless they have prior approval regarding their compensation. This challenges promoting a more active role for women in rehabilitation efforts. Cultivating the right perceptions and motivations to encourage women's active participation in these activities is crucial. However, it remains a challenge for the Pantai Bahagia Village community. The support of the government and various stakeholders is essential. Recognizing and valuing the contributions of women in society, particularly from men and local leaders, along with institutional backing, can enhance women's participation in natural resource management activities ([Begum et al. 2021](#)). Mangrove conservation is a complex issue with socially demanding challenges. Social difficulties often hinder the enforcement of mangrove conservation legislation ([Castellanos-Galindo et al. 2017](#); [De la Rosa-Velázquez et al. 2017](#)).

4. Conclusion

The development of mangrove forest management has allowed women's groups to participate in conservation activities. Women play an important role in mangrove forest management, but the level of participation is low. This is due to male dominance in decision-making, feelings of inferiority, limited knowledge, and limited access to information. For this reason, support from the government and stakeholders is very important. Efforts can be made for women to create transparency in the information provided, involve women in decision-making, and help women develop strong partnerships with stakeholders. This study recommends training on sustainable mangrove forest management, effective

communication techniques in building collaboration, and joint deliberation to realize forest management norms with equal roles for men and women.

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References

- Agarwal, B. (2018). Gender Equality, Food Security and the Sustainable Development Goals. *Current Opinion in Environmental Sustainability*, 34, 26–32.
- Agarwal, B. (2009). Gender and Forest Conservation: The Impact of Women's Participation in Community Forest Governance. *Ecological Economics*, 68(11), 2785–2799.
- Arnstein, S. R. (1969). A Ladder of Citizen Participation. *Journal of the American Institute of Planners*, 35(4), 216–224.
- Begum, F., De Bruyn, L. L., Kristiansen, P., & Islam, M. A. (2021). Institutionalising Co-Management Activities for Conservation of Forest Resources: Evidence from the Sundarban Mangrove Forest Management of Bangladesh. *Journal of Environmental Management*, 298, 113504.
- Bryan-Brown, D. N., Connolly, R. M., Richards, D. R., Adame, F., Friess, D. A., & Brown, C. J. (2020). Global Trends in Mangrove Forest Fragmentation. *Scientific Reports*, 10(1), 7117.
- Baker, S., & Chapin, S. (2018). Going Beyond “It Depends:” The Role of Context in Shaping Participation in Natural Resource Management. *Ecology and Society*, 23(1), 20.
- Castellanos-Galindo, G. A., Kluger, L. C., & Tompkins, P. (2017). Panama's Impotent Mangrove Laws. *Science*, 355(6328), 918–919.
- De la Rosa-Velázquez, M. I., Espinoza-Tenorio, A., Díaz-Perera, M. Á., Ortega-Argueta, A., Ramos-Reyes, R., & Espejel, I. (2017). Development Stressors are Stronger than Protected Area Management: A Case of the Pantanos de Centla Biosphere Reserve, Mexico. *Land Use Policy*, 67, 340–351.
- Espada, A. L. V., & Kainer, K. A. (2023). Women and Timber Management: From Assigned Cook to Strategic Decision-Maker of Community Land Use. *Land Use Policy*, 127, 106560.
- FAO. (2016). *Gender*. Food and Agriculture Organization of the United Nations, Rome.
- Garekae, H. J., Lepetu, O. T., Thakadu, V., Sebina, N., & Tselaesele. (2020). Community Perspective on State Forest Management Regime and Its Implication on Forest Sustainability: A Case Study of Chobe Forest Reserve, Botswana. *Journal of Sustainable Forestry*, 39(7), 692–709.
- Gamarra, N. C., Hawes, J. E., Costa, E. C. L., Vieira, V. A. S., Rodrigues, A. C., Ladle, R. J., Malhado, A., & Campos-Silva, J. V. (2022). Arapaima Co-Management through the Lens of the Protected Areas Assets Framework. *Journal of Nature Conservation*, 67, 126161.
- Giri, C., Ochieng, E., Tieszen, L. L., Zhu, Z., Singh, A., Loveland, T., Masek, J., & Duke, N. (2011). Status and Distribution of Mangrove Forests of the World using Earth Observation Satellite Data. *Global Ecology and Biogeography*, 20(1), 154–159.
- GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit). (2018). *Conserving Biodiversity, Improving Management of the Sundarbans Mangrove Forests, Sundarbans: Conservation and Increased Adaptation to Climate Change Project, Sundarban Mangrove Forest, Bangladesh*.

- Guilford, J. P. (1956). The Guilford-Zimmerman Aptitude Survey. *Personnel & Guidance Journal*, 35, 219–223.
- Hussain, S. A., & Badola, R. (2010). Valuing Mangrove Benefits: Contribution of Mangrove Forests to Local Livelihoods in Bhitarkanika Conservation Area, East Coast of India. *Wetlands Ecology and Management*, 18, 321–331.
- Islam, M. M., & Hossain, M. M. (2017). *Community Dependency on the Ecosystem Services from the Sundarbans Mangrove Wetland in Bangladesh*. Springer, New Delhi.
- Jacobs C.(2011). Measuring Success in Communities: The Community Capitals Framework. *Extension Extra. Paper*, 517, 1-2.
- Liu, J., & Innes, J. L. (2015). Participatory Forest Management in China: Key Challenges and Ways. *International Forestry Review*, 17(4), 477–484.
- Middleton, L., Astuti, P., Brown, B. M., Brimblecombe, J., & Stacey, N. (2024). We Don't Need to Worry Because We Will Find Food Tomorrow: Local Knowledge and Drivers of Mangroves as a Food System through a Gendered Lens in West Kalimantan, Indonesia. *Sustainability*, 16(8), 3229.
- Mosse, J. C. (1996). *Half the World, Half a Change*. Pustaka Pelajar, Yogyakarta.
- Mukul, S. A., & Quazi, S. A. (2009). Communities in Conservation: Protected Area Management and Enhanced Conservation in Bangladesh. *International Conference, Asia-Pacific Forestry Commission*.
- Maulani, A., Taufiq, S. P. J., & Pratikto. (2021). Perubahan Lahan Mangrove di Pesisir Muara Gembong, Bekasi, Jawa Barat. *Jurnal Maritim Riset*, 10, 5563.
- Manandhar, T. D., & Shin, M. Y. (2013). How Community-Based Forest Management Can Improve Rural Livelihoods: A Case of Kabhre District, Nepal. *Forest Science and Technology*, 9(3), 131–136.
- Nhem, S., & Lee, Y. J. (2019). Women's Participation and the Gender Perspective in Sustainable Forestry in Cambodia: Local Perceptions and the Context of Forestry Research. *Forest Science and Technology*, 15(3), 93–110.
- Park, S. P., & Chang, Y. Y. (2021). Impact of Collaborative Forest Management on Rural Livelihood: A Case Study of Maple Sap Collecting Households in South Korea. *Sustainability*, 13, 1594.
- Salampessy, M. L., Lidiawati, I., & Metkono, E. (2023). Failure of Local Institutions of Coastal Communities to Conserve Mangroves. *IOP Conference Series: Earth and Environmental Science*, 1192, 012033.
- Spalding, M., Kainuma, M., & Collins, L. (2010). *World Atlas of Mangroves (Version 3.0)*. Earthscan, London.
- Sugiyono (2017). *Metode Penelitian Bisnis: Pendekatan Kuantitatif, Kualitatif, Kombinasi, dan R&D*. Penerbit CV. Alfabeta. Bandung.
- Roy, A. K. D. (2016). Local Community Attitudes Towards Mangrove Forest Conservation: Lessons from Bangladesh. *Marine Policy*, 74, 186–194.
- Ravaoarinarotsihoarana, L. A., Ratefinjanahary, I., Aina, C., Rakotomahazo, C., Glass, L., Ranivoarivelo, L., & Lavitra, T. (2023). Combining Traditional Ecological Knowledge and Scientific Observations to Support Mangrove Restoration in Madagascar. *Forests*, 14, 2–21.
- Rahayu, S. M., Ramadhanti, W., Rahayu, D. S., Osada, H., & Indrayanto, A. (2019). Gender Stereotypes in Indonesian Public Companies' Performance. *Journal of Applied Management*, 17(1), 20–32.
- United Nations. (2015). *The World's Women 2015: Trends and Statistics*. United Nations, New York.

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