

THE ROLE OF WOMEN IN CONFLICT RESOLUTION ON THE UTILISATION OF CAPTURE FISHERIES RESOURCES IN THE COASTAL AREA OF SOUTH SULAWESI

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<http://doi.org/10.46754/jssm.2024.09.002>

Received: 6 December 2023

Accepted: 8 June 2024

Published: 15 September 2024

Abstract: The mobilisation of women in conflict resolution is often constrained by a cultural context that limits them to gender-specific spaces and roles. Women can be both triggers of conflict and reducers of conflict in coastal communities. Therefore, involving women in conflict resolution in coastal communities is especially important. The research objective is to determine fishermen's conflicts in the use of capture fisheries resources, conflict resolution strategies in the use of capture fisheries resources, and the role of women in conflict resolution in the use of capture fisheries resources in the coastal area of Maros Regency, South Sulawesi. The data collection method is by conducting in-depth interviews to explore the role of women using the snowball method. The results obtained were assessed by Pentahelix through Focus Group Discussion (FGD), which focused on justifying women's roles and using AHP analysis. The results of Pentahelix assessment indicated that the most influential role of women in conflict resolution is the role of mediation. This research can contribute to conflict resolution in coastal areas by involving women as mediators, negotiators, and decision-makers.

Keywords: Capture fisheries, conflict resolution, fishery resources, sustainability, women's role.

Introduction

One area with potential coastal resources in Indonesia is the Maros Regency. The physical and economic potential of fisheries resources can slowly decline if usage patterns are not managed well, especially regarding handling conflicts over the use of coastal resources in the region. Conflict over the use of coastal resources in Maros Regency has been introduced previously. This conflict has occurred for a long time, especially during the implementation of the Regional Autonomy Law, which divided the authority to manage marine areas into four miles for districts/cities and 12 miles for provincial authorities. According to Daris (2017), the social dynamics of coastal communities is one of the causes of conflict in a series of battles that occurred in the use of coastal resources in Maros Regency. If this conflict continues, the impact includes the degradation of fisheries, damage to the ecosystem, unrest in the

community and a decline in the production at fisheries in this region. Conflict resolution can be resolved through family negotiations and without a written agreement. Conflict resolution can also occur through avoidance, which stops automatically based on each person's awareness (Bueno & Schiavetti, 2019; Boustany *et al.*, 2021; Massiseng *et al.*, 2022). Sustainable ecosystem management can be realised via a system involving women (Nessa *et al.*, 2020). The pattern of resolving conflicts between fishermen in Bangladesh uses economic adaptation practices initiated by women (Ahmed *et al.*, 2023), while in Polynesia local cultural practices with the involvement of women are used (Gianella *et al.*, 2019).

One way to handle social conflict in coastal resource management involves women (Daris *et al.*, 2017). From the perspective of the roles of men and women, they both carry out roles

in the domestic, public and social spheres, but women bear more domestic roles. Women play an important role from the perspective of their position in dealing with indirect productive work (domestic) and direct practical work (public) (Nosheen *et al.*, 2023). These dual roles position women in two worlds, placing domestic and public roles in equally essential positions. Moral support for the husband can trigger toughness while conversely, reluctance towards the husband would trigger unrest and may even give rise to open or latent conflict. The mobilisation of women for conflict resolution is often constrained by cultural contexts that limit them to gender specific spaces and roles (Tran, 2021). Conflict resolution is closely related to gender roles because women can increase or decrease emotional stress, influence changes in the concept of self and ensure self-adjustment (Pappadis *et al.*, 2014).

One approach to conflict resolution in society involves the use of women. Over time, women have been able to become part of world diplomatic endeavours, conflict management, policymaking, and cooperative efforts to tackle challenges (Orakzai, 2022). Asteria *et al.* (2014) stated that the participation of women as environmental activists is essential in communicating environmental conflict resolution. Women are critical to preventing conflict, reducing acts of violence, and conducting negotiations for peace, primarily through informal approaches outside the negotiating table (soft power) (Cierra *et al.*, 2021).

The Helix concept has previously been applied in the industrial, tourism, and community empowerment sectors to create sustainable economic growth so that Indonesia could become an industrialised nation by 2020 (Amrial & Muhamad, 2017). Collaboration between stakeholders in conflict resolution is a current trend. Many studies have revealed how to involve all stakeholders in the handling of conflicts, especially when using capture fisheries resources. The stakeholders gathered in the Pentahelix study can be used as an element of

collaboration for accelerating the conservation and growth of marine resources. Ecosystems and sustainable fisheries, which can justify the role of women as mediators. Uduji and Okolo's (2018) research found that women are often key actors in the use of capture fisheries. Still, they are usually excluded from fisheries management and decision-making because of cultural norms. Women's collaborative action in conflict resolution is important because it can be an alternative solution to social conflict issues involving capture of fisheries resources.

This research aims to determine the causes of issues with the use of capture fisheries, conflict resolution strategies and the role of women in conflict resolution in the use of capture fisheries resources in the coastal area of Maros Regency, South Sulawesi.

Materials and Methods

Location and Time of the Study

The research location, which is the object of research data collection is inhabited by people who work as fishermen in the coastal area of Maros Regency, South Sulawesi Province, Indonesia. This research was carried out in January to July 2023. The coastal areas that are the research locations in Maros Regency are Bontoa, Lau', Maros Baru, and Marusu Districts. The presentation of the research location can be seen in Figure 1.

Data Types and Sources

This research uses primary and secondary data types. Preliminary data was obtained from direct data collection at the research location. The data taken is related to research objectives regarding fishing conflicts in the use of capture fisheries resources, conflict resolution strategies in the use of capture fisheries resources, and the role of women in conflict resolution. Primary data is collected through field observations, in-depth interviews, and focus group discussions (FGD). This differs from secondary data, which is obtained through publications, documents, and activity reports related to research by relevant

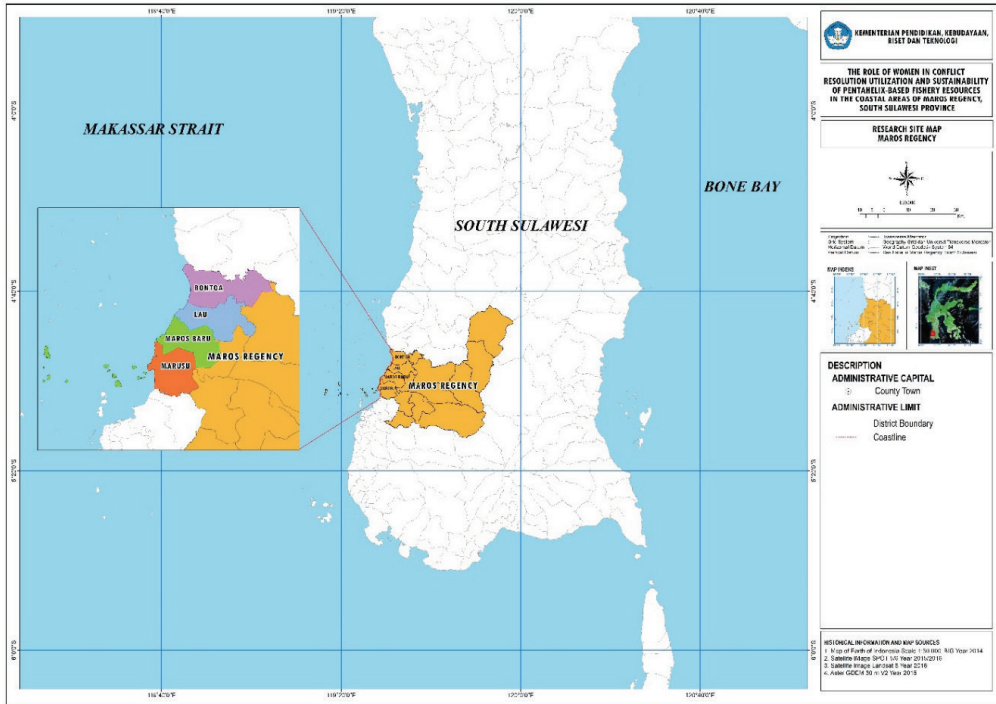


Figure 1: Research locations map

agencies and previous studies published in national and international journals. For clarity, the types of data used can be seen in Table 1.

Data Collection Method

Data collection begins by creating question guides for in-depth interviews according to the data needed and research objectives. Next, carry out field observation activities by coordinating and discussing conflict in the research area and

determining key actors (Gena & Jarra, 2023) as respondents for in-depth interviews. After these two preparations, in-depth interviews were conducted using the snowball technique to see the extent of the conflict, the role of women in conflict resolution, and what strategies were carried out by the community and government vis-à-vis conflict resolution over the use of capture fisheries resources in the research area. After the data was obtained through observation and in-depth interviews, secondary data was

Table 1: Types and source of data

No.	Objectives	Source of Data	Location/Unit
1	Fishermen’s conflict in the utilisation of capture fisheries resources on the coast of Maros Regency	Observation, in-depth interview	4 districts
2	Conflict resolution strategies in utilisation of capture fisheries resources in the coastal areas of Maros Regency, South Sulawesi	FGD	4 districts
3	The role of women in conflict resolution utilisation of capture fisheries resources in the coastal area of Maros Regency, South Sulawesi	Observation, in-depth interview, FGD	4 districts

Source: Primary data collection

also collected regarding documents and reports from related agencies and scientific publications related to the research. The results obtained were then presented to the Pentahelix elements to be assessed according to their perceptions using a questionnaire through a Focus Group Discussion (FGD). The data was then collected and analysed.

Data Analysis Method

Fishermen’s Conflict in the Use of Capture Fisheries Resources on the Coast of Maros Regency

The data analysis used for the resulting data related to fishing conflicts in the use of capture fisheries resources in the coastal area of Maros Regency is qualitative descriptive analysis (Mihās, 2023).

Conflict Resolution Strategies Regarding the Use of Capture Fisheries Resources in the Coastal Areas of Maros Regency, South Sulawesi; and the Role of Women in Conflict Resolution with Regard to the Use of Capture Fisheries in the Coastal Area of Maros Regency, South Sulawesi

The data obtained from observation activities and in-depth interviews were then discussed using the FGD method with the elements of the Pentahelix, which also justified the role of women in conflict resolution with regards to the use of capture fisheries resources in the Maros Regency. The results of the FGD were then made in the form of criteria based on Analytical

Hierarchy Process (AHP) analysis, and the results were validated through measuring hierarchical consistency followed by interpretation and presentation of the results (discussion). The Hierarchy Process in this research can be seen in Figure 2.

The hierarchy of this research is divided into two levels, namely:

- (1) The objective (goal), namely decision-making in determining the role of women in Pentahelix-based conflict resolution in capturing fisheries resources in Maros Regency.
- (2) The criteria (factors) that influence decision-making is the second part of the research hierarchy, which consists of four parts:
 - (a) Strengthening institutions related to community institutions in the coastal areas of Maros Regency.
 - (b) Increasing awareness related to efforts to increase public attention in the coastal areas of Maros Regency.
 - (c) Enforcing rules related to policies and regulations about the use of capture fisheries in the coastal areas of Maros Regency.
 - (d) Zoning changes related to fishing routes or zones in the coastal areas of Maros Regency.
- (3) The aspect occupies the third level of the hierarchy where an aspect is a parameter for evaluating the role of women in decision-

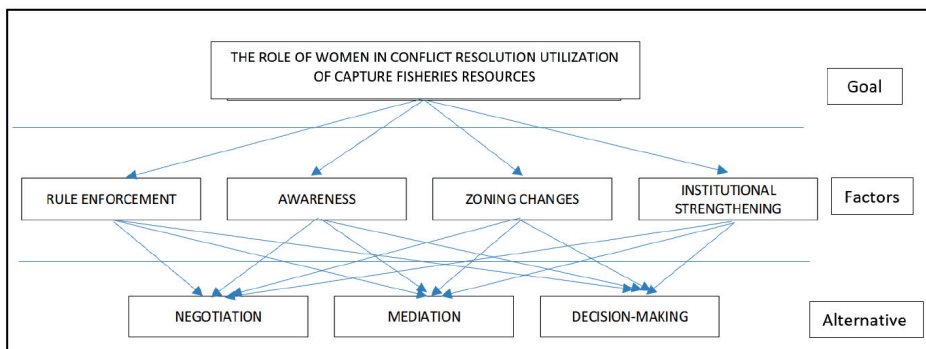


Figure 2: Research Analytical Hierarchy Process (AHP)

making in Pentahelix-based conflict resolution model with regard to the use of capture fisheries resources in Maros Regency.

- (4) An alternative is the lowest tier of the hierarchy, the most appropriate alternative decision to achieve the main goal, which consists of mediation, negotiation and decision-making activities.

Next, the analysis stage is carried out using A, with the following steps:

- (a) Defining the problem and determining the desired outcome.
- (b) Creating a hierarchical structure.
- (c) Creating a hierarchical comparison matrix (Table 2).

If the weighting vector of operational elements A1, A2, A3, A4 is expressed as a vector W, with $W = (w1, w2, w3, w4)$, then, the value of the intensity of importance of operational elements A1 compared to A2 can be expressed as a ratio of the weights of operational elements A1 to A2 namely $w1/w2$ which is the same as $a12$. If this matrix is multiplied by column W $(w1, w2, w3, w4)$, then, we get the relationship:

$$AW = nW \tag{1}$$

Matrix A is known, and we want to obtain the value of W so it can be solved with the equation:

$$\{ A - nI \} W = 0 \tag{2}$$

where I = identity matrix,

Calculation of consistency (Consistency Index), which states the consistency deviation CR (Consistency Ratio), measures whether or not a pairwise comparison weighting value is consistent.

Testing the level of consistency of this weighting is necessary because, in actual circumstances, there will be some deviation from this relationship, so, the matrix is not perfectly consistent. This occurs due to inconsistencies in a person’s references. Deviations from consistency are expressed by the consistency index, with the equation:

$$CI = \lambda \text{ maks} - n/n-1, \tag{3}$$

where: $\lambda \text{ maks}$ = root maks (3)

$$n = \text{matrix size} \tag{4}$$

Consistency index (CI): Random matrix with a rating scale of 1 to 9 as a random index (RI). The comparison between CI and RI for a matrix is defined as the consistency ratio (CR), with equation:

$$CR = CI/RI \tag{5}$$

The comparison matrix will be accepted if the CR value is ≤ 0.1 (Saaty, 1993). Currently, there is a lot of AHP data processing software available. The author used an expert choice program to simplify data calculations in this case.

Results and Discussion

Fishermen’s Conflict in the Utilisation of Capture Fisheries Resources on the Coast of Maros Regency

Maros Regency has the potential to capture fisheries resources, which can trigger conflicts in their utilisation activities. The source of this conflict often arises due to differences in the use of resources or how they are managed. Conflicts between fishermen have been going on for a very long time. Based on Table 3, it can be

Table 2: Hierarchical comparison matrix

The Influence of Criteria in Women’s Role Decision-making in Penta Helix-based Conflict Resolution	A1	A2	A3	A4
Institutional strengthening (A1)	A11	A12	A13	A14
Increased awareness (A2)	A21	A22	A23	A24
Rule enforcement (A3)	A31	A32	A33	A34
Zoning changes (A4)	A41	A42	A43	A44

Source: Primary data

Table 3: Conflict over the use of capture fisheries resources in the coastal area of Maros Regency

Period (Year)	Forms of Conflict		Actor
	Horizontal	Vertical	
1985-1995	- Cantrang fishermen vs. net fishermen (including klitik nets)	Cantrang Fishermen vs. Maros Regency Fisheries Service	Cantrang fishermen, net fishermen, Maros Fisheries Service, Subdistrict Head, Village Head, Lau Police, NGOs
1996-2005	- Cantrang fishermen vs. Klitik net fishermen	Cantrang Fishermen vs. Maros Regency Fisheries Service	Cantrang fishermen, klitik net fishermen, trap fishermen, sodo boat fishermen, Maros Fisheries Service, Subdistrict Head, Village Head, Lau Police/POLAIR, SATGAS, Maros DPRD
	- Cantrang fishermen vs. trap fishermen		
	- Sodo boat fishermen vs. klitik net fishermen		
	- Sodo boat fishermen vs. trap fishermen		
2006-2015	- Cantrang fishermen vs. Klitik net fishermen	Cantrang Fishermen vs. Regency Fisheries Service	Cantrang fishermen, klitik net fishermen, trap fishermen, sodo boat fishermen, sub-district heads, village heads, police, POKMASWAS, Maros Regent, Maros DPRD
	- Cantrang fishermen vs. trap fishermen		
	- Sodo boat fishermen vs. klitik net fishermen		
	- Sodo boat fishermen vs. trap fishermen		
2016-2020	- Cantrang fishermen vs. Klitik net fishermen	Cantrang Fishermen vs. Maros Regency Fisheries Service	Cantrang fishermen, klitik net fishermen, trap fishermen, sodo boat fishermen, Maros Fisheries Service, Police, POKMASWAS
	- Cantrang fishermen vs. trap fishermen		
	- Sodo boat fishermen vs. klitik net fishermen		
	- Sodo boat fishermen vs. trap fishermen		

Source: Primary data

seen in detail the conflict over the use of capture fisheries resources in the coastal areas of Maros Regency from year to year. Based on Table 3, conflicts over the use of coastal resources in Maros Regency began to occur in 1985 and only ended in 2020. This provides encouragement and motivation to research disputes over the use of coastal resources in Maros Regency, especially those related to strategy and the role of stakeholders—efforts to resolve conflicts in coastal communities.

The history of conflict over the use of coastal resources in Indonesia, including conflicts involving fishing, is a long-standing issue. In the 1970s, there was a large-scale conflict between traditional fishermen and fishermen using trawl fishing gear in Sumatra and Java. Even though the coverage was minimal (in the New Order era), this conflict claimed many lives as well as property (fishing equipment and boats). The conflict was so severe that President

Soeharto, who was in office at that time, had to issue a policy prohibiting the use of trawlers via Presidential Decree Number 39 of 1980. Conflicts over the use of coastal resources in Maros Regency began to occur in 1985 because fishermen started to use trawl-type tools, which they called *cantrang*. Cantrang fishing gear was initially developed by migrant fishermen from Makassar and Takalar, and then adopted by fishermen in the coastal areas of Maros Regency.

Conflicts over the use of coastal resources reflect coastal communities as a social system, where in their existence, they face various functional problems to survive, grow, and develop in adapting to increasingly limited natural resources (Silva & Lopes, 2015; Siakwah, 2018; Sjostrom *et al.*, 2021; Wang *et al.*, 2022). Conflicts that occur in fishing communities into three types: (1) Class conflicts, namely conflicts between social classes of fishermen due to the dominance of capital-based businesses and traditional businesses such as the conflict between mini trawl fishermen (upper class) and small fishermen (lower class) in the coastal areas of Maros Regency; (2) orientation conflicts, conflicts that occur between fishermen who have different orientations (short term and long term) with regard to resource use such as horizontal conflicts between fishermen who use bombs or potassium cyanide and other fishermen whose fishing gear which are environmentally friendly; and (3) rural conflicts, that occur as a result of fighting for control of fishing grounds. These conflicts can occur between fishermen from

different social classes or between fishermen from the same social class.

Conflict Resolution Strategies in the Use of Capture Fisheries Resources in the Coastal Areas of Maros Regency, South Sulawesi

Results of the comparison of conflict resolution strategy criteria regarding the role of women in conflict resolution over the use of capture fisheries resources in Maros Regency are shown in Figure 3.

Alternative resolution of conflicts over the use of capture fisheries resources in Maros Regency using a comparison of institutional strengthening criteria, increasing awareness, enforcing regulations, and zoning changes to know the role of women in conflict resolution in Maros Regency based on the results of the Pentahelix assessment.

The results of the Pentahelix assessment (Figure 3) show that alternative conflict resolution strategies in the use of capture fisheries resources in Maros Regency are institutional strengthening criteria with a value of 0.386, awareness raising criteria with a value of 0.317, rule enforcement criteria with a value of 0.176, and zoning change criteria with a value 0.120. From the results of the AHP analysis, it can be concluded that the role of women in conflict resolution in the use of capture fisheries resources in Maros Regency is strengthening coastal community institutions with a score of 0.286.



Figure 3: Results of the comparison of conflict resolution strategy criteria regarding the role of women in conflict resolution over the use of capture fisheries resources in Maros Regency

The Role of Women in Conflict Resolution with Regards to the Use of Capture Fisheries Resources in the Coastal Area of Maros Regency, South Sulawesi

The Pentahelix concept has been described to identify the actors involved in the management model (Flores *et al.*, 2020). Rodriguez *et al.* (2020) illustrated the phenomenon of the Pentahelix concept in empowering women/homemakers. Maximising the role of Pentahelix can be compared with other role elements because if each role still works independently without standing parallel to complement each other, contribute and synergize, then the functional efficiency and strength of each role will have no chance of providing improvement solutions (Eriksson *et al.*, 2019; Dahlet, 2021). The role of the Pentahelix in conflict resolution, according to Jimenez *et al.* (2019) can be one of the conflict resolution factors that can reach an agreement approved by all relevant stakeholders according to the root of the problem so that the implications can be applied in conflict management in society. It is essential to know the root of the problem so that the settlement of the agreement can truly resolve the problem. Initial identification carried out systematically is a strong foundation in the conflict resolution process.

Fishermen conflicts usually occur due to differences in traditional and modified fishing gear, including internal allocation typologies and management mechanisms (Daris *et al.*, 2022). Added to this is that the social dynamics in fishing communities have triggered various conflicts in the Maros Regency (Daris *et al.*, 2023). Women believe in perfection to be able to change the situation around them to be as they wish (Gutierrez *et al.*, 2022). In their research, Nunan and Cepic (2020) explained that women are significantly less involved in community-based fisheries management than men; their limited involvement proves this. Although limited, women's participation can be channelled through collaborative fisheries management committees. A case study of fishing communities in the Colombian Caribbean in the

research by Barrios *et al.* (2020) concluded that women are becoming local community leaders for livelihoods that promote sustainability in Colombian Caribbean fishing communities.

An assessment of the role of women in conflict resolution in the use of capture fisheries resources in Maros Regency was carried out by involving pentahelix elements consisting of the community (fishermen, NGOs), fisheries entrepreneurs, government (regional government, central government), academics, and mass media. The research results of Daris *et al.* (2023) show that women's role in conflict resolution in the coastal area of Maros Regency is the role of mediation, negotiation role, and decision-making role. The part of mediation, negotiation, and decision-making roles carried out by women are the criteria for conflict resolution. In contrast, conflict resolution strategies through strengthening institutions, increasing awareness, enforcing rules, and changing fishing zones are used to assess women's role in Pentahelix-based conflict resolution in the use of coastal resources in the Maros Regency.

The role of women in conflict resolution over the use of capture fisheries resources in the coastal area of Maros Regency, South Sulawesi was carried out through focus group discussion (FGD) activities, which Pentahelix representatives attended. The role of women was assessed by comparing criteria (mediation, negotiation, decision making) with conflict resolution objectives (institutional strengthening, increasing awareness, enforcing rules, changing zones) in the coastal area of Maros Regency, South Sulawesi. The results obtained are as follows:

- (1) The role of women in strengthening institutions for conflict resolution.

The role of women in conflict resolution over the use of capture fisheries resources in Maros Regency, which is linked to the aim of strengthening coastal community institutions using the criteria of mediation, negotiation and decision-making based on the results of the Pentahelix assessment can be seen in Figure 4.



Figure 4: Results of the comparison of criteria for the role of women in conflict resolution towards strengthening coastal community institutions in Maros Regency

The results of the Pentahelix assessment (Figure 4) show that the alternative strengthening coastal community institutions in Maros Regency using mediation criteria with a value of 0.466, negotiation criteria with a value of 0.213, and decision making with a value of 0.322. From the results of the AHP analysis, it can be concluded that the role of women in strengthening coastal community institutions in Maros Regency is negotiation, with a value of 0.466.

Strengthening coastal community institutions is one effort to improve community welfare using the coastal area development concept. The concept of coastal area development can be assumed that (1) community income would increase with regional economic growth, (2) community economic growth would be achieved through accelerated development programmes, and (3) centralised regional development will encourage economic growth and industrialisation. The concept of regional development must be able to answer several fundamental problems of coastal communities, especially those related to increasing the contribution, participation and productivity of fishing communities. The real issues associated with the concept of regional development are: (1) How to encourage the participation of fishing families, fisheries business actors, and local community institutions in the development process, (2) how to create linkages between sectors in coastal areas to create economic cycles and growth for local communities, and (3) how to organise planning and economic development functions for coastal communities. The types of local community institutions that exist in the coastal areas of Maros Regency,

namely: (1) Community institutions (fishermen’s groups, fish cultivator groups, fishery product processing and marketing groups, coastal monitoring community groups, ponggawa-sawi system, nakasa system), (2) market institutions (cooperatives, mini plants, people’s markets, palele systems), and (3) government institutions (district heads, villages, hamlets and neighbourhoods, extension institutions). Women are involved and have roles in various types of local institutions in the coastal areas of Maros Regency. The role of women is quite dominant in community institutions such as fishery product processing and marketing groups, the *ponggawa-sawi* system, and the *nakasa* system. Women also play a significant role in market institutions such as cooperatives, mini plants, people’s markets and the palele system, and local government institutions such as village heads and neighbourhood heads.

(2) The role of women in increasing awareness of conflict resolution.

Results of the comparison of criteria for the role of women in conflict resolution towards increasing awareness of coastal communities in Maros Regency are shown in Figure 5.

The role of women in conflict resolution in the use of coastal resources in Maros Regency is associated with increasing public awareness by using the criteria of mediation, negotiation, and decision-making based on the results of the Pentahelix assessment as seen in Figure 5. The results of the Pentahelix assessment (Figure 5) shows that the alternative is to increase awareness of coastal communities in Maros Regency using mediation criteria with a value of



Figure 5: Results of the comparison of criteria for the role of women in conflict resolution towards increasing awareness of coastal communities in Maros Regency

0.495, negotiation criteria with a value of 0.323, and decision-making with a value of 0.182. From the results of the AHP analysis, it can be concluded that the role of women in increasing awareness of coastal communities in Maros Regency is mediation, with a value of 0.495.

With regards to the efforts to resolve conflicts over the use of coastal resources in Maros Regency, the role of the government is not only needed but also part of all elements of society, including the role of women. The women’s role in efforts to resolve conflicts over the use of coastal resources in Maros Regency is to raise awareness among coastal communities on fishing activities that are not environmentally friendly (illegal fishing), the destruction of coral reefs, clear cutting mangrove forests, and dumping rubbish that pollutes and damages aquatic ecosystems. The government has made efforts to increase public awareness by involving women in socialisation, education, and environmental conservation campaigns regarding the prohibition of illegal fishing and the ban on logging of mangrove forests in the coastal areas of the Maros Regency.

(3) The role of women in enforcing rules for conflict resolution.

Results of the comparison of criteria for the role of women in conflict resolution and Enforcement of regulations in the use of capture fisheries resources in Maros Regency are shown in Figure 6.

The role of women in conflict resolution in the use of capture fisheries resources in Maros Regency is linked to rule enforcement using the criteria of mediation, negotiation and decision-making based on the results of the Pentahelix assessment, as seen in Figure 6. The results of the Pentahelix assessment (Figure 6) show that the alternative is rule enforcement in the utilisation of coastal resources in Maros Regency using mediation criteria with a value of 0.536, negotiation criteria with a value of 0.294, and decision-making with a value of 0.171. From the results of the AHP analysis, it can be concluded that the role of women in enforcing regulations in the use of capture fisheries resources in Maros Regency is mediation, with a value of 0.536.

Strengthening local community institutions will only significantly impact efforts to increase



Figure 6: Results of the comparison of criteria for the role of women in conflict resolution and enforcement of regulations in the use of capture fisheries resources in Maros Regency

their empowerment if they are supported by the role of government institutions, which also have the same interest in the sustainability of coastal resources. This means that establishing policies, regulations, and development planning in coastal areas must favour the interests of fishing communities and be oriented towards preserving capture fisheries.

One of the efforts made by the Maros Regency Government in managing coastal resources has been outlined in the form of Regional Regulation Number 12 of 2005 concerning the management of coastal and marine resources. Regional Regulation Number 12 of 2005 regulates maritime management area boundaries, traditional community rights in managing coastal and marine areas, and dispute resolution (conflict prevention and conflict resolution). Apart from that, there are also several national regulations regarding the management of coastal and marine resources such as Law Number 31 of 2004 concerning fisheries, Decree of the Minister of Agriculture Number 392 of 1999 concerning fishing routes and Regulation of the Minister of Maritime Affairs and Fisheries Number 59/PERMEN-KP/2020 of 2020 concerning fishing routes and fishing equipment in the fisheries management areas of the Republic of Indonesia and offshore. All existing regulations are pretty good and straightforward, but many still need to be enforced in practice due to a lack of law enforcement aspects for people who violate them.

(4) The role of women in zoning changes towards conflict resolution.

Results of the comparison of criteria for the role of women in conflict resolution regarding changes in fishing zoning in the coastal area of Maros Regency are shown in Figure 7.

The role of women in conflict resolution in the use of coastal resources in Maros Regency is associated with changes in fishing zoning using the criteria of mediation, negotiation, and decision-making based on the results of the Pentahelix assessment as seen in Figure 7. The results of the Pentahelix assessment (Figure 7) showed that the alternative changes in fishing zoning in the coastal area of Maros Regency using mediation criteria with a value of 0.566, negotiation criteria with a value of 0.268, and decision-making with a value of 0.165. From the results of the AHP analysis, it can be concluded that the role of women in changing fishing zoning in the coastal area of Maros Regency is mediation, with a value of 0.566.

Conflicts in managing coastal and marine resources between stakeholders using fisheries resources are caused, among other things, by differences in personal/group interests, differences in perceptions in assessing fisheries resources, and technical differences in fisheries resource management. These differences in perception can be detrimental to one party economically, socially and ecologically.

Violations of fishing routes are a source of conflict due to differences in fishermen’s perceptions about common property resources. Therefore, for the use of marine resources as a shared resource, there needs to be boundaries or fishing routes as stated in the Decree of the Minister of Agriculture Number 392 of 1999 concerning fishing routes (Table 1) and the



Figure 7: Results of the comparison of criteria for the role of women in conflict resolution regarding changes in fishing zoning in the coastal area of Maros Regency

Regulation of the Minister of Maritime Affairs and Fisheries. Fisheries Number 59/PERMEN-KP/2020 of 2020 concerning fishing routes and fishing equipment in the fisheries management areas of the Republic of Indonesia and offshore.

Based on the research results, fishermen using klitik net fishing gear generally carry out fishing activities in lane I (0-3 nautical miles), which is intended explicitly for fishermen using fixed (passive) fishing gear and active fishing gear that is not modified using boats. Without motor size ≤ 10 meters. Meanwhile, fishermen using mini trawl fishing gear generally carry out fishing activities in lane I (3-6 nautical miles) and lane II (6-12 nautical miles). Route I (3-6 nautical miles) is intended for fishermen using non-fixed fishing gear modified by fishing boats without motors or outboard motors measuring ≤ 12 m or ≤ 5 GT.

- (5) Comparison of conflict resolution criteria on the role of women in utilising capture fisheries resources in Maros Regency.

Results of the comparison of conflict resolution criteria on the role of women in using capture fisheries resources in Maros Regency are shown in Figure 8.

The conflict resolution criteria which consist of the role of mediation, the role of negotiation, and the role of decision-making regarding the role of women in the utilisation of capture fisheries resources in Maros Regency can be seen in Figure 8. The results of the Pentahelix assessment (Figure 8) show that the alternative role of women in the resolution of conflict utilisation of capture fisheries resource in Maros Regency using mediation role criteria with a value of 0.497, negotiation role criteria

with a value of 0.267, and decision-making role criteria with a value of 0.236. From the results of the AHP analysis, it can be concluded that the role of women in conflict resolution over the use of capture fisheries resources in Maros Regency, which received the highest score was the role of mediation with a value of 0.497, followed by the role of negotiation with a value of 0.267, and the part of decision making with a value of 0.236.

An example of women’s role in mediation is mediating conflicts related to differences in fishing gear used by fishermen by providing solutions and making rules for dividing fishing zones based on fishing gear. Another example related to women’s role in negotiations is how they explore conflicts between their husbands and other fishermen, carry out validation through other fishermen’s wives, and look for solutions that do not harm the two conflicting parties. As for the role of women in decision-making, women are involved in Community Monitoring Groups (POKMASWAS), and they become part of decision-making regarding conflicts between fishermen.

Conclusions

The results of the role of women in conflict resolution over the use of capture fisheries resources in Maros Regency are: (1) The role of women in strengthening community institutions is negotiation with a value of 0.466; (2) the role of women in increasing public awareness is mediation with a value of 0.495; (3) the role of women in enforcing rules and mediation with a value of 0.536; (4) the role of women in changing fishing zoning in the coastal areas of Maros Regency is mediation with a value of 0.566; and (5) the role of women in conflict resolution

Combined Instance -- Synthesis with respect to Goal: The Role of Women in Pentahelix-Based Conflict Resolution



Figure 8: Results of the comparison of conflict resolution criteria on the role of women in utilising capture fisheries resources in Maros Regency

over the use of capture fisheries resources in Maros Regency which received the highest score was the role of mediation with a value of 0.497, followed by the role of negotiation with a value of 0.267, and the role of decision making with a value of 0.236. This research illustrates the importance of involving women in conflict resolution in fishing communities by applying women, in this case, fishermen's wives, as an alternative for conflict resolution in the use of captured fisheries resources so that conflicts in fishing communities can be resolved well. The most influential role of women in conflict resolution is the role of mediation. This research can contribute to conflict resolution in coastal areas by involving women as mediators, negotiators, and decision-makers.

Acknowledgements

The author would like to thank the Ministry of Education, Culture, Research and Technology of the Republic of Indonesia for funding this advanced research through the 2022 to 2023 national competitive basic research (pdkn) programme. Thanks are also expressed to the head of the Maros Regency fisheries service, South Sulawesi, the staff who have provided facilities, and the stakeholders who are members of the Pentahelix element who happily participated in this research. Special thanks to the Chancellor of Cokroaminoto University, Makassar, who has provided recommendations for conducting research.

Conflict of Interest Statement

The authors declare that they have no conflict of interest.

References

Ahmed, I., Chowdhury, I. M. D. A., Zzaman, R. U., Islam, S. L., Nahar, S., & Roy, S. K. (2023). Assessing the vulnerability of fishermen communities in coastal Bangladesh: A "climate vulnerability index"- Based study in Assasuni

Upazila, Satkhira, Bangladesh. *Natural Hazards Research*, 12, 1-33. <https://doi.org/10.1016/j.nhres.2023.12.018>

Amrial, A. M., & Muhamad, E. (2017). Penta helix model: A sustainable development solution through the industrial sector. *Conference Paper "Indonesian Sustainable Development Goal", Hokkaido Indonesian Student Association Scientific Meeting-14 (HISAS-14)*, Jepang 18-19 March 2017. pp.152-156.

Asteria, D., Suyanti, E., Utari, D., & Wisnu, D. (2014). Model of environmental communication with gender perspective in resolving environmental conflict in urban area (Study on the role of women's activists in sustainable environmental conflict management). *Procedia Environmental Sciences*, 20, 553-562. DOI: 10.1016/j.proenv.2014.03.068

Barrios, L. M., Prowse, A., & Vargas, V. R. (2020). Sustainable development and women's leadership: A participatory exploration of capabilities in Colombian Caribbean fisher communities. *Journal of Cleaner Production*, 121277. DOI: 10.1016/j.jclepro.2020.121277

Boustany, A. M., Hernandez, D. A., Miller, E. A., Fujii, J. A., Nicholson, T. E., Tomoleoni, J. A., & Houtan, V. K. S. (2021). Examining the potential conflict between sea otter recovery and Dungeness crab fisheries in California. *Biological Conservation*, 253(108830), 1-8. DOI: 10.1016/j.biocon.2020.108830

Bueno, P. F., & Schiavetti, A. (2019). The influence of fisherman scale in the resilience of socio-ecological systems: An analysis using Q methodology, *169*, 214-224. DOI: 10.1016/j.ocecoaman.2018.12.0.

Ciera, V., Nicolás, X., Gómez, A., Harte, M., Glaser, S. M., & Watson, J. R. (2021). Cooperation and conflict in the small-scale fisheries of Puerto Rico. *Marine Policy*, 134(104809), 1-13. doi.org/10.1016/j.marpol.2021.104809

- Dahlet, L. I., Cornell, H. A., & Metzner, R. (2021). Fisheries conflict as drivers of social transformation. *Current Opinion in Environmental Sustainability*, 53, 9-19. DOI: 10.1016/j.cosust.2021.03.011
- Daris, L. (2017). *Dinamika sosial masyarakat pesisir*. LeutikaPrio Press. pp.1-202. [Indonesian]
- Daris, L., Aslinda, A., & Rapi, N. L. (2017). Forms and strategies of conflict resolution in fishing resources utilisation in the coastal area of Maros District, South Sulawesi Province. *AAFL Biflux*, 10(6), 1540-1545.
- Daris, L., Massiseng, A. N. A., Fachri, M. E., Jaya, J., & Zaenab, S. (2022). The impact of fishermen's conflict on the sustainability of crab (*Portunus pelagicus*) resources in the coastal areas of Maros District, South Sulawesi, Indonesia. *Biodiversitas*, 23(10), 5278-5289. <https://doi.org/10.13057/biodiv/d231037>
- Daris, L., Massiseng, A. N. A., Fachry, M. E., Zaenab, S., Jaya, J., & Mustaking, M. (2023). Types and forms of fishermen conflicts in the utilisation of coastal resources in Maros Regency, South Sulawesi Province. *IOP Conference Series: Earth and Environmental Science*, 1147, 012019. DOI: 10.1088/1755-1315/1147/1/012019
- Eriksson, B., Johansson, F., & Blicharska, M. (2019). Socio-economic impacts of marine conservation efforts in three Indonesian fishing communities. *Marine Policy*, 103, 59-67. DOI: 10.1016/j.marpol.2019.02.007
- Flores, M. C., Leyva, J. L., Oritz, M. P., Moreno, A. O., Sanchez, J. F., & Arballo, O. M. (2020). A framework of penta-helix model to improve the sustainable competitiveness of the wine industry in Baja California based on innovative natural resource management. *E3S Web of Conferences ICESD*, 167, 1-5. <https://doi.org/10.1051/e3sconf/202016706005>
- Gena, A. M., & Jarra, K. A. (2023). An appraisal of the practice of indigenous conflict resolution mechanisms in building a culture of peace in Bale zones, Oromia National Regional State, Ethiopia. *Heliyon*, 9, 1-12. <https://doi.org/10.1016/j.heliyon.2023.e14970>
- Gianella, L. G., Grancher, D., Magnan, A. K., Belizal, E. D., & Duvat, V. K. E. (2019). The perception of climate-related coastal risks and environmental changes on the Rangiroa and Tikehau atolls, French Polynesia: The role of sensitive and intellectual drivers. *Ocean & Coastal Management*, 172, 14-29. DOI: 10.1016/j.ocecoaman.2019.01.018
- Gutierrez, L., Velasco, L., Blanco, S., Catala, P., Mira, P. M. Á., & Peñacoba, C. (2022). Perfectionism, maladaptive beliefs and anxiety in women with fibromyalgia. An explanatory model from the conflict of goals. *Personality and Individual Differences*, 184(111165). DOI: 10.1016/j.paid.2021.111165
- Jimenez, É. A., Barboza, R. S. L., Amaral, M. T., & Frédou, L. F. (2019). Understanding changes to fish stock abundance and associated conflicts: Perceptions of small-scale fishers from the Amazon coast of Brazil. *Ocean & Coastal Management*, 104954, 1-12. DOI: 10.1016/j.ocecoaman.2019.1049
- Massiseng, A. N. A., Tuwo, A., Fachry, M. E., & Bahar, A. (2022). Characteristics of plastic waste and perceptions of coastal communities in the Baluno mangrove ecotourism area, West Sulawesi, Indonesia. *Biodiversitas*, 23(12), 6262-6274. <https://doi.org/10.13057/biodiv/d231222>
- Mihás, P. (2023). Qualitative research methods: Approaches to qualitative data analysis. *International Encyclopedia of Education* (4th ed.). Elsevier. pp.302-313. <https://doi.org/10.1016/B978-0-12-818630-5.11029-2>
- Nessa, N., Gatta, R., Rappe, R. A., Jompa, J., & Yahya, A. F. (2020). The role of women in the utilisation of *Enhalus acoroides*: Livelihoods, food security, impacts and

- implications for coastal area management. *IOP Conference Series: Earth and Environmental Science*, 564, 1-9. DOI: 10.1088/1755-1315/564/1/012073
- Nosheen, M., Iqbal, J., & Ahmad, S. (2023). Economic empowerment of women through climate change mitigation. *Journal of Cleaner Production*, 421, 1-12. <https://doi.org/10.1016/j.jclepro.2023.138480>
- Nunan, F., & Cepić, D. (2020). Women and fisheries co-management: Limits to participation on Lake Victoria. *Fisheries Research*, 224(105454). DOI: 10.1016/j.fishres.2019.105454
- Orakzai, S. B. (2022). Woman in diplomacy. *Encyclopedia of Violence, Peace, & Conflict* (3rd ed.), Volume 3, pp. 28-335.
- Pappadis, M. R., Sander, A. M., Leung, P., Parrish, D. E., & Epstein, M. W. (2014). Impact of gender role conflict on adjustment in women with traumatic brain injury. *Archives of Physical Medicine and Rehabilitation*, 95(10), e68-e69. DOI: 10.1016/j.apmr.2014.07.219.
- Rodriguez, J. M. R., Montoya, M. S. R., Diaz, I. A., & Lucena, F. J. H. (2020). Social appropriation of knowledge as a key factor for local development and open innovation: A systematic review. *Journal of Open Innovation: Technology, Market, and Complexity*, 6(44), 1-13. <http://dx.doi.org/10.3390/joitmc6020044>
- Siakwah, P. (2018). Actors, networks, and globalised assemblages: Rethinking oil, the environment and conflict in Ghana. *Energy Research & Social Science*, 38, 68-76. DOI: 10.1016/j.erss.2018.01.021
- Silva, M. R. O., & Lopes, P. F. M. (2015). Each fisherman is different: Taking the environmental perception of small-scale fishermen into account to manage marine protected areas. *Marine Policy*, 51, 347-355. DOI: 10.1016/j.marpol.2014.09.01
- Sjostrom, A. J. C., Ciannelli, L., Conway, F., & Wakefield, W. W. (2021). Gathering local ecological knowledge to augment scientific and management understanding of a living coastal resource: The case of Oregon's nearshore groundfish trawl fishery. *Marine Policy*, 131(104617), 1-16. DOI: 10.1016/j.marpol.2021.104617
- Tran, D. (2021). A comparative study of women environmental defenders' antiviolent success strategies. *Geoforum*, 126, 126-138. DOI: 10.1016/j.geoforum.2021.07.02
- Uduji, J. I., & Obasi, O. E. N. (2018). Does corporate social responsibility (CSR) impact on development of women in small-scale fisheries of sub-Saharan Africa? Evidence from coastal communities of Niger Delta in Nigeria. *Marine Policy*, 1-11. DOI: 10.1016/j.marpol.2018.10.036
- Wang, Z., Tang, H., Xu, L., & Zhang, J. (2022). A review on fishing gear in China: Selectivity and application. *Aquaculture and Fisheries*, 7(4), 345-358. doi.org/10.1016/j.aaf.2022.02.006