RESEARCH ARTICLE

GAPS HINDERING THE OBJECTIVES OF FISHERIES CO-MANAGEMENT MECHANISMS IN SRI LANKA

Ranatunga RADS[1]*, De Silva DMA[2], Amarasinghe O[3], and Kularatne MG[4]

[1]Faculty of Graduate Studies, Sabaragamuwa University of Sri Lanka

[2]Department of Agri-Business Management, Faculty of Agricultural Sciences, Sabaragamuwa University of Sri Lanka

[3]Department of Agriculture Economics, Faculty of Agriculture, University of Ruhuna, Sri Lanka

[4]Department of Economics, Faculty of Social Science, University of Kelaniya, Sri Lanka

Received: 13 January 2025; Accepted: 29 May 2025; Published: 30 June 2025

ABSTRACT

The fisheries industry in Sri Lanka plays a vital role in nutritional and food security, job creation, and foreign revenue earnings. Co-management is an important strategy for sustainable fisheries management, where fishers, government bodies, and other stakeholders work together. This study aimed to identify gaps affecting the achievement of 17 FAO good practice indicators related to social and economic goals and objectives of co-management in Sri Lanka's coastal fisheries sector. A two-stage cluster sampling method was used to select participants: two Fisheries Management Areas were randomly selected from 18 existing areas, followed by three Fisheries Management Committees from each of the chosen Fisheries Management Areas. Data collection involved a structured questionnaire administered to 115 fishers, representing a 40 percent sample of the total membership across six selected Fisheries Management Committees. A desk study of existing laws and regulations, two focus group discussions, and 30 key-informant interviews with officers from the Department of Fisheries and Aquatic Resources, scientists, leading fishermen, and academics were conducted. The study revealed significant gaps affecting the successful implementation of co-management. Key findings include the absence of comprehensive fisheries management and development plans, low participation of women, youth, and other marginalized groups, limited involvement of state and non-state agencies beyond the Department of Fisheries and Aquatic Resources, and weak linkages between co-management programs and economic benefits for fishers. To address these issues, the study recommends prioritizing the development of comprehensive co-management plans, actively involving all stakeholders, including women, youth, and marginalized groups, and creating co-management platforms that accommodate the diverse interests of all stakeholders.

Keywords: Coastal fisheries, Co-management, Fisheries management

INTRODUCTION

The coastal fisheries sector, often classified under the Small-scale Fisheries (SSF), is particularly significant for Sri Lanka. It makes a substantial contribution to nutritional and food security, job creation, and foreign revenue earnings (Ministry of Fisheries, 2024). Characterized by small-scale operations, limited capital investment, shallow-water fishing, and more focus on local markets and domestic consumption (Amarasinghe and Bavinck, 2017; Pathmanandakumar, 2017; Koralagamage, 2020), this sector employs approximately 85% of Sri Lanka's 59,000-strong fishing fleet. These small-scale fishers are responsible for 56% of the national fish production (Ministry of Fisheries, 2024).

However, achieving sustainable development within the SSF sector remains a considerable challenge and an emerging global development agenda, especially due to issues like poverty, growing population reliance on ecosystem resources, economic globalization,

Corresponding author: dhammikadsr@yahoo.com

and climate change (Evans *et al*., 2011; Kosamu, 2015; Courtney *et al*., 2019). Consequently, sustainable resource use has become a critical concern within the SSF sector. The significant decline in Sri Lanka's resource availability, as evidenced by annual data, has necessitated focused attention on the sustainable use of resources. Specifically, the annual fish catch in the coastal fisheries sector decreased from 269,000 metric tons in 2015 to 164,995 metric tons in 2023 (Ministry of Fisheries, 2024).

Co-management has been increasingly discussed in the literature, and it has gained recognition as a fisheries management strategy that shows promise for improving governance towards greater sustainability, efficiency, and fairness (Cavelle *et al*., 2020). Fisheries co-management is now a commonly accepted approach to fisheries governance. It is commonly defined as a partnership arrangement in which the community of local resource users (fishers) and government, with support and assistance as needed from other stakeholders (boat owners, fish traders, fish processors, boat builders, business people, etc.), and external agents (nongovernmental organizations, academic and research institutions), share the responsibility and authority for the management of the fishery (Pomeroy *et al*., 2022). Pioneering studies on co-management in fisheries in Sri Lanka are limited to inland fisheries (Amarasinghe, 1988; Amarasinghe and De Silva, 1999; Nathanael and Edirisinghe, 2002; Murray, 2007). Nevertheless, there are several recent studies underpinning the significance of co-management in the coastal fisheries sector in Sri Lanka (Pathmanandakumar, 2017; Cohen *et al*., 2021; Ranatunga *et al*., 2024).

Although various co-management platforms have been initiated among coastal communities in Sri Lanka and a supportive legal framework is in place (Ranatunga *et al*., 2024), their effectiveness is not very satisfactory due to reasons such as general distrust for government-imposed regulations, non-acceptance of the definition of artificial co-management units, and the existence of other strong community groups (Cohen *et al*., 2021). Understanding the obstacles that prevent collaborative management efforts from succeeding is crucial. In this context, it is extremely important to identify the factors negatively affecting the success of co-management initiatives. This research attempts to explore the gaps hindering the goals and objectives of co-management in the coastal fisheries sector in Sri Lanka. A framework developed by the FAO for evaluating the success of fisheries co-management initiatives uses 34 indicators of best practice, categorized into four key areas: social, economic, ecological, and governance (Pomeroy *et al*., 2022). This study attempts to recognize the gaps hindering the achievement of social and economic goals and objectives of co-management platforms in the coastal fisheries sector and suggests solutions to bridge these gaps.

In Sri Lanka, the number of communities actively involved in co-management platforms for fisheries is relatively small. Consequently, this study focused exclusively on those communities participating in co-management initiatives of the Department of Fisheries and Aquatic Resources (DFAR). The Fisheries and Aquatic Resources Act (No. 2) of 1996, specifically Sections 31 and 32, empowers the Minister of Fisheries, upon the recommendation of the Director-General of DFAR, to designate Fisheries Management Areas (FMAs). These FMAs encompass both water bodies and adjacent land areas, facilitating the sustainable management of fisheries within those specific zones. The Act stipulates that one or multiple Fisheries Management Committees (FMCs) can be formed within each FMA, with active community participation. Furthermore, a Fisheries Coordinating Committee (FCC), composed of pertinent government officials and representatives from the community-based FMCs, is mandated for each FMA (Department of Fisheries and Aquatic Resources, 2016).

Each FCC generally comprises four elected representatives from each of its constituent FMCs. In cases where two or more FMCs

operate within the same FMA, the FCC membership can be expanded to include up to twelve elected representatives from all the FMCs in that area (Department of Fisheries and Aquatic Resources, 2016). For the purposes of this study, the established FCC within each FMA was considered the primary co-management platform.

It is widely accepted that co-management initiatives in all parts of the world have yielded varied outcomes, including both successes and failures (Pomeroy, 2003; Pomeroy and Rivera-Guieb, 2005; Chabwela and Haller, 2010; Gutierrez *et al*., 2011; Kaluma and Umar, 2011; Haambia *et al*., 2015; Trimble and Berkes, 2015; Tilley *et al*., 2019; Cohen *et al*., 2021). Lack of appropriate policies and legal frameworks to support communities (Chabwela and Haller, 2010), corruption in local organizations, which dilutes the efforts of imposing sanctions and subsequent continuation of illegal and destructive fishing activities (Kaluma and Umar, 2011) are salient challenges to co-management. There are other issues including non-participation of resource users in management activities such as preparation of regulations, monitoring, environmental management, etc. (Chabwela and Haller, 2010), the inability of weakly supported community organizations to adequately represent the interests of communities (Haambiya, *et al*., 2015), non-recognition of customary laws of communities by the state (Amarasinghe and Bavinck, 2017), and long-standing conflicts between small-scale fishers and government agencies, and between small and large-scale fisheries sectors (Trimble and Berkes, 2015). Lack of adaptation to changing circumstances (Sandstrom and Rova, 2010) also hinders co-management. These challenges generate gaps for implementing co-management platforms. Amarasinghe and Bavinck (2017) and Cohen *et al*. (2021) have identified similar challenges in the Sri Lankan context. This study examined the FMC members' satisfaction with the contribution of FMCs in implementing the good practice indicators identified in the assessment sheet for the evaluation of the achievement of goals and objectives of the fisheries co-management introduced by the FAO (Pomeroy *et al*., 2022)

MATERIALS AND METHODS

Selection of the Study Area

To date, the Minister in charge of Fisheries has established 18 FMAs across Sri Lanka's fishing regions, 13 of which are situated within lagoon ecosystems. At the time of this study, the remaining 5 FMAs lacked both FCCs and FMCs or their involvement was limited to specific target fisheries such as catching lobsters and chank. Therefore, only lagoon-based FMAs indicated in Figure 1 and Table 1 were used in the study.

Figure 1: Map of the Lagoon-based Fisheries Management Areas in Sri Lanka

Table 1: Lagoon-based fisheries management areas recognized by the Department of Fisheries and Aquatic Resources

Fisheries Management Area (FMA)	No. of Gazette notifications	Date of Gazette notifications
Negombo lagoon FMA	1415/12	18-10-2005
Rakawa lagoon FMA	1045/01	16-02-1999
Batticaloa lagoon FMA	1254/16	19-09-2002
Periya lagoon FMA	1614/19	13-08-2009
Puttalam lagoon FMA	1665/17	04-08-2010
Komari, Murukkandan and Thimitta lagoon FMA	1665/18	04-08-2010
Chilaw lagoon FMA	1744/4	08-02-2012
Kokilai lagoon FMA	1964/3	25-04-2016
Urani and Kottal lagoon FMC lagoon FMA	1964/2	25-04-2016
Madampa lagoon FMA	1997/17	15-12-2016
Koggala lagoon FMA	1997/18	15-12-2016
Garanduwa lagoon FMA	1997/19	15-12-2016
Dedduwa lagoon FMA	1997/20	15-12-2016

Source: Department of Fisheries and Aquatic Resources, 2023

A two-tiered cluster sampling approach was used to select participants from the 13 lagoon-based FMAs. In the first stage, FMAs served as the primary clusters, with Chilaw and Puttalam FMAs being randomly chosen from the 13 FMAs.

Situated on the northwestern coast of Sri Lanka, Puttalam Lagoon has a substantial surface area of 32,700 hectares (Pathirana *et al*., 2007). This ecologically rich lagoon supports a diverse array of natural resources, including fish, shellfish, coral reefs, sand dunes, mangroves, salt marshes, and sand beaches (Pathirana *et al*., 2007). Fishing and fish trading constitute the primary livelihoods for the local communities residing in the vicinity (De Silva and Sandaruwan, 2017).

Chilaw Lagoon, located on the western coast of Sri Lanka, is a small tidal lagoon characterized by intermittent closures (Wijeratne *et al*., 2004). It extends approximately 4 kilometers in length and has an average width of 1.6 kilometers (Wijeratne *et al*., 2004). Fishing activities within these lagoons are conducted using a variety of fishing gear, employing vessels such as Outboard Engine Fiber Reinforced Boats (OFRP), Motorized Traditional Boats (MTRB), and Non-motorized Traditional Boats (NTRB) (De Silva and Sandaruwan, 2017). There are 28 FMCs in the two selected FMAs. All these fishing operations come within the term of coastal small-scale fisheries, and therefore, they should be governed by the FMCs and FCCs.

Subsequently, in the second stage, simple random sampling was applied within each of the two selected FMAs to choose three secondary clusters (FMCs) each for both clusters, resulting in a total of six FMCs. Accordingly, the following FMCs were randomly selected from two identified FMAs in the second stage as the secondary clusters.

Chilaw
1.Iranawila Fisheries Management Committee
2.Pambala St. Sebestian Fisheries Management Committee
3.Welihena Fisheries Management Committee

Puttalam
1.Anawasala Lagoon Fisheries Management Committee
2.Wanathavilluwa Lagoon Fisheries Management Committee 0
3.Puttalam Lagoon Fisheries Management Committee 01

Data Collection

A pre-tested questionnaire using closed-ended questions was employed for the field study. About 115 coastal fishermen randomly selected from 06 FMCs, to represent 40 percent of the membership of selected FMCs, were interviewed to obtain data on the contribution of FMCs to fulfill 17 good practice indicators related to social and economic goals and objectives of co-management. The sample size of 115 was

determined to represent 40 percent of members from each selected FMC. Two focus group discussions were conducted with the members of two selected FMAs, i.e., Chilaw and Puttalam, to obtain their general views on the present status of co-management. In addition to that, key informant interviews were held–with about 30 persons, including state officers, academics, scientists, and leading fishermen, who have experience in co -management to obtain their views on the nature of existing co-management initiatives, particularly about 17 good practice indicators. Additional information on the establishment and functioning of FMCs and FCCs was obtained from the relevant officers of the Department of Fisheries and Aquatic Resources through direct interviews and analysis of official documents.

Data Analysis

This study attempted to identify the gaps in achieving the 17 good practice indicators related to social and economic goals and objectives of co-management. Fisheries Management Committees' contribution to fulfilling 17 good practice indicators related to social and economic goals and objectives of co-management was measured using a Likert scale ranging from 1-5, where 1 indicates strongly disagree and 5 indicates strongly agree. Descriptive statistics were used to measure the perceived contribution of FMCs to fulfil the goals and objectives of co-management. Existing literature, legal documents, and verbal information collected from the participants of focus group discussions were also used to explore the gaps hindering the achievement of good practice indicators. These information were considered under each good practice indicator, critically analysing the content of all qualitative data.

RESULTS AND DISCUSSION

The satisfaction of fishers with the role of the fisheries committees in fulfilling social goals and objectives of co-management is clearly described by the studied indicators (Table 2).

Table 2: Satisfaction of the participants of the survey on the role of the fisheries committees in fulfilling social goals and objectives of co-management

Indicator	Frequency of responses						Mean
	Strongly disagree (1)	Disagree (2)	No opinion (3)	Somewhat Agree (4)	Strongly Agree (5)	Total	
The co-management approach and measures represent the range of interests of different stakeholders and accommodate the full diversity of those interests.	10	22	5	51	27	115	3.54
Equitable management that represents the range of interests of stakeholders and accommodates the full diversity of those interests.	10	20	7	48	30	115	3.59
Indigenous and local knowledge is explicitly reflected.	21	35	4	33	22	115	3
There is support for co-management among different stakeholder groups.	25	20	11	52	7	115	2.96
Diversity of gender, youth, and ethnicity aspects have been integrated into the co-management committee.	34	47	5	18	11	115	2.35
Tenure and access rights are fairly allocated.	4	10	7	54	40	115	4.00
Social learning (collective knowledge, shared values) is enhanced.	7	12	6	37	53	115	4.01
Local values and beliefs about marine resources are enhanced.	1	1	6	25	82	115	4.61
The co-management provides social benefits to stakeholders.	3	16	5	47	44	115	3.98

According to the findings, only three indicators have reached the mean level of four (4) out of five (5), i.e., tenure and access rights are fairly allocated, social learning (collective knowledge, shared values) is enhanced, and local values and beliefs about marine resources are enhanced. All other indicators have a mean score below four (4). This score level below 4 indicates that the contribution of FMCs to achieving social goals and objectives is medium to low. The lowest mean score (2.35) was recorded for integrating the diversity of gender, youth, and ethnicity aspects into co-management. The participants accept that there is less focus on integrating women and youth into co-management platforms (Figure 2).

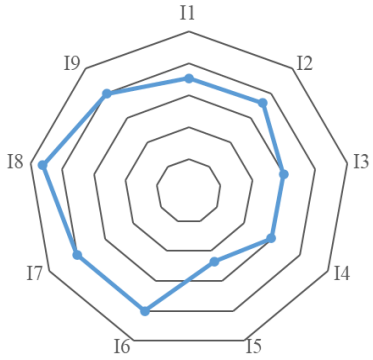

Figure 2: Satisfaction of the participants of the survey on the role of the fisheries committees in fulfilling social goals and objectives of co-management

I1: The co-management approach and measures represent the range of interests of different stakeholders and accommodate the full diversity of those interests

I2: Equitable management that represents the range of interests of stakeholders and accommodates the full diversity of those interests

I3: Indigenous and local knowledge is explicitly reflected

I4: There is support for co-management among different stakeholder groups

I5: Diversity of gender, youth, and ethnicity aspects have been integrated into the co-management committee

I6: Tenure and access rights are fairly allocated

I7: Social learning (collective knowledge, shared values) is enhanced

I8: Local values and beliefs about marine resources are enhanced

I9: The co-management provides social benefits to stakeholders

The study also examined the FMC members' satisfaction with the contribution of FMCs to achieving economic goals and objectives (Table 3).

Table 3: Satisfaction of the participants of the survey on the role of the fisheries committees in fulfilling economic goals and objectives of co-management

Indicator	Frequency of responses						
	Strongly disagree (1)	Disagree (2)	No opinion (3)	Somewhat Agree (4)	Strongly Agree (5)	Total	Mean
Seafood availability and access have increased at household/ community/market levels	24	51	12	14	14	115	2.50
The benefits of operating and maintaining co-management arrangements exceed the costs	12	11	4	46	42	115	3.82
There are incentives for stakeholders to support co-management	5	2	3	47	58	115	4.31
Co-management has benefited stakeholders economically	12	4	2	43	54	115	4.06
Fish catches have improved overall in the co-managed fishery or area	11	59	24	16	5	115	2.52
Co-management participants have a higher level of material lifestyle (housing, household goods, etc.)	24	34	11	27	19	115	2.85
The number of sick days among co-management participants has gone down	27	44	7	23	14	115	2.59
Incomes/benefits are fairly distributed between men and women	40	36	6	18	15	115	2.40

According to the findings, only three indicators related to achieving economic goals and objectives have reached the mean level of over four (4) out of five (5), i.e. there are incentives for stakeholders to support co-management, co-management has benefited stakeholders economically, and fish catches have improved overall in the co-managed fishery or area. About three other indicators have shown a score below three (3), which indicates that the contribution of FMCs is not satisfactory (Figure 3).

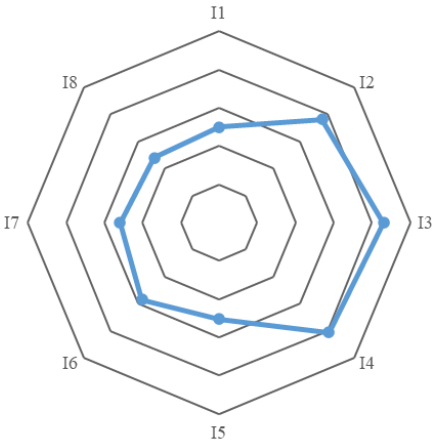

Figure 3: Satisfaction of the survey participants on the role of the fisheries committees in fulfilling economic goals and objectives of co-management

I1: Seafood availability and access have increased at household/ community/market levels

I2: The benefits of operating and maintaining co-management arrangements exceed the costs

I3: There are incentives for stakeholders to support co-management

I4: Co-management has benefited stakeholders economically

I5: Fish catches have improved overall in the co-managed fishery or area

I6: Co-management participants have a higher level of material lifestyle (housing, household goods, etc.)

I7: The number of sick days among co-management participants has gone down

I8: Incomes/benefits are fairly distributed between men and women

Identification and Explanation of Existing Gaps

Further challenges to co-management in the local context can be identified through the analysis of reasons affecting the implementation of good practices. In addition to survey data, insights from focus group discussions and key informant interviews were also helpful in identifying and explaining these gaps. This analysis aims to identify and explain these gaps affecting the good practice indicators of achieving social and economic goals and objectives of co-management.

Gaps to implement good practice indicators related to social goals and objectives

Indicator 1: The co-management approach and measures represent the range of interests of different stakeholders and accommodate the full diversity of those interests

For this indicator, the mean score of the survey is 3.54 out of 5, which displays a medium-level success in achieving the good practice indicator. According to De Silva and Sandaruwan (2017), fishing activities in two lagoons are conducted using a variety of fishing gear, employing vessels such as Outboard Engine Fiber Reinforced Boats (OFRP), Motorized Traditional Boats (MTRB), and Non-motorized Traditional Boats (NTRB). Their interests are also diverse with different fishing gears and different boat types. However, all these diverse groups cannot represent FCCs, as there is a legal ceiling of a maximum of 12 persons in an FCC. On most occasions, there are more than 06 FMC in one FMA. Therefore, only 01 or 02 members from an FMC represent the FCC. This representation may not be sufficient to represent the interests of diverse groups within the FMC. There are no specific provisions to ensure the representation of women, youth, or special minority groups.

Indicator 2: Equitable management represents the range of interests of stakeholders and accommodates the full diversity of those interests

The mean score of the survey is 3.59 out of 5, which indicates a medium-level success in achieving this indicator. According to Evans *et al* (2011), one of the major objectives of co-management is to ensure inclusion of diverse stakeholders to integrate diverse knowledge and value systems on which to base decisions. Hence, it is not just the representation or taking diverse views into account but using their knowledge and values for improving the

decisions. The insufficiency of the representation of diverse interest groups is a major gap in co-management.

Indicator 3: Indigenous and local knowledge is explicitly reflected in the fisheries co-management plan

The mean score of the survey is 3 out of 5, which indicates a lower-level success in achieving this indicator. Integration of different knowledge systems is a key objective of co-management (Trimble and Berkes, 2015). In Sri Lanka, there are examples among some coastal fishers such as beach seine operators, brush park fishers, and stilt fishers of having a wealth of indigenous knowledge that has been accumulated through their experience and using locally crafted rules and evolved norms for sustainably managing fisheries (Deepananda *et al*., 2016a; Deepananda *et al*., 2016b; Gammanpila *et al*., 2019). However, those local knowledge systems have not been formally transferred into co-management plans. Section 31 B of the Fisheries and Aquatic Resources Act No. 35 of 2013 makes provisions for FCCs to prepare a Fisheries Development and Management plan. However, the FCCs in the study area are yet to prepare such plans. Therefore, the reflection of indigenous and local knowledge in the co-management plan has not yet been fulfilled. However, focus group discussions with the community found that people value the significance of local knowledge.

Indicator 4: There is support for co-management among different stakeholder groups in co-management activities

The mean score of the survey is 2.96 out of 5, which indicates a lower-level success in achieving this indicator. The results show that the involvement of some stakeholder organizations is not sufficient. Public distrust for some state-oriented regulations has also been identified as a reason for limited support (Cohen *et al*, 2021). According to the participants of the survey, the Department of Fisheries and Aquatic Resources (DFAR) is the primary co-management partner for community organizations, with 95.7% of respondents identifying its active involvement. Following DFAR, other institutions were mentioned with varying degrees of involvement: Divisional Secretariat (59.1%), National Aquatic Resources Agency (NARA) (51.3 %), Coastal Conservation Department (CCD) (43.5 %), and Department of Wild Life (39.1 %). These institutions appear to play a leading role in co -management activities.

However, the results indicate that the contribution of agencies such as NGOs, Political authorities, Universities, and Sri Lanka Tourism is insufficient.

Indicator 5: Diversity of gender, youth, and ethnicity aspects have been integrated into the co-management committee

The mean score of the survey is 2.35 out of 5, which indicates an unsatisfactory integration of gender, youth, and ethnicity aspects into co -management. It is widely accepted that women play a crucial role in fisheries management though their roles often go unrecognized (Koralegama *et al*., 2017; Freitas *et al*., 2020). However, Freitas *et al*., (2020) find that co-management in Brazil has made a significant impact for women by providing opportunities for financial rewards for their participation, giving more autonomy, and providing support services such as child care. Zurba and Trimble (2014) indicate that youth have higher expectations of collaboration with resource users and they are more likely to engage in co-management. However, co-management initiatives in Sri Lanka have not yet made any significant impact on these aspects. According to the findings of the focus group discussions, the FMCs are male-dominated. There is no sufficient representation of youth, females, etc., though there is no legal barrier to the representation of females and youths.

Indicator 6: Tenure and access rights are fairly allocated

The mean score of the survey is 4 out of 5, which indicates a satisfactory contribution of co-management in achieving tenure rights. There are several tenure-related issues in the coastal fisheries sector of Sri Lanka such as the acquisition of anchorages and beach seine

sites by other commercial industries like tourism, non-availability of space for craft and gear repairs and fish processing, and acquisition of access roads by other parties (Sri Lanka Forum of Small-Scale Fisheries, 2019). It is evident from the findings that co-management has positively addressed some of these issues. Fishers accept that tenure and access rights are open to all members of the committee in an equal manner. Restrictions are in place for outsiders to engage in fishing. However, some people do not see this as an achievement of the co-management platform as it was the traditional practice.

Indicator 7: Social learning (collective knowledge, shared values) is enhanced

The mean score of the survey is 4.01 out of 5, which indicates a satisfactory contribution to enhance social learning. Community members who joined with focus group discussions accept that co-management enhances the aspects of collective knowledge and shared values. However, there is no formal method within co-management platforms to enhance social learning. The FCCs in the study area are yet to prepare co-management plans. Therefore, collective knowledge and shared values are not reflected in co-management plans. The process of FMCs and FCCs to collaboratively solve issues may have given the impression that collective knowledge is used and enhanced through co-management.

Indicator 8: Local values and beliefs about marine resources are enhanced

The mean score of the survey is 4.61 out of 5, which indicates a satisfactory contribution to enhancing local values and beliefs about marine resources. Community members who joined with focus group discussions accept that co-management enhances the local values and beliefs about marine resources.

Indicator 9: The co-management provides social benefits to stakeholders

The mean score of the survey is 3.98 out of 5, which indicates a medium-level success in achieving this indicator. The participants of focus group discussions accept that co-management moderately contributes to providing social benefits by addressing issues related to health facilities, children's education, occupational safety, etc. However, according to them, the contribution to addressing some social issues such as drug addiction, alcoholism, and social security aspects is not satisfactory. Some social advancements such as pension schemes, insurance, and law and order situations are beyond the full control of the co-management platform. Therefore, it is natural that co-management only can play a corresponding role in achieving such social benefits.

Gaps to implement good practice indicators related to Economic goals and objectives

Indicator 1: Seafood availability and access have increased at household/ community/ market levels

The mean score of the survey is 2.50 out of 5, which indicates a low success in achieving this good practice indicator. Participants of focus group discussions or key informants did not have any evidence to say that seafood availability and access have increased as a result of the co-management. The statistics at the national level and the relevant fisheries districts show a declining catch from coastal fisheries (Ministry of Fisheries, 2024). On the other hand, economic gains cannot be expected in the short term as it requires considerable time to improve the resources and fish catch.

Indicator 2: The benefits of operating and maintaining co-management arrangements exceed the costs

The mean score of the survey is 3.82 out of 5, which indicates a medium-level success in achieving this indicator. Participants of focus group discussions did not have any idea about the cost of operating and maintaining co-management. The participating government agencies have to bear the cost of deploying their representatives. At the moment, stakeholders have no proper idea about the cost and benefits of co-management. The findings suggest that fishers recognize a favorable return on their effort invested in co-management though it is not very impressive.

Indicator 3: There are incentives for stakeholders to support co-management

The mean score of the survey is 4.31 out of 5, which indicates a higher level of satisfaction among the participants regarding the incentives to support co-management. Participants of focus group discussions and key informants accept that there are social benefits due to the involvement of co-management platforms to address social issues such as lack of health facilities, lack of access to children's education, and safety issues. Further, participants agree that co-management slightly contributes to enhancing self-employment opportunities for women. Given the fact that there are several identified issues related to social and occupational well-being of fishers such as limited access to social protection, lack of access to safety equipment, and limitations in health care and educational facilities for children (Sri Lanka Forum of Small Scale Fisheries, 2019), this situation seems to be a positive implication of co-management.

Indicator 4: Co-management has benefited stakeholders economically

The mean score of the survey is 4.06 out of 5, which indicates a higher level of success in achieving this indicator. This is somewhat contradictory to the findings on indicator 01 of the economic goals; i.e. the availability of seafood at market and domestic levels. Irrespective of the fact that there is no increase in seafood availability, participants think that co-management brings economic benefits. According to the focus group discussions and key informants, co-management brings other economic benefits such as the ability to obtain fishing gear at a lower price, increased bargaining power in selling their harvest, etc.

Indicator 5: Fish catches have improved overall in the co-managed fishery or area

The mean score of the survey is 2.52 out of 5, which indicates a very low level of success in improving fish catches. Neither focus group participants nor key informants provided evidence of increased fish catches attributable to co-management. However, it's understood that improving fish catches is a long-term objective, and immediate increases are unlikely given Sri Lanka's already heavily exploited coastal resources.

Indicator 6: Co-management participants have a higher level of material lifestyle (housing, household goods, etc.)

The mean score of the survey is 2.85 out of 5, which indicates a lower-level success in achieving a higher level of material lifestyle as a result of co-management. Participants of focus group discussions or key informants did not have any evidence of this kind of difference between co-management participants and others. The co-management platforms examined in this study are relatively recent. Consequently, immediate material benefits cannot be anticipated. However, given the fishers' perception that co-management fosters economic gains, these outcomes are achievable over the long term.

Indicator 7: Number of sick days among co -management participants

The mean score of the survey is 2.59 out of 5, which indicates a medium-level success in achieving the reduction of sick days. Participants of focus group discussions or key persons accept that co-management helps to address some issues related to the lack of health facilities. However, they do not have any evidence about the contribution of co-management to reducing sick days or major improvements in health care.

Indicator 8: Incomes/benefits are fairly distributed between men and women

The mean score of the survey is 2.40 out of 5, which indicates a lower-level success in achieving of fair distribution of benefits among men and women. According to the focus group discussions, fishers agree that there is a disparity between the wages of men and women. The contribution of co-management to resolve issues related to wage discrepancies is very low. Wage discrepancy between men and women is not seen as an issue by a majority of participants of focus group discussions. Key informants confirmed this situation. According to the findings of other countries, co-management can help to address issues such as income disparity and

non-acceptance of the role of women in fisheries (Freitas, 2020). Therefore, this can be considered a serious gap in co-management.

This study identifies several gaps which impede the successful implementation of co-management's social and economic goals. Ideally, co-management frameworks should reflect the diverse interests of all stakeholders. However, current platforms frequently fail to adequately engage women, youth, and marginalized groups. Specifically, Fisheries Management Committees (FMCs) are largely male-dominated, with insufficient representation of youth, women, and minority groups, despite the absence of legal barriers. Efforts to enhance the participation of these underrepresented groups are lacking. Furthermore, the Department of Fisheries and Aquatic Resources is the primary active state sector participant, while support from other government agencies is inadequate. Additional significant gaps include the non-implementation of essential co-management components, such as the development of co-management plans, and the absence of formal mechanisms for social learning and knowledge sharing.

The study also reveals a lack of official recognition of local knowledge. Moreover, co-management does not ensure equitable benefit distribution between men and women, a critical deficiency given its stated objectives. Although legal provisions exist to support co-management, FCCs, and FMCs do not hold regular meetings. The lack of consistent engagement hinders the realization of co-management's full potential. Finally, insufficient attention to social issues, such as alcoholism, poverty, inadequate healthcare, and children's education, further obstructs the achievement of co-management goals and objectives.

CONCLUSION

The study demonstrates that there are several gaps, which affect the co-management efforts of coastal fisheries. The absence of comprehensive fisheries management and development plans in co-management platforms has led to many information and knowledge gaps as it creates a situation where existing information and knowledge on some essential components of co-management are insufficient. As a top priority, it is advised to create co-management plans for every FMA, guarantee active participation from all stakeholders, and take the necessary steps to accommodate the various interest groups in co-management platforms.

AUTHOR CONTRIBUTION

RADSR designed and conducted the study and wrote the first draft. DAMDS, OA, and MGK supervised the study and supported the development of the questionnaire and data analysis. All authors critically reviewed the manuscript.

ACKNOWLEDGEMENTS

The authors express their gratitude to the Management Division of the Department of Fisheries and Aquatic Resources officers for their cooperation in obtaining vital information on the practical implementation of co-management platforms. The authors also wish to acknowledge the assistance given by Professor U.S. Amarasinghe of the Kelaniya University of Sri Lanka to improve the manuscript.

REFERENCES

Amarasinghe, O. (2020) 'Sri lanka's national Fisheries Policy needs to be remodelled to incorporate the SSF guidelines in order to attain the goal of securing sustainable small-scale fisherie', *Samudra*; *The tri-annual journal of the international collective in support of fish workers*.Vol.82, pp. 11-14.

Amarasinghe, O., & Bavinck, M. (2017) 'Furthering the Implementation of the Small-Scale Fisheries Guidelines: Strengthening Fisheries Cooperatives in Sri Lanka'. In S. Jentoft, R. *The Small-scale Fisheries Guidelines*, MARE, Volume 14.

Amarasinghe, U.S. (1988) 'The role of fishermen in implementing management strategies in reservoirs of Sri Lanka'. In: S.S. De Silva (ed.)

Reservoir Fishery Management and Development in Asia, International Development Research Centre, Ottawa, Canada. pp.158-163.

Amarasinghe. U.S. and De Silva S.S. (1999) 'The Sri Lankan reservoir fishery: a case for introduction of a co-management strategy'. *Fisheries Management and Ecology*, 6: 387-399. https://doi.org/10.1046/j.1365-2400.1999.00170.x

Cavelle, M., Said, A., and Oriordan, B. (2020) '*Co-management for small scale fisheries; Principles, practices and challenges'*, Low Impact Fishers for Europe.

Chabwela, H. N., & Haller, T. (2010) 'Governance issues, potentials and failures of participatory collective action in the Kafue Flats, Zambia*'. International Journal of the Commons*, Vol. 4, No. 2 (August 2010), pp. 621-642

Cohen, P.J., Roscher, M., Wathsala Fernando, A., Freed, S., Garces, L., Jayakody, …….. DeYoung, C. (2021) '*Characteristics and performance of fisheries co-management in Asia - Synthesis of knowledge and case studies: Bangladesh, Cambodia, Philippines and Sri Lanka. Bangkok*'. FAO.

Deepananda, K. H. M. A., Amarasinghe, U. S., & Jayasinghe-Mudalige, U. K. (2016a). Neither bust nor boom: Institutional robustness in the beach seine fishery of southern Sri Lanka. *Ocean & Coastal Management*, *128*, 61–73. https://doi.org/10.1016/j.ocecoaman.2016.04.020

Deepananda, K. H. M. A., Amarasinghe, U. S., Jayasinghe-Mudalige, U. K., & Berkes, F. (2016b). Stilt fisher knowledge in southern Sri Lanka as an expert system: A strategy towards co-management. *Fisheries Research*, *174*, 288–297. https://doi.org/10.1016/j.fishres.2015.10.028

Department of Fisheries and Aquatic Resources (2016) *The Compendium of High Seas Fishing Legislations in Sri Lanka,* Department of Fisheries and Aquatic Resources, Sri Lanka.

De Silva, D.W.L.U. and Sandaruwan, K.P.G.C. (2017) 'Livelihood constraints of fishers of Puttalam Lagoon in Sri Lanka; A case study', In *Proceedings of the International Symposium on Agriculture and Environment*, University of Ruhuna, Sri Lanka

Evans, L., Cherrett, N., & Pemsl, D. (2011) 'Assessing the impact of fisheries co-management interventions in developing countries: A meta-analysis'. *Journal of Environmental Management*, *92*(8), 1938–1949

Freitas, C.T., Espirito-Santo, H.M.V., Compos-Silva, J.V., Peres, C.A., Lopes, P.T.M. (2020) 'Resource co-management as a step toward gender equity in fisheries', Ecological Economics, 176. http;// doi.org/10.1016/ j.ecolecon.2020.106709

Gutiérrez, N. L., Hilborn, R., & Defeo, O. (2011) 'Leadership, social capital, and incentives to promote successful fisheries'. *Nature*, *470*(7334), 386–389. https://doi.org/10.1038/nature09689

Haambiya, L., Kaunda, E., Likongwe, J., & Chama, L. (2015) 'Co-management driven enforcement of rules and regulations on Lake Tanganyika, Zambia'. *International Journal of Fisheries and Aquatic Studies*, 2(6), pp. 73-80.

Kaluma, K., & Umar, B. B. (2021) 'Outcomes of participatory fisheries management: An example from co-management in Zambia's Mweru-Luapula fishery'. *Heliyon*, *7*(2), pp.1-13. https:// doi.org/10.1016/j.heliyon.2021.e06083

Koralagamage, D.N. (2020) '*Small-scale fisher migration, conflict, and wellbeing: A case study from Sri Lanka*, University of Amsterdam

Koralagamage, D. N., Gupta, J., and Pouw, N. (2017) 'Inclusive development from a gender perspective in small-scale fisheries, Current Opinion in Environment Sustainability, 24, 1-6.

Kosamu, I. B. M. (2015) Conditions for

sustainability of small-scale fisheries in developing countries. *Fisheries Research*, *161*, 365–373. https://doi.org/10.1016/j.fishres.2014.09.002

Ministry of Fisheries (2024) *Statistical Information of Fisheries Sector*, Ministry of Fisheries, Sri Lanka.

Murray, F. (2007) 'When Co-management Fails: A Review of Theory and Lessons Learned from Reservoir Fisheries in the Dry-Zone of Sri Lanka'. In: M. Dickson and A. Brooks (eds.) *Proceedings of the CBFM-2 International Conference on Community Based Approaches to Fisheries Management*, Hotel Radisson, Dhaka, Bangladesh, 6-7 March 2007, Conference Paper, 11.Dhaka,Bangladesh:WorldFishCenter.http://www.worldfishcenter.org/resource_centre/WF_37455.pdf

Nathanael, S. and U. Edirisinghe (2002) 'Developing co-management in an artisanal gill net fishery of a deep hydro-electric reservoir in Sri Lanka'. *Fisheries Management and Ecology* 9 (5): 267-276. https://doi.org/10.1046/j.1365-2400.2002.00304.x.

Pathirana, K.P., Riyas, M.C., Kamal, A.R., Safeek, A.L.(2007), 'Sustainable management of lagoon resources; A case study of Puttalam Lagoon and associated resources', *Proceedings of the 663rd Annual Sessions of the Sri Lanka Association of the Advancement of Science,* Sri Lanka Association of the Advancement of Science

Pathmanandakumar, V. (2017) 'The Effectiveness of Co-management Practices: The Case of Small-scale Fisheries in Sri Lanka'. *Journal of Aquaculture Research & Development*, *08*(09). https://doi.org/10.4172/2155-9546.1000509

Pomeroy, C. (2003) 'Co-Management and Marine Reserves in Fishery Management. In D. C. Wilson, J. R. Nielsen, & P. Degnbol (Eds.), *The Fisheries Co-management Experience* (pp. 213–229). Springer Netherlands. https://doi.org/10.1007/978-94-017-3323-6_13

Pomeroy, R.S., Oh, K., Martone, E., Westlund, L., Josupeit, H. & Son, Y. (2022) '*Guidebook for evaluating fisheries co-management effectiveness*'. FAO, Rome.

Pomeroy, R. S., Rivera-Guieb, R. (2009) '*Fishery co-management: a practical handbook'*. CAB International in association with the International Development Research Centre, Ottawa, Canada. http://site.ebrary.com/id/10119722

Ranatunga, R.A.D.S., De Silva, D.M.A., Amarasinghe, O., Kularatne, M.G. (2024) 'Contribution of legal architecture toward strengthening co-management platforms in small-scale fisheries in Sri Lanka', *Sri Lanka Journal of Aquatic Sciences*, 29(2): 99 -108. http://doi.org/10.4038/sljas.v29i2.7618

Sandström, A., & Rova, C. (2010) 'Adaptive Co-management Networks: A Comparative Analysis of Two Fishery Conservation Areas in Sweden'. *Ecology and Society*, *15*(3), 1-14. https://doi.org/10.5751/ES-03531-150314

Sri Lanka Forum of Small-scale fisheries (2019) '*Implementing Voluntary Guidelines for securing sustainable small scale fisheries in the context of food security and poverty eradication'*, Sri Lanka Forum of Small-scale fisheries

Tilley, A., Hunnam, K. J., Mills, D. J., Steenbergen, D. J., Govan, H., Alonso-Poblacion, E., Roscher, M., Pereira, M., Rodrigues, P., Amador, T., Duarte, A., Gomes, M., & Cohen, P. J. (2019) 'Evaluating the Fit of Co-management for Small-Scale Fisheries Governance in Timor-Leste'. *Frontiers in Marine Science*, *6*, 392. https://doi.org/10.3389/fmars.2019.00392

Trimble, M., & Berkes, F. (2015) 'Towards adaptive co-management of small-scale fisheries in Uruguay and Brazil: Lessons from using Ostrom's design principles'. *Maritime Studies*, *14*(1), 14.

Wijeratne, E.M.S., Rydberg, L., Pathirana, K.P.P. (2004) Modelling of sea levels, water exchange and dispersion in an intermittently closed tidal estuary: Chilaw Lagoon, *Proceedings of the 10th Asian Congress of Fluid Mechanics*, Sri Lanka

Zurba, M and Trimble, M. (2014), 'Youth as the inheritors of collaboration: crises and factors that influence participation of the next generation in natural resource management'. *Environmental Science and Policy*, 42, 78-87.