5.5 Strategies for achieving socially equitable and livelihood benefits from culture-based fisheries in Sri Lankan reservoirs

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Abstract

This study examines strategies for achieving socially equitable and livelihood benefits from CBF in Sri Lankan reservoirs. Conducted between October 2023 and March 2024, the research focused on 13 reservoirs across Anuradhapura, Kurunegala and Puttalam districts, selected based on geographical location and reservoir size. A total of 272 fishers, all members of reservoir fisheries societies, participated in face-to-face semi-structured interviews and large group discussions (LGDs). Using a Sustainable Livelihood Framework (SLF)-SWOT analysis, the study identified key socioeconomic, cultural and governance factors influencing equitable livelihood benefits.

The research employed both primary and secondary data collection methods, including a pretested household survey complemented by land-use data and annual reports. Data analysis was conducted using IBM SPSS Statistics (Version 22) to generate descriptive statistics and assess relationships between livelihood factors. Findings highlight that social equity and livelihood benefits from CBF vary across reservoir fishing communities, with socioeconomic and governance factors playing a crucial role in shaping outcomes. While opportunities exist to strengthen local governance, enhance capacity building and promote community participation, significant constraints such as policy gaps, financial limitations and inequitable resource distribution hinder progress.

To ensure sustainability, effective CBF integration should focus on equity and resilience within fishing communities. Policy enhancements must address governance weaknesses and promote equitable access to CBF benefits while introducing financial support mechanisms for small-scale fishers. Capacity building should be prioritised by empowering fisheries societies in decision-making and providing training for sustainable fishing practices.

Community engagement and collaboration through participatory governance models and partnerships with local authorities, research institutions and fishing communities can further drive progress. For future research, long-term studies on the impact of CBF on social equity and livelihoods are essential, alongside an exploration of gender dynamics to develop more inclusive fisheries policies. These measures can contribute to a more equitable and sustainable reservoir fishery system.

Keywords: *culture-based fisheries, socially equitable, livelihoods*

Introduction

Livelihoods are shaped by a combination of skills, resources and activities that individuals and households employ to sustain their wellbeing. These resources, commonly categorised as 5 types of capital – natural, physical, human, financial and social – play a crucial role in determining livelihood resilience and sustainability (Chambers and Conway 1992). A livelihood is considered sustainable if it can withstand external shocks, recover from stresses, and maintain or enhance its asset base without depleting natural resources. The Sustainable Livelihood Approach (SLA) has emerged as a valuable framework for analysing poverty reduction strategies and rural development, emphasising the importance of asset-based strategies in building resilient livelihoods (DFID 1998; Scoones 1998).

CBF have become a significant livelihood strategy for reservoir fishing communities in Sri Lanka. As a fisheries enhancement approach that integrates aquaculture practices with community participation, CBF are recognised for their potential to improve rural economies and contribute to food security (FAO 1994; De Silva et al. 2006). Given Sri Lanka's extensive network of irrigation reservoirs – many of which were originally constructed for agriculture – CBF have emerged as a secondary use of these water bodies, particularly in seasonal reservoirs with short water retention periods (Amarasinghe and Wijenayake 2015). While CBF have contributed to increased fish production and income generation in rural communities, their sustainability is challenged by climate variability, socioeconomic disparities and governance issues.

A key concern in CBF management is ensuring that livelihood benefits are equitably distributed among fishers. Social equity in CBF involves fair access to resources, equal participation in decision-making and the ability of all stakeholders to benefit from fisheries-related income opportunities. However, structural inequalities, limited access to financial services and the absence of strong institutional mechanisms often hinder equitable benefit sharing among fishing communities.

This study aims to assess the strategies for achieving socially equitable livelihood benefits in CBF in Sri Lankan reservoirs. By applying the SLF, this research examines how the 5 forms of capital – natural, physical, human, financial and social – contribute to or constrain equitable livelihood outcomes. The findings of this study will provide insights into policy interventions and community-based strategies that can enhance social equity and sustainability in CBF-dependent fishing communities.

Materials and methods

The study on 'Strategies for achieving socially equitable and livelihood benefits from CBF in Sri Lankan reservoirs' was conducted between October 2023 and March 2024 in 13 selected reservoirs in 3 districts. The selection of reservoirs for this study was based on geographical location and reservoir size, covering major, medium and minor reservoirs in the Kurunegala, Puttalam and Anuradhapura districts. Fishing households were selected using a randomised sampling method, with participants drawn exclusively from the reservoir fisheries society members. Data were collected using 2 primary qualitative methods: semi-structured interviews and LGDs. A total of 272 face-to-face semi-structured interviews were conducted across these reservoirs with fishers to gather in-depth information on the strengths, weaknesses, opportunities and threats related to economic, social and cultural factors influencing socially equitable and livelihood benefits. These findings were integrated into a SLF-SWOT analysis. The primary objective of this activity was to identify opportunities and constraints in achieving socially equitable livelihood benefits from CBF.

This study uses the SLF (Ashley and Carney 1999; DFID 1999) (Figure 5.5.1), which explores how and extent to which different types of livelihood assets combine and contribute to different livelihood strategies in order to achieve livelihood outcomes. Central to the framework is the analysis of the range of formal and informal organisational and institutional factors that influence sustainable livelihood outcomes (see Scoones 1998 for a full description on the framework). The livelihood assets explained in this framework are, in turn, classified into 5 major categories, including:

1. Human capital
2. Natural capital
3. Financial capital
4. Physical capital
5. Social capital.

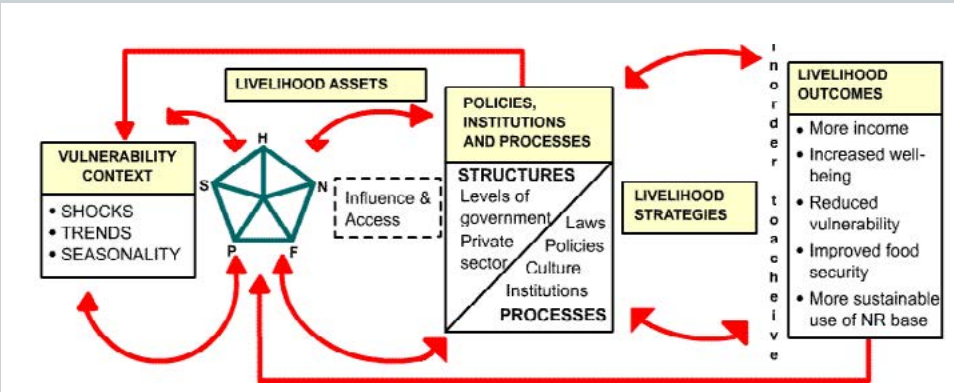

Figure 5.5.1: The sustainable livelihoods framework (Ashley and Carney 1999)

It proceeds by focusing on each component of this framework and with special reference to livelihood assets, and relates them to social equity and livelihood benefits by the CBF-related communities of concern.

In each reservoir, interviews included both male and female members of the fisheries societies, with 97% of respondents being male and 3% female. To ensure structured discussions, a list of topics and guiding questions was developed before conducting the interviews. The ethnic composition of participants consisted of 90% Sinhala, 2% Tamil, 2% Muslim and 6% Burgher. In terms of religion, 88% were Buddhist, 1% Hindu, 2% Muslim and 9% Christian.

Both primary and secondary data collection methods were employed in this study. A draft questionnaire was initially developed and pretested among fishers in the Vijayakatupotha (Puttalam district) and Maeliya (Kurunegala district) reservoirs to assess its suitability for achieving the study's objectives. The insights gained from pretesting facilitated the refinement of the final questionnaire, which focused on socioeconomic conditions, sources of income, family size and factors affecting livelihoods. Primary data collection was conducted through a household survey, complemented by land-use data and relevant annual reports to validate field observations.

A total of 272 fishers from 13 reservoirs in 3 districts (Anuradhapura, Kurunegala and Puttalam) – Kottukachchiya, Andarawewa, Mahauswewa, Pahariya, Tabbowa, Ranawa, Huruluwewa, Hakwatunawa, Maeliya, Kibulwana Oya, Mahasiyambalagamuwa, Usgalasiyabalangamuwa and Karawitagaraya – were interviewed to provide a comprehensive understanding of the livelihood status among CBF communities.

The collected data were systematically processed and analysed using SPSS software.

Results and discussion

Sociodemographic characteristics of fishers and their households

All communities are shaped by their sociodemographic characteristics, which influence their livelihoods and economic wellbeing. The study included both male and female members of reservoir fisheries societies, with a significant gender imbalance observed. Overall, 97% of the participants were male, while only 3% were female. This disparity reflects the limited participation of women in fisheries activities, as some reservoir fisheries

Table 5.5.1: Reservoirs selected for the study

	District		
Reservoir size	**Anuradhapura**	**Kurunegala**	**Puttalam**
Major	Huruluwewa		
Medium		Hakwatunawa Mahasiyambalagamuwa	Karawitagaraya Mahauswewa Tabbowa
Minor	Ranawa	Kimbulwana Oya Maeliya Usgalasiyambalagamuwa	Andarawewa Kottukachchiya Phariya

societies do not allow or encourage female involvement. In terms of ethnicity, the majority of participants were Sinhala (90%), followed by Burgher (6%), Tamil (2%) and Muslim (2%). Religious composition showed that 88% of respondents were Buddhist, while Christians made up 9%, Muslims 2% and Hindus 1%. These demographic patterns highlight the dominance of Sinhala Buddhist fishers in the study areas, with relatively lower representation from other ethnic and religious groups.

Table 5.5.2 presents the sociodemographic characteristics of the target population in this study. The majority of respondents (35%) belong to the middle-aged (40–49 years) category, followed by 29% in the early middle-aged (30–39 years) group. The average age of the respondents falls within this range, indicating that middle-aged individuals play a dominant role in CBF, while the older generation (50 years and above) accounts for 29%, suggesting continued participation even at later stages of life.

In terms of education, 82% of respondents have received formal education up to secondary or tertiary levels, with the highest proportion (44%) attaining secondary education. This suggests that most fishers possess basic literacy, which may support their engagement in fisheries management and financial decision-making. However, 1% of respondents have no formal education, highlighting the need for educational support programs to enhance knowledge transfer within fishing communities.

Household size is another key factor influencing livelihood strategies. Most respondents (79%) live in medium-sized households (3–5 members), followed by 13% in small households (1–2 members) and 8% in large households (6+ members). This indicates that fishing households are generally of moderate size, potentially balancing labour availability and economic sustainability.

Regarding marital status, an overwhelming 95% of respondents are married, while only 3% are unmarried and 1% are widowed. This suggests that fishing livelihoods often support family structures, reinforcing the importance of economic stability in sustaining household wellbeing.

Housing conditions and access to basic infrastructure also reflect the socioeconomic stability of the respondents. A significant 46% of respondents live in houses with asbestos roofing, while 58% have tiled shelters, indicating a relatively stable housing situation. Additionally, almost all respondents (99%) have access to electricity, and a considerable 97% own at least one mobile phone, suggesting high connectivity and access to communication. Furthermore, 77% of respondents own a refrigerator, indicating a reasonable standard of living and the ability to store food, which is essential for improving food security and reducing post-harvest losses.

Overall, the sociodemographic characteristics highlight that CBF communities are primarily composed of middle-aged, married men with moderate levels of education and medium-sized households. Their housing conditions and access to essential infrastructure suggest a relatively stable livelihood, though continued efforts are needed to enhance financial resilience and technological adaptation within these communities.

Perceptions of social equity and livelihood benefits in CBF

The perceived benefits of reservoir fisheries varied across major, medium and minor reservoirs. Income generation was identified as the most significant benefit,

Table 5.5.2: Sociodemographic characteristics of fishing communities

Category	Subcategory	Percentage (%)
Gender	Male	97%
	Female	3%
Age	20–29 (young)	7%
	30–39 (early middle-aged)	29%
	40–49 (middle-aged)	35%
	50–59 (older middle-aged)	21%
	60 and above (older)	8%
Household size	Small household (1–2)	13%
	Medium household (3–5)	79%
	Large household (6+)	8%
Education	No formal education (0)	1%
	Primary education (1–5)	17%
	Secondary education (6–10)	44%
	Tertiary education (11–13)	38%
Civil status	Married	95%
	Unmarried	3%
	Widowed	1%
	Other	1%
Ethnicity	Sinhala	90%
	Tamil	2%
	Muslim	2%
	Burgher	6%
Religion	Buddhism	88%
	Hinduism	1%
	Islam	2%
	Christianity	9%

with 100% of respondents in both major and medium reservoirs recognising it as a primary advantage, while 89% of respondents in minor reservoirs indicated the same. Food security was reported as a benefit by 26% of fishers in both medium and minor reservoirs, whereas none from major reservoirs mentioned it. Independence was cited as a benefit by 18% of fishers in medium reservoirs, 15% in minor and only 4% in major reservoirs. 'Other benefits' were minimally acknowledged, with only 2% of respondents from minor reservoirs referring to any additional advantages (Figure 5.5.2). These findings suggest that while income remains the dominant benefit across all reservoir types, aspects such as food security and independence are more recognised in medium and minor reservoirs.

The study highlights key aspects of wellbeing, vulnerability and sustainability within fisheries societies and communities. Income maximisation was rated the highest (3.85), reflecting its critical role in fishers' livelihoods, while future wellbeing (3.72)

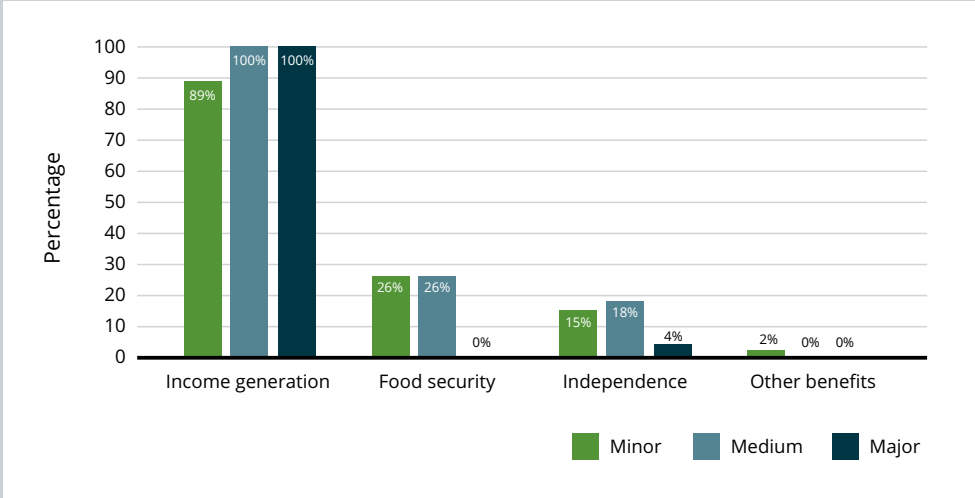

Figure 5.5.2: The perceived benefits of CBF

scored higher than past wellbeing (2.86), indicating a perceived improvement over time. The role of fisheries societies (3.71) and concerns related to vulnerability (3.7) and food security (3.68) were also acknowledged. In terms of social equity, fair distribution of fishing costs (3.66) and income among households (3.65) were rated positively, while fair participation in decision-making received the lowest score (3.59), suggesting a need for more inclusive governance in the fisheries sector.

The income distribution among fishing communities varies across major, medium and minor reservoirs, reflecting different economic conditions. In major reservoirs, the majority (80%) belong to the average income group, while 20% fall into the poor category. Medium reservoirs show a more diverse distribution, with 60% classified as average income, 38% as poor and a small fraction (1%) as very poor or better off. Minor reservoirs have a relatively higher percentage of low-income households, with 54% categorised as poor and 46% in the average income group. These variations highlight the economic disparities among fishers, with minor reservoir communities experiencing higher levels of poverty compared to those in major and medium reservoirs.

Contributing factors to social equity and livelihood benefits

The analysis of human capital in reservoir fishing communities reveals significant differences in main occupations and training received across minor, medium and major reservoirs. In major reservoirs, fishing is the sole occupation (100%), whereas in medium reservoirs, 82% engage in fisheries, with 14% involved in farming and a small percentage in business (1%) or other activities (3%). In minor reservoirs, the dependence on fisheries is lower (50%), with a significant portion (44%) engaged in farming and 6% involved in other activities.

Regarding training received, participation is highest in medium reservoirs (73%), followed by minor reservoirs (20%) and

lowest in major reservoirs (7%). Fisheries training is the most common type across all reservoir categories, with medium reservoir fishers having the highest participation (63%), while minor (17%) and major (7%) reservoir fishers have lower engagement. Farming and business training are minimal across all reservoirs, and a small percentage in medium reservoirs (7%) have received other types of training. These findings indicate a disparity in skill development, with medium reservoir fishers having the most access to training opportunities, while major and minor reservoir fishers have limited exposure to capacity-building programs.

The financial capital analysis of reservoir fishing communities highlights significant differences in credit usage, savings and household income across major, medium and minor reservoirs. Credit usage is highest among fishers in medium reservoirs (65%), followed by minor reservoirs (23%), while it remains low in major reservoirs (12%). Similarly, savings behaviour follows the same trend, with 69% of fishers in medium reservoirs saving money, compared to 24% in minor and only 6% in major reservoirs.

Household income levels vary, with low-income households (earning ≤LKR30,000) most prevalent in medium reservoirs (57%), followed by minor (32%) and major (11%) reservoirs. Middle-income households (LKR30,001–75,000) are relatively evenly distributed, with 48% in medium, 32% in minor and 20% in major reservoirs. High-income households (≥LKR75,001) are more common in major reservoirs (24%), followed by medium (44%) and minor (32%) reservoirs.

The reported monthly household income ranges from LKR10,000 to LKR150,000, with a mean income of LKR61,748.09. However, a large standard deviation of LKR26,322.737 indicates substantial income disparity within the fishing communities. These findings suggest that medium reservoir fishers have greater access to financial resources, while major and minor reservoir fishers exhibit lower financial security and savings behaviour.

Natural capital, including access to drinking water and land ownership, varies significantly among reservoir fishers, influencing their livelihoods and wellbeing. Drinking water access is highest among medium reservoir fishers (72%), while only 19% in minor reservoirs and 9% in major reservoirs report having access, highlighting disparities in essential resources. Land ownership also differs across reservoir types; in major reservoirs, 72% are small landowners (≤40 perches), whereas in medium reservoirs, land ownership is more evenly distributed, with 27% owning small plots, 30% medium-sized plots (41–100 perches), and 34% large plots (101–400 perches). In minor reservoirs, the majority (65%) own large plots, with only 5% holding small land. Additionally, a small percentage in each category owns very large plots exceeding 400 perches, with 15% in minor, 9% in medium and 8% in major reservoirs. These variations in natural capital demonstrate the unequal distribution of land and water resources, affecting the sustainability and resilience of fishing communities.

Physical capital, including household assets and fishing equipment, varies across reservoir fishing communities, influencing their productivity and quality of life. Mobile phone ownership is widespread, with 100% of major reservoir fishers owning one, followed by 98% in medium and 94% in minor reservoirs. Electricity access is nearly universal, with 100% in major and minor reservoirs and 99% in medium reservoirs.

Ownership of refrigerators, however, shows a decreasing trend from minor (80%) to medium (76%) and major (72%) reservoirs, indicating differences in household storage capacity. Fishing equipment availability also varies, with fibre boats being more common in major reservoirs (96%) compared to medium (83%) and minor (85%) reservoirs. Traditional rafts (Theppan) are used only in minor (17%) and medium (12%) reservoirs, while major reservoir fishers rely entirely on modern fibre boats. Fibre net usage is high across all categories, with nearly universal adoption (98% in minor, 97% in medium and 100% in major reservoirs). These differences in physical capital reflect variations in technological access and fishing practices among different reservoir communities.

Social capital plays a crucial role in shaping trust, cooperation and social relations within reservoir fishing communities. Trust in fisheries community leaders (3.72) and fisheries society members (3.74) is relatively high, indicating strong confidence in leadership and collective decision-making within fisheries societies. Trust in people within the fishing community (3.61) is slightly lower but still significant, suggesting a sense of unity among fishers. However, trust decreases when extending beyond the fishing sector, with people in the general community (3.4) and people in the village (3.38) receiving lower scores, reflecting weaker social ties with the broader community. Despite these differences, generosity within the fishing community scores the highest (3.84), highlighting a strong culture of mutual support among fishers. These findings indicate that while internal trust and cooperation within fisheries communities are strong, their social integration with the wider community remains relatively limited.

Constraints to maximising social equity and benefits

Several constraints hinder the maximisation of social equity and livelihood benefits in reservoir fishing communities, particularly environmental, governance and economic challenges. Unauthorised fishing is a significant issue across all reservoirs, reported by 100% of major, 90% of medium and 67% of minor reservoir fishers, threatening resource sustainability. Elephant threats are a major concern in all reservoir types, affecting 100% of major and 59% of both medium and minor reservoirs. The presence of excessive aquatic plants (8% in major, 29% in medium and 15% in minor reservoirs) and predator damage (76% in major, 18% in medium and absent in minor reservoirs) further disrupts fishing activities. Governance issues, such as compliance with rules and regulations, are relatively low, with 4% in major, 11% in medium and 7% in minor reservoirs identifying governance as a constraint.

Barriers to income, food security and fisheries sustainability also limit social equity. Unnecessary expenditure and excessive spending are high across all reservoirs (96% in major, 80% in medium and minor), alongside a lack of proper financial management (4% in major, 20% in medium and minor). The high cost of food is a universal challenge, affecting all fishers in major and minor reservoirs and 94% in medium reservoirs. While most communities can access food within a reasonable distance, long travel distances to buy food are a minor issue (5% in medium reservoirs). Additionally, limited knowledge (52% in major, 64% in medium, 50% in minor) and fisheries society crises (48% in major, 36% in medium, 50% in minor) indicate challenges in accessing education and maintaining cooperative structures. These constraints collectively

impact the sustainability, equity and economic stability of fishing communities.

Opportunities to maximise social equity and benefits

Opportunities to maximise social equity and livelihood benefits in reservoir fishing communities include improving access, income, wellbeing, and reducing vulnerability. Expanding fisheries societies by recruiting new members is a key opportunity, with the highest potential in minor (84%) and medium (77%) reservoirs, though lower in major reservoirs (40%). Supporting farmers' membership in fisheries societies could also strengthen social equity, though this is more common in major reservoirs (32%) compared to medium (14%) and minor (6%) reservoirs. Ensuring fair commission practices in the fish trade is a strong opportunity across all reservoirs, particularly in medium (79%), major (60%) and minor (70%) reservoirs. Diversifying income sources, such as promoting GFP, has potential in all reservoir types, with minor reservoirs showing the highest interest (28%). Financial stability could be enhanced by maintaining a savings system, which is consistently high across reservoirs (68% in major, 76% in medium and 74% in minor). Additionally, providing financial counselling may improve household financial management, though interest is relatively low (32% in major, 36% in medium and 26% in minor reservoirs).

Efforts to reduce vulnerability and improve food security are also promising. Risk management programs are crucial, with strong support in medium (73%), major (64%) and minor (54%) reservoirs. Insurance systems could help mitigate financial risks, especially in minor reservoirs (46%), though support is lower in medium (26%) and major (36%) reservoirs. Providing subsidised meals is a widely accepted strategy (72% in major, 65% in medium and 77% in minor reservoirs), helping to improve food security. Establishing fish shops to enhance market access has lower but notable interest (28% in major, 32% in medium and 23% in minor reservoirs). These opportunities highlight pathways to strengthen social equity, economic resilience and food security within reservoir fishing communities.

Conclusion and recommendations

The findings highlight that social equity and livelihood benefits from CBF vary across reservoir fishing communities, with socioeconomic and governance factors playing a crucial role in shaping outcomes. While opportunities exist to strengthen local governance, enhance capacity building and promote community participation, significant constraints such as policy gaps, financial limitations and inequitable resource distribution hinder progress.

To ensure sustainability, effective CBF integration should focus on equity and resilience within fishing communities. Policy enhancements must address governance weaknesses and promote equitable access to CBF benefits while introducing financial support mechanisms for small-scale fishers. Capacity building should be prioritised by empowering fisheries societies in decision-making and providing training for sustainable fishing practices. Community engagement and collaboration through participatory governance models and partnerships with local authorities, research institutions and fishing communities can further drive progress.

For future research, long-term studies on the impact of CBF on social equity and livelihoods are essential, alongside an exploration of gender dynamics to develop more inclusive fisheries policies.

These measures can contribute to a more equitable and sustainable reservoir fishery system.

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