



Research Article

Sea insecurity and small-scale fishers' well-being: A case study in Mannar, Sri Lanka

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Abstract: International maritime boundary lines and legitimate fishing techniques safeguard the marine environment from poaching and over-exploitation of resources while ensuring sustainable fisheries-based livelihoods. Indian trawler trespass and illegal fishing have been extensively practiced along the Northwestern coast of the country, especially in Mannar. This paper examines the impacts of sea insecurity on small-scale fisheries living in Mannar. A mixed method approach was adopted employing both quantitative and qualitative data collection techniques, including a questionnaire survey (n=138), focus group discussions, in-depth interviews (n=15), participatory rural appraisal techniques, and key informant interviews (n=8). Fishing sites: Silavathurai, Vankalai, Pesalai, and SouthBar, which host both small-scale migrants and local fishers, were selected for the study. Individuals for the qualitative data collection were selected purposively, yet a simple random sampling technique was adopted for the questionnaire survey. A three-dimensional well-being approach- material, relational and subjective was used to assess the well-being of small-scale fishers. The Indian trawler poaching has reduced fishers' harvest by more than 60 percent, thereby changing the income by 90 percent, making almost all debtors. Loss of material well-being due to increased cost of production, lower catch per unit effort, debt, and prolonged deprivation has led to illegal fishing such as dynamiting, ring seine, log fishing, and brush piles in the near-shore area. Mushrooming social conflicts among multiple user groups have jeopardized inter and intra-community relationships and networks. Illegitimacy negatively affects on the subjective well-being of fisher folk, both men and women, due to loss of self-esteem, frustration, and fear. Respondents claim interactive and communicative governance mechanisms for better implementation of rules and regulations. Frequent boat patrols and reconnaissance are requested to ensure sea security. Two main conclusions are drawn. First, sea security is needed to ensure the well-being of fisher folk over material, relational, and subjective aspects. Second, the lack of sea security encourages illegitimacy; the marine ecosystem's health is damaged and jeopardized. Thus, an interactive and inclusive governing regime is suggested, which would replace the present inefficient and fragmented governing structure.

Keywords: Destructive fishing, Illegitimacy, Poaching, Sea security, Well-being.

1. Introduction

Conflicts and social unrest on sea and ocean have increased in the recent past (Aswani, 2022; Yeasmin and Tkach, 2022; Williams, 1996). The absence of maritime governance creates possibilities for illicit activities (Pomeroy et al., 2016), including poaching and destructive fishing in sea-based territories (Yeasmin and Tkach, 2022). Multiple negative socioeconomic impacts have been brought forth by economic stress, social hardships, and complex competition for resources (Pomeroy et al., 2007). Security-related threats and challenges, also referred to as 'fish wars' (ibid.), are mitigated through power balancing, negotiation, deterrence, and/or military activities. However, security and related matters need to be evaluated from economic, societal, political, and environmental aspects (Yeasmin and Tkach, 2022; Bates, 2001) so as the menace of insecurity. In a broader sense, maritime governance has become woefully inefficient due to: limitations in the maritime security systems, enormous conflicts among user groups, illegitimacy or inadequate rules and regulations, poor enforcement and monitoring, partial judicial processes, and

corruption of institutions and personnel (Koralagama and Bavinck, 2022; Sandoz, 2012). Eventually, fisher folk's well-being is affected as these impede food and nutritional security, livelihoods (Scholtens, 2016; Allison et al., 2009), and social relationships (Weeratunge et al., 2020), depriving material, relational, and subjective well-being (Coulthard et al., 2014). Despite the plethora of literature on maritime security and governance (Scholtens et al., 2019), well-being perceived through legitimacy is lacking.

Mannar region on the Northwest coast of Sri Lanka hosts 17,540 active fishers from 14,990 fishing families from 36 fishing villages (MFARD, 2021). Hence, the fishing community accounts for 48 percent of the district's population—the region is characterized by a small-scale fishery employing both traditional and modern fishing techniques. Different types of canoes, locally known as *Kattumaram*, *theppam*, *vallam*, are the traditional fishing craft with fishing gears such as set nets or stake nets, beach-seine, cast net, trap diving, and hand lines. Trawlers (28-32 feet) with trawling nets and outboard engine fiber reinforced plastic boats (OFRP)



(17.5-23 feet) with gill nets are the typical modern craft and gears used (Peramunagama, 2020). Despite the diverse ecosystem-based livelihoods of lagoon, coastal, and offshore fishing, coastal fishing with small boats is paramount. This is evident in the number of OFRP boats occupying 68 percent of Mannar's total fishing fleets (MFARD, 2021). The main governing institution in Mannar is the central Government through the National Fisheries and Aquatic Resources Act of 1996. In addition, community-based organizations are prevailing, namely the Panankattikuttiya fisheries association and the Valaparaï women association.

Using multiple fishing techniques with different craft-gear combinations characterizes the Northern fisheries of Mannar. Different fishing groups are responsible for different fishing gears. Multi-stakeholder issues in the Northern coastal waters fall in two directions. The first is the Indian Trawling issue, and the second is the use of destructive gear and conflicts among diverse local stakeholders; southern migratory fishers, fish merchants, gear groups, and a few others (Amarasinghe, 2013).

Destructive fishing refers to using fishing gears in ways or in places where one or more of the critical elements of an ecosystem are eliminated, destroyed, or unable to provide essential ecosystem functions. From an ecosystem and precautionary approach, destructive fishing is the use of gears or practices that are at high risk of local or universal damage to a population of the target, related or dependent species, or their habitats to eliminate the possibility of continuously producing the goods and services desired for current and future generations, especially if recovery is not possible within an acceptable time frame. Few, if any, fisheries are consistently "destructive" (Willer et al., 2021). Only a few fishing gears or fishing methods are recognized as inherently destructive wherever and however they are used, the prime examples being explosives and synthetic toxins. In the absence of a formal agreement on this term, classifying a gear or practice as destructive is a policy choice in accordance with predetermined objectives and national and international law (FAO, 2009).

Having this broader definition of destructive fishing, it is obvious that the impact is detrimental and negatively affects human well-being, especially in the fishing community. Thus, security or an effective governance mechanism is crucial to safeguarding the ecosystem. The absence of security cultivates illegal activities (Peramunagama and Thusyanthini, 2021; Koralagama, 2020). The fisheries are affected by the trespassing Indian trawlers and destructive fishing gear (Scholetens, 2016; Amarasinghe, 2013), and the lack of an effective governance mechanism (Koralagama and Bavinck, 2022). Eventually, the well-being of fisher folk is affected.

Thus, this study aims to unravel the impact of illegitimacy and maritime insecurity on small-scale fishers through a well-being lens. The three-dimensional

well-being approach is used to analyze well-being over the material, relational, and subjective dimensions (McGregor, 2007; Coulthard et al., 2011). Material well-being refers to an individual endowed with income, employment, health, environment, wealth, and education. Relational well-being explains social capital, relationships, rules and regulations, freedom from conflicts, and equality. Ideologies, beliefs, satisfaction, confidence, and patience are considered under subjective well-being (Coulthard et al., 2014; White, 2010; McGregor, 2007).

2. Methodology

The aim of this study was achieved through an intensive fieldwork carried out in the years 2017 and 2019. Mannar islet in the Northern Province was selected due to the prevalence of Indian trawler poaching and illegal fishing. Four fishing areas, namely Silavathurai, SouthBar, Vankalai, and Pesalai, where both migrants and local fishers reside, particularly during the northeast monsoon period, were selected. With the onset of the northeast monsoon- from October to March- the fishers on the west coast migrate to Mannar; hence the target population of the research is both seasonal migrant fishers and local fishers. A mixed method approach was adopted using quantitative and qualitative data collection techniques. A questionnaire survey (n=138) was administered to glean data from migratory fishing households on demographic factors, income, fish catch, cost of operation, loss of fishing, satisfaction, and other quantifiable variables. Qualitative data collection methods were adapted through key informant discussions with three female fisher wives and five fishermen, including two office bearers (total n=8), two focus group discussions (FGD) at each study area (n=8/10 per FGD), two pair-wise ranking exercises in Silavathurai and Pesalai, and in-depth interviews (n=15). The sample for the questionnaire survey (138 fishing households) was drawn randomly by using the list obtained from fishing cooperatives/associations. However, the individuals for the qualitative data collection were selected purposively based on the requirement. The interpretivist approach was undertaken through an emic epistemological departure to answer why and how questions while data were interpreted quantitatively and qualitatively for more elaborative inferences.

The pair-wise ranking is a tool used in group discussions to gather information logically with the participation of all the members. It is one of the important tools in the Participatory Rural Appraisal toolbox, which uses to prioritize the burning issues prevailing in a community. Being a group activity, the decisions were taken collectively. First, the group members were asked to mention the most pressing problems in their day-to-day life (or particular to the preferred activity). Then the stated problems arrange in a matrix displaying horizontally and vertically. Next, the group was asked to compare one problem against the other, discussing and deciding which one was the most severe issue for them. Once all the problems compare collectively in a sequence, the occur-

Table 1: Pair-wise ranking exercise in Silavathurai

Problems	1	2	3	4	5	6	7	8	9	10	11	Total	Rank
1. Lack of water	x	2	3	4	5	6	7	8	9	10	11	0	11
2. Lack of toilet		x	3	4	5	6	7	8	9	10	11	1	10
3. Reduce no. of migrant fishers			x	4	3	6	7	8	3	3	3	6	5
4. Indian trawlers				x	4	4	4	4	4	4	4	10	1
5. Indian" vallam"					x	6	7	8	5	5	5	5	6
6. Use of brush piles in near-shore						x	6	6	6	6	6	9	2
7. Use of logs & dynamite							x	7	7	7	7	8	3
8. Ring seine								x	8	8	8	7	4
9. Lack of Sinhala officers for fisheries office									x	9	9	4	7
10. Police fine when boat transport										x	10	3	8
11. Boat transport cost is high											x	2	9

Source: Focus Group Discussion (n=8)

Table 2: Pair-wise ranking exercise in Pesalai

Problems	1	2	3	4	5	6	7	8	9	10	Total	Rank	
1. Destroy nets (Brush pile and stake net)	x	1	1	1	1	6	7	1	1	10	6	3	
2. Thievery of nets			x	3	4	5	6	7	8	9	10	0	6
3. Use of monofilament net				x	4	5	6	7	3	3	10	3	4
4. Use explosive materials for small fish					x	4	6	4	4	4	10	6	3
5. Getting sand from land						x	6	7	8	5	10	3	4
6. Indian trawlers							x	7	6	6	10	7	2
7. Fish merchants reduce fish price								x	8	7	10	6	3
8. Local trawlers									x	9	10	3	4
9. Local and Indian fishermen fight at sea border										x	10	2	5
10. Use of dynamite											x	9	1

Source: Focus Group Discussion (n=10)

rence of each issue in the matrix was counted. Finally, the count (frequency of each problem that has been prioritized in the matrix as most important) was ranked. This tool was demonstrated in Silavathurai and Pesalai with the migrant and local fishing communities, respectively.

3. Results and discussions

Migrant and local fishers in Mannar are small-scale fishers. They target small pelagic fish species such as sardinella, smoothbelly sardinella, ponyfish, shortfin scad, and a few more. These fishers employ gill nets, hook and line, and occasionally purse seine (ring seine nets) with OFRP boats. Albeit, local fishers have their permanent residencies, migrants live in small temporary huts constructed on the beach. However, both communities are struggling with a myriad of issues; hence pair-wise ranking exercise was employed in Silavathurai and Pesalai, where migrants and locals reside, respectively. The pair-wise ranking outcome of Silavathurai is given in Table 1.

Indian trawling is one of the burning issues for both communities (see Tables 1 and 2). In trawling, bag-shaped nets are pulled along the ocean floor, sweeping the sea bed and entangling pieces of coral and fish on their routes. Large plates at each end of the net are dragged along the ground, keeping the net closer to the

ocean floor while stirring up sediment and forcing all the animals into the net's closed end. Bottom trawling literally scrapes the ocean floor, cleans ocean life, and is considered clear-cutting forests under the water (Rijnsdorp et al., 2020). Thus, the impacts of trawling are many folds; (i) it destroys the marine ecosystem and fish habitats, (ii) detrimental to small-scale fishers, fishing gears, and craft, (iii) it chases away fish; therefore, the small-scale fishers have to sail far resulting higher operational costs, and (iv) poor catches. Although a few Indian *vallum* trespasses illegally (violating the International Maritime Boundary Line law), the impact has been reported as negligible. Hence (in Table 1), it has been ranked sixth. Almost all the fishers interviewed- both migrants and locals- are not much opposed to Indian *vallum* as it is neither destructive nor threatening to their livelihood. The second, third, and fourth issues were related to illegal fishing techniques. None of these techniques are banned (except dynamiting) by the Fisheries Act of 1996, but operationalization is illegal. Security at the IMBL has not been confirmed but leaving voids to encroach trawlers into Sri Lankan waters.

Dynamiting was ranked as the first severe constraint in Pesalai, a process in which explosives are used to kill fish. Dynamite or blast fishing is done easily and cheaply with dynamite or homemade bombs made of locally available materials. The eruptions can unintentionally kill many fish and other marine organisms and damage or destroy

the physical environment. Even though dynamiting and ring seine nets are banned by the law, a few locals still use them. These fishing techniques are hazardous to the ecosystem where the small fingerling is caught, making the resource unsustainable. The following quote expresses the vexation.

"If this dynamiting and ring seine continues, the sea will empty one day"
(Migrant fisher from SouthBar)

Brush pile fisheries are a fishing technique whereby cut mangrove branches are put in lagoons to aggregate fish and encircled with a net. When the mangrove twigs rot, they are replaced by new branches so that a single brush pile exists in the same place for a long time. As a single person does all these works, the brush pile and its site are considered as his property. The majority of locals are heavily practiced. Although brush piles are set for squid for lucrative earnings, they are not allowed in the near-shore area. The disagreement of migrant fishers is shown by the quote given below.

"Sea is like a forest; we cannot manure our boats freely. Getting entangled with brush piles, our nets get damaged. It is a huge cost for us"
(Migrant fisher from Silavathurai)

Gill nets with a single filament are called monofilament nets. This transparent plastic has been widely used because it is usually more difficult to see, hence more efficient at catching fish. These nets catch large quantities of fish due to their high catchability, which could be attributed to the fact that fish cannot see the net due to the thinness of the filament. Fish that are not targeted in a catch and fish that are still growing are also caught in these nets. An uncontrolled increase in fishing efforts of this method is leading to the sudden depletion of target stocks. Monofilament gill nets and ring seine are detrimental to fisheries' sustainability. Over-exploitation, less recruitment, and unsustainability jeopardize the future of the fishery. Thus, the job security of fisheries-related livelihoods is challenging.

Consequently, fishing households' and communities' material and subjective well-being are threatened. Insufficient supervision and monitoring have led to such illegitimacy at local and national levels; thus, the fishing techniques are not adequately examined. They have been blatantly justified by wrongdoers as follows.

"Due to Indian trawling, dynamiting, and surukku nets [ring seine], we are unable to get a good harvest. I could not help to go against the rule because I cannot let my children to starve"
(Migrant fisher from Southbar)

"Fishing is only possible for us during these months. However, migrants are coming, and Indian trawlers are

poaching. Fishing has become a contest. We can pull in only during this period, but it is also limited due to competition. We use these earnings for the rest of the year. We do not migrate like others. Therefore, we try to get maximum harvest"
(Local fisher from Arippu)

These quotes explain the impacts of Indian trawling, illegal fishing, and migration on locals as well as migrants. However, the impact of migration is beyond the aim of this paper. Hence, rest two factors were discussed. Poaching and illegal fishing are considered as a violation of rules and regulations. Tremendous impacts on fishers' well-being are reported and observed during the fieldwork.

Local respondents of FGDs, especially in Pesalai and Silavaturai claimed that destructive fishing gears are more efficient and thus able to land higher catches compared to more acceptable fishing gears. Therefore, fishing households can accomplish their material well-being for a shorter period as they over-exploit the resources. However, use of destructive fishing gear damages relational well-being and subjective well-being due to the annoyance and mental unrest caused by illegal activities. In contrast, due to a lack of formal education (in Pesalai), fishermen stick to these fishing gears because they do not appreciate the negative impacts of using these gears. At the same time, the non-availability of alternative livelihoods and the weakness of policies have been highlighted as reasons for using destructive gear, hence the Government's passive acceptance of destructive fishing gear. The availability of cheap but destructive fishing gears on the market also contributes to the continued existence of these gears.

3.1. Impact on three-dimensional well-being

This study also probed into the issue of the well-being of Mannar fisheries. The material comprises assets, welfare, and standards of living. For practical analysis, the relational aspect is divided into two spheres: the social: social relations and access to public goods; and the human: capabilities and personal relationships. The subjective also has two aspects: on the one hand, people's perceptions of their (material, social, and human) positions, and on the other hand, cultural values, ideologies, and beliefs (White, 2010).

Fishers perceive material well-being as much more important for a comfortable life. The agreement of fishers is shown by the quote given below.

"To live well, money is a critical factor. Our main income is fishing, and new craft and fishing gears are required to do it well. Most of us are crew members. We have no craft. Therefore, our husbands earn little money. We wish one day our husband will buy their boats"
(Local fisherwoman from Vankalai)

They have suffered 30 years from armed war and have lost most of their belongings, including fishing gear, houses, and property. Further, illegitimacies affect fishers' and fishing communities' material, relational, and subjective well-being. Loss of income (see Figure 1), job insecurity, higher cost of production, resource depletion, physical insecurity, indebtedness, and limitations on dried fish processing (for women) have deprived fishers and fishing communities of material well-being.

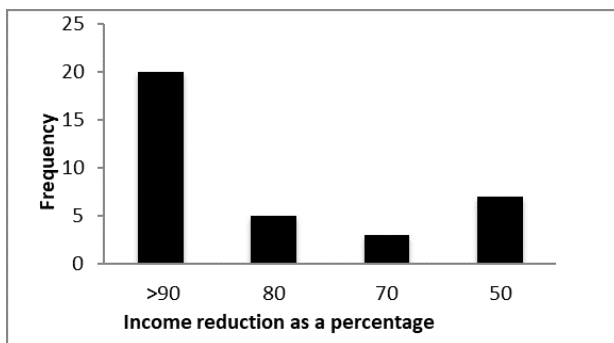


Figure 1: Income reduction of Mannar fishers due to Indian trawling (Source: Fieldwork)

Figure 1 presents the income reduction of small-scale fishers (migrants and locals) due to Indian trawling. More than 90 percent of fishing income is foregone due to the loss of fishing days, mainly when trawling occurs. On the other hand, trawling reduces Catch Per Unit Effort (CPUE) due to comparatively longer fishing trips. Fish in near-shore is chased away due to trawling, thus operational costs have been increased. Frequent income losses, higher operational costs, and inability to do fishing freely make fishers debtors depressing them with mental frustration. These deprivations and dissatisfactions adversely affect social relationships.

Indian trawling brings adverse impacts on relational well-being as it breaches law and relationships. This leads to conflicts among diverse fisher groups who pursue a higher share of the limited available resources that may negatively affect other individuals, communities, and at the country level. This was followed by increased entry into fishing (or increased fishing pressure). Definitely, trawling by Tamil Nadu fishers can be called 'resource smuggling'. With a low level of development in the area and in a context of low availability of alternative employment, fishers have no alternatives other than falling back on common property resources and using them more intensively. Hence, vigilant sea security has to be enforced.

As evident from the suggestions made by people, implementing a "trawl ban" is considered to be a measure that would improve the well-being of both men and women (Amarasinghe, 2013). Enforcing laws strictly against the users of destructive fishing gear and drug trafficking, improving people's safety and security, improving the population's educational standards, etc., are mentioned by both men and women as measures to be adopted to improve their well-being. Apart from these

common factors, men mentioned the importance of resolving land disputes (along with releasing land acquired for establishing high-security zones) and controlling the price of 'fish' (establishing fair prices). At the same time, women indicated the importance of strengthening the fisheries cooperatives and proper governance (as indicated by "appropriate decision making" by state officials) as factors that would improve their well-being. This analysis also highlights trawling, destructive fishing, weak law enforcement, drug trafficking, weak safety and security measures, and weak governance as the "ill-being" factors confronted by the coastal populations in the North. It is evident that most ill-being factors are related to multi-stakeholder issues in the North.

Conflicts between migrants and locals, violence, competition and disputes among multiple user groups, and loss of relationships due to indebtedness is crucial concerning relational well-being. Frustration, loss of self-esteem, fear of the future, and loss of freedom to engage in fishing are the factors affecting subjective well-being. In contrast, fishers expect legitimacy to safeguard the marine ecosystem, especially from Indian trawling. That helps to stop illegal fishing as well. The absence of trawling would result in resource abundance. Hence, illegal fishing methods would not be essential for a lucrative harvest. Vigilant surveillance and monitoring mechanisms are crucial in controlling poaching and environmentally hazardous fishing techniques while ensuring the marine ecosystem's health following illegal, unreported, and unregulated guidelines (DFAR, 2013). Responsible authorities, mainly Navy and fisheries officers, must be mindful and safeguard the fishery while strengthening sea security and legitimacy that enhance small-scale fishers' individual and collective well-being.

4. Conclusion

This paper examines sea insecurity and illegitimacy prevailing in northern Sri Lanka, especially in the Mannar islet. "Poorly governed or ungoverned maritime spaces also invite undue influence from predatory states that seek to exploit a country's offshore fisheries...or natural resources" (Pomeroy et al., 2016). Proving the same, sea insecurity in Sri Lanka has underpinned two main problems; Indian trawlers trespass the IMBL and extensive use of illegal fishing techniques. Impacts of these illegitimacies affect fisher folk's material, relational and subjective well-being in multiple ways, which further drive fishers to engage in illegal and destructive fishing methods. Moreover, the marine ecosystem has been destroyed due to Indian trawling and illegal fishing methods. The use of efficient but destructive fishing techniques results in a major source of conflicts among the stakeholders in Northern Fishing communities. Disagreements arise when the interests of diverse user groups are incompatible and when the priorities of some user groups are not considered in projects, programs, and policies. Such conflicts of interest are an inevitable feature of all societies. These conflicts, if not addressed, can escalate into violence, cause environmental degradation,

disrupt programs and undermine livelihoods. This study concludes that sea security, reconnaissance, monitoring, and control are essential to sustain the marine ecosystem. Negligence of responsibilities would not only result in the ecosystem's degradation but also jeopardize livelihoods, relationships, social networks, life satisfaction, and mental freedom. Material, relational, and subjective well-being is tremendously affected. The remedies are expected from respective authorities, including Navy and fisheries officers, within an effective governance regime.

5. Data availability

The data supporting this study's findings are available on request from the corresponding author.

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