https://doi.org/10.4038/cjmr.v7i1-2.69

FGS - CJMR Journal - March & November 2022 - Volume 07 - No. 01 & 02 (36 - 61)

Prevention of Destructive Fishing Practices: Prospects and Challenges in Law Reform

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Abstract

Destructive fishing practices have been identified as a common problem in the Northern Province, Sri Lanka. The major causes for destructive fishing in Northern region are increasing the demand for fish consumption, lack of alternative jobs for early dropout schoolchildren, increased gear efficiency, policy failure of existing laws, and poaching by Indian and Southern migratory fishers. The dynamiting, bottom trawling, monofilament net, stake net, brush pile fisheries, purse seines and scuba diving have been identified as the most common destructive fishing practices in the Northern region. Consequences of destructive fishing practices include unintentional killing of target and non-target fish and other marine organisms, hampering local fishing activities such as operations of gill nets and fiber plastic boats and threatening environmentally sensitive marine ecosystems in Sri Lanka. The entire fishing sector in Sri Lanka is regulated by mainly the Fisheries and Aquatic Resources Act No. 2 of 1996 and the Fisheries Act No. 59 of 1979 enacted by the Department of Fisheries and Aquatic Resources (DFAR). The Fisheries Act No. 59 of 1979 prohibits fishing by foreign boats in Sri Lankan waters with provisions to impose penalties for any violations. However, major loopholes which are not included in the act comprise of type of fishing gear, methods and harmful material that are prohibited and specific penalty system for usage of banned fishing gear, materials and methods. At the international level, Sri Lanka has ratified the

ISSN : 2362-0633

United Nations Convention on the Law of the Sea (UNCLOS) established to outline a legal framework for all marine and maritime activities. Furthermore, the major international instruments ratified by Sri Lanka are "The International Union for Conservation of Nature (IUCN), The Conservation of Biological Diversity (CBD), and The Conservation on International Trade in Endangered species (CITES). However, these legal instruments have not been regulated in the Sri Lankan fishing sector. Therefore, it is necessary to revise the existing laws with proper law enforcement while considering geographical regions, type and abundance of marine resources, oceanography, ecology, social aspects and regular monitoring system of fishing practices to maintain the sustainability of marine resources.

Keywords: Destructive fishing, Laws, Marine eco system, Northern Province, Sri Lanka

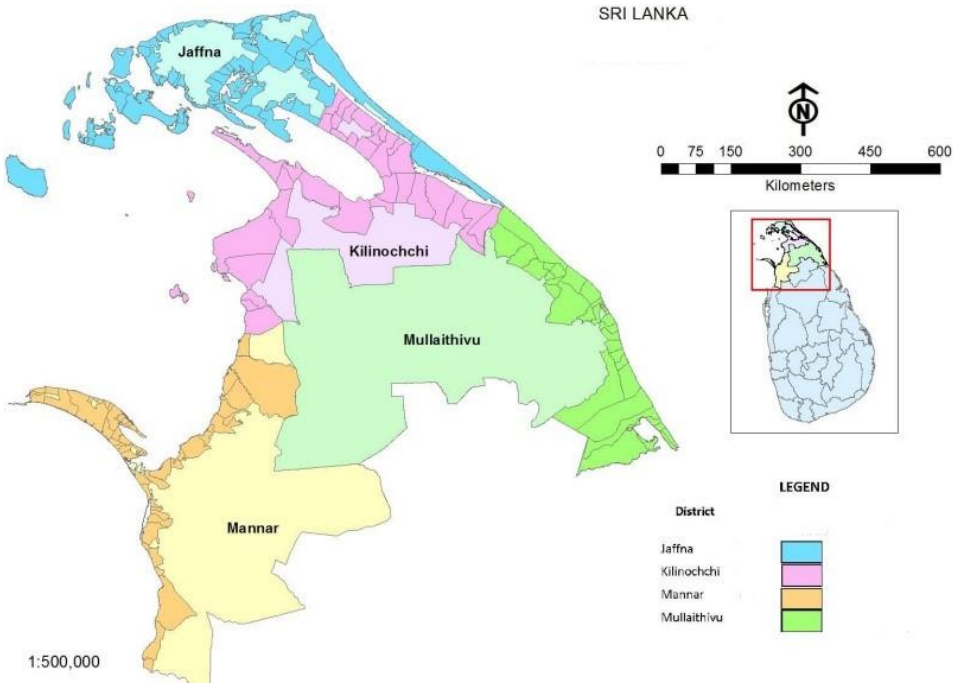
Introduction

Fisheries sector in Sri Lanka plays a major role as it supports mainly for employment and nutrition demand. There are four districts contributing to marine fishery sector in Northern Province of Sri Lanka namely Jaffna, Mullaitivu, Kilinochchi and Mannar (Fig.1). Fishery sector is an important economic element in districts of Northern Providence especially Jaffna and Mannar since many people choose marine fish catch as their main livelihood. (Sosai, 2015; Peramunagama, and Ramanathan, 2021) and nearly 200 000 people are depend on the costal fisheries (Sosai, 2015; Ragavan et al., 2016; Thivviyan and Jayakody, 2016). For instance, fisheries are the main source of income in the Mannar district. According to the Fisheries and Aquatic Resource and Development (2019) of the Mannar District, the fishing population in Mannar comprises 17,540 from 14,990 fishing families from 36 fishing villages, approximately 48% of the district's population. The highest marine fish catch in Northern Province (Mt) in 2019 was reported in Jaffna District which was 44250 and then followed by Mannar, Kilinochchi and Mullaitivu which were 25270, 11670 and 5120 respectively. Therefore, Jaffna and Mannar Districts

were taken pioneer position for marine fish catch in Northern Province (Fisheries Statistics, 2020).

Jaffna peninsula has been reported as having one of the highest coral reef diversities in Sri Lanka which was not discovered in the past due to 30 years old ethnic conflict (Arulananthan et al. 2021). Further, there is only a sparse seagrass spread along the shallow coastal belts of the Jaffna peninsula and around the Jaffna islands. Palk Bay and the Gulf of Mannar have been found to be biodiversity hotspots as there are estimated to include over 20 percent of marine life from the entire Indian Ocean (Peramunagama and Ramanathan, 2021). The Bar Reef ecosystem which is known as the largest coral reef ecosystem in Sri Lanka is located in Gulf of Mannar. Further, The Palk Bay and Gulf of Mannar together which consist of an area of 10, 500 km^2 is a shallow and highly productive area due to the presence of sandy shores, coastal lagoons, estuaries, mangroves, coral reefs, and seagrass beds with sand dunes (Miththapala, 2012). Moreover, seagrass beds can be found from Mannar Island (from Mannar to the northwest across the Palk Bay to Rameshwaram Island in India) to the mainland and among coastal lagoon of the Jaffna islands that provide good breeding ground for fish and other marine fauna especially sea cucumber and prawns (Kumara, 2012; Kularatne, 2014). The fringing coral reefs located in the Jaffna peninsula around the island of Palk Bay and along the northern coastline in the Palk Strait provide nurseries for fish and invertebrates (Fig.2) (Rajasuriya and White, 1995; Rajasuriya, 2007; Kularatne, 2014). Therefore, the Northern Province in Sri Lanka provides an ideal location for the marine fishery industry in Sri Lanka.

Figure 1: *Marine fishing districts in the Northern Province, Sri Lanka*



Source: Amerasinghe, 2015

Figure 2: *Costal area around Northern Province in Sri Lanka*

Source: Miththapala, 2012

There was no widely accepted definition of term "Destructive Fishing Practices". However, according to the Food and Agriculture Organization defines that destructive fishing refers to the use of fishing gears in ways or in places such that one or more key components of an ecosystem are obliterated, devastated or cease to be able to provide essential ecosystem functions. Indeed, many fishing gears could be considered "destructive" if used in the wrong environment (Chitravadivel, 1990). From an ecosystem and precautionary approach perspective, destructive fishing refers to the use of gears and/or practices that present a high risk of local or global damage to a population of target, associated or dependent species or their habitat, to the point of eliminating their capacity to continue producing the expected goods and services for present and future generations, particularly if recovery is not possible within an acceptable time frame (FAO Fisheries and Aquaculture Report No. 925).

Nature of the Environmental Problem

In the late 1950s, with the emergence of Blue revolution, fishery sector showed a rapid growth in terms of fish production, fish consumption, fishing income and employment. Therefore, use of destructive gears appears to emerge as a crucial factor which threatened the sustainability of the fish resources and caused degradation of resources (Peramunagama et al., 2017). Destructive fishing practices are one of the major environmental issues in Northern Province which create severe ecological, social, political and economic impacts. The reason is lack of awareness among fishers about the impact of destructive fishing on marine ecosystem and sustainability of the fishery industry. Dynamiting, brush pile and multi-hook artificial bait for cuttlefish, stake net, local trawling net, crabs net (trap), disco net, dragging net, gill net, monofilament net, long line, soda net and maduwa net, scuba diving to collect sea cucumber and conch, fishing with moxi and trammel nets and uncontrolled exploitation are reported as destructive fishing practices adopted by fishers in the Northern province of Sri Lanka.

Many destructive fishing techniques cause marine pollution and imbalance in the marine ecosystem due to destruction of ecologically important marine ecosystems.

Most of the coral reefs are more than 100 years aged and they cannot be introduced to their natural environment easily after destruction. Further, coral reefs act as a good feeding and breeding source for fish and many marine organisms and absence of these corals cause a gradual decline in the fish productivity in the area. Moreover, the absence of coral reefs causes destruction of mangrove forests in the coastal area. Mangroves act as a breeding ground for many marine organisms including fish and prawns and the destruction of mangroves led to the depletion of fish resource in the area. Mangroves protect the shoreline during storm events by absorbing energy of waves and reducing the velocity of water by passing water through the dense root mass. Therefore, the loss of mangroves accelerated sea erosion in the area. Destructive fishing has resulted in coastal erosion that may increase the cost of establishment of erosion control structures in the area (Sosai, 2015). Among the 17 Sustainable Development Goals (SDGs) that encompass the 2030 Agenda for Sustainable Development, the sustainable utilization and conservation of life below water has been embedded in goal number 14. One of the targets under this goal is to effectively regulate harvesting and end overfishing, illegal, unreported, and unregulated fishing and destructive fishing practices. Therefore, this article aims at exploring the use of destructive fishing practices in the Northern Province, Sri Lanka, reason for their use, their impacts on the livelihood of fishing population and environment, relevant international instruments, Sri Lanka legal regimes, and their effectiveness.

Methodology

This study was carried out by using information gathered from various secondary sources such as referred academic journals (i.e., international and local scientific journals and law/policy journals), gray literature (e.g., conference proceedings) and the Acts (Fisheries and Aquatic Resources Act No. 2 of 1996 and Fisheries Act No. 59 of 1979) enacted by the Government of Sri Lanka and government gazettes.

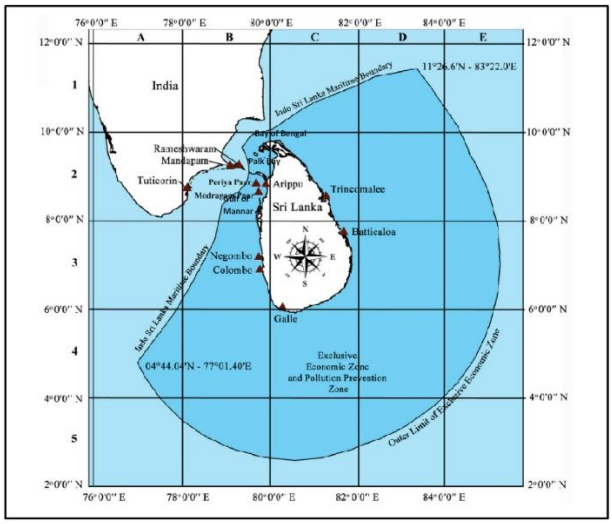
Causes for Destructive Fishing

The growing population has increased the demand for fish industry, and it also has increased the number of fishermen in coastal areas. Fishermen have experienced on destructive fishing practices that are more convenient and efficient than traditional fishing (Peramunagama et al., 2016). Many of the school students in the Northern coastal area have dropped from their schools early to join fishing to start earnings by observing their parents and as an adaptation to them. They completely rely on fishing and do not consider the damage to the environment and other sustainable fishing practices. Stopping the use of destructive fishing techniques will affect their livelihood since they do not have any alternative jobs to improve their livelihood (Peramunagama et al., 2016). Additionally, most of the region's fish processing factories suffer from a lack of fish supply and this has created an opportunity for a lucrative industry for fishing. The imperfection of policies also was a reason to increase destructive fishing. Furthermore, the relevant authorities are unable to make decisions due to their are origins from same areas and the most destructive fishermen are their friends and relations. The political intervention was another factor explaining the continued existence of beach seines in the many areas of northern region. Another cause for destructive fishing is accessibility. Furthermore, it occurred that the use of some of the destructive fishing methods could not be eradicated as the numbers of those who use them have increased and surpassed the number of those fishermen who have the power of voting for politicians. Many destructive fishing gears are more readily available in the market for cheap prices and those are conventional to use than legal nets. Furthermore, most fishermen find it difficult to adopt alternative legal fishing gears as many of them have a low propensity to save.

Destructive fishing is more common among migrant fishermen especially South India (Tamil Nadu) than local fishermen as they cross the International Maritime Boundary Line (IMBL) between India and Sri Lanka and are attached to traditional fishing grounds (Fig. 3: Fig. 4 a and Fig. 4 b). The reason is fish stock in Indian

seas was drastically depleted due to steel-hulled fishing vessels and engagement in continuous bottom trawling to increase their daily catch and due to the Sri Lankan government imposing severe restrictions against fishing in the Northern sea. Therefore, Indian fisherman started to cross the IMBL and trawlers began to encroach on the Sri Lankan water (Bavinc, 2015; Sosai, 2015; Dodangodage, 2017; Wijesundara and Amunugama, 2017; Manoharan and Deshpande, 2018; Kularatne, 2020). Further, local migratory fishermen especially southern fishermen in the country started to encroach on the northern seawater and their earnings were based on the quantity they caught. Hence, they were only concerned about catching more fish quantities than considering fish ground. These migrant fishermen move to another area if fish stock is declined. The wide range of boat gear combinations mainly with motorized and fiberglass reinforced plastic (FRB) boats are very commonly used with the modernization of fisheries in the northern area. These vessels provide fishermen with an operational radius of 40 km while traditional crafts like wooden vellams and kattumarans operate closer to the coast and lagoon. For overexploitation, they use harmful fishing gears to increase the efficiency.

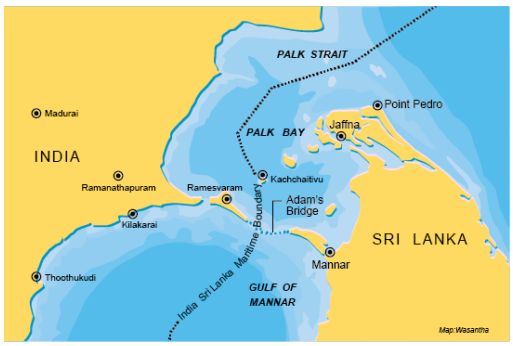
Figure 3: *Map of the Sri Lankan Exclusive Economic Zone (EEZ), which is 200 nautical miles or 370 km (except at the present maritime boundaries with India)*



Source: Arachchige et al., 2017

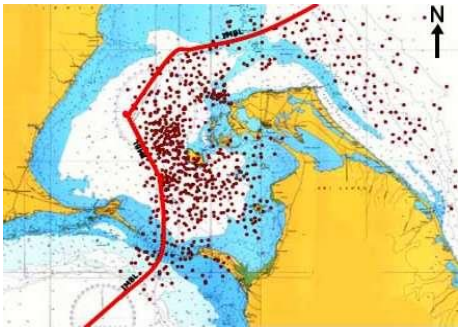
Figure 4:

(a) International Maritime Boundary Line between India and Sri Lanka



Source: https://counterpoint.lk/sri-lanka-india-fishing-dispute/

(b) Sri Lanka Air Force image shows poaching in Sri Lankan water by Indian fishermen



Source: https://www.sundaytimes.lk/110227/News/nws_17.html

Effects of Destructive Fishing Activities

The irresponsible destructive fishing activities severely impact the marine ecosystem, and the well-being and livelihood of the small scale fishers in the Northern Province small scale fishers. Impacts of these practices on both marine ecosystem and small-scale fishery sector depend on the type of destructive fishing practice adopted by fishers in the region. Dynamiting is one of the most common destructive fishing methods and a dynamiting eruption can unintentionally kill both targeted and untargeted fish and other marine organisms (Sosai, 2015; Peramunagama and Ramanathan, 2021). The brush pile fishery is another common destructive fishing technique adopted by the fishers in the Northern Province. Fishers cut mangrove branches, and these are placed in a lagoon to aggregate the fish. This fishing technique threatens local fishing activities by damaging their gill nets, drift nets and fiber plastic boats (Kularatne, 2020). Many destructive fishing operations destroy the benthic habitats and result in indiscriminate fishing mortality (Peramunagama and Ramanathan, 2021).

The identified ecological impacts were depletion of vulnerable marine resources, especially extensive fishing coral reefs, seagrass beds, coastal lagoons, estuaries, sea sponges, mangroves, salt marshes and shifting of fish and other organisms (Arulananthan et al. 2021). For instance, use of explosives for blast fishing can produce very large craters, devastating between 10 to 20 square meters of the sea floor and throwing of dynamite in the sea can result in hitting coral reefs and destroying the coral reefs (Sosai, 2015). Further, uncontrolled and increased use of these fishing methods lead to sudden depletion of target fish stock and some ecologically valuable marine organisms such as catch fish, turtles, sharks, seals, whales, and dugongs. Furthermore, some effects may include: modification of phenotypes (e.g. size/ age at reproduction, growth parameters) and change in species dominance such as shifting of extensive fringing coral reefs from coral dominated to algae dominated reefs due to overfishing of ecologically important herbivorous fish and invertebrates (Arulananthan et al. 2021). Destructive fishing practices result in loss of marine biodiversity, alteration of marine food web, extinction of endangered marine organisms, unsustainability of target fish species and it causes marine pollution which is irreversible.

One of the major social issues is these practices effects on the small-scale fishery sector in the Northern region (Sosai, 2015; Peramunagama and Ramanathan, 2021). The physical injuries of local fishermen have been reported while attempting to save their nets from being damaged by Indian boats and while stay on ashore due to fear of Indian fishermen damaging their fishing gears (Bavinc, 2015; Sosai, 2015; Dodangodage, 2017; Wijesundara and Amunugama, 2017). Further, many local fishermen have been maimed by dynamite due to unintentional explosion and it has caused loss of livelihood of the fishermen. Moreover, dynamiting resulted in migration of fish from the costal shore. Therefore, small scale fishers are unable to harvest fish due to less productivity of fish in the region. Further, dynamiting destroyed drift nets used by small scale fishers (Sosai, 2015). On the other hand, adaptation of these destructive techniques leads to increased malnutrition levels in the region due to lack of accessibility of protein sources and many people in the

region depending on fish as a major protein source in the region (Peramunagama and Dinushika, 2017). Finally, destructive fishing techniques have an impact on the increase of the food insecurity and poverty level of the country. Tourism industry is one of the major sectors which contribute to the economy of Sri Lanka and many foreigners are attracted to the Northern Province due high biodiversity in the marine ecosystem. Destruction of marine ecosystem especially coral reef and mangroves reduce the attraction of foreigners and directly reduce the income generation in the hotel industry (Sosai, 2015; Arulananthan et al. 2021; Peramunagama and Ramanathan, 2021).

The destructive fishing practices affect the economy of Sri Lanka. One of the major economic impacts associated with bottom trawling is local fishermen losing around Sri Lankan Rs 180,000–900,000 of income per annum (depending on the occupation) due to the adverse impacts caused by Indian fishermen (Sosai, 2015). Further, the country loses around 12,096–20,160 metric tons of prawns and around 25,056–41,760 metric tons of demersal fish per annum due to bottom trawling by Indian fishermen and income loses per annum were Rs 7,862,400,000–13,104,000,000 and Rs 8,769,600,000–14, 616,000,000, respectively (Madanayaka, 2015; Dodangodage, 2017). In addition, trawlers destroy the drift nets of local fishermen and can seriously damage small boats and nets. This mostly occurs at night, when trawl boats fail to observe the long, and invisible gillnets most commonly deployed by local fishers. This results in an annual missed income of approximately six million LKR (Sri Lankan Rupees), or 40,000 LKR per fisherman, which constitutes in general about 20% of a fisherman's annual revenue (Scholtens et al., 2012). Beach seining is one of the main livelihoods for thousands of people in Southern Mannar. Due to the current presence of the wing nets, however, around 100 fishing families depend on beach seine production and 1,000 fishermen have been affected as all fish are fenced off by these wing nets (Sosai, 2015).

Relevant International Instruments Related to Destructive Fishing

In 1976, Sri Lanka and India concluded an agreement between the two countries Sri Lanka and India on the International Maritime Boundary in the Gulf of Mannar and the Bay of Bengal and related matters for extending the maritime boundary line to cover the Gulf of Mannar and the Bay of Bengal (Jayasinghe & Kewal Singh, 1976) (Fig.4 a).

In 1982, the United Nations Convention on the Law of the Sea (UNCLOS) was established to outline a legal framework for all marine and maritime activities (Sri Lanka and India became parties to Fish Stock agreement 1995 as a response to implementation of UNCLOS). This is also referred to as the Law of the Sea Convention or the Law of the Sea Treaty and it has provided a more effectual framework for the management of marine living resources and definition of the rights and responsibilities of nations with respect to their use of the world's ocean with establishing guidelines for businesses. In the Exclusive Economic Zone (EEZ) of a state, they can perform sovereign rights and jurisdictions for the investigation, makes use of the resources, and engage in conservation, and management.

Sri Lanka and India are parties to the fish stocks agreement 1995 (an a Agreement for the implementation of the UNCLOS) since 24.10.1996 and 19.08.2003 relating to the conservation and management of straddling fish stocks and highly migratory fish stocks which means both countries are legally bound to adhere to the principles of this agreement and incorporate relevant provisions in the domestic laws. Further, both countries are parties to the Indian Ocean Tuna Commission (IOCT) or Agreement for the Establishment of the Indian Ocean Tuna Commission (approved by the Council of the Food and Agriculture Organization of the United Nations/UNFAO in November 1993) and Sri Lanka become a party to this on 13.06.1994.

Principle 21 of the 1972 Declaration of the United Nation's conference on the Human Environment, principle 2 of the 1992 Rio Declaration on Environment and

Development and Article 193 of UNCLOS in 1982 have stipulations for managing and conserving living resources in the 200 nautical-mile exclusive economic zones. More than 90% of the fish resource is commercially valuable and found within the EEZs in the world (Balton, 1996).

Rights allocations are mentioned in the article No.56 of UNCLOS, and it is a part of international customary law. Part V of the UNCLOS is especially subjected to the offshore fisheries management. Article 118 of the UNCLOS, which is about 'Cooperation of states in the conservation and management of living resources' has stated that the states shall cooperate with each other in the conservation and management of living resources in the areas of high seas. Additionally, they should be taking measures to conserve of the marine resources which is a necessity of the cooperation establishment of sub regional or regional fisheries organizations.

Fish exploitation outside the EEZs is regulated by the Regional Fisheries Management Organizations (RFMO). There are number of member states that work together for conservation of the fish resources for future benefits. Agenda 21 of the chapter 17 of Rio De Janeiro Convention refers to the provisions of the Convention of the Law of the Sea. This includes marine environmental protection, sustainable use, and conservation of marine resources of the high seas.

The 14th goal of the United Nation's Sustainable Development Goals (SDGs) describes that control of illegal, unreported, and unregulated (IUU) fishing, harvest regulation and destructive fishing practices. The SDG target 14.4 aims to achieve these requirements by 2020. Provisions for maintaining fish stocks at a level capable of level of producing sustainable and maximum yield is included in UNCLOS 1982, FAO code of Conduct in 1995 and UN fish Stock Agreement in 1995. FAO Code of Conduct for responsible fisheries in 1995 was established to meet international standards of responsible behavior to ensure conservation and management and development of the living aquatic resources. This is the most scattered global fisheries instrument after the UN convention in 1982.

There are some international instruments such as "The International Union for Conservation of Nature (IUCN), The Conservation of Biological diversity (CBD), The Conservation on International Trade in Endangered species (CITES), Regional Seas Conservations and associated Action Plans, Bonn Convention and The International Conservation for the Prevention of Pollution from Ships (MARPOL)" adopted to deal with especially biodiversity and conservation however; there are strong implications for fisheries.

Sri Lankan Legal Regime Governing the Destructive Fishing

According to the Fisheries Act (1996) enacted by the Department of Fisheries and Aquatic Resource, and implemented by Ministry of Fisheries and Aquatic Resources, there are provisions for the destructive fishing methods such as usage of bottom trawl nets, push net operations, moxi net fishing operations, gill net or trammel net fishing operations on coral reefs or rocks, catching of any marine mammals and sea turtles and harpooning of marine mammals, causing escape of any poisonous, explosive or stupefying substances or other noxious or harmful materials are prohibited. Sri Lankan regulatory framework including Fisheries and Aquatic Resource Act No. 2(1996) as amended by the Ministry of Fisheries and Aquatic Resources Development (Amendment) Act No. 4(2004) and Fauna and Flora Protection Ordinance No. 2(1937) has included provisions that state boats entering Sri Lankan waters shall not possess bottom trawling nets and other prohibited fishing gears such as moxi nets, monofilaments and hazardous material such as explosives and poisonous material under any circumstances.

The Fisheries and Aquatic Resource Act No. 2(1996) under Section 27 (1), clearly states "No person shall use or attempt to use any poisonous explosives including dynamite in Sri Lankan waters with the intention of poisoning, killing, disabling, stunning any fish or other aquatic resources" and section 27 (3) stated "No person shall place, deposit, dump or cause the escape of poisonous, explosive or stupefying substance (including dynamite) or other noxious or harmful material or substance in Sri Lanka Waters". Furthermore, section 28 states "No person shall use or possess,

or have on board any local fishing boat, any prohibited fishing gear or engage many any prohibited fishing method in any area of Sri Lanka Waters or the High Seas" while Section 28(A) strictly prohibits the use of fishing trawl nets. In addition, usage of monofilament nets is also prohibited under Monofilament Nets Prohibition Regulations 2006 Act and there was an amendment to the Fishing Operations Regulations of 1996 prohibiting scuba-diving fishermen from using Purse seines (ring nets). Also usage of spear guns and any sharp items (e.g., hooks) by scuba diving fishermen to capture fish, sea cucumber, chanks and lobsters is prohibited.

The regulatory and implementing body of the Fisheries and Aquatic Resource Act No. 2(1996) which is recognized as the Fisheries and Aquatic Resources Department of the Ministry of Fisheries has empowered the fisheries inspectors functioning under directors of fisheries in 14 districts to obtain legal actions against destructive fishing methods. Moreover, the Fisheries and Aquatic Resource Act has extended powers to the magistrate courts to impose punishment for fishing operations using bottom trawls nets. Where the punishment is imprisonment for a period not exceeding 2 years or a fine not less than Rs 50,000 as per Section 49 (2AA) and Rs. 100,000 fine or three to five years imprisonment for persons who are releasing prohibited substances to waters (i.e., poisonous, explosive or stupefying substances, etc.) for fishing purposes. Second and repeated violations could attract a penalty of 5–7 years' imprisonment or a fine not less than Rs 500,000 as per Section 49 (3). Furthermore, usage, attempt to use, possession, dumping and/or causing to escape of prohibited material are not bailable as per Section 46(A). Moreover, according to the section 49 (2) of the amended Act 35 of 2013 states that any person operating without a valid fishing license in Sri Lanka and/or found to have used any prohibited gear or operations (whether in Sri Lankan waters or in High Seas) such as harpooning of marine mammals, catching marine mammals and reptiles, push nets, moxi nets, gill net or trammel net fishing operations on coral reefs or rocks and monofilament nets will be subjected to a fine not exceeding Rs 25,000.

Directive principles of the constitution (1978) highlighted "The state shall protect, preserve and improve the environment for the benefit of the community" in Article 27(14). Article 28(f) of the constitution stated "It is the duty of every person in Sri Lanka to protect nature and conserve its riches". Based on these directive principles, destructive fishing can be considered as a violation of the duty of protecting the environment, and citizens of the country and relevant government entities should enforce the law after considering the impact on marine ecosystems. Under the constitutional provisions of Article 12(1), all persons are before the law and are entitled to the equal protection of the law. This provision further elaborates the right of the individuals who are living in the Northern Province or as a citizen of the country to file a case regarding marine eco system degradation due to illegal fishing activities in Sri Lankan water.

According to the penal code of Sri Lanka, Chapter XIV mentions about the offences affecting the public health, safety, convenience, decency and morals. Application of dynamite and other noxious substances for continuous basis can cause long-term health related issues among the human populations due to accumulation of chemical substrates within the food chains. Further, section 270 of the penal code highlights that "whoever voluntarily fouls the water of any public spring or reservoir commits an offence". Some of the destructive fishing activities are causing severe water pollution and contaminations that can be considered as an offence under the penal code.

Section 18 of the National Environmental Act No.47 of 1980 states that central environmental authority in consultation with the Ministry of fisheries and aquatic resources can recommend a system of rational exploitation of fisheries and aquatic resources within the terrestrial waters, exclusive economic zone or within the inland waters of Sri Lanka and authorities can encourage citizen involvement for maintaining and enhancing the optimum and continuous productivity of Sri Lankan water.

Effectiveness of the Legal Regime to Deal with Destructive Fishing

Transboundary fisheries in the world are a legal pluralism perspective. But, in the Northern part of Sri Lanka, which co-exists in the Palk Bay transboundary fishery, there have been many challenges and complications for the development of an effective and fair governance framework. These challenges are pressuring the local fishermen to do destructive fishing practices. Sri Lanka's nearest maritime neighbor is India which is separated from northern Sri Lanka by the Palk Bay and the Gulf of Mannar. Both Sri Lankan and South Indian Tamil Nadu fishermen have been using the Palk Bay and Gulf of Mannar waters for a long period as there were no defined maritime boundaries until 1974 and which were revised again in 1976, which prohibited crossing of maritime boundaries for fishing purposes (Kularatne, 2020). The IMBL is uncomfortably close to the shores of both countries in the Palk Bay, where the maximum distance between the two countries is only around 45 km, and the minimum is just 16 km between Dhanuskodi on the Indian coast and Thailaimannar on the Sri Lankan coast. A crossing of the IMBL would imply entry into the territorial waters (12 nautical miles or 22 km) rather than the EEZ (Vivekanandan, 2003).

However, the South Indian fishermen with 1500–2500 or more mechanized boats encroach on the Northern Sri Lankan waters with heavy usage of large-mechanized boats equipped with bottom trawl nets which are banned in Sri Lanka (Dodangodage, 2017). The failure of Indian government to address bottom trawling in Sri Lankan water is a clear violation of the fish stock agreement 1995, IOCT, Bonn convection and UNCLOS 1982.

The fragmented institutional architecture is hard to explain why legal systems in the Palk Bay produce outcomes that consistently marginalize Northern Sri Lankan fishermen. Also, the relationship between fishermen of the two countries is strong yet contrarily, making competition for resource access, which is a daily reality, which eventually leads both to use destructive gears.

Indian fishermen, in Tamil Nadu have significant political influence compared to the fishermen in Northern Sri Lanka, as Sri Lankan raids are in a repressive and militarized post-war environment with lack meaningful political representation leading to marginal levels of political agency (Scholtens and Bavinck, 2014). When the Tamil Nadu fishermen were arrested for illegal trawling in the Northern Sri Lankan waters, they produced claims and counterclaims with the support of Indian media, and Tamil Nadu politicians were quick to argue that their fishers had fallen victim to the brutal aggression of the Sri Lankan Navy. In some cases, India abstained from backing resolutions to support Sri Lanka at International summits and councils, forcing the release of the Indian fishermen (Scholtens and Bavinck, 2014). The problem is inadequate implementation of the relevant laws in Sri Lanka to address IUU fishing by foreign fishing vessels.

In contrast, the Northern Sri Lankan fishermen's voices have been hardly heard due to population's limited agency. Thus, these Sri Lankan traditional fishers would want the Sri Lankan State to employ a stronger and effective level of deterrence, not arresting illegal fishers but keeping the gear, and trawlers in custody. However, the functioning of the Joint Working Group addresses that the fishing conflict remains weak and political factors have consistently hampered institutional integration (Scholtens and Bavinck, 2014).

However, in Sri Lanka very few refereed reports have been documented based on research that bottom trawling has been causing severe scraping and ploughing of the seabed with extensive loss of critical productive habitats such as seagrass beds and coral reefs. Therefore, there should be more scientific surveys and continuous data collections for maintaining sustainable fish stocks in the area. Proper law enforcement and regular monitoring of IUU and destructive fishing activities in the Northern coastal areas are essential.

However, some major loopholes exist in the Sri Lanka laws such as Regulation of Foreign Fishing Boats on Act No. 59 of 1979, which states that there is no clear indication regarding the type of prohibited fishing gear, fishing methods and

harmful material. Also, there is no specific penalty system for their usage of them, though the fine of Rs 750,000 is applicable for violations of the conditions mentioned in the valid fishing permits issued by the DFAR and penalty is Rs. 25,000 for obstruction of DFAR or authorized officers in carrying out any duties in accordance to the provisions of the Act. Hence there is an urgent need to reform the existing laws for sustainable fishery in Sri Lanka.

Therefore, it seems proper monitoring by strengthening the existing laws with proper enforcement by the Department of Fisheries and Aquatic Resources with support of other stakeholders of the area, like the Sri Lankan Navy and other relevant government agencies would be the only feasible solution to combat disruptive fishing practices.

Suggestions for Law Reformations on Destructive Fishing

Penalties for an offence committed by any person who acts in contravention of a provision of the fisheries Act of 1973 and its amendments should be revised and increased as this penalty is not enough to discourage people from destructive fishing activities because they are looking for huge profits and continuing inappropriate fishing practices more profitable compared to the penalty for the guilty of an offence. Each state of the world has sovereign right to manage their exclusive economic zones. However, in Sri Lanka, the law enactments of the waters the in territory is very poor. Indian fisheries receive benefits from Sri Lankan waters due to these loopholes in the laws. They are using destructive fishing techniques to enhance their profits while the Sri Lankan fishing community is helpless. Therefore, the Sri Lankan fisheries act must be able to act on any people who perform illegal fishing activities in Sri Lankan waters. Further, section 27 of part IV of the fisheries and aquatic resources act of 1996 states that the prohibition of using harmful substances or materials for fishing activities should be amended and produced as a different regulation formulated by the Ministry of Fisheries under the section 61 (1), (j) of the act which can be used to prevent the practice of any gear or fishing technique that is harmful for fish sources and marine ecosystems.

In Sri Lanka, there is a vital necessity to revise the fisheries and aquatic resources act (No.02 of 1996) while formulating new laws by geographical regions, type and abundance of marine resources, oceanography, ecology, social aspects etc. As an instance, the Northern Province of Sri Lanka specifically Gulf of Mannar and Jaffna peninsula have been identified as high marine biodiversity hotspot after the post-civil war period and strict localized regulations could be introduced for prohibiting destructive fishing activities and preservation of unique marine biodiversity. The above law reforms are to be carried out with proper involvement of different stakeholder groups such as government institutions, scientific community, fisheries communities and civil society organizations. At present, the government has an initiative to implement fisheries co-management committees in fisheries management regions under the provisions available in the fisheries act 1996, which is to be revised to ensure that participatory platforms are effective and inclusive.

While imposing penalties on destructive fishing activities, cooperative socially responsible projects should be introduced for fishing communities with the intention of enhancing the socio-economic level of fishers including provision of scholarships for education, training and capacity building programs, self-employment opportunities, equal opportunities for communities etc. For an instance, in Philippines, Coastal Communities Empowerment Project (CCEP) was initiated with funds obtained through United States Agency for International Development (USAID) and International Marinellite Alliance (IMA) to empower coastal communities to prevent unsustainable fishing activities. Further, this program was initiated to transform coastal dwellers into marine resource protection managers through proper awareness, technical training and enterprise development programs (Rubec, 2001). In a Sri Lankan context, fisheries cooperatives should be empowered as genuine fisher community groups which should be supported to carry out management functions and to interlink with parallel organizations to formulate challenging fisheries cooperative federations that can influence the overall fishing practices of Sri Lankan waters.

The weakness of the fisheries law enforcement mechanism was observed as major issue in the Sri Lankan legal system. Enforcement of the fisheries and aquatic resource act should be done through fisheries inspectors. However, these inspectors are burdened with different administrative works covering a vast scope related to their operations. Further, they are holding responsibilities for assisting people with protecting crafts, fishing gears, public goods, and crediting and imposing penalties for law breakers while creating inconsistencies in their assigned duties and responsibilities. Moreover, fisheries inspectors highlighted that there are different constraints when acting against fishermen who use dynamite due to loopholes in the existing law. According to the law, fisherman using dynamite should be caught while they are applying these substances or when they are caught apparently, it should be evident that the fish was caught with using dynamite which should be proven by scientific evidence. High degree of political interventions is also linked with difficulties of enforcing law by the fisheries inspectors in Sri Lankan context. Furthermore, the Sri Lankan and Indian governments have made attempts to overcome the issue of Indian fisherman encroaching on Sri Lankan waters but they have not been very successful. Therefore, it is needed to proper enforcement of laws and regular monitoring mechanism in the Northern Seas to investigate any violators or alleged offences is needed. This can be achieved through strengthening the costal guard department, the Sri Lankan Navy and the Sri Lankan Air Force (Peramunagama and Dinushika, 2017).

According to the North Carolina general assembly for fisheries reform act in the United States, effective from 1999, a licensing system for fishermen who harvest fish has been introduced and only the fishermen who hold the endorsement to sell under the license moratorium will be eligible to purchase new commercial fishing licenses. This license can be transferred only to another member of his immediate family or to someone who buys his boat when he was retired. Sri Lankan fisheries cooperation can produce this type of license and strictly prohibit selling licenses to outsiders. This will help control destructive fishing activities.

In the West African region, where poachers can simply gain access from one country's Exclusive Economic Zone to that of another country, regional cooperation is vital to obtain information on illegal fishing activities including vessel monitoring and fishermen engaged in destructive fishing. In Sri Lankan context, West African region approach can be adapted to develop regionally-harmonized legislations and regulations in the Indian maritime boundaries while delegating and sharing with neighboring state (India) apprehension and enforcement rights related to illegal fishing activities. Further, provision of technical support for sustainable fishing techniques and improving fisheries monitoring, control and surveillance (MCS) including fishing vessel monitoring system (VMS) adherence to the FAO guidelines can be applied for strengthening the sustainable fishing in the Asian region (Bray, 2000).

The Australian Fisheries Management Authority applies different approaches to protect fisheries consisting of monitoring fishing vessels, tracking fish catch and networking with other countries to preserve shared fish stocks. Policing of fisheries in Australia includes inspections which are carried out by fisheries officers in Commonwealth endorsed operators with intention to prevent fishers from involving in illegal fishing activities. Apart from that, all Commonwealth fishing boats are traced through satellites to vessel monitoring systems. Further, tracking the catch has been monitored to ensure the correct amount of fish was caught. Monitoring system includes electronic logbooks, observers, and audits, catch disposal records and catch documentation schemes. Mechanisms adopted by the Australian Fisheries Management Authority can be integrated into the Sri Lankan fisheries sector for ensuring sustainable harvesting of marine resources and these insights could be embedded into the upcoming law reforms in illegal fishing activities (AFMA, 2021).

According to the study conducted by the e Costa et al. (2016) related to the regulation-based classification system for Marine Protected Areas (MPAs), scoring system weighted by the potential impact on biodiversity and habitat was built and each zone within an MPA was scored and an MPA index defined the zone scores.

This system classifies MPA and MPA zones separately and it is globally applicable without considering geographical limitations. Even though, a national policy on environmentally sensitive area protection in Sri Lanka is being formulated, most of the MPAs in the Northern Province have not been identified as environmentally sensitive areas which should be protected under strict laws and regulations. For instance, Mannar to Rameshwaram is planned to be designated as a sensitive marine ecological zone in Northern Province in line with this policy. According to the MPAs classification mechanism introduced by the e Costa et al. (2016) can be applied to identify MPAs in the Northern Province of Sri Lanka. Further, the "Philippines fisheries law section No. 86 – unauthorized fishing or engaging in other unauthorized fisheries activities" reveals that it is unlawful for any commercial fishing vessel to catch fish in bays and fishery management areas which may be hereafter declared as overexploited. This section can be integrated into law reforms in Sri Lanka to prohibit illegal fishing activities in the Northern Province of Sri Lanka which could be declared as MPAs after considering the highly vulnerable marine biodiversity of these zones.

Conclusion

Destructive fishing practices are major harmful anthropogenic activities which cause irreversible marine environmental damages and threaten to achieve UN Sustainable Development Goal 14 "Life below Water". Most frequently used destructive fishing practices are dynamiting, brush piling, multi hook artificial bait for cuttlefish harvesting, different unsuitable nets and uncontrolled exploitation that causes damages to the sustainability of fish population and the biodiversity of marine environment in the Northern Province of Sri Lanka. People tend to use destructive fishing due to the increasing demand for fish to meet requirements of the rising population, increase of poverty, poor strategies implemented by the relevant authorities and poor policy management. These destructive fishing methods will adversely affect to the balance of marine ecosystem as well as the livelihood of the small-scale fishers of the Northern Province. As an island, Sri Lanka has to control illegal and destructive fishing practices not only by local fishers but also by other

South Asian fishers especially Indian fishers within the Sri Lankan waters. When compared to the laws on fishing industry and marine environment which were imposed by other countries of the world, Sri Lanka is still in a place where the legal aspect regarding this sector is essential to be reformed immediately in order to protect the marine ecosystem as well as the small-scale fishing communities in the Northern Province of Sri Lanka.

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