Potential Solutions to Environmental Conflict on Exploitation of Fish Stocks in Palk Strait among Fishermen of India and Sri Lanka

S. Sivaramanan

Environmental Impact Assessment Unit, Environmental Management and Assessment Division, Central Environmental Authority, Battaramulla, Sri Lanka.

*Corresponding author: sivaramanansr@gmail.com

ORCID ID: https://orcid.org/0000-0002-9904-2977

Received: 30.12.2022 Revised: 03.03.2023 Accepted: 12.03.2023 Online: 15.03.2023

Abstract Illegal catching of fish stocks beyond the borders of India and Sri Lanka by violating the International Maritime Boundary Line (IMBL) by the fishing communities of both countries has become a major international direct environmental conflict between both nations. Overexploitation of natural resources is a keystone environmental problem. It has been reported that Indian fishermen are stealing fish catch worth many millions of US dollars annually from Sri Lankan coastal waters. The bilateral agreements of 1974 and 1976 are frequently violated. The heavy use of trawlers that are not permitted to fish on coastal seas and the use of internationally banned bottom sea nets by Indian poachers are major threats to the coastal resources of north Sri Lanka. Trawlers catch fish flocks unselectively; the catch may include several non-targeted species and juvenile stages of fish, which is leading to species extinction. Arresting and imprisoning of fishermen by coastal guards of both countries (and collecting penalties) continue, and this is an unsustainable way of handling the issue. Sri Lanka has banned bottom trawling since the 6th of July 2017, which is a *sustainable solution* and beseeched possible *greener solutions* such as creating awareness, sensitizing fishermen, and promoting the use of GPS navigation, and also provoked *conventional solutions* such as monitoring or patrolling, which often lead to imprisonment and penalties for trespassing and seizing of fishing trawlers. *Restorative solutions* such as coral restoration, mangrove restoration, implantation of artificial reefs, and establishing mutually beneficial 'no catch zone' along the IMBL and marine reserves (or marine protected areas) by both nations may facilitate preventing the deterioration of fish stocks and ensuring their revival in the region. Above all, if this illegal catching continues, the availability of fish stocks in the Palk Strait region in the next ten years will be in question.

Keywords: fishermen, India and Sri Lanka, Environmental conflict, illegal fishing, overexploitation, fishery.

INTRODUCTION

According to the United Nations Environment Programme (Schwartz and Singh 1999), environmental conflicts occur for three main purposes. 1) Overuse of renewable resources, 2) pollution or unfavourable change in the environment, and 3) impoverishment of the space for living. Direct environmental conflicts occur when there is international competition for renewable resources such as water, crude oil, cropland, fish, and forests. Nations may even tend to justify it by military action in the name of economic preservation and national security; this can even occur between states, e.g. the conflict over the Cauvery water resource between the states of Tamil Nadu and Kerala in India, Sudan and South Sudan for oil resources, Egypt and Ethiopia for Nile water flow, etc. (Schwartz and Singh 1999). Indirect environmental conflicts occur where factors such as soil erosion, agricultural contamination, and water pollution create or elevate other social issues such as poverty, famine, ethnic cleavages, mass migration, and uneven distribution of resources, e.g., desertification and famine in East African countries such as Ethiopia, pollution of mine tailings in Papua New Guinea, deforestation and soil erosion in Mexico, overfishing and water pollution in Kenya, pollution from oil exploration in Nigeria, etc. (Schwartz and Singh 1999).

Indian and Sri Lankan fisheries in the Palk Strait region have a long history; even before the British colonial period, fishermen of both countries had highly intimate relationships. This is still visible, as some fishing families have relations in

other nations and often exchange their resources among families. However, increased population and competition for coastal resources, invasion of trawlers and machinery fishing, overexploitation and destruction of non-targeted environmental resources, use of prohibited fishing methods such as bottom sea net, the previous internal war in Sri Lanka, abduction of narcotics and jewels across borders, and illegal trade have all led to both countries tightening their maritime legislation and rules. Even though this could not be sufficient to control the situation, it worsens the conflicts among the fishing communities of both nations and emerges as a direct environmental conflict. It is estimated that Indian illegal trespassing fishermen steal US$750 million in Sri Lankan coastal fish resources each year (Waduge 2014). In addition, overexploitation of natural resources is a keystone environmental problem. The main purpose of this review is to identify a plausible solution for the prolonged conflict between trespassing fishermen of both nations. The gap in establishing a meticulous restorative solution to the conflict is yet to be filled.

The following scholars have worked on the same problem, and their suggested solutions are as follows: Suryanarayan (2016) stated that "the governments of both countries have affirmed their commitment to finding a permanent solution to the dispute. His paper pointed out three factors such as "the issue of territorial rights of Kachchativu, frequent poaching by Indian fishermen in Sri Lankan waters, and the damaging economic and environmental impacts of trawling," and he proposed the following two suggestions: (1) get back the island of Kachchativu on lease in perpetuity, and (2) permit licensed Indian fishermen to fish within a designated area of Sri Lankan waters and vice versa. Both of these solutions ignore the environmental problem of overexploitation of marine resources in Sri Lankan territorial waters; thus, bottom trawling in the Palk Strait region may further fuel environmental deterioration and loss of biodiversity.

Scholtens (2016) proposed two solutions: (1) a nation's right to use its power to protect its resources, and (2) institutional resource stewardship based on marginalizing access mechanisms. These two solutions prioritize resource sharing over resource sustainability and protection. In contrast, Menon, Bavinck, Stephen and Scholtens (Stephen *et al*. 2013) have suggested solving the issue more through dialogue and exemplified the 2004 and 2010 agreements between the fishing communities of both nations with the mediation of a non-governmental organization. The 2010 agreement restricted Indian fishermen from conducting unlawful fishing operations in Sri Lankan waters, such as purse seining and pair trawling, and it also prevented the presence of Indian fishing vessels too close to Sri Lankan shores. Yet the implementation of the 2010 agreement failed due to a lack of monitoring mechanisms to observe the Indian fishing activities in Sri Lankan waters, and the increased export (foreign) demand for shrimp caught in the region further pushed Indian fishermen to violate the agreement.

According to Amarasinghe (2011), the conflict resolution talks were held at three levels: (1) at the level of fishermen; (2) between fishermen and their respective governments; and (3) at the government level with ministerial talks between India and Sri Lanka. He further stated that a bilateral meeting of both Sri Lankan and Indian government representatives held on April 21, 2005, in New Delhi led to the establishment of a bilateral Joint Working Group (JWG). As a result, meetings in 2008, 2011, and 2012 prevented Indian fishing vessels from entering the identified sensitive areas (Scholtens 2015).

Stirrat (2018) views on how the dispute was approached in terms of "legal pluralism" resonate with those of political economy, where resource utilization and the drivers should be well understood. Vincent (2020) proposed that long-term solutions to the tragedy include the retrieval of Kachchcthivu and the restoration of traditional rights of Tamil Nadu fishermen in Kachchativu. This solution seems biased toward the Indian counterpart. However, Vincent concluded that joint governance and management of Palk Bay by both countries was the final solution.

Deepananda *et al*. (2021) postulated the following five reasons as influential factors in the conflict: (1) the establishment of the IMBL; (2) the introduction of trawlers by Indian fisheries in the 1960s with the expansion of shrimp exports; (3) the implementation of the fishing ban by the government of Sri Lanka during the internal war (1983-2009); (4) the resumption of distant water fisheries by Sri Lanka after the end of the internal war in 2009; and (5) damage to artisanal fishers'

fishing craft and gear. Yet the study concluded that both governments should seek an amicable, long-lasting, sustainable solution without mentioning anything specific. Vivekanandan (2023) suggested that vital solutions can be made through continuous dialogs between the fishermen of both nations. For example, consider the 2004 and 2010 fisher-to-fisher dialogues.

Majumder and Malhotra (n.d.) have done a brief critical analysis of the international law perspective and questioned why both India and Sri Lanka do not seek international litigation for the conflict under the United Nations Convention on the Law of the Seas (UNCLOS) and also highlighted, for the sake of environmental benefits, international attention should be brought to the issue by abiding by the International Tribunal for the Law of the Sea. Mayilvaganan (2016) suggested both governments should take the following measures: (1) educating and sensitizing fishermen on transboundary crossings; (2) conducting regular meetings between both parties, (3) banning trawling, purse seines, and minnow seines; (4) decongesting Rameshwaram fishing trawlers, (5) breaking the nexus between politicians, businessmen, and fishermen. Indeed, Mayilvaganan's suggestions broadly consider most of the socio-economic and political factors, but they hardly consider the environmental factors and the restoration of the natural resources in the Palk region.

MATERIALS AND METHODS

Qualitative content analysis methodology was applied in the present study (Figure 1). Real-world evidence from the literature supported the links as cause-and-effect relationships between each environmental problem. Restorative solutions and sustainable solutions were identified as link cutters and bridge links.

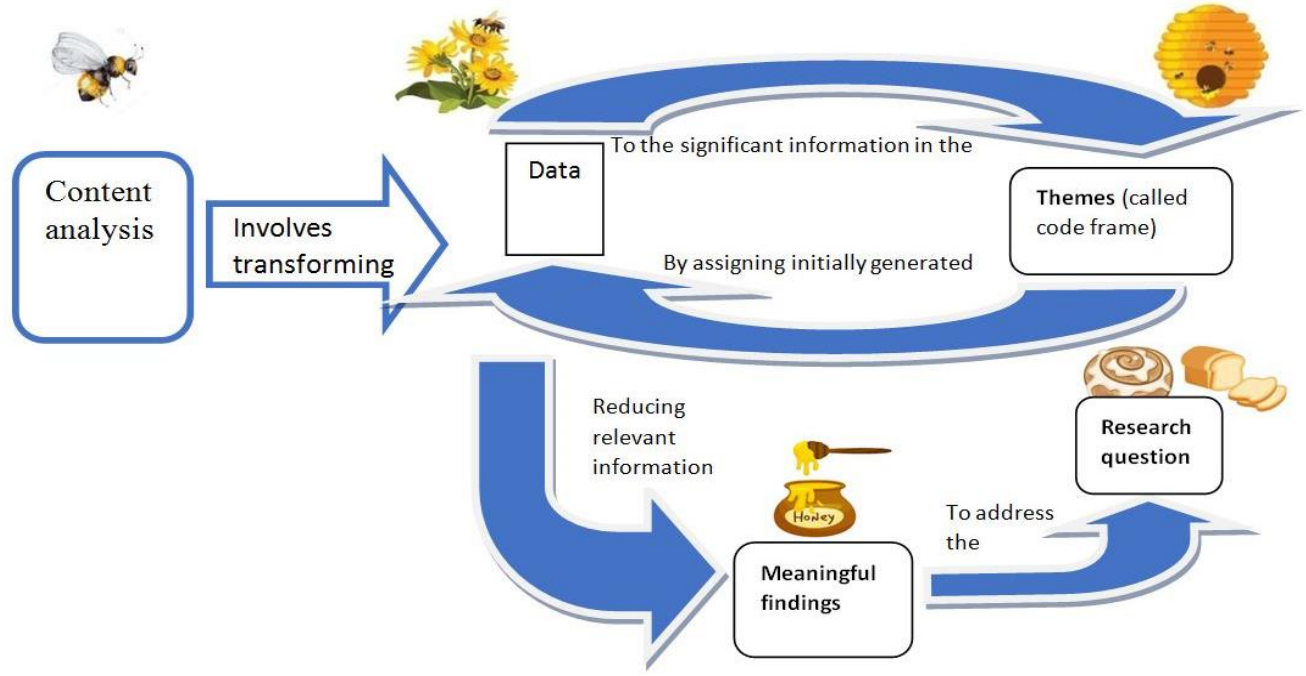

Fig 1 Qualitative content analysis methodology Adapted from Adu (2017)

RESULTS

Indo-Sri Lanka relationship

In 1974, Kachchativu (an island found at the coastal borders of both countries) was given to Sri Lanka by India as a symbol of friendship. In addition, India has a strong influence on the Sri Lankan political stream. However, the Sri Lankan internal war had a significant effect on the fishing communities of both nations at Palk Strait. Several shooting incidents against fishermen have also been reported while the LTTE (Liberation Tigers of Tamil Eelam) was smuggling arms and during clashes between Sri Lankan security forces and the LTTE. In addition, illegal taxation of the fishermen by the LTTE, restricted time limits given by the government to fish, passing system and security checks, and displacements due to the war all affect the livelihood of the fishing community in Sri Lanka. However, after the end of the war, the invasion of Indian fishing vessels increased in Sri Lankan waters. It has been noticed that a flotilla of boats trespasses IMBL on alternate nights and usually overexploits the Sri Lankan coastal resources unselectively (both non-targeted species and juvenile forms of fish).

Conflict in brief

It has been expressed that Indian fishermen are using illegal methods of fishing, which are banned in Sri Lanka as well as internationally (e.g. bottom trawling) because the Palk Strait is shallow and contains highly valuable coral reef structures, deep-sea trawlers are not appropriate for use. By the West Bengal Marine Fishing Regulation Act of India (1993), trawlers are permitted beyond three nautical miles from the shores, but they often violate the act due to the high catch in the region (Gupta 2015) More impressively, unlike Sri Lankan vessels, such Indian trawlers are provided with GPS tracking systems, and they clearly know their location in the sea (whether beyond the border or not).

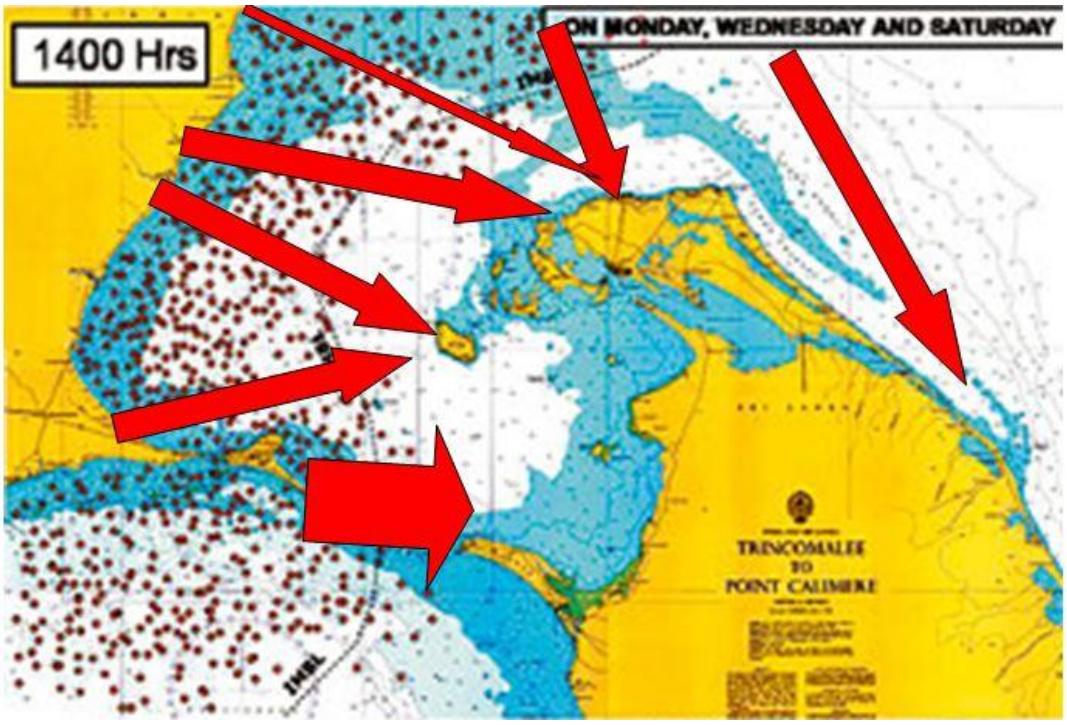

Fig 2 Indo-Sri Lanka coastal boundary and routes of illegal entry of Indian fishermen (Adapted from sundaytimes.lk 2011).

Trawler fishing is an unselective way of fishing; it destroys the coral reefs, which are vital for the biodiversity of the region, and it also catches juvenile forms of fish and untargeted organisms

such as endangered sea turtles. Sri Lankan fishermen do have multi-day boats, and they are not as destructive as trawler fisheries. It has been noticed that Indian trawlers are arriving from Nagapattinam, Thanjavur, Pudukottai, and Ramanathapuram, and they violate the IMBL by fishing illegally in Sri Lankan territorial waters such as Delft, Pesalai, Iranaitivu, and up to Pulmoddai on the east coast of Sri Lanka (Waduge 2014) (Figure 2).

These massive invasions and unselective overexploitation of fishing resources result in resource depletion or even species extinction in the long run. Sri Lanka has an unavoidable responsibility to protect her natural fish resources and the livelihood of Northern fishermen, who have already been affected by the internal war; further, it is a violation of the fundamental rights of the Sri Lankan fishermen, and this may cause a loss of public trust and have a great impact on the governance of natural resources in the territorial sea. In this case, even shooting incidents by naval security forces were complained about on several occasions. The South Indian political network has condemned Sri Lankan political leadership for recently mentioning of Indian fishermen have no rights in Sri Lankan territorial waters in the north. However, this does not affect the visiting of Indian fishing families during the Kachchativu temple festival and drying their fishing nets there (as per article 5 of the 1974 Kachchativu agreement and the 1976 agreement). Sri Lankan fishermen also illegally invaded Indian coastal waters and were found guilty under the MZI Act (Maritime Zones of India Act 1981).

It is visible that there is a relationship between Indian and Sri Lankan fishermen, or "transnational families," as they may even be relatives (connected by blood or marriage). However, the laws between countries cannot be altered, and as a result, the violators would be found guilty and imprisoned, which is also accompanied by the seizure of their fishing vessels (trawlers). Similarly, so many arrests, imprisonments, and seizures were recorded in the past by the coast guards of both nations. Furthermore, despite the fact that representatives from both fishing communities have met and discussed the issue on several occasions, ongoing conflicts between fishermen from Rameshwaram, Toothukudi and Kanyakumari in India and Mannar, Jaffna and Puttlam in Sri Lanka have not been resolved.

Sinking abundant corroding busses as artificial reef-like structures in Sri Lankan waters

According to the public press ("Old SLTB buses sunk in the deep sea off North Sri Lanka to regenerate marine life" 2021), the Department of Fisheries and Aquatic Resources had landed 20 abandoned and discarded buses belonging to the Sri Lanka Transport Board (SLTB) on the sea floor. As an initiative, four discarded buses were sunk off Delft Island, and many more are to be sunk in the near future. According to the Ministry of Fisheries and Aquatic Resource, Sri Lanka, the purpose of the project is to create artificial reefs to provide breeding grounds and habitat for the fish population and to ensure that marine resources are protected because they are facing jeopardy of depletion due to poaching and illegal fishing activities conducted by the fishermen of the neighbouring country (Figure 3). According to Spieler *et al*. (2001), materials such as tires, plastic, metal, wood, fiberglass, polyvinyl chloride, boulders, and tree logs are used as artificial reefs. Artificial reef-like structures are preferred when there is a need to restore the habitat by giving refuge to fish, corals, and other animals, conserving the biodiversity, supporting the re-establishment of coral reefs, restraining rubble, altering the ocean currents, and providing aesthetic value for tourism. Thus, it is a *restorative* solution. However, they are not as productive to the environment as true corals, where photosynthesis and the production of oxygen and energy occur.

Fig 3 Sinking of abandoned buses in the Kachchativu sea area (Northern Sri Lanka) Source: (dailythanthi.com 2021)

It has already been criticized by India-based independent public media sources that this move by the Ministry of Fisheries, Sri Lanka is similar to creating iron barbed wire fence in the bottom sea of International Maritime Boundary Limits (IMBL) that damages the illegal bottom trawling nets and when the fishing gear stuck to the sunken bus, the boat would come to sudden halt, which is a potentially serious deterrent and may cause a significant loss to the Indian fishermen trespassing IMBL (poachers). Yet as an independent nation, Sri Lanka has the right to protect its valuable fish stocks within its IMBL limits because bottom trawling is illegal internationally in many parts of the world (including Sri Lanka). The European Union implemented a ban on bottom trawling in shallow waters not greater than 800 m deep. The United States joined the ban in 2010. Sri Lanka implemented its ban on bottom trawling via an amendment to Section 28A of the Fisheries and Aquatic Resources Act No. 02 of 1996 on 6th of July 2017 (a Supplement to Part II of the Gazette of the Democratic Socialist Republic of Sri Lanka 2017). Thus, the Fisheries Department in Jaffna, Sri Lanka has taken on a project that is part of a prodigious vision to create artificial breeding grounds for its declining fish population and indirectly preclude the poaching of coastal resources.

DISCUSSION

Overexploitation of marine fish resources is a *keystone environmental problem* (Sivaramanan and Kotagama 2022). Conventional solutions such as the imprisonment of fishermen and seizure of trawlers trespassing the International Maritime Boundary Line are an unsustainable way of handling the issue (and the problem persists without a solution), banning bottom trawling in Sri Lankan waters is a sustainable solution (but expensive and requires frequent coastal patrolling), and the restorative solutions are establishing ‘no catch zones’ in the area adjacent to the IMBL and establishing marine protected areas or marine reserves (Figure 4).

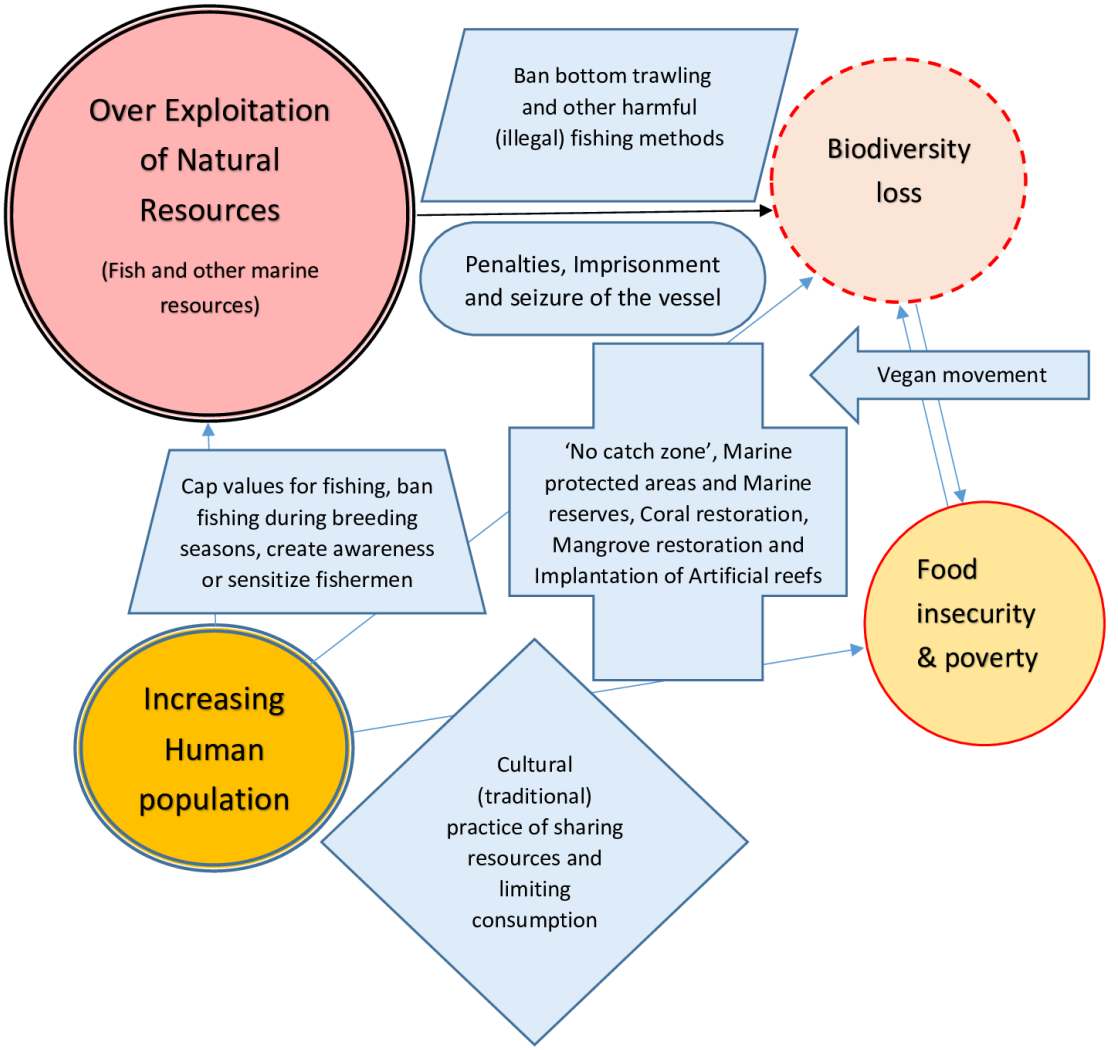

Fig 4 Solutions to overexploitation of natural resources or overfishing.

Black circle: problem under concern, Blue circle: cause, Red circle: effect, Double-lined circle: keystone environmental problem, Single-lined circle: environmental problem, Dotted-lined circle: problem to be mitigated when keystone environmental problem gets solved, Black arrow: cause-effect link for which solutions are given, Blue arrow: cause-effect link.
N.B.: - Each problem in the circles is connected to many other problems based on cause-and-effect links, and they are not shown here.

(Author has developed the above diagram after consulting with Bill Reed – principal of Regenesis Group Inc. 20 Woodland St. Arlington, MA 02476, USA)

Restorative vs. Sustainable vs. Conventional solutions

Banning bottom trawling is a sustainable solution because, according to the definition of sustainable development stated in the 1987 Brundtland Commission report, "development that meets the needs of the present without compromising the ability of future generations to meet their needs" could be considered sustainable development. However, sustainable solutions are often expensive due to their high energy requirements, such as frequent coastal patrols by coast guards and the need for expensive satellite and radar technologies. And unlike smart restorative solutions, they cannot adapt to or co-evolve with nature, they cannot always affirm well-being (conflict-free), and they depict relatively low systemic vitality (Figure 5).

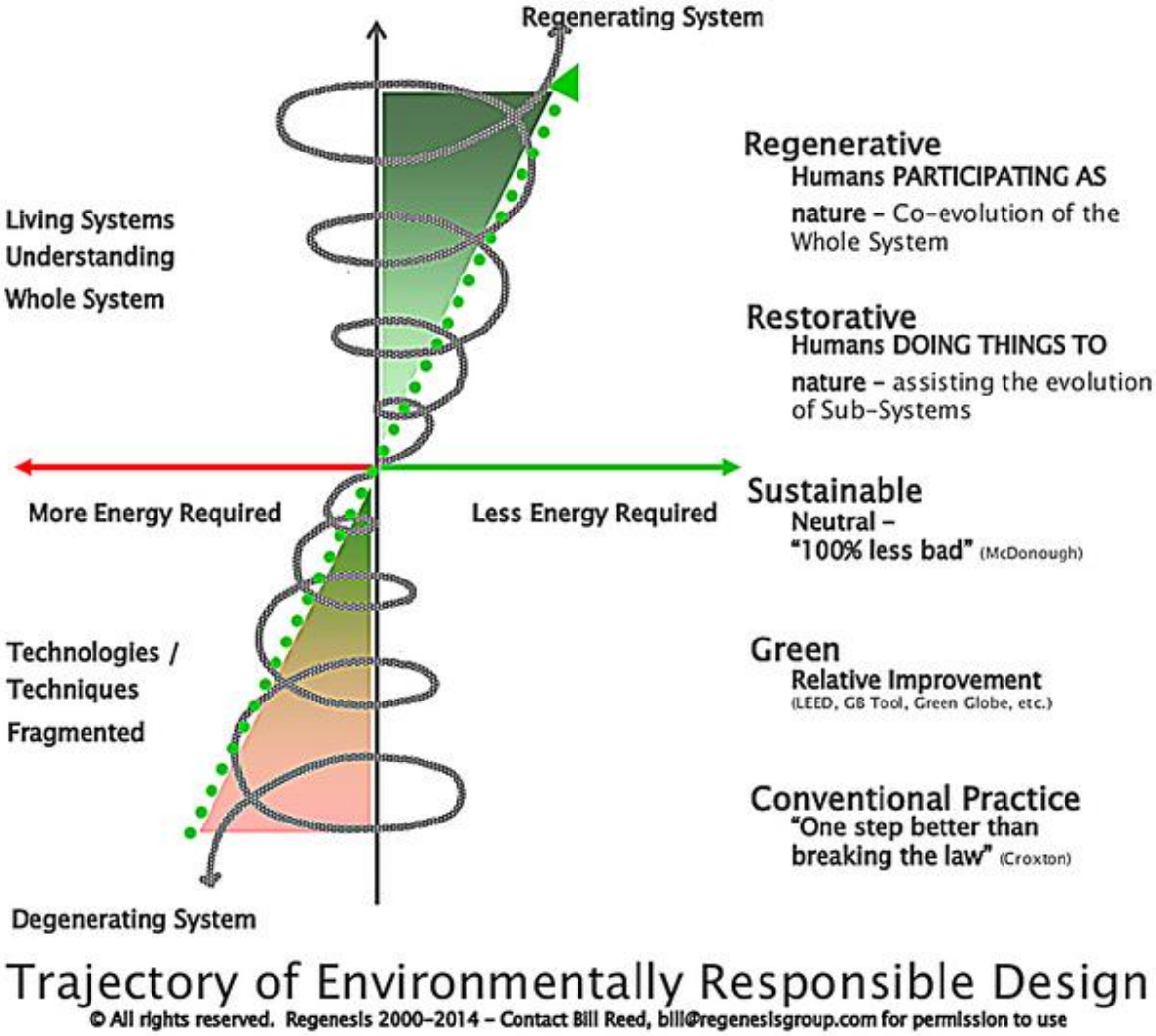

Fig 5 Restorative vs. other designs (including sustainable design) [With permission from Bill Reed]

According to the aforementioned reasons, a sustainable development path is not always feasible for developing countries. However, Sri Lanka has implemented its *ban on bottom trawling* (a sustainable solution) via an amendment to Section 28A of the Fisheries and Aquatic Resources Act No. 02 of 1996 on July 6, 2017. According to the legislation, the fishermen who engage in bottom trawling or individuals who cause the practice (trawler owners) should be charged a penalty not less than Rs. 50,000 or imprisonment not exceeding two years (a Supplement to Part II of the Gazette of the Democratic Socialist Republic of Sri Lanka 2017). In addition, it is high time to go for the most vital, highly resilient, and low energy (less costly) restorative solutions (co-creating conditions conducive to life), such as establishing 'No catch zones' or marine protected areas (marine reserves), coral restoration programmes and establishing mangrove nurseries at the shores of the archipelago in the region along the IMBL by both nations. Establishing unbreakable artificial coral-like structures (corroded buses) can also be considered a smart or wise approach to handling the problem, and it is a restorative solution, even though it fails to ascertain the well-being of all parties (poachers).

Possible mitigation and solutions

GPS location-finding facilities on fishing boats are available in almost every boat because smartphone-based GPS application software is easily accessible by every fisherman, but the illegal entry of fishermen with clear knowledge of their borders cannot be stopped. In addition to current coast guard patrolling, there is a need for a stable monitoring system at the borders that assures continuous monitoring, signaling, and surveying. But it appears the political heads of both nations are not really interested in finding a permanent solution to this ecological, social, and economic dispute, and there is no way to blame economic status because the problem is between two developing nations. Based on the U.S. EPA's resource guide for resolving environmental conflicts (2000), suggested alternative dispute resolution (ADR) methods can be followed in conflict resolution, such as convening, facilitation, mediation, consensus building, and an ombudsman.

1. Convening (conflict assessment): convening is the use of a neutral third party to assist with the solution of the conflict through mediation, consensus, and building. The convener also helps both parties understand the issue and the solutions by providing the required level of education and technological support.
2. Facilitation: This process assists a group of parties in solving more complex issues. Here more room is allocated for discussions, effective communication, and the conflict resolution process among all parties. Even those who do not like to resolve the problem are also accessed by the facilitation method.
3. Mediation: Third-party assistance is provided in an unbiased manner. Mediation is voluntary, informal, and confidential. Mediators make no judgments about the people or the conflict and issue no discussion; satisfactory agreements are reached at the end.
4. Consensus building: it is a relatively informal process where the parties participate in discussion cooperatively. This facilitates the stakeholders in implementing their own mutually agreed strategies to resolve the problem.
5. An Ombudsman: Ombudsman is an official who receives complaints from parties involved in conflicts and observes them independently to find solutions.

   Adapted from U.S. EPA (2000)

Restorative solutions are smart, wise, adaptable, highly resilient, vital, and affordable ways to handle the crisis. Furthermore, restorative solutions such as the declaration of a 'no catch zone' with the cooperation of both nations and the establishment of Marine Protected Areas (MPA) along the IMBL may facilitate the revival of the degrading aquatic life and ascertain sustainable fisheries in the region. United Nation's Sustainable Development Goal (SDG) 14 also mentioned the establishment of more *marine protected areas* to improve the fish population. According to Rutledge, *et al*. (2022), MPA's are established to surmount overfishing, marine litter, water pollution, and global climate change. In addition, MPAs are also established to

protect historic sites or shipwrecks (of World War II). There are more than 5,000 MPAs declared worldwide which cover 0.8% of the ocean. Georges Bank, off the coast of New England in the USA, and Nova Scotia in Canada were once one of the world's greatest fisheries. But they were overexploited for centuries, leading to a decline in commercial fish populations (cod, haddock, flounder, etc.). After the declaration of several MPAs, the fish population revived and the fish catch improved. According to (Rutledge *et al*. 2022), MPAs can be declared by national, state, local, and tribal governments. There are national governments, which work together to maintain MPAs that cross their national borders, e.g. Pelagos sanctuary for Mediterranean marine mammals was established by three governments: Italy, France, and Monaco (Rutledge *et al*. 2022). Thus, India (or the Tamil Nadu state government) and Sri Lanka should work together to establish a no-catch zone or MPA (Figure 6) extending a few kilometers from the IMBL on either side. This will not only preclude the trespassing of the fish fleet of both countries and also assure the regeneration of commercial fisheries, which is currently on the decline due to plummeting fish stocks. Furthermore, illegal migration of people and illegal activities such as smuggling narcotics, banned products and arms can also be hindered in the long run.

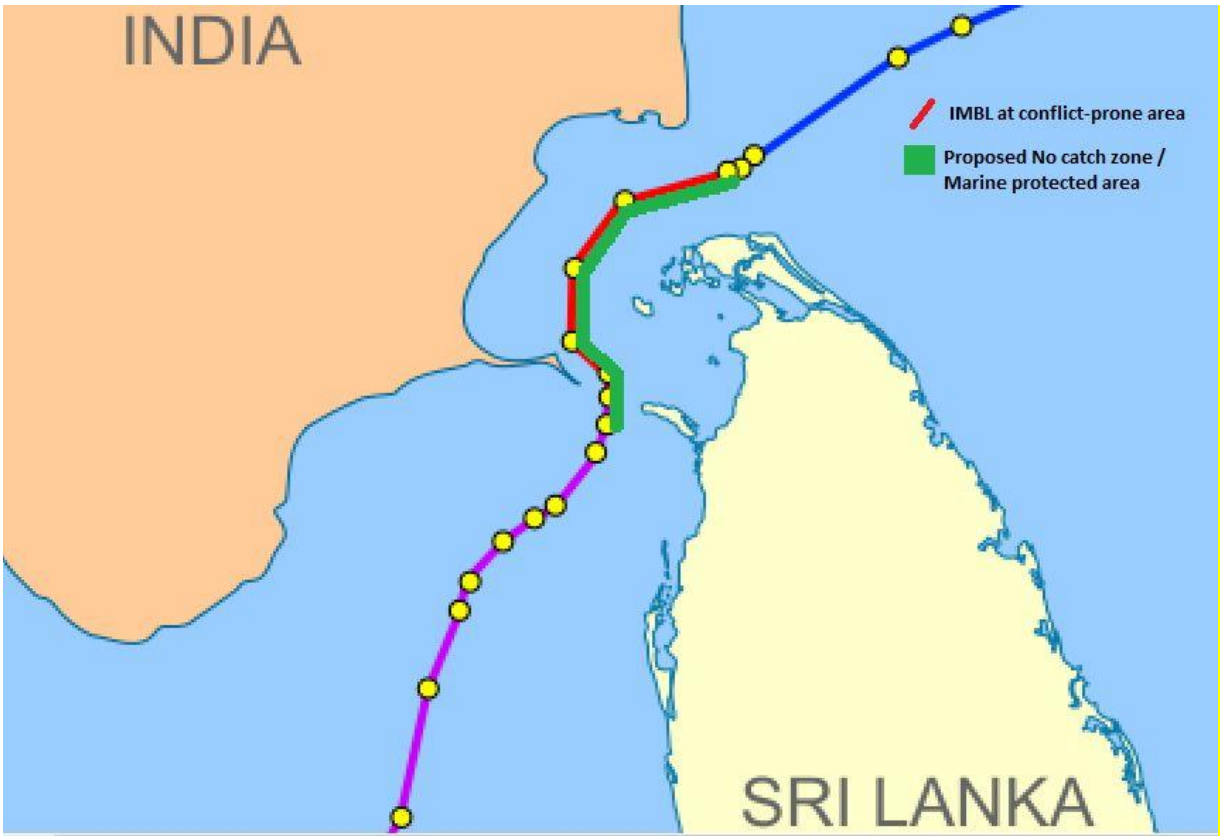

Fig 6 Proposed No catch zone or MPA at the Sri Lankan side from the IMBL
Adapted from (India-Sri Lanka Maritime boundary agreements 2021); License: CC BY-SA 4.0
NB: Similar 'No catch zone,' or MPA can also be established on the Tamil Nadu (India) side as well.

CONCLUSION

The conflict over the overexploitation of fish resources beyond the Indo-Sri Lankan coastal borders continues without a solid solution. The primary cause is thought to be the difficulties in judging the boundaries of the coastal sea. Yet due to the eminent fish catch in the region, there is an extreme level of competition between the fishing communities of India and Sri Lanka, which pushes them to breach their limits. Fishermen of both

countries had experienced the adverse effects of the Sri Lankan internal war, which lasted for three decades. The invasion of Indian trawlers is a major threat to the sustainability of the fish stocks (though they are a renewable resource), habitat, and other natural resources such as coral reefs in the region. It is illegal to use trawlers in coastal waters within three nautical miles (The West Bengal Marine Fishing Regulation Act of India 1993), but Indian coast guards remain careless in implementing the laws against them. This also affects the livelihood of Sri Lankan fishing communities and often creates conflicts with Indian poachers. On the Sri Lankan side, there is a need for fully implementing the Fisheries and Aquatic Resources Act, No. 2 of 1996, and the Amendment Act, No. 35 of 2013, in northern coastal waters to ensure the sustainable use of marine biodiversity in the region. There are various arrests and imprisonments of fishermen and seizure of their fishing vessels by both nations for entering their territorial waters (also with the aid of radar and satellite technologies), and these *conventional* solutions are *not* a sustainable means of handling the dispute. The ban on bottom trawling, which is a *sustainable* solution imposed in 2017 by Sri Lanka, is only amenable to the Sri Lankan fishing community, and trespassing Indian trawlers *do not* obey this rule. In addition, fisher-to-fisher dialogs (2010), mediation approaches (2004), and diplomatic interventions (1974, 1976, and 2016), permitting licensed Indian fishermen in Sri Lankan waters with a levy, declaring cap values, only banning fishing during breeding seasons, and educating or sensitizing fishermen on cross-border issues (creating awareness) could be listed as *greener* solutions, but many of them failed or were not even implemented. Thus, to establish a solid solution for the issue, *restorative* solutions can be recommended, such as coral restoration and mangrove restoration, restoration of the fish population via implanting artificial reefs or artificial reef-like structures, establishing a mutually acceptable 'no catch zone' along the IMBL or maritime protected area by both countries, despite the fact that its political feasibility is quite uncertain. This may increase the fish population not only in the marine protected region but also in the catchable waters of both nations. However, the Indian fishing community has been continuously expressing their unwillingness to restrict their catch within their IMBL limits. They continue to request permission to fish beyond their IMBL limits, and they continue to lobby their central government for the return of Kachchativu Island from Sri Lanka.

ACKNOWLEDGEMENT

The author thanks the staff of the Central Environmental Authority of Sri Lanka for supporting the study.

REFERENCES

Adu, P. 2017. Understanding Qualitative Content Analysis. The USA. Retrieved 10 23, 2020, from https://www.slideshare.net/kontorphilip/qualitative-content-analysis-for-systematic-reviews

Amarasinghe, O. 2011. *Fisheries Conflicts in Palk Bay: Is There a Way Out? From a Sri Lankan View Point.* University of Ruhuna.

Dailythanthi.com. 2021. Retrieved 06 14, 2021, from: https://www.dailythanthi.com/News/State/2021/06/13073828/In-the-sea-area-of-Kachchativu-Old-buses-Government.vpf

Deepananda, K., N. Abeykoon & K. Amaralal. 2021. Indo-Sri Lanka Fishing Conflict in the Palk Bay and Its Implications for Fisheries. Journal of the Indian Society of Coastal Agricultural Research, 39 (2). 140-150. https://doi.org/10.54894/JISCAR.39.2.2021.110627

Government of Sri Lanka. 2017. *Parliament of the Democratic Socialist Republic of Sri Lanka-Fisheries and Aquatic Resources (Amendment) Act No 11 of 2017.* Government of Sri Lanka. Retrieved 6 14, 2021, from https://www.lawnet.gov.lk/fisheries-and-aquatic-resources-amendment-3/

Gupta, C. 2015 Blurred borders: Coastal fish flock and environmental conflicts between India and Sri Lanka, Retrieved from https://www.researchgate.net/publication/253723948 on August. 06. 2015.

India-Sri Lanka Maritime boundary agreements. 2021. Retrieved 12 30, 2022, from https://en.wikipedia.org/wiki/India%E2%80%93Sri_Lanka_maritime_boundary_agreements

Majumder, B. & A. Malhotra. (n.d.). The Fishingwars Maritime Border conflict between India and Sri Lanka. *The Michigan Journal of International Law*.

Mayilvaganan, M. 2016. *Fishing Conflicts in the Palk Bay: Are the Indian Fishermen 'Carefully Careless'?* Retrieved 02 14, 2023, from www.thehindu.com/opinion/editorial/easing-tensionsin -the-palk-bay/article5583217.ece

Old SLTB buses sunk in the deep sea off North Sri Lanka to regenerate marine life (2021) Retrieved fromtimesonline.lk: https://sundaytimes.lk/online/latest-news/Old-SLTB-buses-sunk-in-deep-sea-off-North-to-regenerate-marine-life/18-1133726

Rutledge, K., M. McDaniel. S. Teng. H. Hall. T. Ramroop and E. Sprout. 2022. *"National Geographic.org'*. Retrieved 12 30, 2022, from https://education.nationalgeographic.org/resource/importance-marine-protected-areas/

Scholtens, J. 2015. Limits to the governability of transboundary fisheries: implications for small scale fishers in northern Sri Lanka and beyond. Pp 515-536 in: S. Jentoft, & R. Chuenpagdee, Interactive Governance for Small-Scale Fisheries*: Global Reflections* (pp. 515-536.). Dordrecht, The Netherlands: Springer.

Scholtens, J. 2016. The elusive quest for access and collective action: North Sri Lankan fishers' thwarted struggles against a foreign trawler fleet. International Journal of the Commons, 10 (02), 929-952.

Schwartz, D. & A. Singh. 1999. *Environmental Conditions, Resources, and Conflicts: An Introductory Overview and Data Collection.* UNEP.

Sivaramanan, S., & S. Kotagama. 2022. Investigation into the Interconnected Nature of Environmental Problems and Identifying Keystone Environmental Problems. Vidyodaya Journal of Science (Current Scientia), 25 (2), 81-104.

Spieler, R., D. Gilliam. & R. Sherman. 2001 Artificial substrate and coral reef restoration: what do we need to know what we need. *Bulletin of Marine Science 69(2): 1013-1030*.

Sundaytimes.lk 2011 Retrieved on 17.05.2022 from https://www.sundaytimes.lk/110227/ News/ nws_17.html

Stephen, J., A. Menon. J. Scholtens. & M. Bavinck 2013. Transboundary Dialogues and the 'Politics of Scale' in Palk Bay Fisheries: Brothers at Sea? South Asia Research 33 (02), 141–161.

Stirrat, R. 2018. The Palk Bay Fishing Dispute Revisited. India Quarterly: A Journal of International Affairs 74(25): 0974928417 74964 DOI: 10.1177/0974928417749641.

Suryanarayan, V. 2016. *The India-Sri Lanka fisheries dispute: creating a win-win in the palk Bay*. Retrieved 02 13, 2023, from carnegieendowment.org: https://carnegieendowment.org/files/Suryanaryanan_Fisheries_Dispute_.pdfVincent, S. 2020. Palk Bay fishing problem requires Indo-Sri Lankan joint-governance. Maritime Affairs: Journal of the National Maritime Foundation of India, 16 (2): 1-18.

Vivekanandan, V. 2023. *socialworkindia.in*. Retrieved 02 14, 2023, from https://socialworkindia.in/profiles/v-vivekanandan

U.S. EPA. 2000. Resolving Environmental Conflicts in communities (pdf. file)

UNEP 1999. Schwartz, Daniel and Singh, Ashbindu. Environmental Conditions, Resources and Conflicts: An Introductory Overview and Data Collection. United Nations Environmental Programme, Nairobi, Kenya. 44 p.

Waduge, S. D. 2014. Indo-Lanka Fishing dispute: Time for solutions, Lankaweb, retrieved from http://www.lankaweb.com/news/items/2014/06/12/indo-lanka-fishing-dispute-time-for-solutions Retrieved on August. 07. 2015.

Waldman, S. 2018. *E&E News conservation*. Retrieved 11 3, 2019, from https://www.scientificamerican.com: https://www.scientificamerican.com/article/human-pressures-have-shrunk-wildlife-populations-by-60-percent/