



TRAFFIC

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**IN DEEP WATER:
INDIA'S SEA CUCUMBERS
IN ILLEGAL WILDLIFE
TRADE**

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TRAFFIC REPORT

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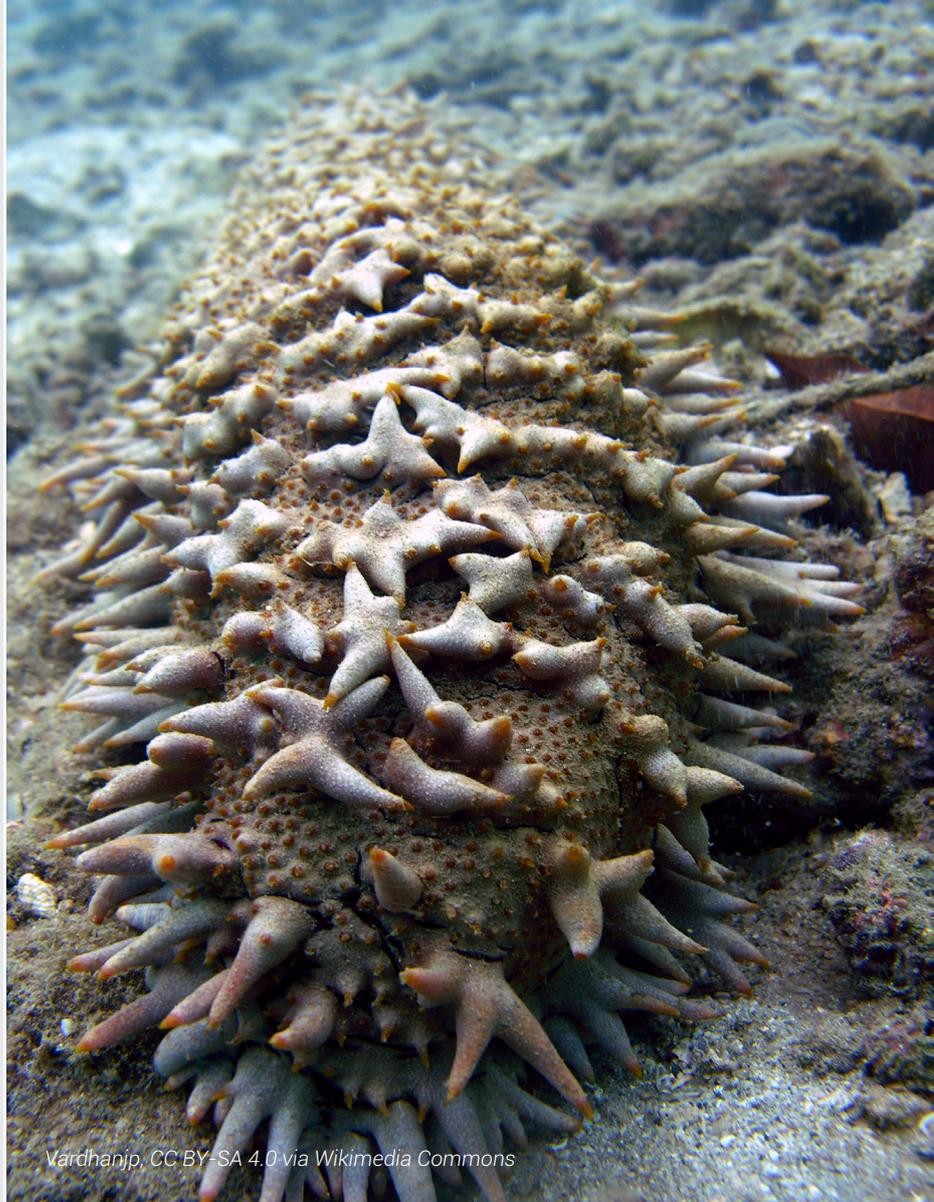
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ACRONYMS

CITES:	Convention on International Trade in Endangered Species of Wild Fauna and Flora
DoEF:	Department of Environment and Forest, Government of Lakshadweep
FAO:	Food and Agriculture Organisation
GoMNP:	Gulf of Mannar National Park
IUCN:	International Union for the Conservation of Nature
IWT:	Illegal Wildlife Trade
LEA:	Law Enforcement Agencies
MoEFCC:	Ministry of Environment, Forest, and Climate Change, Government of India
MPA:	Marine Protected Areas
MPEDA:	Marine Products Export Development Authority
NP:	National Park
PA:	Protected Area
TNFD:	Tamil Nadu Forest Department
WC:	Wildlife Crime
WiTIS:	Wildlife Trade Information System (TRAFFIC)
WLS:	Wildlife Sanctuary
WPA 1972:	Wildlife (Protection) Act, 1972
WWF:	World Wide Fund for Nature



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EXECUTIVE SUMMARY

Sea cucumbers belong to Class Holothuroidea of Phylum Echinodermata. These marine animals, benthic in nature, are distributed across the seas in the tropics. In India, there are approximately 200 species reported from the shallow waters dwelling in habitats such as seagrass meadows, coral reefs, rocky shores, sandy shores, and mudflats. The species are protected under strict legal provisions, yet the Holothurian populations in India have been subjected to illegal harvest. Demand for sea cucumbers in East Asian and Southeast Asian markets, along with the ease of harvest and low processing costs (drying) is proving to be detrimental to the species and its survival in their habitats in India.

This project is aimed to understand the extent of the sea cucumber trade in India, gaps in wildlife law enforcement initiatives for curbing this trade and provide guidance on the practical implementation of legal provisions.

This study covers 12 years (2010-2021) of seizure information from the Union Territory of Andaman and the Nicobar Islands, Lakshadweep, and the coastal state of Tamil Nadu.

To address the paucity of information on the illegal trade of sea cucumbers from the study areas, data was collated from:

- Open-source media reports
- TRAFFIC's Wildlife Trade Information System (WITIS)
- Law enforcement agencies
- Secondary verified reports including trade reports and memory recall data collected via targeted interviews of locals inhabiting villages in the project area.
- Questionnaires administered to the fishing community to understand trade routes and modes of transportation.

At the same time, surveys were carried out with law enforcement agencies to understand issues with the implementation of the existing laws for the protection and conservation of sea cucumbers.

During the study, a total of 163 seizures were recorded for sea cucumbers from 2010 to 2021, which amounted to 101.40 t and 6,976 individuals. The seized consignments consisted of live and dead individuals. However, it was not evident in 45 seizure reports amounting to 13 pieces and 34.03 t, if the species recovered were dead or alive.

A maximum of 139 seizures were reported from Tamil Nadu, followed by 15 seizures in Lakshadweep, four in Andaman and Nicobar Islands, two in Karnataka, and one each in Manipur and Kerala, while one seizure occurred in mid-sea. Hand-picking and skin/free diving were the main ways for collection in Andaman and Nicobar Islands and Lakshadweep, while in Tamil Nadu mechanised boats were the primary method used to collect sea cucumber. In the Andamans, preservation was done by cleaning, cutting, and drying while in Lakshadweep it was done through salting. In Tamil Nadu fresh sea cucumbers (i.e., sea cucumbers kept alive in seawater) and drying as a method of preservation was preferred. In the Islands, the sea was the main choice of transport, while in Tamil Nadu, the sea and road networks were preferred.

According to the seizure reports, Sri Lanka, China, and Southeast Asian countries were the top three destinations for sea cucumbers.

The study indicates an ongoing illicit sea cucumber trade trend from India to neighbouring countries. With limited information about its population status, the trade could have a detrimental impact on the species' future.

Sea cucumber needs robust conservation and protection measures. Some of these include

- Undertaking research for monitoring and developing molecular tools for species-level identification and population structure to aid the understanding of provenance.
- Using wildlife sniffer dogs at critical sites to detect protected marine species.
- Developing courses and modules for law enforcement officials on species identification, detection, and implementation of the Wildlife (Protection) Act, 1972.
- Enhancing cooperation within law enforcement agencies for implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) regulations by import countries for CITES-listed sea cucumber species
- Creating awareness programmes for fishers and the fish trading community.



Sea cucumbers for sale in Hong Kong © Meg Gawler / WWF

INTRODUCTION

SEA CUCUMBERS ARE MARINE ANIMALS BELONGING TO CLASS HOLOTHUROIDEA OF PHYLUM ECHINODERMATA. THEY ARE FOUND IN SHALLOW WATERS AND DEEP OCEAN AND SEA FLOORS.

SPECIES DIVERSITY AND DISTRIBUTION

Sea cucumbers are widely distributed across the seas in the world's tropical regions. Nearly 1,400 species of sea cucumbers are reported worldwide, while in India, approximately 200 species have been reported from the shallow waters, dwelling in their preferred habitats of seagrass meadows, coral reefs, rocky shores, sandy shores, and mudflats (Raghunathan and Venkatraman 2014., Asha *et al.*, 2015, Asha *et al.*, 2017).

Within India, sea cucumbers have been reported from the Union Territory of Andaman and Nicobar and Lakshadweep; Gulf of Mannar, Palk Bay, and Ennore in Tamil Nadu; Gulf of Kutch in Gujarat; Malvan coast in Maharashtra; and Kakinada Bay in Andhra Pradesh (Asha *et al.*, 2017). Some reports indicate a variation in the length and weight within the same species from India (Table 1).

ECOLOGICAL ROLE

Sea cucumbers play a crucial role in the maintenance of marine ecosystems. They consume decomposing organic matter converting it into recyclable nutrients, which are then available for other marine species (Purcell *et al.*, 2016). Due to the removal and subsequent conversion of organic matter, the oxygen conditions within the sediments stay relatively stable, thus ameliorating some of the adverse effects of organic matter enrichment in coastal ecosystems (MacTavish *et al.*, 2012). This creates an environment and habitat suitable for other marine life forms. Sea cucumbers form an essential part of the

biomass in the ecosystem. In addition, feeding and excretion by sea cucumbers increase seawater's alkalinity, buffering the ocean's acidification.

When they are present in high densities in close proximities to corals, they contribute tangibly to the resilience of coral reefs (Purcell *et al.*, 2016).

THREATS

Sea cucumbers are organisms with separate sexes of individuals that release their gametes into the surrounding environment for fertilisation. Therefore, they are particularly vulnerable to the Allee effect, which is characterised by failure of reproductive output associated with the insufficient density of matured individuals at a given place in time (Bell *et al.*, 2008). Their biological characteristics, primarily their sluggish movement, late age of maturity, slow growth, and low recruitment rate, make them vulnerable to pressures of targeted extraction or as bycatch. Once it collapses, the Holothurian population's recovery is slow even after implementing harvesting bans, as observed in the northern Red Sea Coast, Egypt (Ahmed and Lawrence, 2007).

In India, there is a lack of reliable information about the population and biological parameters of different species of sea cucumbers. The lack of this type of information that is paramount for devising policies for the species increases the challenges of effective management and planning (Asha *et al.*, 2015).

TABLE 1:

Range in length (in cms) and weight (in gms) for sea cucumber species in the Gulf of Mannar and Palk Bay, Tamil Nadu.

SPECIES	RANGE OF LENGTH (IN CM)		RANGE OF WEIGHT (IN GM)	
	GULF OF MANNAR	PALK BAY	GULF OF MANNAR	PALK BAY
<i>Stichopus horrens</i>	12.5-24.5	10.8-45.2	20-260	10-230
<i>Holothuria scabra</i>	14.5-24.5	16.1-18	115-580	50-780
<i>Holothuria atra</i>	6-32	5.1-24.8	40-1100	10- 400
<i>Holothuria spinifera</i>	9.5-38	5-18.6	50-1300	8-280
<i>Holothuria leucospilota</i>	7.3-42		20-1000	
<i>Stichopus horrens</i>	2.5-22	7-22.5	20-260	10-230
<i>Bohadschia marmorata</i>	11-41		100-1800	

SOURCE: Central Marine Fisheries Research Institute, 2015.

The international demand for sea cucumbers is mainly driven by their consumption in wet and dried forms, and their price depends on appearance, colour, odour, body wall thickness, and taste (Asha *et al.*, 2017). To meet the demand, Holothurians are either wild-caught or raised in aquaculture facilities to prepare a highly desired, dried, and processed product, known as 'Beche-de-mer' or "trepang".

In China, 'Beche-de-mer' has been an object of interest for trade since 1898. Later the markets shifted to Hong Kong and Singapore, which also started acting as hubs of re-export. The leading exporters of sea cucumber are Indonesia, Philippines, Fiji, Japan, Madagascar, Papua New Guinea, Solomon Islands, Thailand, and the United States of America (Conand, 2004).

Before listing sea cucumbers in the Wildlife (Protection) Act, 1972 (WPA 1972) in 2001, they were harvested and *Beche-de-mer* (cuisine made from sea cucumber) was traded from India. Reports suggest that between 1963-2001, India exported between 3 t to 70 t of sea cucumber products yearly, showing lowering trends towards 2001. However, these exports had put sea cucumber populations at risk (Asha *et al.*, 2017).

Before 1980, the export-grade size was 4-6 inches per individual; however, due to the non-availability of enough individuals of this size range (an early sign of stressed population due to over-harvesting), size grades less than 3 inches were also traded. This 'less than 3 inches' size group accounted for 49-87% of the total annual exports, despite their undesirably high sand content. In 1982, Marine Products Export Development Authority (MPEDA) suggested to the Ministry of Environment, Forest, and Climate Change (MoEFCC), that India should ban exports of sea cucumbers below the size grade of 3 inches. The subsequent ban led to a sudden reduction in trade volumes from 70 t in 1996-97, to 47.84 t in 1981 (Asha *et al.*, 2017). In 2001, the import of *Beche-de-mer* by Hong Kong SAR (Hong Kong Special Administrative Region) from India was reported at 3.81t, as there were not enough individuals meeting the specified export criteria (Hong Kong SAR import Statistics).

In 2001, a complete ban on trade was imposed on all Holothurian species, and these species were enlisted in Schedule I of the WPA 1972, thus providing them with the highest level of legal protection under Indian law.

PROTECTION STATUS

All sea cucumber species have been accorded the highest level of protection under the laws in India.

WILDLIFE (PROTECTION) ACT OF INDIA, 1972:

All species are listed in Schedule I of the Act making their extraction, trade, or any other form of utilisation a punishable offence.

CITES: Two species of sea cucumber found in Indian waters - *Holothuria fuscogilva* and *H. nobilis* are listed in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) since 2020, which regulates their international trade.

Despite the strict legal provisions, the Holothurian populations in India are under stress due to illegal and unsustainable harvests driven by persisting demand in Asian markets, ease of extraction and low processing (drying) costs. These factors are proving detrimental to the persistence of the species and its survival in the coastal waters of India (Asha *et al.*, 2015). In 2021, illegal trade in sea cucumber from India to Sri Lanka was reported with Tamil Nadu documented as one of the key source sites for sea cucumber poaching (Bondaroff 2021). This assessment only covered one State in India, but there was a lack of a comprehensive review on the overall illegal trade from India since the inclusion of the species in the WPA 1972 and listing in CITES.

Hence, it was pertinent that a study is undertaken to understand the illegal trade for sea cucumbers at key sites with international maritime borders where pressures would be high such as in Andaman and Nicobar Islands, Lakshadweep Islands and Tamil Nadu. In the same vein, the study also aims to understand the obstacles faced by law enforcement agencies (LEA) in addressing illegal trade and suggest the practical implementation of legal provisions for the LEA. The study was devised with the following objectives.

OBJECTIVES

1. Assessment of sea cucumber trade in India to determine the extent of trade, common trafficking routes, and modus operandi.
2. Identify issues in the practical implementation of legal provisions in curbing illegal trade and provide policy gap analysis.



Sea cucumbers for sale, Japan. © Michel Gunther / WWF

STUDY AREA

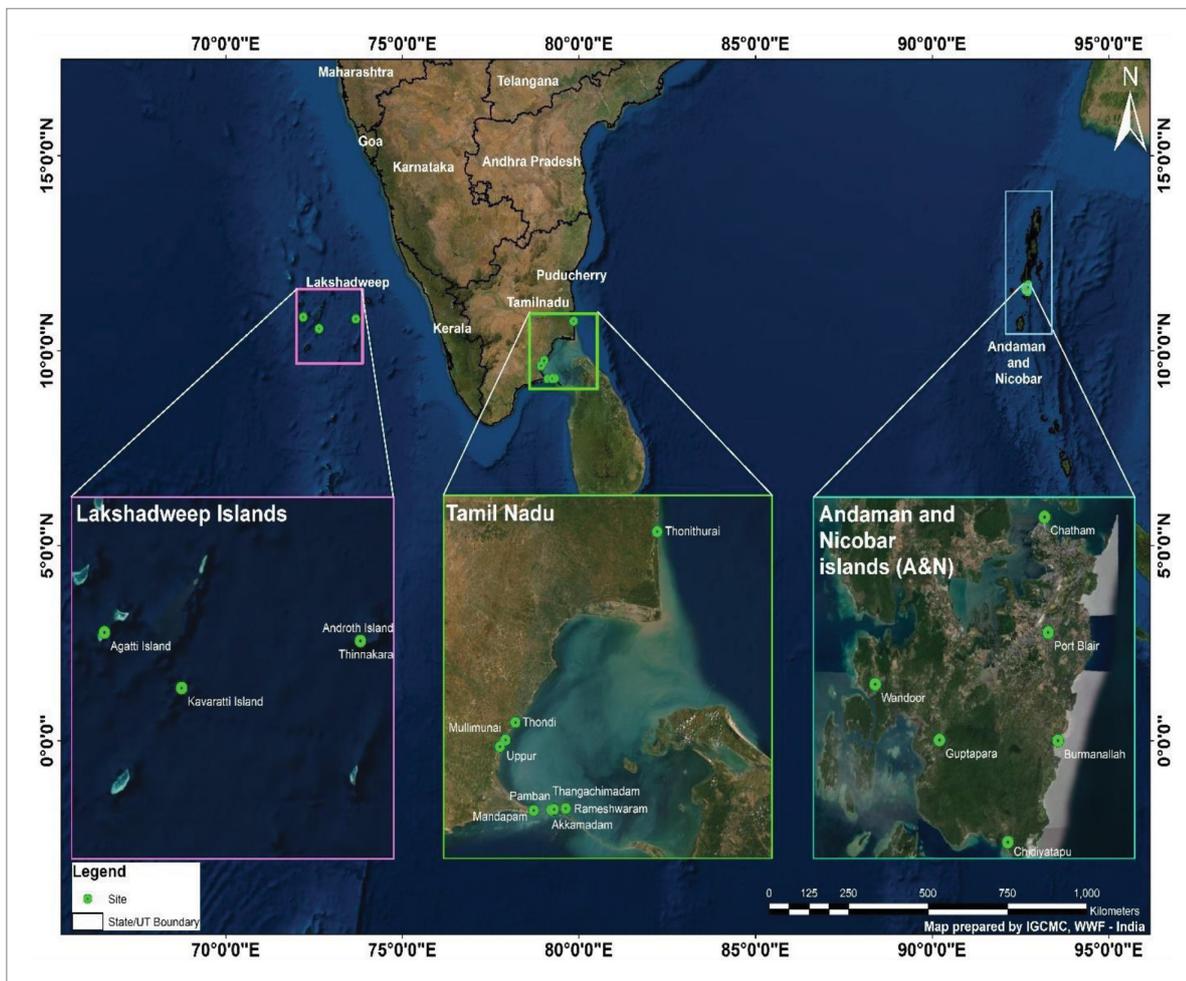
THE PRESENT STUDY WAS UNDERTAKEN IN THE UNION TERRITORY (UT) OF ANDAMAN AND THE NICOBAR ISLANDS, LAKSHADWEEP, AND THE STATE OF TAMIL NADU. THESE AREAS HAVE A SIGNIFICANT SEA CUCUMBER POPULATION, LINK TO INTERNATIONAL WATERS AND HAVE REPORTED ILLEGAL SEA CUCUMBER TRADE.

ANDAMAN AND NICOBAR ISLANDS

The Andaman and Nicobar Islands are a group of over 500 islands with a total combined area of 4,947 km², of which 1,620 km² is protected under India's WPA 1972. In total, there are 104 Protected Areas (PA), of which nine are national parks, and 95 are wildlife sanctuaries in the archipelago. Of the total PAs, 100 are Marine Protected Areas (MPA), including terrestrial habitats and marine components. Very few islands are inhabited and permitted for a visit, while on many islands, visits are restricted or not allowed.

The primary approach to the Andaman group of Islands is by sea or air.

The MPAs cover more than 30% of the terrestrial area of the islands and protect more than 40% of the available coastal habitats of the Islands (Sivakumar *et al.*, 2012). The Mahatma Gandhi Marine National Park and Rani Jhansi Marine National Park are the two most important MPAs in Andaman and Nicobar Island. The waters are used by multi-day trawlers from the mainland, while the international waters are used by neighbouring countries.



MAP:
Study sites for sea cucumber surveys in India.

LAKSHADWEEP ISLANDS

The Lakshadweep Archipelago is India's only chain of coral islands with atolls. It is a group of 36 islands, including 12 atolls, three reefs, and five submerged banks, located in the Indian Ocean. The islands are geographically isolated from the mainland, and are separated from one another by an average distance of 40-60 km. The designated MPAs cover 685 km² of the Lakshadweep Islands (including the Lakshadweep Sea).

There are three conservation reserves in three locations of the islands. The first area is spread over 239 km² at Cheriyanani and called Dr K. K Mohammed Koya Sea Cucumber Conservation Reserve. The second is the largest global marine conservation reserve between Amini and Pitti archipelago, with an area of 344 km², declared as Attakoya Thangal Marine Conservation Reserve. The third reserve is the first PA for marine birds in India across 62 km² (named P.M. Sayeed Marine Birds Conservation Reserve). The only sanctuary is the Pitti Bird Sanctuary, declared by notification in 2011, and an important nesting site for marine turtles.

TAMIL NADU

The State of Tamil Nadu is bound north by Andhra Pradesh, Karnataka on the northwest, Kerala on the west, and the Bay of Bengal on the east. In the south of Tamil Nadu is the Indian Ocean which shares the international water boundary with Sri Lanka.

Tamil Nadu has an area of 1,30,058 km², of which approximately 7,072.95 km² is designated as PA, which comes to roughly 30.92% of the State's forest area. The PA in the state includes five National Parks, 15 Wildlife Sanctuaries, 15 bird sanctuaries and two conservation reserves, besides five Tiger Reserves viz. Anamalai, Kalakkad - Mundanthurai, Mudumalai, Sathyamangalam and Srivilliputtur-Megamalai. The Gulf of Mannar Biosphere Reserve expands to an area of 10,500 km². of which approximately 560 km² are the coral reefs surrounding 21 islands.



Sea cucumber, Singapore © ProjectManhattan, CC BY-SA 3.0 via Wikimedia Commons

METHODS AND ANALYSIS

To address the paucity of information related to the illegal catch and trade of sea cucumbers from the study areas, the collation of information from various sources is suggested (Hansen *et al.*, 2012). Hence, seizure information for the twelve years period (2010-2021) was collated from various sources. The information sources included:

1. Open-source media reports
2. Data available on the Wildlife Trade Information System (WiTIS) of TRAFFIC
3. Data from law enforcement agencies
4. Secondary verified reports, which included trade reports and memory recall data collected via targeted interviews of locals inhabiting villages in the project area.

I. SEIZURE RECORDS

Information on seizures of sea cucumbers for 2010-2021 was sought in a standard format developed for LEA. The data requested was used to compute the frequency of illicit trade, the quantum of sea cucumber seized (with unit numbers/kilogrammes), and possible transit or trade route and likely destination information, if available.

Information was taken from published literature (newspaper articles, manuscripts) and the seizure updates on official social media handles of various LEAs. Information from CITES and UN Comtrade trade data for importer countries before and after 2015 were also checked for details related to the major export countries.



Survey with 'fishers' community at project site ©TRAFFIC

The information was catalogued in an excel sheet, along with information related to the destination. When the record had more than one destination site, information was plotted using CIRCOS, a software for the visualisation of data and relationships between variables. The number/weight was proportionally divided into the number of destination sites mentioned (Krzywinski *et al.*, 2009).

II. QUESTIONNAIRE SURVEY WITH 'FISHERS' COMMUNITY AND CIVIL SOCIETY AT CRITICAL SITES WITHIN THE STUDY AREAS

To understand the status, vulnerability, and extent of extraction of sea cucumbers, field surveys were undertaken in the three study areas. Sites were selected based on earlier reports of extraction and knowledge of illegal trade at the village/town/city levels. All the selected sites were within the distributional areas of sea cucumber. The household survey method was employed for sampling (St. John *et al.*, 2010). Approximately 1% of the households in a village were surveyed using the random sampling method, and each selected house was a sampling unit. The surveys were carried out from 2020 to 2021 but only during the permitted duration of the COVID pandemic, following the COVID protocols in place by the Government of India and that of the State. Representatives of civil society, such as from non-governmental organisations and scientific institutions were

also interviewed to access their perceptions of sea cucumbers' illegal trade and viewpoints on implementing the existing legal framework.

For data collection, an open-ended nominative questionnaire was developed to document areas of illegal harvest, frequency, collection method, storage, processing, and possible trading routes. The questionnaire contained five sections of which the first section dealt with information related to sourcing, the second contained questions about storage/processing, the third contained questions on the mode of transport/trade, the fourth on the level of awareness of sea cucumber crime, and the fifth on the roles, efficiency, and challenges faced by LEAs at the site.

The information was collected via a face-to-face interview after prior consent. The interviewees' anonymity was ensured during the process. Due to the subject's sensitive nature and to prevent accidental leak of identity, the interviews were not recorded digitally; instead, hand-written notes were taken during the interaction on the replies received.

III. ISSUES IN THE PRACTICAL IMPLEMENTATION OF LEGAL PROVISIONS IN CURBING ILLEGAL TRADE AND POLICY GAP ANALYSIS

Face-to-face interviews of staff of Forest Departments, Police Department, Customs and Coast Guards were conducted using an open-ended questionnaire. The exercise was undertaken to understand the issues faced by LEAs in controlling the illegal trade of sea cucumbers, to gauge their perception of the existing provisions of the WPA 1972; to know the status of implementation of the legal framework and assess the involvement of communities in the illegal trade.

The questionnaire surveys were administered at the three field sites with LEA, representing officers from the field officer level to the senior officer level. The questionnaire was deliberately left open-ended to capture the officers' perceptions more accurately. The questionnaire contained four sections to collect information related to illegal trade, current policy, suggestions for enhancing the implementation of the legal framework, and the status of involvement of the community in the illicit sea cucumber trade.

ENFORCEMENT AGENCIES

In Andaman, there were 15 respondents including 13 officials from the Forest Department, the Superintendent of Police from the Police Department, and the Commandant officer from the Indian Coast Guard. The respondents from the forest Department included the two Deputy Conservators of Forest (DCF), two Range Forest Officers, and one Assistant Conservator of Forests, Deputy Range Officer, Forester, Head Forest Guard, and Forest Guard.

Fifty-eight respondents represented three enforcement agencies in the Union Territory of Lakshadweep, of which there was one respondent each from the Department of Fisheries and Indian Coast Guard and the rest from the Department of Environment and Forest (DoEF), Government of Lakshadweep. The responses from DoEF represented 41 responses from Lakshadweep Marine Wildlife Protection Watchers, one from Range Forest Officer, three from Head of Departments, and 13 responses from rank officers.

Seven officials from the Forest Department, Department of Fisheries and Fishermen Welfare, and Coastal Security Group, Marine Police represented law enforcement agencies in Tamil Nadu. The officials were of the rank; Sub-inspector - Marine Police (2 officers), Range Officer (3 officers), and Forest Guard (1 officer), from Forest Department of Tamil Nadu from Ramnad, Pamban, Thoothukudi, and Devipattinam and Assistant Director (1 officer), Department of Fisheries and Fishermen Welfare, Tamil Nadu.

'FISHERS' COMMUNITY

A total of 30 fishers participated in surveys in Andaman and Nicobar Islands. These surveyed fishers used mechanised/motorised vessels for commercial fishing, with fishing gear such as gill or cast net/handline, pole and line, and purse seine nets.

In Lakshadweep, 24 fishers participated in the surveys from the islands of Agatti, Kavaratti and Andrott. The surveyed fishers operated a motorised vessel or a traditional boat and used a combination of fishing gear such as gillnet, pole and line, handline, longline, purse seine and trawlers for commercial fishing.

In Tamil Nadu, a total of 45 fishers participated in the survey. The fishers interviewed used mechanised (24 fishers), motorised (16 fishers), and traditional boats (5 fishers), with gill nets or trawl nets for commercial fishing. The representation of each village/island is given in Annexure I.



Dried sea cucumber © Gunawan Kartapranata, CC BY-SA 4.0 via Wikimedia Commons

RESULTS AND DISCUSSION

ASSESSMENT OF ILLEGAL TRADE AND TRADE ROUTES OF SEA CUCUMBERS

A total of 163 seizure cases were recorded for sea cucumbers from 2010 to 2021, which amounted to 101.40 t and 6976 individuals (Figure 1A). The seized consignments consisted of live (11 seizures, 46 pieces, and 1.46 t), and dead individuals (110 seizures, 6,917 pieces, and 65.89 t).

However, in 45 seizures, data was insufficient to conclude if the sea cucumbers were dead or alive. Three seizures had both live and dead sea cucumbers for which their weight and numbers were included separately in their respective categories.

TEMPORAL PATTERNS OF SEIZURES

Across the 12-year period, the highest number of seizures (27) were reported in 2017 from Tamil Nadu. The highest quantity (37.3 t) of sea cucumber seized was in 2015, including a single largest seizure of 14 t. The year 2020 reported the highest number of individuals seized (2324).

According to the study, Tamil Nadu recorded the highest number of sea cucumber seizures in India. Till 2014, the number of reported seizures declined in Tamil Nadu and then showed an upward trend till 2017, again decreasing till 2021.

However, despite this decline, the overall quantity (weight, median) of sea cucumbers seized increased gradually from 2016 to 2020 (Figure 1B).

SPATIAL PATTERN OF SEIZURES

The maximum seizures were reported from Tamil Nadu (139 seizures) where 4130 pieces and 82.02 t were seized. It was followed by 15 seizures in Lakshadweep (2846 pieces and 14.63 t), four in Andaman and Nicobar Islands (101 kg), two seizures in Karnataka (2.15 t), one seizure each in Manipur (1.0 t) and Kerala (1.5 t), and one seizure occurred mid-sea. The 139 seizures in Tamil Nadu

were reported from eight locations (Table 2), namely Ramanathapuram, Thoothukudi, Nagapattinam, Chennai, Pudukkottai, Tiruchirappalli, Sivaganga, and Madurai. Apart from the above, there were six seizures, amounting to 321 pieces and 1.65 t where the location was not mentioned (Figure 1b).

The 15 seizures at Lakshadweep were reported from four locations, Agatti Island, Laccadive Islands, Aminidivi, and Suheli Island, details of which are given in Table 3. There were three other seizures reported from Lakshadweep, amounting to 74 pieces and 4.30 t where the location of the seizure was not mentioned.

The biggest, single seizure of individuals was in the year 2016, with 1900 individuals reported in a single seizure

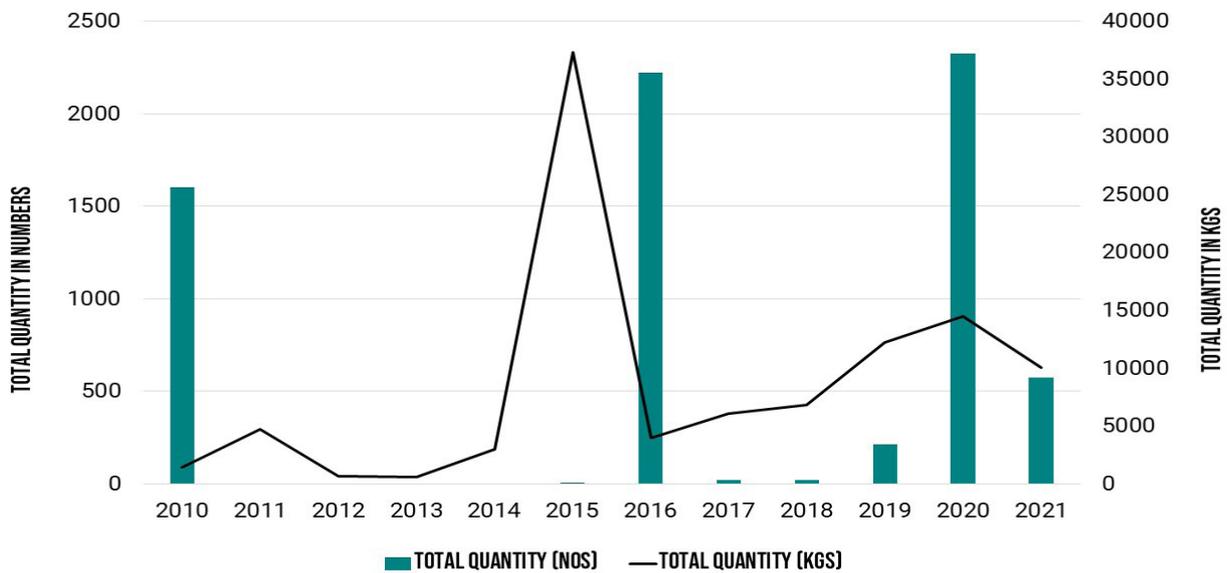


FIGURE 1A:

Sea cucumber seizures (in total numbers shown as a bar graph and weight in kilogram shown as a line graph) from 2010 to 2021.

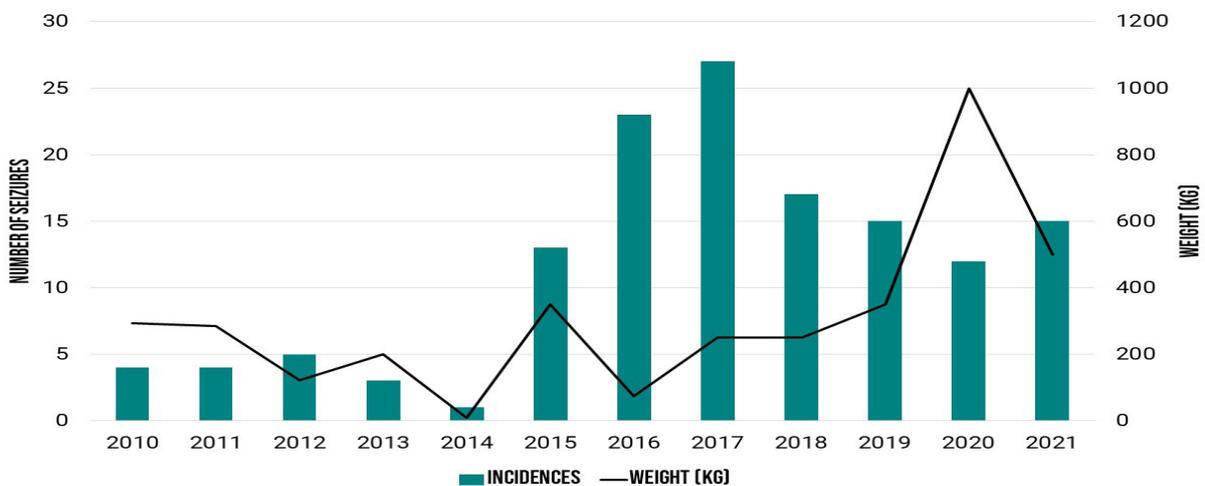


FIGURE 1B:

Number of incidences of sea cucumbers (bar plots) and median weight in kilograms plotted from 2010 -2021 for Tamil Nadu.

TABLE 2:

Sites in Tamil Nadu which reported seizures of sea cucumber.

SITES	SEIZURE	NUMBERS	WEIGHT (T)
Ramnathapuram	90	3500	37.99
Thoothukudi	26	71	14.24
Nagapatinam	7		13.45
Chennai	4		14.14
Pudukkottai	3	27	0.10
Tiruchirappalli	1	211	
Sivaganga	1		0.33
Madurai	1		0.11

There were four seizures in Andaman and Nicobar Islands. Two seizures comprising 0.10 t of sea cucumber was reported from South Andaman. One sea cucumber seizure was from Barren Island where the quantity was not reported. In one seizure, the location and quantity of sea cucumber seized were not disclosed.

Two seizures were reported in Karnataka, one at Mangaluru (2 t) and another at Bengaluru (0.15 t). There was one seizure at the Imphal Airport in Manipur, (0.10 t) and a single seizure in Kerala (1.5 t) where the location was not disclosed.

TABLE 3:

Sites in Lakshadweep which reported seizures of sea cucumber.

SITES	SEIZURE	NUMBERS	WEIGHT (T)
Agatti Island	7	534	0.46
Laccadive Islands	2	36	0.012
Aminidivi	2	486	9
Suheli Island	1	1716	0.85

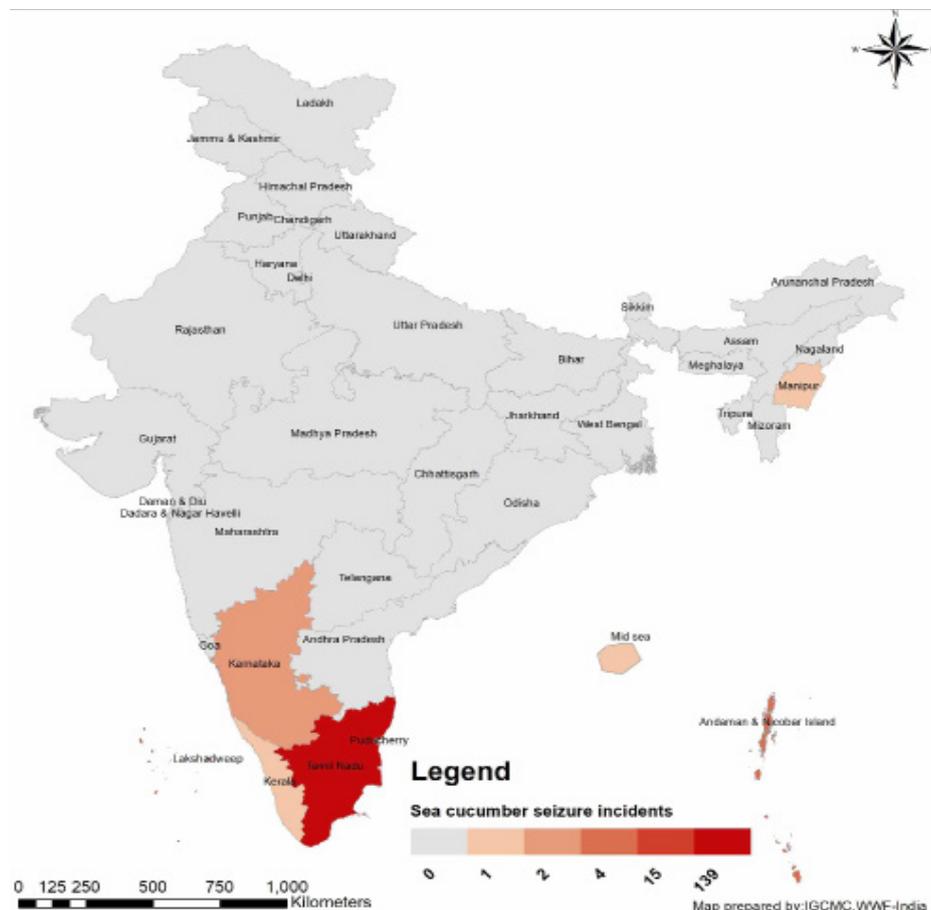


FIGURE 2:

Total number of sea cucumber seizures in India (2010-2021).

SOURCE SITES

The source sites (sites from where sea cucumbers were sourced) were mentioned in only 24% of seizure incidences (38 seizures). Of the mentioned source sites, 71% were in Tamil Nadu, 18% were in Lakshadweep, and the rest were from Andaman and Nicobar Islands. (Figure 3).

SEA CUCUMBER-RICH AREAS

ANDAMAN AND NICOBAR ISLANDS:

According to 27% of the fishers, Rutland Island is a major sea cucumber-rich area from where the trade chain starts. The fishers reported it as a major hotspot for the sea cucumber trade. Cinque Island was also reported as a sea cucumber-rich area by 24% of the fishers. Wandoor, Jollybuoy island, and the areas between Katchal and Nicobar were reported as sea cucumber-rich areas by seven% of the fishers for each of the three sites. The 24 islands grouped as 'Nicobar Islands' were reported as sea cucumber-rich areas by 16% of the fishers.

LAKSHADWEEP:

The fishers reported Perumal par (46% respondents), Suheli (41% of fishers), Cheriya pani and Valiya pani (37% of fishers for each site), Bangaram (8% of fishers), and Bitra (4% of fishers) as sea cucumber rich sites.

According to 59% of the fishers, sea cucumber collection occurred in other uninhabited islands.

TAMIL NADU:

Devipattinam was reported as the sea cucumber-rich site by 35.5% of the fishers. This was followed by Dhanushkodi (15.5%), Rameswaram (13%), Ariyaman (7%), Olaikuda (4%), Azhagankulam (4%), Mandapam (2.5%), Allaiathavalasai (2.5%), and Pasipattinam (2.5%). The stretch from Mandapam to Devipattinam, Rameswaram to Devipattinam, Passipattinam to Pudupattinam, Devipattinam to Thondi, and Dhanushkodi to Devipattinam were also reported as sea cucumber rich sites by the fishers.

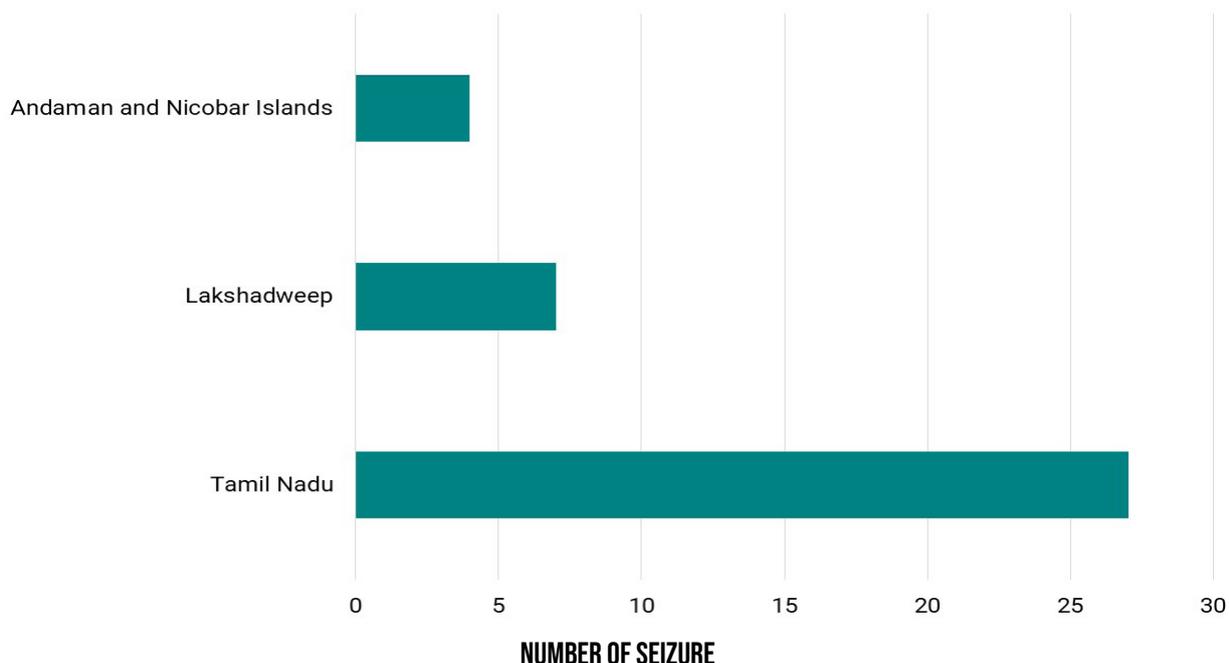


FIGURE 3:

Number of seizures that have mentioned source sites in Andaman and Nicobar Islands, Lakshadweep and Tamil Nadu.

AREAS OF EXTRACTION

ANDAMAN AND NICOBAR ISLANDS:

According to 10% of fishers, sea cucumbers were found up to 5 m from shore, at 10-20 m by 20% of the fishers, between 100-300 m by 10% of the fishers, between 300-500 m by 20% of the fishers, and between 500-1000 m by 65% of the fishers. The fishers interviewed said that the sea cucumbers found closer to the shore are the most valuable species, especially those found within the coral reefs and rocky shores. The extraction sites for sea cucumber include Diglipur, Campbell Bay, Camoth, John Lawrence Islands, Narcondam Island, Barren Island and Wandoor.

LAKSHADWEEP:

The hotspots of extraction in Lakshadweep were reported by the fishers to be less than 1 km from shore by 30% of fishers, 10m to 2 km by 3 % of fishers, and 10 m to 3 km by 3% of fishers. Twenty per cent of fishermen claimed that sea cucumbers are found everywhere in lagoon areas, and 6% of fishers reported sea cucumbers are also found as far as 12 km from shore. The respondents reported nine sites in Lakshadweep where the illegal harvest of sea cucumbers is undertaken. These sites included Agatti (74%), followed by Suheli (50%), Valiyapani (36%), Perumal Par (29%), Cheriyanpani (26%), Parali par (9%), Kavaratti (5%), Thinnakkara (3%), Kadmat (3%), Bitra (1.7%), and other uninhabited islands (48%).

TAMIL NADU:

Among the fishers surveyed, 55.5% reported that sea cucumber populations were rich between 1-5 km from the shore, 29% of fishers reported that they were found mainly in shallow areas, 20% of fishers reported that they were also found between 6-10 km from the shore, while sandy areas and seagrass beds were reported by only one fisher each. Nearly 43% of the fishers suggested Devipattinam, Thondi, Vedalai, and Mandapam while 14% fishers suggested Nambuthalai, Rameswaram, Thonithurai, Serankottai, Olaikuda, Karayoor, and Thespuram as sites from where extractions is undertaken.

More than half (57%) of the enforcement officers agreed that the extraction hotspots are different to seizure sites. Broadly the extraction hotspots reported by them were Gulf of Mannar (from Rameswaram to Thoothukudi) and Palk Bay (from Devipattinam to Thondi).

One official reported that most of the traders were in Vedalai.

FREQUENCY OF ILLEGAL TRADE

ANDAMAN AND NICOBAR ISLANDS:

There were 12 responses received from enforcement agencies, where 67% of the responses stated that there was less than one incidence of sea cucumber seizure per month, while 25% suggested it to be 1-2 incidences per month. The rest suggested it to be more than five cases per month.

LAKSHADWEEP:

Nearly 65% of the officers suggested illegal trade was occurring not more than once a month, 15% of the officials suggested incidences were occurring between 1 to 2 a month, 6% of the officials stated the incidences were occurring 2 to 5 times per month, and more than 5 times per month each.

TAMIL NADU:

Nearly, 72% of the officials stated that the frequency of sea cucumber seizures was between one to two a month, 14% of officials stated it to be within the range of two to five incidences per month, and 14% of officials stated it to less than one incidence per month.

COLLECTION METHOD

ANDAMAN AND NICOBAR ISLANDS:

There were two methods mentioned by the 'fishers' community for the collection of sea cucumbers. According to 86.66% of the fishers, skin-diving/freediving was used for sea cucumber extraction while 46.66% of the fishers mentioned the used of handpicking method. The handpicking method was used during low tide or in the shallow areas of the reefs, while skin-diving/free diving was used for collection in deeper areas during the low tide (Figure 4).

LAKSHADWEEP:

According to 75% of the fishers, the preferred method for sea cucumber extraction was skin-diving/ freediving/ swimming. Handpicking was used according to 41.66% of the fishers while the traditional boats were used according to 29.16% of the fishers. Scuba diving, harpooning, and the use of mechanised boats were each reported by 4% of the fishers (Figure 4).

TAMIL NADU:

The collection of sea cucumbers was undertaken using mechanised boats according to 84.44% of the fishers, by traditional boats according to 26.66%, crab-nets according to 6.66%, swimming/ free diving according to 4.44%, and handpicking by 2.22% (Figure 4).

COLLECTION TIMING

ANDAMAN AND NICOBAR ISLANDS:

The sea cucumbers were reported to be collected during low tide by 40% of the fishers, while 7% of the fishers responded that there is no fixed time for the collection, and it was dependent on the demand and request. More than 10% fishers stated that the availability is all year round, and the rest did not reply. However, the most valuable species are found in the winter months between December to February.

LAKSHADWEEP:

Sixteen percent of the fishers reported that sea cucumbers were fished mostly at night because of higher visibility while 20% of the fishers claimed there was no specific time of the day for extraction.

Five out of six fishers who responded said that the months from September to April are the most preferred season. One fisher said that sea cucumbers were available and collected all year round depending on the demand.

TAMIL NADU:

All fishers reported no specific time for collection. A total of 39 fishers stated that sea cucumber collection occurred all year round, and six fishers were unsure of the seasonality of sea cucumber availability.

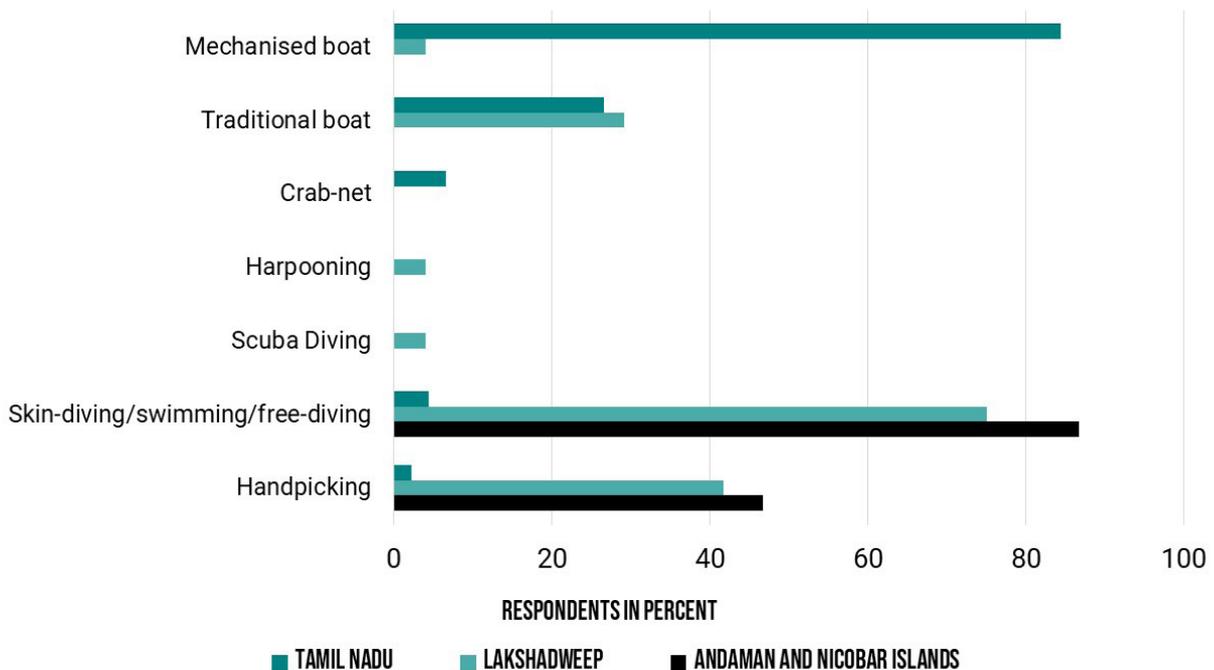


FIGURE 4: Reported collection methods for sea cucumbers in Andaman and Nicobar Islands, Lakshadweep, and Tamil Nadu.

STORAGE

For storage after collection while still in the sea, majority of the fishers reported use of wooden drums on the fishing boats and the storage area in the boats. On land, various methods were used for storage. In Andaman, the most preferred method was the use of metal containers (30%), jute sacks (23%) while in Lakshadweep it was in sheds (50%), sand burial (42%) and one respondent reported use of freezer. For Tamil Nadu, all responses received from the fishers' community indicated no storage of harvested sea cucumbers.

PROCESSING/PRESERVING

Across the three sites, various methods were used for processing/ preserving sea cucumbers for illicit trade.

ANDAMAN AND NICOBAR ISLANDS:

A total of 76.66% of fishers said that the sea cucumbers were processed, while 6.66% were not aware and the rest did not reply. It was reported that the processing usually occurred on uninhabited islands, and the buyer specified whether they required processed or unprocessed sea cucumbers in their order. It was reported that before the ban, women helped in processing; however, nowadays they are not engaged in the processing.

LAKSHADWEEP:

Nearly 87.5% of the fishers' interviewed said that the sea cucumbers were processed. At the same time, one response suggested, that due to improved implementation of the legal framework, it was challenging to process sea cucumbers, and hence the species were extracted and traded live.

TAMIL NADU:

Nearly, 60% of fishers said that the sea cucumbers were processed post collection, while 40% were not sure about the methods used. Sixty per cent of fishers also reported that womenfolk are involved in the boiling process of sea cucumbers.

The most preferred methods used for processing and preserving (reported by fishers and officials) in all three states for the processing of sea cucumbers is given in Figure 5.

TRANSPORT

Information on the transport mode used for trafficking sea cucumbers was mentioned in 69 seizure incidences (42.33% of all seizures). Seventy-one per cent of these incidences used water transport, 20% used land-based vehicles, while 9% of incidents involved air transport as a preferred mode of transportation (Figure 6). Since there was insufficient information about the mode of transportation in the reported seizure incidences, the surveys from the 'fishers' community were used to understand the mode of transport most frequently used.

ANDAMAN AND NICOBAR ISLANDS:

According to the 'fishers' community, the main mode of transport of sea cucumbers was by shipping vessels (70%) of which nearly 90% responses indicated that the shipping vessels were from another state, while only 10% suggested that the shipping vessels were from Andaman and Nicobar Islands. There was one respondent who suggested the use of an air transport system. Thirty per cent of respondents did not answer the question (Figure 7).

LAKSHADWEEP:

Seventy per cent of respondents mentioned using fishing vessels from other states to transfer sea cucumbers, while the rest were unaware (Figure 7).

TAMIL NADU:

The entire fisher's community indicated the use of the road network and the sea route to transport sea cucumbers. On-road the main mode of transport reported, were cars/Omnivans (73.33%), heavy vehicles (26.66%), and buses (13.33%).

A total of 69% of respondents suggested local fishing boats, which are used for trading with Sri Lankan fishing boats in the high seas, while about 15.55% of respondents were not sure about the mode of transport (Figure 7).

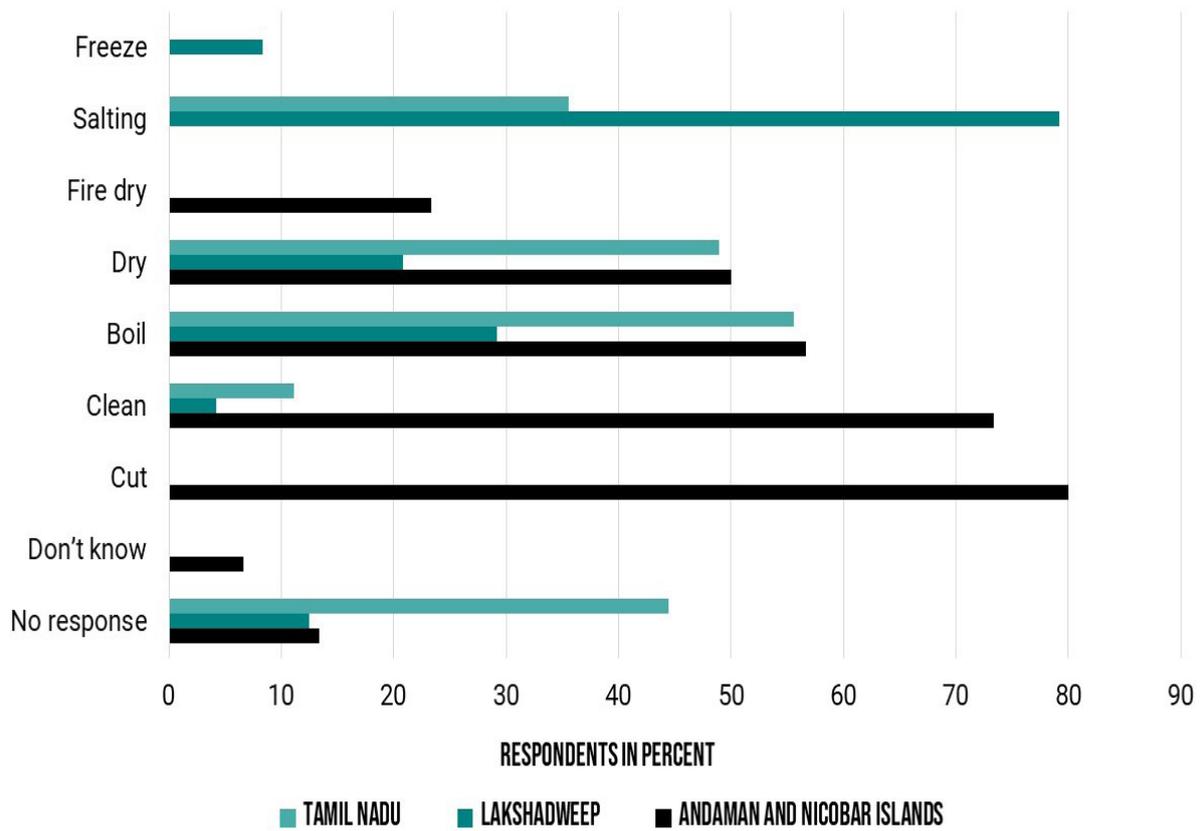


FIGURE 5: Various methods used to process and preserve sea cucumbers across the three sites in India.

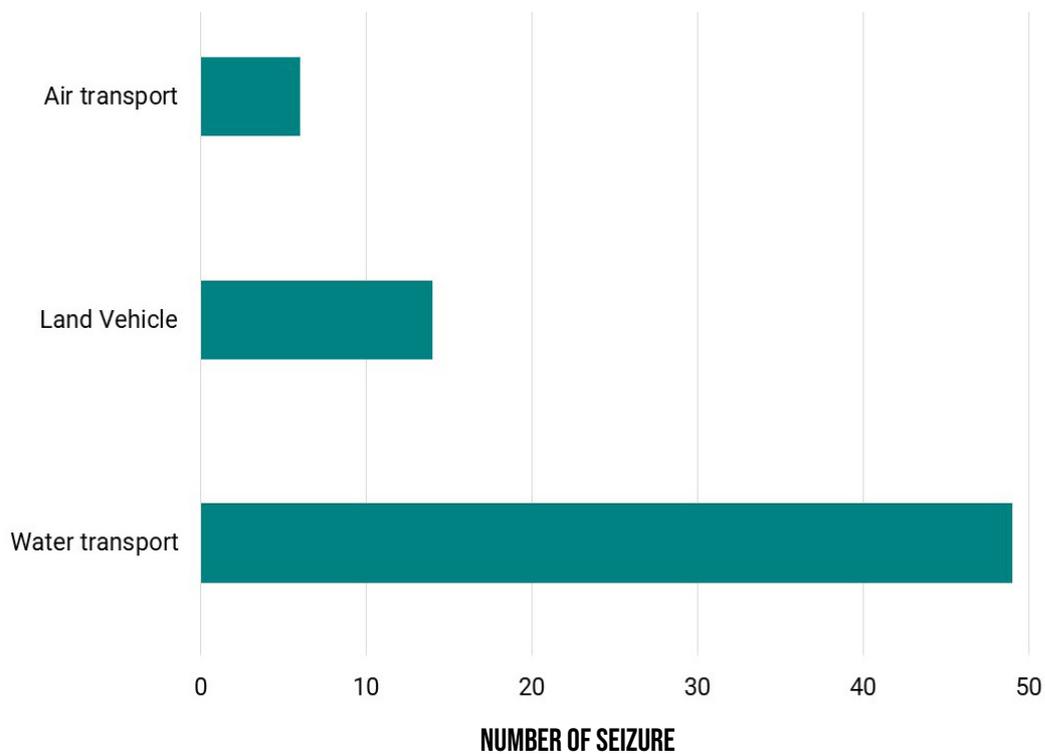
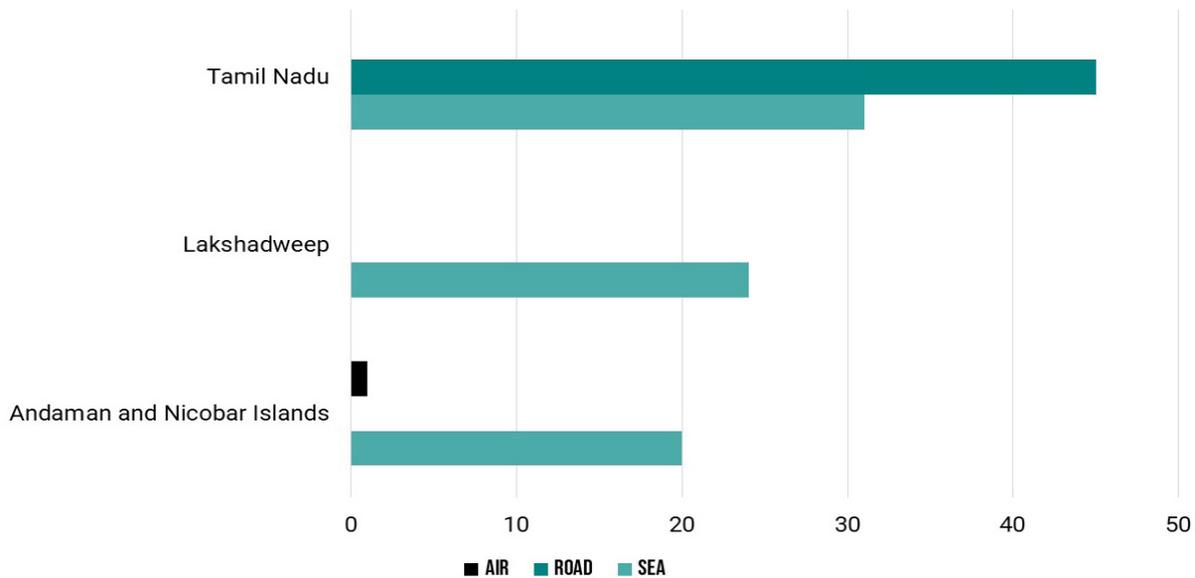


FIGURE 6: Mode of transport used in the illegal trade of sea cucumbers from India.



NUMBER OF SEIZURE

FIGURE 7:

Mode of transport used in Andaman Islands, Lakshadweep, and Tamil Nadu.

DESTINATION

From 163 seizure records, less than 35% of the incidences mentioned the destination countries (five), and only one region was mentioned as the destination of the harvested sea cucumbers.

According to 71.64% Sri Lanka was the most likely destination, followed by China (10.45%), Singapore (5.97%), Myanmar (2.99%), Thailand (1.49%), and Southeast Asia region (7.46%) (Figure 8A).

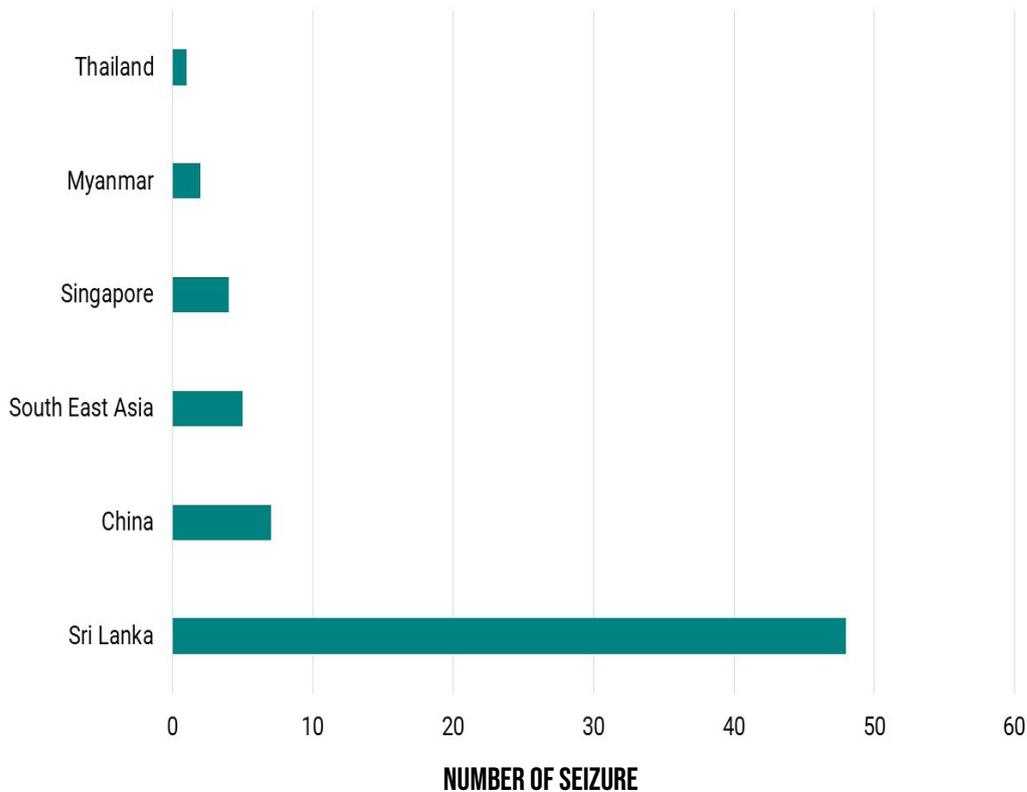


FIGURE 8A:

Reported destinations of sea cucumber from India.

Information from 20.24% of seizure incidences were used to plot linkages from seizure sites to destination sites. Based on the reported seizure incidences, nearly 32 t of sea cucumbers headed towards Sri Lanka from Lakshadweep (27.58%) and Tamil Nadu (72.42%). This was followed by the Southeast Asian region (06%) from Lakshadweep (46.61%) and Tamil Nadu (53.38%). China (5%) from Tamil Nadu, Myanmar (2.6%) through Manipur, Singapore (approx. 1.6%) from Karnataka (24.35%) and the rest from Tamil Nadu, and Thailand less than one% from Tamil Nadu (Figure 8B).

The consignment from Imphal, Manipur, was sourced from Andaman and Nicobar Islands; similarly, the seized sea cucumbers from Sivaganga, Tamil Nadu, were also sourced from Andaman and Nicobar Islands. There was no information on the source site for the seized sea cucumbers at Bengaluru, Karnataka.

WITNESSES TO SEA CUCUMBER CRIME:

ANDAMAN AND NICOBAR ISLANDS:

Most of the fishers reported having never witnessed illegal harvesting of sea cucumber or trade. The reason for this is that the collection of sea cucumbers occurred in

secluded and uninhabited islands, or maybe due to the illegality of the trade, they were not ready to acknowledge this. However, the fishers were aware of the ongoing illegal trade of sea cucumbers through various other means such as at social gatherings, print/social media, and through awareness programmes conducted by the Forest Department.

LAKSHADWEEP:

Twenty-five per cent of the interviewed fishers claimed to have witnessed unidentified non-local boats collecting the species. Seventeen per cent of the fishers had seen local fishing boats of Lakshadweep collect sea cucumbers, and 3% of fishers even reported to have seen a Sri Lankan boat collect sea cucumbers, while 42% of fishers had never witnessed a sea cucumber crime.

TAMIL NADU:

Nearly 62% of the interviewed fishers reported that they had witnessed sea cucumber crime.

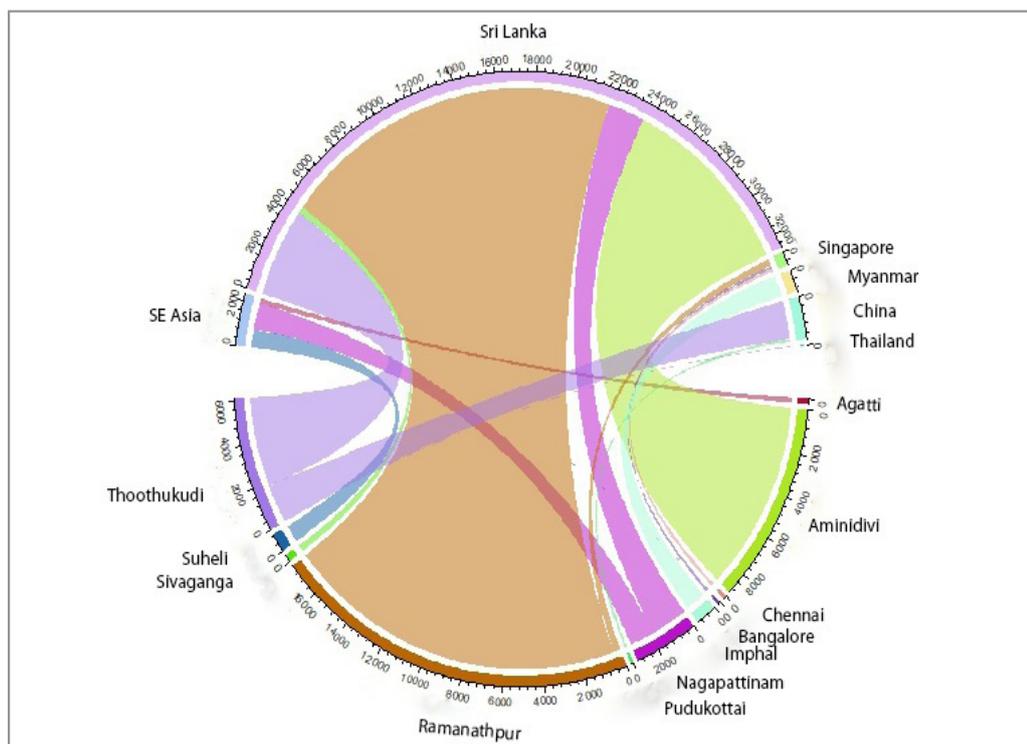


FIGURE 8B: Linkage of illegal sea cucumber trade from seizure sites to destination countries.

DRIVER FOR ILLEGAL HARVEST AND TRADE

ANDAMAN AND NICOBAR ISLANDS:

All fishers interviewed reported illegal harvest of sea cucumbers due to monetary value attached to the trade. It was also reported that traders also engage with unemployed locals who are not fisherfolks to collect and supply sea cucumbers.

LAKSHADWEEP:

Opportunistic trade was reported by nearly 20% of fishers while targeted trade was reported by nearly 30% of fishers. While one fisher reported that a small quantity of the harvest is targeted, with the younger generation more involved in targeted poaching.

TAMIL NADU:

Approximately 67% of the fishers were unaware whether the sea cucumbers were targeted for trade or were opportunistic catch. Nearly 10% of the fishers stated that sea cucumbers were collected as targeted and another 10% suggested it was opportunistic catch and 13% of the fishers did not respond. All fishers reported that there is no domestic use or market for sea cucumbers, but that they are collected as this facilitates supplementing income, despite the present risk.

TRADERS

ANDAMAN AND NICOBAR ISLANDS:

Approximately 40% of the fishers were not aware of the identity or origin of buyers, but they said that traders who order the sea cucumbers are from the mainland. Two fishers mentioned that buyers were from Kolkata and Chennai. Buyers were also reported to be from Myanmar by one respondent from the fisher's community. There were no local buyers as there is no demand for the sea cucumbers in Andaman and Nicobar Islands except in a few tribal communities of Nicobar, where they consume the sea cucumbers in the soup as a part of their traditional medicine system. The orders to collect sea cucumbers were reported to be received from the mainland or Myanmar or Thailand.

LAKSHADWEEP:

A total of 20 fishers reported they were unaware of the buyer of sea cucumbers, while three claimed that fishing vessels from the mainland were buying the sea cucumbers. One reported that middlemen from Sri Lanka were buying the sea cucumbers. A total of 11 fishers said that traders were from Lakshadweep Islands.

TAMIL NADU:

Nine fishers reported buyers to be local, and two reported that the buyers were both local and international; 16 fishers were unaware of the buyers. Officials reported that the local fishers were transferring the collected sea cucumbers to traders.

PROTECTION AND CONSERVATION EFFORTS

ANDAMAN AND NICOBAR ISLANDS:

Various departments, such as Environment and Forest, Fisheries, Police, and Coast Guards, conducted awareness campaign for the fishers' communities. The responders (23 fishers) stated that these awareness campaigns provided knowledge on the protection of sea cucumbers. All fishers stated that the enforcement agencies worked efficiently to curb sea cucumber crime in Andaman and Nicobar Islands.

LAKSHADWEEP:

Anti-poaching camps have been set up in Cheriyaipani, Veliyapani, and Thinnakara. A total of 200 Lakshadweep Marine Wildlife Protection Force Watchers (MWPFW) has been appointed for surveillance in these anti-poaching camps by the Environment, and Forest Department (EFD) of Lakshadweep. Other initiatives recorded included the recruitment of forest guards and foresters, the provision of patrolling and monitoring 24X7 hours at anti-poaching camps, and improved coordination and cooperation with other LEA such as the Department of Fisheries, and Police Department, where the seizures have been referred to the Central Bureau of Investigation for further investigation.

On 27 February 2020, to enable better monitoring and protection The EFD of Lakshadweep declared the 'World's first sea cucumber conservation reserve, Dr KK Mohammed Koya Sea Cucumber Conservation Reserve, at Cheriyanani lagoon and surrounding reef area of approximately 239 km².

Fifty-three officials reported excellent awareness programmes conducted by EFD of Lakshadweep for the local community, including information, educational and communication material at strategic locations. All surveyed fishers were aware that the sea cucumber trade is illegal; eight fishers responded that their knowledge of sea cucumbers was from campaigns, posters, and flex-print boards, and four fishers reported social media, such as WhatsApp groups to be the source of information. One fisher said that the local news channel was the source of information.

A total of 16 fishers claimed that the EFD of Lakshadweep had done excellent work, especially in the last two years, to curb poaching, leading to seizures. Seven fishers reported there to be scope for improvement with the Forest Department's efforts to curb sea cucumber crime.

TAMIL NADU:

All officials reported that the TNFD has taken various initiatives to curb sea cucumber crime in the state including awareness campaigns carried out in the community, and regular patrolling in crime hotspot areas. The patrolling was also extended to night-time patrols in very sensitive and vulnerable areas. Informant networks were set up to bring in knowledge and intelligence, leading to seizures; this also included the recruitment of local fishers as informants. TNFD has also formed special teams for curbing sea cucumber crime, including those responsible for boat patrolling and intelligence gathering.

All the fishers knew that sea cucumber extraction and trade were illegal. A total of 18 fishers reported that searches, and seizures conducted by TNFD, were their source of information. The awareness campaigns and material displayed by the TNFD were reported as their source of information by 13 fishers.

Community elders were the source of awareness building for eight fishers, and meeting with forest officers was a source for five fishers while local news for just one fisher. Thirty-two fishermen reported TNFD, to have done excellent work, while 12 fishers disagreed and stated that enforcement could have been more efficient. No measures for improvement, however, were suggested.

DISCUSSION

The demand for sea cucumber for consumption in South Asia continues to persist. To regulate its trade, in 2020 a few species of sea cucumbers were listed in CITES Appendix II. However, apart from India, no other neighbouring country has protected sea cucumber species under their national legislation. This in turn has created a scenario where species from India become vulnerable to illegal extraction to countries where trade continues to be legal. There is an ongoing illicit trade where international maritime borders such as those shared between India and other neighbouring countries are exploited to traffic these species.

From the study, it is observed that there have been a four-time increase in the number of seizures from the period 2010-2014 to 2015-2021 and a five-time increase in the quantum (weight) of seized sea cucumbers, despite the species being protected under the WPA 1972.

ANDAMAN AND NICOBAR ISLANDS:

Improved vigilance at exit points (air and sea) has resulted in seizures, which has in turn resulted in deterring illegal trade in sea cucumbers destined elsewhere from the Islands. In 2014, a seizure which occurred in Manipur had its origin in Andaman and Nicobar Islands, and since then, there has been an increase in the efforts by the LEA of the islands to prohibit the illegal trade of the species.

LAKSHADWEEP:

The largest number of seizures were recorded around Agatti Island in Lakshadweep. There are two reasons for the abundance of cases:

- i) Agatti Island and the connecting port to the mainland, Kochi, where all mainland ships dock for resource supply to the Lakshadweep Islands.

- ii) Agatti Island and the neighbouring reefs of uninhabited islands of Cheriyapani, Velliyapani, Thinnakara, Perumal Par, Suheli and Bitra. Extraction is easier in these reefs due to monitoring limitations of enforcement, increasing the vulnerability of these reefs to poaching. Hence, transfer to Agatti Island for transport to the mainland states or to international waters is easily accessible.

TAMIL NADU:

This study found that most of the seized articles in Tamil Nadu were sourced from the Gulf of Mannar Marine National Park (GoMNP) and Palk Bay regions. GoMNP is a PA and has a management system in place to protect and conserve species within the PA, while Palk Bay is a multiple-use seascape area, whereby protecting the marine resources in the area is a challenge. GoMNP also reports a higher population density than that of Palk Bay in seascapes (Asha *et al.*, 2017) and this may be an influencing factor for higher illegal extraction. The study found there to be more than twice the number of seizures compared to what had been reported earlier for Tamil Nadu (Bondaroff 2021). Compared to the Lakshadweep Islands and Andaman and Nicobar Islands which have international waters, the seascape of GoMNP and Palk Bay share an international maritime borderline with Sri Lanka and hence increasing pressure within the waters of India continues, given the ongoing sea cucumber trade of Sri Lanka.

The import figures from the UN Comtrade database and CITES Trade database from 2010-2014 and from 2015-2020 for China and Hong Kong SAR indicated an increase in the import of sea cucumber within the study period. The figures from both sources, however, showed vast differences.

For mainland China, the increase was as much as 700% (from 4,382.90 t to 24,824.62 t between the two periods) as reported on UN Comtrade and about 180% (from 53.11 t to 147.94 t) as reported on the CITES database. For Hong Kong SAR the increase was 37% (from 24,882.57 t to 34,198.51 t) as reported on the UN Comtrade and approximately 5000% (from 9.94 t to 499.23 t) as reported on the CITES database. The drastic increase in imported quantities indicate an increase

in sea cucumber demand in these countries. The increase in the number of seizures from our study indicates illicit extraction of sea cucumbers from India to meet these demands as India is still reported as a major source of sea cucumbers to South Asian countries (Ong and Chin, 2022). For Singapore, there were no declared CITES exports from India; however, a decrease was observed in total quantities reported for imports by Singapore from India (from 2,407.77 t to 1,871.72 t).

There are major discrepancies globally in reporting trade of dried sea cucumbers. For example, only six countries in Africa reported trade with Hong Kong SAR, while Hong Kong SAR reported imports from 33 African countries (Louw and Burgener 2020). This indicates an incorrect use of HS tariff codes, the identification codes used for goods in international trade. This could be due to the incorrect use of codes by mistake or intentional misdeclaration of the consignments by exporter countries (Toral-granda *et al.*, 2008). It could also mean the trade is associated with illegal sea cucumber fishing operations in the countries.

Sea cucumber crime clearly appears to be highly organised and transnational in nature rather than localised crime. Seizures were often retrieved from hidden locations such as buried in grounds or private spots or smuggled through transnational or interstate registered boats. Therefore, for effective reduction in crime incidences, the cases should be dealt with as transnational crimes with coordination and support from all governmental bodies in involved countries.

RECOMMENDATIONS

The present inferences were drawn from restricted field surveys undertaken during the COVID pandemic and open media data collated. While all LEA in the study area were contacted, very little information was made available, and therefore, the present recommendations are drawn from the inferences from the analysed data.

I. RESEARCH

a. Species identification

Nearly 200 species of sea cucumbers are reported from India, and nearly all incidences of IWT have mentioned the generic name sea cucumbers, thereby limiting inference at the level of the family and the species. The species-level information is vital as it would then indicate if there were detrimental effect on the population from the selected species extraction, or if the extraction was rampant without any discrimination at the species level.

b. Use of molecular studies in research and monitoring

As Sri Lanka is reported to trade with sea cucumbers, this has increased the level of pressure on their population within the Indian waters. It would be pertinent to initiate molecular level studies to understand if the populations can be differentiated across the countries, as many species of sea cucumbers are common across both countries. Molecular methods have been used to identify the species and the population at the genomic level within a species. Thereby, facilitating LEA officials at the ports and CITES authorities in import countries and developing strategies for protecting and conserving the species in India and Sri Lanka is critical.

c. Uniformity of data

For effective management, there is a need for the information to be catalogued with all requisite data. It is necessary hence, to have a standard template across the states in India. Critical linkages such as source sites can be mapped with data consistency. This will facilitate the development of effective adaptive management strategies for protecting and conserving sea cucumbers in India.

II. ENHANCE CAPACITY FOR INTERDICTION

a. Human Resources

The Government of Lakshadweep has taken multiple steps to enhance the level of protection and conservation of sea cucumbers through the recruitment of marine watchers, which are posted on both habited and uninhabited islands. This has led to an increase in the protection of sea cucumbers and other marine protected species. Such a mechanism of having anti-poaching watchers may be replicated for the Andaman and Nicobar Islands and along the Palk Bay, Pudukkottai, Ramanathapuram, and Thoothukudi Districts in Tamil Nadu.

b. Use of tools and technologies

There is a need to integrate proven tools and develop newer technologies that can meet the challenge of detection and prohibition by enhancing the ability of LEA to respond. Some tools can help process what the human brain cannot, such as scanning equipment, or Artificial Intelligence and others, such as apps, put a world of information at our fingertips. Tools provide rapid detection and greatly enhance enforcement capacity at critical sites while reducing, to an extent, human errors.

Trained wildlife sniffer dogs may be deployed at strategic sites such as tourist hotspots (railway stations, air/seaports), fish landing centers and cargo facilities in Andaman and Nicobar Islands, Lakshadweep and at critical sites at GoMNP, and Ramanathapuram District, Tamil Nadu.

RECOMMENDATIONS

II. ENHANCE CAPACITY FOR INTERDICTION

c. Enhancing capacities across LEA

Regular participation in capacity-building training programs on identifying protected marine species, including sea cucumbers, and the detection and implementation of the WPA 1972, for better protection of sea cucumbers are among the LEA suggestions for enhancing the capacities. Such training programs need to be conducted with the Marine Police in the coastal states, as they are the entrusted authority monitoring the coastline to track illegal movement and illegal fishing in the area.

d. Enhance cooperation across LEA for monitoring.

The seascape is a multiple-use area, with a wide range of stakeholders. These areas also have multiple LEA with a mandate to protect and conserve the natural resources within the seascape and prohibit illegal resource extraction. The Wildlife Crime Control Bureau (WCCB) has this precise mandate, hence, it is suggested that a dedicated unit is to be set up, comprising officers from all relevant LEAs such as District Office, Forest, Fisheries, Police, Customs, Department of Revenue Intelligence, Indian Coast Guard, Indian Navy and WCCB to monitor and coordinate efforts to curb illegal fishing near the coastal areas in the region.

III. POLICY

a. Non-Detrimental Findings for trade under CITES

Three species of *Holothurians*; *Holothuria fuscogilva*, *Holothuria nobilis* and *Holothuria whitmaei*, were added to the CITES Appendix II in 2019 (www.cites.org). Since then, there has not been much progress in evaluating the species population for sustainable harvest via the Non-Detrimental Finding reports and regulating and monitoring trade for countries seeking to export sea cucumbers.

Previous studies have indicated significant discrepancies in reporting the trade of dried sea cucumbers from Africa to Asia (Louw and Burgener 2020). The study attributed multiple reasons to the incorrect use of HS tariff codes, either by mistake or intentionally.

There is a need to conclude Non-Detrimental Findings for these three species by a Scientific Authority to ensure their export does not negatively impact the species' survival in the wild.

b. Fishing Vessel Tracking system

In 2016, there were plans to increase the chain of static sensors and Automatic Identification system receivers and radars along the Indian coast by the Indian Coast Guards, for gapless surveillance of the coastline and monitoring of fishing vessels. Further, fishing vessels that operate at/near the international maritime border could also be made mandatory to have inbuilt GPS tracking devices for proper monitoring of fishing operations practised in the oceans. This can be extended to all fishing vessels being operated in all coastal states in India.

RECOMMENDATIONS

IV. COMMUNITY- LEVEL ENGAGEMENT

a. Awareness campaigns with fishers' communities and traders

Several campaigns and awareness programs have been conducted by Forest Department, State Biodiversity Board, Fisheries Department and MPEDA to raise awareness among the fish traders and fishers about sea cucumber conservation and the illegal wildlife trade. Yet, the illegal extraction and trade of species continue. There is a need to design and implement focused communication strategies at critical sites, fishing societies and their federation, traders, and boat operators that highlight the need for the conservation of the species and its role in the ecosystem, the existing provision of protection of the species.

b. Citizen involvement through Biodiversity Management Committees

The Biodiversity Act 2002, wherein the Biodiversity Management Committees within these villages could be strengthened by initiating awareness programs, and enhancing community stewardship towards conservation of protected marine and coastal flora and fauna. These can be initiated in the critical sites and identified stewards can be trained to be the "First Line of Defense" against wildlife crime and illegal wildlife trade and thereby facilitating the thinly scattered presence of LEA across the coastal and marine fishing villages and in the remote islands of Andaman and Nicobar and Lakshadweep.



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ANNEXURE

Number of respondents from the fishers' community within the three areas.

TAMIL NADU		ANDAMAN		LAKSHADWEEP	
VILLAGE	RESPONDENT	ISLANDS	RESPONDENT	ISLANDS	RESPONDENT
Akkamadam	2	Burmanallah	4	Kavaratti	14
Mandapam	8	Chatham	6	Agatti	6
Mullimunai	1	Chidyatapu	2	Androth	4
Pamban	10	Guptapara	7		
Rameshwaram	12	Wandoor	11		
Thangachimadam	2				
Thondi	3				
Thontithuri	6				
Uppur	1				

NOVEMBER 2022

WORKING TO ENSURE THE TRADE
IN WILD PLANTS AND ANIMALS IS
NOT A THREAT TO THE
CONSERVATION OF NATURE

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