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Cover: *Euphaea pseudodispar* shot at Kalindi River, Thirunelly, Wayanad district, Kerala. © Muneer P.K.

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SHORT COMMUNICATION

Landings of IUCN Red Listed finfishes at Chetlat Island of Lakshadweep, southeastern Arabian Sea

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Abstract: The Lakshadweep Islands are well-known for their abundant fishery resources. Present study primarily focused on the systematic representation of IUCN (International Union for Conservation of Nature) Red Listed marine finfish landings of Chetlat Island of Lakshadweep archipelago (India). Monthly collections were carried out from September 2019 to February 2020 from the study area. A list of finfishes along with their scientific name, common name, family, and present conservation status was prepared. As per the IUCN Red List, out of 41 fish species identified, one species is 'Endangered' (EN), two species are 'Near Threatened' (NT), four species are 'Vulnerable' (VU), one species 'Data Deficient' (DD), 29 species 'Least Concern' (LC), and four species are 'Not Evaluated' (NE) categories. Information on the conservation status of fishes plays a significant role in fisheries science since it forms the basis for managing marine fishery resources.

Keywords: Conservation status, fisheries, island, India, marine fishes.

India is home to a diverse range of flora and fauna and is considered as one of the world's richest biodiversity countries. Fisheries contribute significantly to India's national economy (1.21% of total gross domestic product (GDP) and 5.3% of agricultural GDP) and bestow livelihoods to about 10 million people (Infantina et al. 2016). Fishery resources in India are one of the most diversified and most significant natural resources in the world with respect to the abundance of fish species. Marine ecosystems are currently facing an intensified loss of species and populations due to increasing anthropogenic activities, with unknown consequences (Worm et al. 2006). There is a significant alarm about the increasing human interference on marine biodiversity in recent years (Costello et al 2010; Nihal et al. 2021). Since the 1950s, the International Union for Conservation of Nature (IUCN) has issued lists of endangered species, which have been compiled as Red Data Books and Red Lists (Butchart et al. 2005). The IUCN Red List (2017) categorized the species into nine groups based on their population size, rate of decline, geographic distribution area, degree of population, and distribution fragmentation. These include Extinct (EX), Extinct in the wild (EW), Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), Least Concern (LC), Data Deficient (DD), and Not

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Evaluated (NE). The islands of Lakshadweep form India's smallest Union Territory and are typical atolls formed by the perpetual deposition of corals (Tripathy 2002). The archipelago of Lakshadweep, located in the southern Arabian Sea, encompasses 36 islands that make up a group of India's major coral reef complex (Vyshnavi et al. 2020). Fisheries support thousands of fisherman families in and around the island's coastal settlements. The atolls offers a network of habitats for a variety of fish species, both resident and migratory. It forms a model marine system where differentiation of ecologically sensitive and vulnerable regions is challenging due to dependence on its resources. As our knowledge on marine biodiversity is yet inadequate to guide our actions, a careful approach, such as establishing marine reserves, may be required (Tripathy 2002). The fisheries in the Lakshadweep Islands have always been sustainable and subsistence oriented. Tuna and needlefish account for around 95% of the total commercial fisheries in the Lakshadweep Islands, where fishing is the primary source of income (Vinay et al. 2017). These fishes have traditionally been caught with troll line, pole and line, handline and drift gillnet. Knowledge regarding the condition of threatened species biodiversity is critical for protecting species in the wild from extinction and conserving them via good management so they can continue to exist in their natural habitat (Pimm et al. 2015). The ability to tackle biodiversity management and conservation is highly dependent on a thorough understanding of the taxonomy of the flora and fauna that make up biodiversity (Joshi et al. 2016). We have carried out a survey of IUCN Red Listed species of various species landed, and the findings of the same are depicted in this manuscript.

Materials and Methods

Chetlat is an atoll within the Lakshadweep archipelago in the Arabian Sea, off the west coast of India. It is 56 km north of Amini and 432 km (233 nautical miles) west of Kochi. It is located between 11.68 & 11.71 N and 72.68 & 72.71 E and covers an area of 1.40 km^2 (Fig 1). The samples were taken every month from fisherman during September 2019 to February 2020 from the study area. The collected fish species were identified using standard references and keys (Misra 1952; Ebert & Mostarda 2013; Froese & Pauly 2021). A Canon IXUS 190 digital camera was used to acquire the fish photographs. During the auction, fish samples were chosen at random from each mound. All of the samples were rinsed thoroughly with tap water, and preserved in 10% formaldehyde for subsequent analysis in the laboratory. The data on the conservation status of the collected fishes were ascertained according to their IUCN Red List status (IUCN Red List 2017). The data regarding gears used for catching different fishes were obtained from local fishermen.

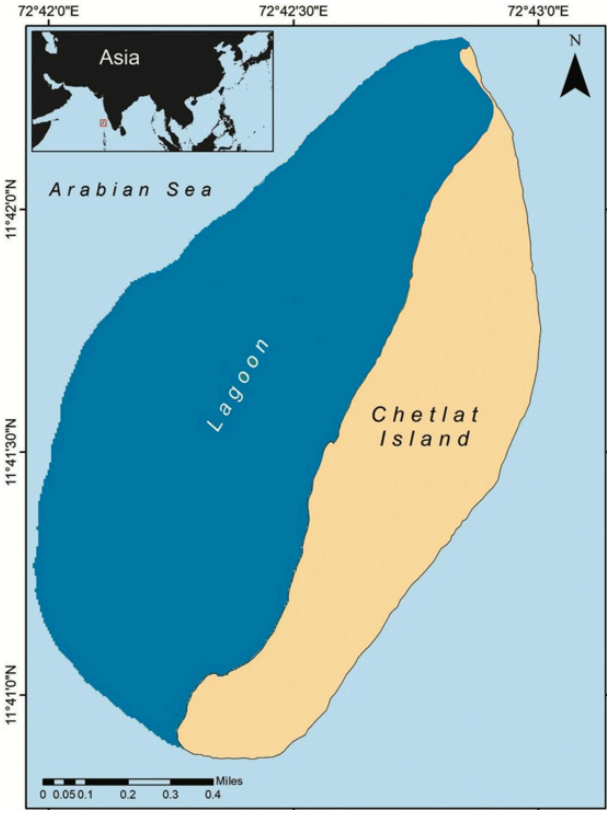

Figure 1. Map depicting the study area.

Results

During the present study, 654 marine fishes belonging to 41 distinct fish species under 20 different families were identified. The Red List status of all identified species was examined, and 41 of them were found to be listed under the 2017 IUCN Red List. The detailed information on species name, family, common name, and IUCN status is given in Table 1. Scombridae was the most represented, out of 20 families, with seven fish species. Lutjanidae was second most represented with four species belonging under it. Belonidae and Carcharhinidae were represented by three species from each family. Two species were represented by each of the following families including Istiophoridae, Carangidae, Serranidae, Lethrinidae, Dasyatidae, Acanthuridae, Spratelloididae, and Mullidae. Only one species from the families of Xiphiidae, Sphyraenidae, Coryphaenidae, Exocoetidae, Hemiramphidae, Alopiidae, Gerreidae, and Pinguipedidae was recorded. Out of the 41 fish species

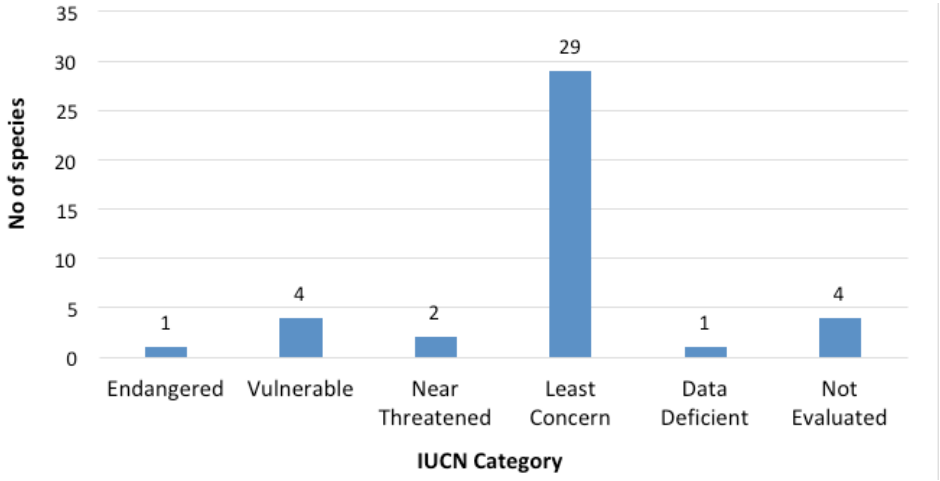

Figure 2. Fish species representatives of IUCN categories.

sampled, one species was 'Endangered', four species were 'Vulnerable', two species were 'Near Threatened', 29 species were 'Least Concern', one species was 'Data Deficient', and four species were 'Not Evaluated' as per the IUCN Red List (Figure 2). The scombroid fishes collected were caught using the gears including pole & line and hook & line. The fishes belonging to the family Carcharhinidae and Carangidae were caught using hook & line. Handlines, gill nets and cast nets were used to catch the fishes coming under the families of Lethrinidae and Lutjanidae. Seine nets were used to catch belonids.

Discussion

The fish diversity in Chetlat was studied using visual examination and descriptive statistics. Tuna, needle fish, sword fish, wahoo, trevally, grouper, sharks, dolphin fish, half beak, sailfish, red snapper, marlins, unicorn fish, emperor fish, goat fish, sting ray, carangids, and perches were among the most common landings in the study area. Scombridae constituted the major catch out of the fishes sampled. The islanders' major source of income is tuna fishing, which takes place for roughly six months, from October to April and forms the major resource (Vinay et al. 2017). Tunas are highly migratory, effective epipelagic predators found more prevalent in the Indian exclusive economic zone's oceanic island regions, particularly Lakshadweep (Kumar et al. 2020). Among the fishes identified, *Alopias pelagicus* (pelagic thresher) constitutes the only fish coming under endangered category as per IUCN status. The pelagic thresher is abundantly captured in gill nets and longlines, and is especially abundant in tuna fisheries. It has been found that intense exploitation would be unsustainable considering the pelagic thresher's vulnerability (Camhi 2008). *Carcharhinus limbatus* and *Scoliodon laticaudus* belong to the 'Near Threatened' category possibly due to the recent population decline documented across its range and hence there is a pressing need for monitoring and regulation (Antony et al. 2014; Smart et al. 2017; Haque et al. 2019). Unsustainable development activities, a rise in human population, overexploitation, and climate change substantially influences the biodiversity of the island (KSCSTE 2013). Overexploitation of these species for food is a primary concern, which has resulted in dramatic population decrease. Anthropogenic interventions have disastrous consequences for island biodiversity. Therefore, conservationists and policymakers must pay close attention (Bijukumar et al. 2015). In 2020, 164,000 tonnes of fishes were landed in Lakshadweep, a 28 percent decrease from the previous year (of 22,929 tonnes) following the same trend of decline as in the preceding year 2018–2019 (CMFRI 2019; 2020). This could be attributed by the improper management and overexploitation of fishery resources. Understanding a region's fish diversity is regarded as critical not only for management but also for conservation and sustainable utilization of fishery resources (Nihal et al. 2021). Proper utilisation of fish discards at the landing centre for fish meal and fertilizer production purposes would prevent the depletion of such resources in the near future. Insular ecosystem rich in endemism is more susceptible to species depletion due to its small population being restricted to live in specific habitats (Andrades et al. 2018). Previous studies on the conservation status of fishes are scanty in Lakshadweep, particularly in Chetlat Island. Covid scenario might be also considered as a reason for the reduction in fish catch correlated

Table 1. List of species recorded from the study area with common name, family and present conservation status.

	Species	Common name	Family	IUCN Red List status
1	*Ablennes hians* (Valenciennes, 1846)	Flat Needlefish	Belonidae	LC
2	*Acanthocybium solandri* (Cuvier, 1832)	Wahoo	Scombridae	LC
3	*Alopias pelagicus* Nakamura, 1935	Pelagic Thresher	Alopiidae	EN
4	*Aprion virescens* Valenciennes, 1830	Green Jobfish	Lutjanidae	LC
5	*Auxis thazard* (Lacepede, 1800)	Frigate Tuna	Scombridae	LC
6	*Belone belone* (Linnaeus, 1760)	Garfish	Belonidae	LC
7	*Caranx ignobilis* (Forsskal, 1775)	Giant Trevally	Carangidae	LC
8	*Carcharhinus limbatus* (Valenciennes, 1839)	Blacktip Shark	Carcharhinidae	NT
9	*Coryphaena hippurus* Linnaeus, 1758	Common Dolphinfish	Coryphaenidae	LC
10	*Elagatis bipinnulata* (Quoy & Gaimard, 1825)	Rainbow Runner	Carangidae	LC
11	*Epinephelus erythrurus* (Valenciennes, 1828)	Cloudy Grouper	Serranidae	LC
12	*Epinephelus fasciatus* (Forsskal, 1775)	Blacktip Grouper	Serranidae	LC
13	*Euthynnus affinis* (Cantor, 1849)	Kawakawa	Scombridae	LC
14	*Exocoetus volitans* Linnaeus, 1758	Tropical Two-wing Flyingfish	Exocoetidae	LC
15	*Gerres microphthalmus* Iwatsuki, Kimura & Yoshino, 2002	Small-eyed Whipfin Mojarra	Gerreidae	NE
16	*Gymnosarda unicolor* (Ruppell, 1836)	Dogtooth Tuna	Scombridae	LC
17	*Hemiramphus far* (Forsskal, 1775)	Black-barred Halfbeak	Hemiramphidae	NE
18	*Istiophorus platypterus* (Shaw, 1792)	Indo-Pacific Sailfish	Istiophoridae	LC
19	*Katsuwonus pelamis* (Linnaeus, 1758)	Skipjack Tuna	Scombridae	LC
20	*Lethrinus lentjan* (Lacepede, 1802)	Pink Ear Emperor	Lethrinidae	LC
21	*Lutjanus bohar* (Forsskal, 1775)	Two-spot Red Snapper	Lutjanidae	LC
22	*Lutjanus gibbus* (Forsskal, 1775)	Humpback Red Snapper	Lutjanidae	LC
23	*Lutjanus rivulatus* (Cuvier, 1828)	Blubberlip Snapper	Lutjanidae	LC
24	*Makaira nigricans* Lacepede, 1802	Blue Marlin	Istiophoridae	VU
25	*Monotaxis heterodon* (Bleeker, 1854)	Redfin Emperor	Lethrinidae	LC
26	*Naso hexacanthus* (Bleeker, 1855)	Sleek Unicornfish	Acanthuridae	LC
27	*Naso tonganus* (Valenciennes, 1835)	Bulbnose unicornfish	Acanthuridae	LC
28	*Neotrygon kuhlii* (Muller & Henle, 1841)	Blue-spotted Stingray	Dasyatidae	DD
29	*Parapercis millepunctata* (Gunther, 1860)	Black-dotted Sand Perch	Pinguipedidae	NE
30	*Parupeneus indicus* (Shaw, 1803)	Indian Goatfish	Mullidae	LC
31	*Parupeneus macronemus* (Lacepede, 1801)	Long-barbel Goatfish	Mullidae	LC
32	*Rhizoprionodon acutus* (Ruppell, 1837)	Milk Shark	Carcharhinidae	VU
33	*Scoliodon laticaudus* Muller & Henle, 1838	Spadenose Shark	Carcharhinidae	NT
34	*Sphyraena jello* Cuvier, 1829	Pickhandle Barracuda	Sphyraenidae	NE in India
35	*Spratelloides delicatulus* (Bennett, 1832)	Delicate Round Herring	Spratelloididae	LC
36	*Spratelloides gracilis* (Temminck & Schlegel, 1846)	Silver-stripe Round Herring	Spratelloididae	LC
37	*Taeniurops meyeni* (Muller & Henle, 1841)	Round Ribbontail Ray	Dasyatidae	VU
38	*Thunnus albacares* (Bonnaterre, 1788)	Yellowfin Tuna	Scombridae	LC
39	*Thunnus obesus* (Lowe, 1839)	Bigeye Tuna	Scombridae	VU
40	*Tylosurus crocodilus* (Peron & Lesueur, 1821)	Hound Needlefish	Belonidae	LC
41	*Xiphias gladius* Linnaeus, 1758	Swordfish	Xiphiidae	LC

EN—Endangered | VU—Vulnerable | NT—Near Threatened | LC—Least Concern | DD—Data Deficient | NE—Not Evaluated.

with the smaller number of fishing days. In light of the above findings, the current study aims to offer a well-documented checklist of major finfishes in Chetlat waters, its diversity, species composition and IUCN status. Conservation and management plans must be developed to ensure the future of island ecosystem. The baseline data on fish distribution and diversity will aid in the design of successful conservation strategies for insular ecosystems such as Chetlat atoll.

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