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Marine Fish Biodiversity of Nellore District, South East Coast of Andhra Pradesh, India

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ABSTRACT: This study on marine fish diversity is aimed to assess and understand the composition, distribution and abundance of fish species in a specific marine ecosystem of Nellore coast. Marine species diversity was studied along the coast of the Bay of Bengal from two selected fish landing stations, Nelaturu and Krishnapatnam (Arcotpalem) in the Nellore coast of Andhra Pradesh, Southeast coast of India during the period October, 2020 to October, 2022. Andhra Pradesh has a diverse marine ecosystem and the state is one of the major fish producers in India. The most diverse fish communities are found in the shallow coastal areas, estuaries, and lagoons. The rich marine fish diversity in Andhra Pradesh highlights the importance of sustainable management and conservation of its marine resources for both ecological and socio-economic reasons. Throughout the study, various sampling methods were employed by the fishermen to collect fish samples and taxonomic identification was carried out to categorize the species. During the study period, 124 species from 33 orders and 58 families were identified except Deepsea fishes. The coastal areas of Nellore district, located on the Bay of Bengal, are also known for their abundant and diverse marine resources. The diversity of fish species in Nellore is influenced by a range of environmental factors, including temperature, salinity, ocean currents and nutrient availability. Anthropogenic disturbances and climatic changes have been identified as factors influencing fish population and diversity. As a result, it is critical to conserve marine biodiversity along Andhra Pradesh's Nellore coast. Biodiversity is part of fundamental research which helps the surveyors to analyse the migrating patterns and classify them under the various conservation lists. The current study also recorded the IUCN status of 124 marine species in various categories of conservation status.

Keywords: Marine fisheries, Marine organisms, Bio-diversity, Conservation, IUCN status, Nellore.

INTRODUCTION

Fish are an integral component of aquatic ecosystems. In addition to being a desired resource for users of the aquatic habitat, they play important role in energy flow, cycling of nutrients and maintaining community balance in the ecosystem (Nelson, 2006). Wide range of fish species represent different families and ecological groups; local environmental factors and habitat characteristics influence variability of fish community composition among different sites (Srinivasan *et al.*, 2020).

Marine fish diversity is influenced by a variety of factors, including temperature, salinity, ocean currents, and nutrient availability. These factors determine the distribution and abundance of fish species in different regions of the oceans. The highest fish diversity is found in tropical and subtropical regions, particularly in coral reefs and shallow waters. Coral reefs are the most biodiverse marine ecosystem, with more than 6,000 species of fish recorded globally (Bellwood *et al.*, 2019). The Indo-Pacific region, including the Coral Triangle, has the highest diversity of coral reef fish species covers 37% of the total species of reef fishes in the world and the highest concentration is located in the eastern part of Indonesia to the Philippines (Allen *et al.*, 2007). In addition to coral reefs, other habitats support high fish diversity, such as seagrass beds, mangrove forests, and rocky shores. These habitats provide essential breeding and nursery grounds for many fish species, contributing to their abundance. Deep-sea habitats also support a diverse range of fish species, including many unique and rare species (Morato *et al.*, 2020). Species-wise catch estimates are important in assessing status of fisheries stocks and knowledge of prominent characters that can aid easy and almost accurate identification of a specimen in the field (Nair and Zacharia 2020).

The Indian fisheries industry is surrounded by a distinctive and varied collection of resources, from the vast Indian Ocean to the pristine waters of the Himalayas, which implies - the resources for fishing are dispersed through several habitats. Millions of people rely on the country's fisheries' biodiversity, which includes a variety of biological and physical components, and understanding species diversity in coastal waters, directs towards the importance of

conserving these species and their habitats (Bineesh *et al*., 2020).

The necessity for aquatic resource development must now be sustainable than ever due to population growth and rising fish protein consumption. In India, fishing is a significant source of nutrition, food, work and income. At primary level, the province supports the livelihood of over 16 million fishers and fish growers, and nearly twice that amount along the value chain. Reduce hunger and malnutrition in one of the healthiest ways is to eat fish, which is a cheap and abundant source of animal protein. This industry has the enormous potential to increase by over two times in terms of earnings of the fishing community and fish farmers (Laffaille *et al*., 2005). Ecological implications of these findings, accentuate the importance of understanding spatial and temporal patterns in fish assemblages for effective fisheries management and conservation (Sajeevan *et al.,* 2022). Spatial patterns of fish biodiversity will identify key conservation priorities, also, it contributes to the understanding of the ecological importance of the habitat for diverse fish species and emphasizes the need for effective conservation strategies to protect this unique ecosystem (De *et al.,* 2021).

More than 10% of the rivers, lakes, and deep seas world's fish and shellfish species can all be found in India's abundant and diverse fisheries resources. The country's extensive coastline, Exclusive Economic Zone (EEZ), which covers 2.02 million square kilometers, and its 0.53 million square kilometers of continental shelf are all home to abundant marine fishing resources. The inland resources include salty water (12.4 lakh Ha), saline/basic influenced regions (12 lakh Ha), flood plain lakes (8.12 lakh Ha), lakes and tanks (24.1 lakh Ha), repositories (31.5 lakh Ha), and flowing canals and rivers (1.95 lakh km). The large, diverse and underdeveloped inland resources present excellent prospects for the creation of livelihoods and the emergence of economic prosperity. Since independence, the country's fish production has steadily increased understanding of the importance of estuarine ecosystems as critical habitats for fish species and underscores the need for conservation efforts to protect these ecosystems to sustain fish populations (Patro *et al*., 2021).

The socioeconomically underdeveloped small-scale fishermen whose lives are closely linked to the oceans and seas, constitute about 96% of the fishers worldwide. However, the mechanized sector accounts for 75% of all marine fish production, followed by the motorized sector (23%), and the artisanal sector (only 2%). The dependence of traditional marine fishers on marine fishing has increased despite the fact that the growth of marine fish production has stopped over time. Therefore, there is a need to develop and promote sustainable alternative livelihoods such as mariculture. Marine aquaculture is the fastest growing sector of aquaculture, and the successful development of inland and brackish water aquaculture in India supports the prospects for expansion in the agricultural sector. Although current mariculture production is low, mariculture production is estimated to be between and 8 million tonnes per year, depending on the area available in the Indian region. Diversity studies provide valuable information on new fish species records and enhance the knowledge of fish diversity in the coastal regions and underscores the need for continued research and conservation measures to protect the rich marine ecosystem (Bineesh and Zacharia 2021).

Due to the rapid expansion of farmed fisheries, this sector is more vulnerable to transboundary aquatic diseases. Coordinated efforts between centers and states, and between states, are needed to mitigate and control water-borne diseases (Kang *et al.,* 2009). Considering issues like shared watersheds, movement of migratory fish through exclusive economic zones, transboundary movement of aquatic animals, trade in fisheries and India's responsibilities, the fisheries sector is moving forward towards a global environment towards international instruments. To ensure the coordinated and cooperative management of shared fisheries resources and their long-term sustainability, the regional dimension must also be duly taken into account.

In terms of land area, Andhra Pradesh ranks 7th in India and in terms of population, it ranks 10th in India. The state of Andhra Pradesh is located between 800 and 850 miles east of the Equator. It is bounded on the east by the Bay of Bengal, north-east by Orissa, north by Chhattisgarh, north-west by Telangana, west by Karnatakaand south by Tamilnadu. The state contains three regions: eastern - Coastal Andhra, south western - Rayalaseema and north-eastern Uttarandhra. 12 of the 26 revenue districts have coastline. Srikakulam, Vijayanagaram, Visakhapatnam, Anakapalli, Kakinada, Konaseema, West Godavari, Krishna, Bapatla, Prakasam, and Nellore are the districts with coastline. It is one of the nation's major fish-producing coastal states. Along with their numerous tributaries, the rivers Godavari and Krishna flow through the state's center; hence Andhra Pradesh is also known as the river-state due to the importance of these two major interstate rivers. Inland fisheries can expand significantly in these rivers, streams and ponds.

The small scale fishermen, most of who live close to the coast of the Bay of Bengal, may be able to overcome some of their most fundamental economic issues if the state grows its fishing industry. The expansion of fisheries may help alleviate malnutrition and provide the state with much-needed foreign currency. There are a lot of marine fisheries resources in Andhra Pradesh. The state has a 974 kilometer coastline, along the continental shelf that extends over an area of about 33,247 square kilometers along the Bay of Bengal, on average, the continental shelf is 33 kilometers wide. The depth range area of 0.5 MT covers approximately 16,600 sq km. Except for a few spots where the ground is rocky, most of the bottom shelf is covered with sand and mud. Offshore waters are thought to have abundant fishing grounds. Sardines, Sciannids, Ribbon fish, Clupeids, Pomfret, Seer fish,

Perches, Leiognathus, Elasmobranches, Mackerals, Mullets, Cat fishes, Anchovies, *penaeid* and *non-penaeids* are among the state's most important marine fish species.

The two monsoon periods, the southwest monsoon from April to September and the northeast monsoon from October to March, determine seasonal changes in climate and oceans that have a significant impact on fisheries. In contrast to the situation on the west coast, the southwest monsoon does not completely deter fishermen from fishing, as the monsoon here only occurs in cyclonic periods of three to four days (Mittermeier and Mittermeier 1997). Next October to April is the peak hunting season, with 59% of the annual landing yield. May to September is considered low season. Fishing in varying degrees is available year-round (except for the closed season, April 15th to June 16th), with the exception of hurricanes. Bottoms less deep (<1 Mtr) are heavily fished along the entire coast. Seasonal variations in fish abundance and composition, with certain species being more dominant during specific seasons indicates the presence of seasonal migrations or changes in habitat preferences among the fish populations (Sivakami *et al.,* 2022).

Some other coastal populations are unutilized or underutilized due to the concentration of fishing activities in shrimp fishing. According to the 2016 report of the State Board of Agriculture, the fisheries of Andhra Pradesh have an estimated production potential of 9,83,756 tonnes. This estimate comes from production records from 2016. The 65 Mandalas contain 555 offshore fishing villages and 353 offshore fish landing centers. There are 3,01,956 fishermen in the sea. According to a 2010 survey by the Fisheries Department of the Government of Andhra Pradesh, there are official motorized boat landing facilities in Visakhapatnam, Kakinada and Nagapatnam, of which 150,868 active fishermen are already involved. Development of Marine Fisheries Resources in Andhra Pradesh.

Fish play a crucial role in aquatic ecosystems. Not only are they a valuable resource for humans to use in aquatic habitats, but they also play a vital role in energy flow, the recyclability of nutrients and the conservation of community harmony in the ecosystem. Because they have long been a staple food in the diets of many people, they play a significant role in the economic growth of many countries. They make up slightly more than half of the approximately 54,711 known species of living vertebrates; an estimated 27,977 legitimate fish species (Ehrlich and Wilson 1991) are described. Biodiversity is necessary for ecosystem stability, environmental quality protection, and comprehending the intrinsic value of all species on Earth (Ehrlich and Wilson 1991; Georges and Cottingham 2002).

To maximize the use of water resources, a scientific knowledge of fish morphological, biological, and adaptive characteristics, as well as their natural distribution, is necessary (Chatla *et al.,* 2020; Dunn, 2004). Collection of data from various sources, including scientific literature, research surveys, from museum specimens i.e., existing taxonomic information will be useful for verification of specimens (Chakraborty and Ramanujam 2020). Studying and evaluating taxonomic details, including scientific names, common names and distribution information for each newly recorded species, contribute to the ongoing efforts to document and understand the marine biodiversity (Devi *et al.,* 2021). The checklist of fishes by the study contributes to the understanding of the diversity and distribution of these elusive and often poorly studied species (Kumar *et al*., 2021). Annotated checklist serves as a valuable resource for researchers, conservationists, and policymakers involved in studying and conserving fish species in Indian marine waters. It provides a comprehensive overview of the current knowledge on fish diversity, aiding in the identification, documentation and monitoring of these species (Rajan, 2022).

Conservation and biodiversity observations will be useful to the understanding of the coastal ecosystem's ecological dynamics and underscores the significance of conservation and sustainable management practices for the long-term health and sustainability of fish populations. (Nair *et al.,* 2021). Implications of the traditional knowledge and taxonomic gaps for fisheries management, conservation strategies and sustainable utilization of fish resources accented the importance of integrating traditional knowledge systems into scientific research and policy-making processes to ensure effective and inclusive decision-making (Kizhakudan *et al.*, 2021).

Human activities have significant impacts on marine fish diversity. Overfishing is a major threat to fish populations, and many species have become overexploited or even extinct due to fishing pressure. Habitat destruction, pollution, and climate change also affect fish populations and their habitats. Coral reefs, seagrass beds, and mangrove forests are under threat from coastal development, dredging, and pollution, which can alter the physical and chemical conditions that support fish communities (Hughes *et al*., 2017). Climate change is a particularly significant threat to marine fish diversity. Rising sea temperatures, ocean acidification, and sea-level rise are already affecting fish populations, and these impacts are expected to intensify in the future (Cheung *et al.*, 2020; Cheung *et al*., 2021). Changes in ocean currents and weather patterns can also affect the distribution and abundance of fish species, leading to range shifts and changes in community composition (Pinsky *et al*., 2020). Conservation and management of marine fish diversity are essential for maintaining healthy and productive marine ecosystems. A range of measures has been implemented to reduce fishing pressure and protect fish populations, including fishing quotas, marine protected areas, and fisheries management plans. Marine protected areas (MPAs) are particularly effective in protecting fish populations, as they provide a safe haven for fish to breed and grow, leading to increased abundance both inside and outside of the protected areas (Edgar *et al*., 2014).

Integrated coastal zone management and ecosystem-based management approaches have been developed to address the multiple threats to marine fish diversity, including habitat destruction, pollution, and climate change. Appropriate management strategies should be adopted to mitigate the threats to ensure the long-term conservation of fish species and their habitats in the aquatic ecosystem (Kesavan *et al.*, 2021). These approaches focus on maintaining the health and productivity of marine ecosystems by considering the interrelationships between different species and habitats. Marine fish diversity is a critical component of global biodiversity and plays an essential role in marine ecosystems and human livelihoods. However, human activities have significant impacts on fish populations and their habitats and conservation and management measures are necessary to maintain healthy and productive marine ecosystems. Marine protected areas and ecosystem-based management approaches are effective in protecting fish populations, and further research is needed to understand the complex interrelationships between fish species and their habitats.

MATERIALS AND METHODS

A. Scope

In this sense, it means to assess and archive biodiversity marine fish fauna at Nelaturu and Krishnapatnam (Arcotpalem) fish landing focuses, situated in SPSR Nellore Area (AP), India and subsequently assessing the preservation status of fish species, thinking about waterfront wellbeing because of the improvement of ventures along the coast to make individuals more mindful about their nearby climate and its protection for their reality.

B. Study area

The Nellore district has 113 km of the sea coast with fishermen community habitation along the east coast of India. Also this coastal area is basically suitable for the brackish water aquaculture, where some industries are gradually increased recently. The selected sampling stations of Nelaturu and Krishnapatnam (Arcotpalem) fish landing points with more fishers in Muthukur Mandal, SPSR Nellore (Fig. 1) which is surrounded by local daily fish markets, thermal power industries and a modern multi-cargo port in the near proximity.

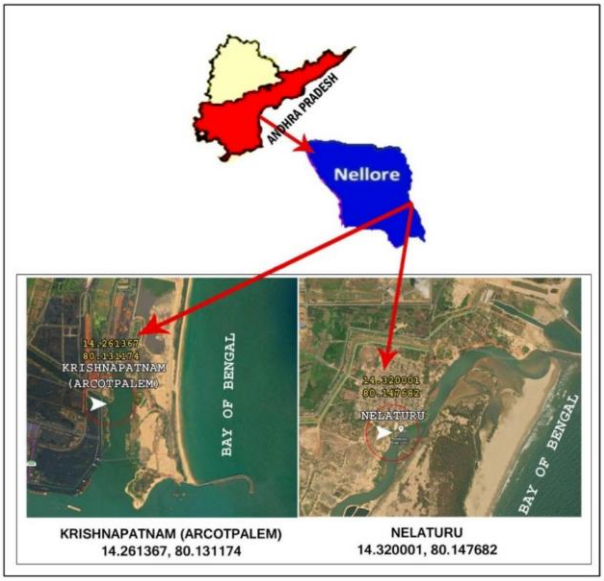

Fig. 1. Study area map indicating Fish landing points of Nelaturu and Krishnapatnam (Arcotpalem).

C. Sampling

Sampling included assortment from both stations with the help of local fishermen by using traditional and gill nets. We likewise visited neighborhood fish markets located near the fish landing points of Muthukurmandal, SPSR Nellore district. Sampling was done at regular basis in both landing points as per the catch availability from October 2021 to October 2022 except fishing ban period of the months of April to June.

Identify the fish by using standard classification keys for fishes of the Indian subcontinent (Day, 1958; Jayaram, 1981; Jayaram, 1999; Talwar and Jhingran 1991). Classification was done on lines of Day (Day, 1889), and web-based keys, Fish Base (www.fishbase.in, and Wikipedia). Fish Base (2022). Conservation status of every species was recorded as per the IUCN report (IUCN,2022) and World Register of Marine Species (www.marinespecies.org) (WoRMS, 2022).

RESULTS AND DISCUSSION

The term "biodiversity" refers to the quantity, variety, species type and what they are like vary over time from one habitat to another. As we are in the midst of Sixth mass extinction it is now crucial to record the marine fauna from all ecosystems in order to understand the current biodiversity condition. A detailed list of all fish species documented, along with common names, locations where they were found at landing sites and IUCN status are presented in Table 1.

Table 1: List of marine species identified from landing points of Nelaturu and Krishnapatnam (Arcotpalem) study area with IUCN status.

Sr. No.	Name of the Order	Name of the Family	Scientific Name of the Species	Common Name of the Species	IUCN STATUS
1.	*Acanthuriformes*	*Sciaenidae*	*Johnius dussumieri*	Croaker	DD
2.			*Otolithes ruber*	Tiger toothed croaker	LC
3.		*Ephippidae*	*Ephippus orbis*	Spade fish	DD
4.	*Actinopterygii*	*Pleuronectiformes*	*Solea solea*	Common sole	DD
5.	*Anguilliformes*	*Congridae*	*Conger cinereus*	Indian conger eel	LC
6.		*Anguillidae*	*Anguilla anguilla*	European eel	CR
7.		*Muraenesocidae*	*Muraenesox cinereus*	Daggertooth pike conger	LC
8.	*Balanomorpha*	*Balanidae*	*Semibalanus balanoides*	Common rock barnacle	DD
9.	*Beloniformes*	*Belonidae*	*Tylosurus crocodilus*	Needle fish	LC
10.	*Carangiformes*	*Carangidae*	*Parastromateus niger*	Black pomfret	DD
11.			*Megalaspis cordyla*	Horse mackerel	LC
12.			*Alepes mate*	Yellow Scad	LC
13.			*Carangoides malabaricus*	Malabar trevally	LC
14.			*Caranx ignobilis*	Giant trevally	LC
15.			*Chloroscombrus chrysurus*	Atlantic bumper	LC
16.			*Scomberoides commersonianus*	Queen fish	LC
17.		*Menidae*	*Mene maculata*	Disk-shaped fish	DD
18.	*Carcharhiniformes*	*Carcharhinidae*	*Carcharhius dussumieri*	White cheeked shark	EN
19.			*Scoliodon laticaudus*	Indian dog shark	NT
20.	*Cichliformes*	*Cichlidae*	*Etroplus suratensis*	Pearl spot	LC
21.			*Oreochromis mossambicus*	Black tilapia	VU
22.			*Oreochromis niloticus*	Nile tilapia	LC
23.	*Clupeiformes*	*Clupeidae*	*Sardonella longiceps*	Indian oil sardine	DD
24.			*Hilsa hilsa*	Hilsa	LC
25.			*Sardinella albella*	Deep bodied sardinella	LC
26.	*Decapoda*	*Portunidae*	*Scylla serrata*	Mud crab	DD
27.			*Portunus sanguinolentus*	Sea Crab	DD
28.			*Portunus pelagicus*	Swimming Crab	DD
29.		*Ocypodidae*	*Ocypode brevicornis*	Ghost crab	DD
30.			*Ocypode macrocera*	Red ghost crab	DD
31.		*Penaeidae*	*Penaeus monodon*	Tiger prawn	DD
32.			*Penaeus semisulcatus*	Flower prawn	DD
33.			*Metapenaeus monoceros*	Brown shrimp	DD
34.			*Metapenaeus brevicornis*	Honey shrimp	DD
35.			*Metapenaeus affinis*	King prawn	DD
36.			*Metapenaeus dobsoni*	Flower tail prawn	DD
37.			*Penaeus indicus*	Indian white shrimp	DD
38.		*Sergestidae*	*Acetes indicus*	Jawala	DD
39.		*Solenoceridae*	*Solenoceravio scai*	Deep sea shrimp	DD
40.	*Elopiformes*	*Elopidae*	*Elops saurus*	Lady finger fish	LC
41.	*Gobiiformes*	*Oxudercidae*	*Scartelaos histophorus*	Mudskipper	DD
42.	*Gonorynchiformes*	*Chanidae*	*Chanos chanos*	Milk fish	LC
43.	*Holocentriformes*	*Holocentridae*	*Holocentrus adscensionis*	Squirrelfish	DD
44.	*Istiophoriformes*	*Sphyraenidae*	*Sphyraena jello*	Barracuda – Giant sea pike	DD
45.	*Mugiliformes*	*Mugilidae*	*Mugil cephalus*	Grey mullet	LC
46.			*Mugil curema*	White mullet	LC
47.			*Valamugil seheli*	Blue spot grey mullet	DD
48.	*Myliobatiformes*	*Dasyatidae*	*Himantura bleekeri*	Whip tail sting ray	EN
49.			*Himantura leoparda*	Leopard whipray	VU
50.			*Himantura undulata*	Honeycomb whipray	EN
51.	*Myopsida*	*Loliginidae*	*Loligo duvaucelii*	Squid	DD
52.			*Doryteuthis sibogae*	Squid	DD
53.			*Doryteuthis gahi*	Squid	DD
54.	*Mytilida*	*Mytilidae*	*Perna viridis*	Asian green mussel	DD
55.	*Neogastropoda*	*Babyloniidae*	*Babylonia zeylanica*	Sea snail	DD
56.		*Conidae*	*Conus abbas*	Cone snail	DD
57.	*Perciformes*	*Chaetodontidae*	*Chelmon rostratus*	Copper band butterflyfish	LC
58.		*Chaetodontidae*	*Chaetodon decussatus*	Indian Vagabond Butterflyfish	LC
59.		*Latidae*	*Lates calcarifer*	Barramundi	LC
60.		*Polynemidae*	*Eleutheronema tetradactylum*	Indian Salmon	EN

61.		*Sparidae*	*Argyrops spinifer*	Long spine sea-bream	DD
62.		*Serranidae*	*Epinephelus diacanthus*	Reef cod	DD
63.			*Epinephelus malabaricus*	Malabar reef cod	LC
64.			*Epinephelus areolatus*	Areolated cod	LC
65.			*Nibea albiflora*	Yellow drum	DD
66.			*Epinephelus fuscoguttatus*	Tiger Grouper	VU
67.			*Epinephelus polyphekadion*	Spot Grouper	VU
68.		*Lutjanidae*	*Lutjanus johnii*	Snapper	LC
69.			*Lutjanus madras*	Indian snapper	LC
70.			*Lutjanus argentimaculatus*	Mangrove red snapper	LC
71.			*Lutjanus decussatus*	Checkered snapper	LC
72.			*Lutjanus bohar*	Two-spot red snapper	LC
73.			*Lutjanus gibbus*	Humpback red snapper	LC
74.			*Lutjanus russellii*	Russell's snapper	LC
75.			*Pinjalo pinjalo*	Pinjalo	LC
76.			*Pristipomoides auricilla*	Goldflag job fish	LC
77.			*Lutjanus sanguineus*	Blood red snapper	LC
78.			*Lutjanus fulviflamus*	Black spot snapper	LC
79.			*Lutjanusc ampechanus*	Northern red snapper	VU
80.		*Terapontidae*	*Terapon jarbua*	Crescent grunter	LC
81.		*Scatophagidae*	*Scatophagus argus*	Spotted scat	LC
82.		*Haemulidae*	*Pomadasys maculatus*	Saddle grunt	LC
83.		*Gerreidae*	*Gerres erythrourus*	Short silverbelly	LC
84.		*Leiognathidae*	*Nuchequula nuchalis*	Pony fish	DD
85.			*Nuchequula gerreoides*	Long spine pony fish	DD
86.	*Percomorpha*	*Nemipteridae*	*Nemipterus japonicus*	Japanese threadfin bream	LC
87.	*Pleuronectiformes*	*Psettodidae*	*Psettodes erumei*	Indian halibut	DD
88.		*Cynoglossidae*	*Cynoglossus macrolepidotu*	Sole	DD
89.			*Paraplagusia bilineata*	Sole	DD
90.		*Paralichthyidae*	*Paralichthys lethostigma*	Southern flounder	NT
91.	*Rhizostomeae*	*Catostylidae*	*Catostylus mosaicus*	Jelly blubber	DD
92.	*Scombriformes*	*Stromateidae*	*Pampus argenteus*	Silver pomfret	VU
93.			*Pampus chinensis*	Chinese pomfret	DD
94.		*Scombridae*	*Rastrelliger kanagurta*	Indian mackerel	DD
95.			*Scomberomorus commerson*	Seer fish (Spanish-mackerel	NT
96.			*Scomberomorus lineolatus*	Seer fish	LC
97.		*Trichiuridae*	*Lepturacanthus savala*	Ribbon fish	DD
98.			*Trichiurus lepturus*	Large-headed ribbon fish	LC
99.	*Scorpaeniformes*	*Scorpaenidae*	*Synanceia verrucosa*	Reef stonefish	LC
100.			*Pterois volitans*	Lionfish	LC
101.			*Pterois antennata*	Spot-fin lionfish	LC
102.		*Platycephalidae*	*Platycephalus indicus*	Indian flathead	DD
103.	*Semaeostomeae*	*Cyaneidae*	*Cyanea capillata*	Lion's mane jellyfish	DD
104.	*Siluriformes*	*Ariidae*	*Arius maculatus*	Cat fish	DD
105.			*Bagre marinus*	Cat fish	LC
106.	*Testudines*	*Cheloniidae*	*Lepidochelys olivacea*	Pacific ridley sea turtle	VU
107.	*Tetraodontiformes*	*Tetraodontidae*	*Arothron immaculatus*	Yellow-eyed puffer	LC
108.			*Arothron reticularis*	Reticulated pufferfish	LC
109.			*Arothron hispidus*	White-spotted puffer fish	LC
110.			*Lagocephalus guentheri*	Diamondback puffer	DD
111.			*Lagocephalus sceleratus*	Silver-cheeked toadfish	DD
112.			*Takifugu oblongus*	Oblong blowfish	DD
113.			*Chelonodon patoca*	Gangetic Pufferfish	LC
114.			*Diodon holocanthus*	Long-spine porcupinefish	LC
115.			*Cyclichthys orbicularis*	Bird beak burrfish	DD
116.			*Chilomycteru sreticulatus*	Spotted burrfish	LC
117.			*Takifugu oblongus*	Oblong blowfish	DD
118.			*Cyclichthys orbicularis*	Bird beak burrfish	DD
119.			*Chelonodontops leopardus*	Banded leopard blowfish	DD
120.			*Triacanthus nieuhofii*	Horse-fish	DD
121.			*Triacanthus biaculeatus*	Silver horse-fish	DD
122.	*Unionida*	*Unionidae*	*Sinanodonta lauta*	Asian green mussel	DD
123.	*Valvatida*	*Goniasteridae*	*Fromia indica*	Indian sea star	DD
124.	*Venerida*	*Cyrenidae*	*Corbicula fluminea*	Asian Snail	LC

In the present study, total 124 species belonging to 33 orders, 58 families were recorded from two fish landing stations Nelaturu and Krishnapatnam (Arcotpalem) of Muthukur Mandal in SPSR Nellore district. The total number of species in various order and families recorded are presented in Table 2.

Table 2: Order-wise and family-wise list of marine species recorded at fish landing points of Nelaturu and Krishnapatnam (Arcotpalem) study area.

Sr. No.	Name of the Order	Number of Family(s)	Number of Species
1.	*Acanthuriformes*	2	3
2.	*Actinopterygii*	1	1
3.	*Anguilliformes*	3	3
4.	*Balanomorpha*	1	1
5.	*Beloniformes*	1	1
6.	*Carangiformes*	2	8
7.	*Carcharhiniformes*	1	2
8.	*Cichliformes*	1	3
9.	*Clupeiformes*	1	3
10.	*Decapoda*	5	14
11.	*Elopiformes*	1	1
12.	*Gobiiformes*	1	1
13.	*Gonorynchiformes*	1	1
14.	*Holocentriformes*	1	1
15.	*Istiophoriformes*	1	1
16.	*Mugiliformes*	1	3
17.	*Myliobatiformes*	1	3
18.	*Myopsida*	1	3
19.	*Mytilida*	1	1
20.	Neogastropoda	2	2
21.	*Perciformes*	12	29
22.	*Percomorpha*	1	1
23.	*Pleuronectiformes*	3	4
24.	*Rhizostomeae*	1	1
25.	*Scombriformes*	3	7
26.	*Scorpaeniformes*	2	4
27.	*Semaeostomeae*	1	1
28.	*Siluriformes*	1	2
29.	*Testudines*	1	1
30.	*Tetraodontiformes*	1	15
31.	*Unionida*	1	1
32.	*Valvatida*	1	1
33.	*Venerida*	1	1
Total		**58**	**124**

The 124 species identified in the current study fall into 6 IUCN categories - Critically Endangered (CR):1, Data Deficient (DD):57, Endangered (EN):4, Least Concern (LC):52, Near Threatened (NT):3, Vulnerable (VU):7 are presented in Table 3 and Fig. 2.

Table 3: Status of IUCN classification of marine species identified at fish landing points of Nelaturu and Krishnapatnam (Arcotpalem) study area.

Sr. No.	Categories of the IUCN	No. of species identified
1.	Critically Endangered (CR)	1
2.	Data Deficient (DD)	57
3.	Endangered (EN)	4
4.	Least Concern (LC)	52
5.	Near Threatened (NT)	3
6.	Vulnerable (VU)	7

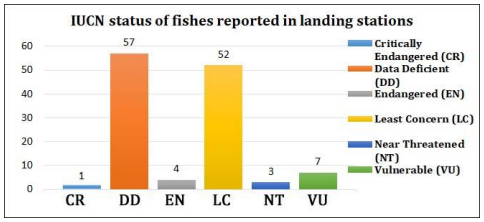

Fig. 2. Status of IUCN classification of fish, crab, prawn, squid and mussel species identified at fish landing points of Nelaturu and Krishnapatnam (Arcotpalem) study area.

CONCLUSIONS

The research on marine fish diversity on the Nellore coast has provided vital insights into the region's diverse aquatic ecosystems. We discovered a broad array of fish species through extensive sampling and analysis, demonstrating the importance of the Nellore coast as a hotspot for marine biodiversity. The study discovered a great diversity of fish species in coastal waters, ranging from small reef-dwelling species to huge migratory species. This diversity emphasises the significance of preserving and conserving maritime environments along the Nellore coast in order to ensure the long-term viability of these species. The study also gave light on the ecological interactions and trophic dynamics of the marine ecosystem. We gained a better knowledge of the functions of various fish species in maintaining the ecosystem's balance and stability by analysing the food web and examining their feeding habits. The findings of this study can be used to develop effective conservation strategies and management plans for the marine resources of the Nellore coast. The conservation of these coastal waters' biodiversity and habitats is critical not only for the health of the fish populations, but also for the lives of the local residents that rely on these resources. Overall,

this work provides a platform for future research and emphasizes the significance of ongoing monitoring and conservation efforts to protect the environment.

FUTURE SCOPE

The study of marine fish diversity holds immense future potential. Researchers may now investigate various environments, discover novel species, decipher evolutionary patterns, and comprehend the effects of climate change through technological advances in DNA sequencing, satellite remote sensing, and through submarine observations of aquatic ecology. The resulting data will support efforts to conserve marine biodiversity, regulate fisheries, and create sustainable practices that will sustain the health and resilience of the marine environment for future generations.

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