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A Study on the Availability of Finfish and Shellfish of Junput Mangrove, East Midnapore, West Bengal, India

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Authors' contributions

This work was carried out in collaboration among all authors. Author TB conducted the primary literature review, synthesized the information, and drafted the manuscript. Author SS contributed by reviewing and integrating the data. Author PP revised and formatted the manuscript, ensuring coherence and clarity in the presentation of complex scientific concepts. All authors read and approved the final manuscript.

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ABSTRACT

The fish species diversity is the most important indicator of health of aquatic environment. A good piscina ecosystem diversity illustrates the equable environment. The present study deals with the variety of fishes in the Junput mangrove area (Biramput to Haripur), East Midnapore district. The Junput mangrove area is located at the northern end of the Bay of Bengal (Latitude- 21°94'04.5"N

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Longitude- 87°26'59.5"E), West Bengal. The field study was taken for a season of two years and data are collected monthly basis were made from May 2022 to April 2024. The study results of the actual inquiry express the occurrence of 93 species (51 finfishes and 42 shellfishes). 51 finfishes belonging to 44 genera, 34 different family and 18 orders and 42 shellfishes belonging to 26 different genera, 15 different family and 03 orders. Among the rerecorded finfish species, 2 species were Vulnerable (VU), 01 species were Near Threatened (NT), 35 species were Least Concern (LC) while 06 species were Not Evaluated (NE), 07 species were Data Deficient (DD) with 44 genus, 18 orders and 34 families. In the case of recorded shellfish species, 33 species were Not Evaluated (NE), 06 species were Least Concern (LC) and 03 species were Data Deficient (DD) with 26 genus, 03 orders and 15 families. The number of species richness in the order Decapoda were dominated by 39 species followed by Perciformes with 08 species; Clupeiformes with 07 species; Tetradontiformes with 05 species; both Gobiformes and Anguilliformes with 04 species; both Acanthuriformes and Carangiformes with 03 species; Siluriformes, Spariformes, Pleuronectiformes, Mugilliformes, Scombriformes, Aulopiformes and Xiphosurida with 02 species; Myliobactiformes, Cypriniformes, Carcharniformes, Elopiformes, Beloniformes and Stomatopoda with 01 species. Out of 93 finfish and shellfish, 50 were carnivores, 39 were omnivores, and 02 were each herbivores and detritivores.

Keywords: Finfish; shellfish; species diversity; junput mangrove.

1. INTRODUCTION

Biodiversity plays an important role in the functioning of an ecosystem. There are different species play an identical role within an environment and every species is dependent on other for food, asylum or other various resources. Hence, the harm of a single species can have eminent effects on the ecosystem as a whole. All the variety of species are dynamic sources of genetic mutation and biological entity has scientific and pedagogic value. Biodiversity loss in aquatic ecosystem due to anthropogenic activities now becoming an alarming issue for our environment [1]. Biodiversity is equally very important for maintaining the balance of biomes, as well as for recognizing the intrinsic value of all species on the earth [2]. India ranks as one of the worlds mega biodiversity, which country holds the 9th position globally in terms of freshwater mega biodiversity [3].

Natural sources and biodiversity reservation has become urgent exposure in current years for achieving an environmentally sustainable futurity. The term biodiversity has various appellations ranging from an appropriate portrayal of species composition to the complication of interaction between different organism and their ecosystem at all the spatial scales at which life appears [4]. The assessment of biodiversity and conservation status of the specimens was conducted using the guidelines from the International Union for Conservation of Nature and Natural Resources Red List [5]. Nearly 60 % of global population resides in the coastal zone, which constitutes 18 % of the Earth's surface. This area has significant biological potential, supporting a diverse array of marine life with essential feeding, nursery and spawning habitats [6]. Fish make up nearly half of the total number of vertebrate species in the world, inhabiting almost every conceivable aquatic environment. Fish are considered keystone species because their presence significantly influences the abundance and distribution of other organisms. They are also regarded as excellent indicators of water quality, with the presence of specific species providing insights into the habitat quality in which they reside [7]. Of the over 60000 vertebrate species on Earth, more than 32,000 species are fishes [8]. According to Fish Base about 34800 fish species had been recorded worldwide as of 2022 [9]. In India, there are a total of 2500 fish species, with 930 residing in freshwater habitats and 1570 found in marine ecosystem [10].

Mangrove forests serve as feeding grounds, nurseries and spawning areas for various aquatic species [11]. They also provide protection for juvenile fish, fish larvae and clams from natural predators. Converting mangrove areas into fishponds for aquaculture alters the composition of mangrove trees. As a result, these mangrove forest ecosystems no longer function as feeding and nursery grounds for marine life. This conversion may threaten the regeneration of these aquatic species. In cases where mangrove ecosystem density is high, logging activities can limit the population of existing biota. As a result, the organisms living

within the substrate are disrupted. Tidal variations in mangrove areas, including high and low tides, play an important role in the presence of crabs, which feed during low tide [12]. Mangrove crabs are highly adaptable to environmental changes and will relocate if their habitat is disturbed [13]. Crustaceans play an important role in shaping the structure and function of tropical ecosystems within benthic communities [14]. West Bengal stands out among the different states of the country for its numerous diversities of fish species resources [15]. The East Midnapore district is rich in natural sources especially the brackish water environment which supports the variety of fauna and flora [16]. Depending on the context and scale, the fish species diversity is known as ichthyofaunal diversity. This term encompasses not only the range of variety of fish species but also the variation in alleles or genotypes within fish populations, the array of species within fish communities and the diversity of life forms across aquatic biodiversity [17].

The involvement of local communities near mangrove forests in the development of mangrove areas for tourism is very important [18,19]. Ecotourism activities primarily involve utilizing mangrove areas while preserving the biological and ecological functions of mangrove ecosystems and providing economic benefits to local people [20,21]. Human activities, such as illegal mangrove tree cutting, have led to reduced crab species density due to environmental stress and physical changes. The substrate composition and content did not change drastically; the substrate itself was altered [22]. The primary reasons are habitat waste and defragmentation, exotic species entry and global climatic change impacts [23].

Furthermore, biodiversity plays an important role in sustaining biodiversity, preserving overall environmental quality and understanding the inherent value of each species inhabiting the planet [2]. The majority of fish production and catch in India are distributed through local markets. Over the past few decades, the landscape of Indian capture fisheries has shifted towards a market-driven industry, evolving into a multi-crore sector [24]. West Bengal coasts an abundance of freshwater fisheries resources, covering approximately 6.08 lakh hectares. These all resources include ponds and tanks (2.88 lakh ha.), beels and boars (0.41 lakh ha.), reservoirs (0.27 lakh ha.), 22 river drainage basins (1.72 lakh ha.), and canals (0.80 lakh ha.) [25].

Junput is a seaside resort city in the state of West Bengal, India. It lies in the East Midnapore district and at the northern end of the Bay of Bengal. It is the most popular sea resort in West Bengal renowned for its beaches. In the Junput mangrove area few canals run across and most of them are well connected with the Bay of Bengal. Thus, the availability and diversity of ichthyofauna and shellfish was abundant.

2. MATERIALS AND METHODS

2.1 Study Site

The present study was conducted in the Junput mangrove area in about 8-10 km experimental area, from May, 2022 to April, 2024. The study area is located between Latitude 21° 38' N to 27° 10' N and Longitude 85° 38' E to 89° 50' E. The samples were collected from Junput canal and nears water bodies of Junput mangrove area (Latitude-21°94'04.5"N;Longitude- 87°26'59.5"E) is situated in the district of East Midnapore. In Junput mangrove area few canals run across and most of them are well connected with Bay of Bengal. In these canals natural tidal fluctuation occurs, thus the availability of marine and brackish water fin fish and shellfishes were in ample amounts. The available fin fish and shellfishes were recorded through physical verification every 30 days interval during the study period. The conservation status of the recorded species in this was tabulated as per the IUCN- Red Data List [26].

2.2 Data Collection and Identification of Fishes

All the field survey data was completed in the morning time from 06:00 AM to 10:00 AM and in the afternoon time 03:00 PM to 05:00 PM, because during these time periods peak fishing activities happen in the canal. The data were collected and recorded every 30 days intervals throughout the mangrove area.

All specimens were photographed and collected samples were identified based on morphological features such as shell color, claw shape, body color and size. All the collected fish species were identified on the field itself and some of them were unidentified species, identified with the help of books and keys [27,28,29,30,31,32,33,34, 35,36] and other methods as developed by [37,38,39,40,41]; and also search in the [42,43]. Some marine fishes are identified by [44,45, 46].

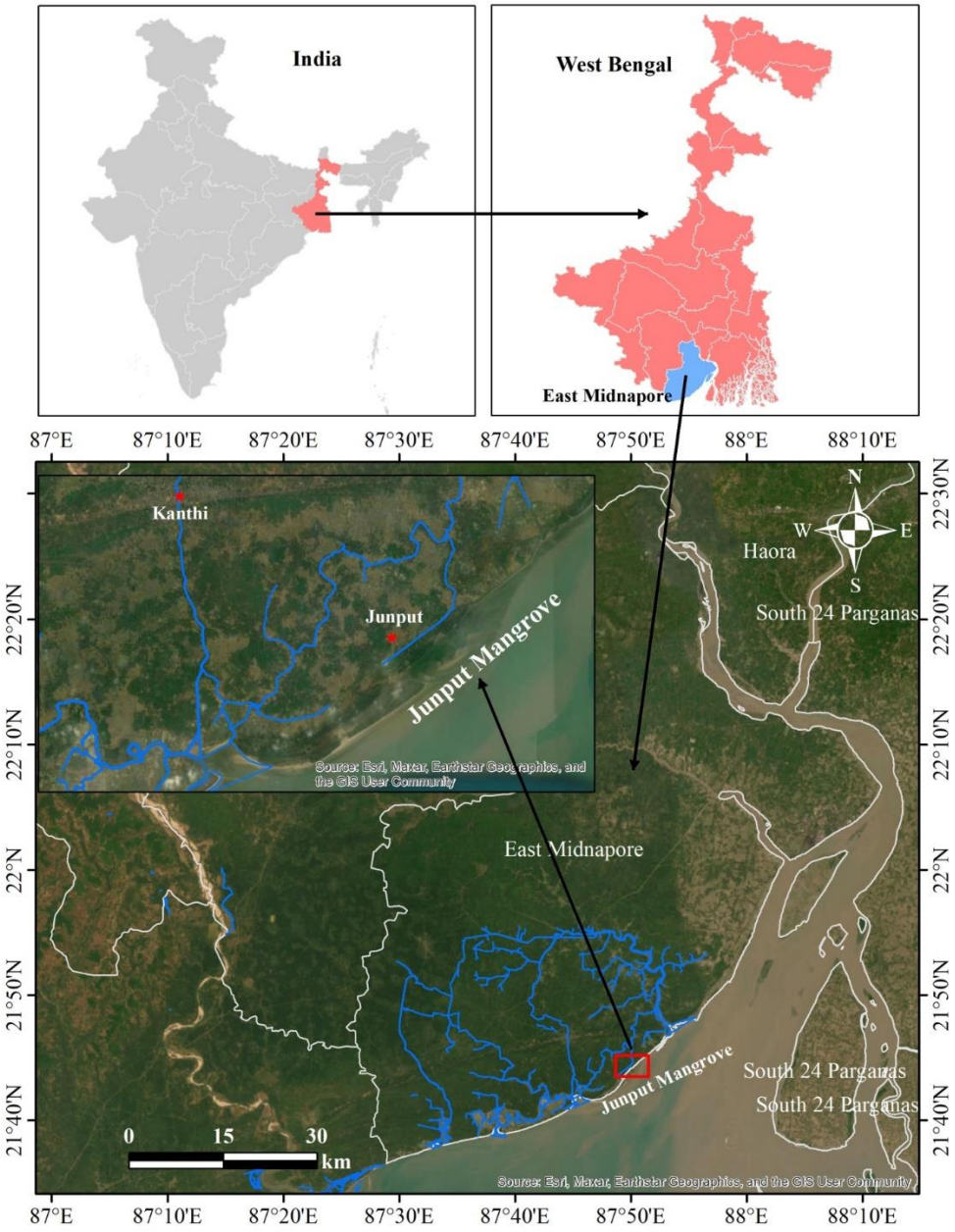

Fig. 1. Location map of the study site

3. RESULTS AND DISCUSSION

The results of the present study express the actual inquiry the occurrence of 93 species, out of which 51 finfish (Plate 1) and 42 shellfish (Plate 2). Among 51 finfishes (Table 1) belonging to 44 different genera, 34 different family and 18 orders and 42 shellfishes (Table 2) belonging to 26 different genera, 15 different family and 03 orders. Among the total recorded 93 finfish and shellfishes, the number of species richness in the order Decapoda was dominated by 39 species followed by Perciformes with 08 species; Clupeiformes with 07 species; Tetradontiformes with 05 species; Both Gobiformes and Anguilliformes with 04 species; Both Acanthuriformes and Carangiformes with 03 species; Siluriformes, Spariformes, Pleuronectiformes, Mugilliformes, Scombriformes, Aulopiformes and Xiphosurida with 02 species; Myliobactiformes, Cypriniformes, Carcharniformes, Elopiformes, Beloniformes and Stomatopoda with 01 species. We found that, among the recorded finfish species, 02 species were Vulnerable (VU), 01 species were Near Threatened (NT), 35 species

Table 1. Fin fish species recorded in Junput Mangrove

Order	Family	Scientific Name	Vernacular Name/ Local Name	Economic Value	IUCN Status	Availability Status	Feeding Habit	Season of Collection	Threat to Human
Acanthuriformes	Drepaneidae	*Drepane punctata* (Linnaeus,1758)	Butter fish/Sickle fish	Edible	Not Evaluated	_	Omnivorous	Summer and Monsoon	Harmless
	Sciaenidae	*Pterotolithus maculatus* (Cuvier, 1830)	Blotched tiger-toothed croaker	Edible	Least Concern	+	Omnivorous	Summer	Harmless
		Johnius dussumieri (Cuvier,1830)	Sin croaker	Edible	Least Concern	+	Carnivorous	Summer	Harmless
Anguilliformes	Moringuidae	*Moringua macrochir* (Bleeker, 1853)	Longfin spaghetti eel	Game fish	Data Deficient	_	Carnivorous	Summer and monsoon	Harmless
	Muraenesocidae	*Muraenesox bagio* (Hamilton, 1822)	Common pike conger	Game fish	Least Concern	_	Herbivorous	Summer	harmless
		Muraenesox cinereus (Forsskal,1775)	Daggertooth pike conger	Edible	Least concern	_	Carnivorous	Summer and monsoon	Harmless
	Muraenidae	*Gymnothorax tile* (Hamilton,1822)	Indian mud moray	Game fish	Least Concern	_	Carnivorous	Summer	Harmless
Aulopiformes	Synodontidae	*Harpodon nehereus* (Hamilton, 1822)	Bombay duck	Edible	Near Threatened	+	Carnivorous	Summer and monsoon	Harmless
		Saurida lessepsianus (Russell, Golani & Tikochinski, 2015)	Lessepsian lizardfish/ Lessepsian Saurid	Edible	Least Concern	_	Carnivorous	Summer and monsoon	Harmless
Beloniformes	Belonidae	*Strongylura strongylura* (Van Hasselt, 1823)	Spottail needlefish	Edible	Least Concern	_	Carnivorous	Summer	Harmless
Carangiformes	Carangidae	*Alepes djedaba* (Fabricius, 1775)	Shrimp scad	Edible	Least Concern	+	Carnivorous	Summer	Harmless
		Megalaspis cordyla (Linnaeus, 1758)	Torpedo scad/ Hardtail scad	Edible	Least Concern	_	Carnivorous	Summer and monsoon	harmless
	Menidae	*Mene maculata* (Bloch & schneider, 1801)	Moon fish	Edible	Not Evaluated	_	Omnivorous	Summer	Harmless
Carcharhiniformes	Carcharhinidae	*Rhizoprionodon acutus* (Ruppell,1837)	Milk shark	Edible	Vulnerable	_	Carnivorous	Summer	Harmless
Clupeiformes	Dorosomatidae	*Anodontostoma chacunda* (Hamilton,1822)	Chacunda gizzard shad	Edible	Least Concern	_	Carnivorous	Summer	Harmless
		Escualosa thoracata (Valenciennes, 1847)	White sardine/ Kagja	Edible	Least Concern	++	Carnivorous	Monsoon and winter	Harmless
	Engraulidae	*Coilia reynaldi* (Valenciennes, 1848)	Reynalds grenadier anchovy	Edible	Least Concern	+	Carnivorous	Summer and monsoon	Harmless
		Coilia ramcarati (Hamilton,1822)	Ramcarat grenadier anchovy	Edible	Data Deficient	+	Carnivorous	Summer and monsoon	Harmless
		*Coilia dussumieri (*Valenciennes, 1848*)*	Goldspotted grenadier anchovy/ Ruli mach	Edible	Least Concern	++	Carnivorous	Winter and summer	Harmless

Order	Family	Scientific Name	Vernacular Name/ Local Name	Economic Value	IUCN Status	Availability Status	Feeding Habit	Season of Collection	Threat to Human
		Setipinna taty (Valenciennes, 1848)	Scaly hair fin anchovy	Edible	Least Concern	++	Carnivorous	Winter and summer	Harmless
		Thryssa dussumieri (Valenciennes, 1848)	Dussumier' s thryssa	Edible	Least Concern	+	Carnivorous	Monsoon	Harmless
Cypriniformes	Cyprinidae	*Puntius ticto* (Hamilton, 1822)	Ticto barb	Edible	Least Concern	+	Omnivorous	Monsoon and winter	Harmless
Elopiformes	Elopidae	*Elops saurus* (Linnaeus, 1766)	Ladyfish	Edible	Least Concern	_	Carnivorous	Summer	Harmless
Gobiiformes	Butidae	*Butis koilomatodon* (Bleeker, 1849)	Mud sleeper	Edible	Least Concern	_	Carnivorous	Monsoon and winter	Harmless
	Eleotridae	*Eleotris pisonis* (Gmelin, 1789)	Spinycheek sleeper	Edible	Least Concern	+	Omnivorous	Summer and monsoon	Harmless
	Gobiidae	*Gobioides peruanus (*Steindachner, 1880)	Peruvian eel-goby	Edible	Least Concern	+	Carnivorous	Summer and monsoon	Harmless
		Pseudapocryptes elongatus (Cuvier, 1816)	Chewa	Edible	Least Concern	++	Carnivorous	Monsoon and winter	Harmless
Mugiliformes	Mugilidae	*Mugil tade* (Forsskal, 1775)	Tade mullet	Edible	Least Concern	+	Omnivorous	Monsoon and winter	Harmless
		Mugil Cephalus (Linnaeus, 1758)	Flathead grey mullet	Edible	Least Concern	+	Omnivorous	Monsoon and winter	Harmless
Myliobactiformes	Dasyatidae	*Dasyatis zugei* (Muller & Henle, 1841)	Pale-edged stingray/ Sharpnose stingray	Edible	Vulnerable	_	Carnivorous	Summer and monsoon	Harmless
Perciformes	Ambassidae	*Chanda nama* (F. Hamilton,1822)	Elongate glass-perchlet	Edible	Least Concern	_	Carnivorous	Summer	Harmless
	Gerreidae	*Gerres erythrourus* (Bloch, 1791)	Deep-bodied mojarar	Edible	Least Concern	_	Omnivorous	Summer and monsoon	Harmless
		Pentaprion longimanus (Cantor,1849)	Longfin mojarra	Edible	Least Concern	+	Omnivorous	Monsoon	Harmless
	Platycephalidae	*Platycephalus indicus* (Linnaeus, 1758)	Bartail flathead	Edible	Data Deficient	_	Carnivorous	Summer	Harmless
	Polynemidae	*Polynemus paradiseus* (Linnaeus,1758)	Paradise threadfin/ Topse	Edible	Least Concern	++	Carnivorous	Monsoon and winter	Harmless
		*Polydactylus sextarius (*Bloch & Schneider, 1801*)*	Blackspot threadfin	Edible/ Game fish	Not Evaluated	_	Carnivorous	Summer and monsoon	Harmless
	Scatophagidae	*Scatophagus argus* (Linnaeus, 1766)	Spotted scat/Vajachauli	Edible	Least Concern	++	Omnivorous	Monsoon and winter	Harmless
	Sciaenidae	*Otolithes pama* (Hamilton,1822)	Pama croaker	Edible	Data Deficient	+	Carnivorous	Monsoon	Harmless
Pleuronectiformes	Cynoglossidae	*Cynoglossus macrolepidotus* (Bleeker, 1851)	Flat fish / Bengal tongue sole	Edible	Data Deficient	_	Carnivorous	Winter	Harmless

Order	Family	Scientific Name	Vernacular Name/ Local Name	Economic Value	IUCN Status	Availability Status	Feeding Habit	Season of Collection	Threat to Human
		Cynoglossus arel (Bloch & Schneider, 1801)	Large scale tongue sole	Edible	Data Deficient	_	Carnivorous	Summer and monsoon	Harmless
Scombriformes	Stromateidae	*Pampus argenteus* (Euphrasen, 1788)	Silver pomfret	Edible	Not Evaluated	_	Carnivorous	Summer and monsoon	Harmless
	Trichiuridae	*Lepturacanthus savala* (Cuvier,1829)	Savalai hairtail	Edible	Not Evaluated	+	Carnivorous	Summer and monsoon	Harmless
Siluriformes	Ariidae	*Arius maculatus* (Thunberg,1792)	Spotted catfish	Edible	Not Evaluated	_	Carnivorous	Summer and Monsoon	Traumato genic
	Bagridae	*Mystus gulio* (Hamilton,1822)	Long Whiskers Catfish/ Nuna-Tengra	Edible	Least Concern	_	Carnivorous	Monsoon and Winter	Harmless
Spariformes	Sparidae	*Acanthopagrus latus* (Houttuyn, 1782)	Yellowfin seabream	Edible	Data Deficient	_	Omnivorous	Monsoon and winter	Harmless
	Sillaginidae	*Sillago sihama* (Fabricius, 1775)	Northern whiting/ Silver sillago	Edible	Least Concern	++	Carnivorous	Monsoon and winter	Harmless
Tetraodontiformes	Tetraodontidae	*Lagocephalus guentheri* (Miranda Ribeiro, 1915)	Diamond back puffer	Non-Edible	Least Concern	_	Carnivorous	Summer	Poisonous
		Lagocephalus inermis (Temminck & Schlegel, 1850)	Smooth blaasop/Puffer fish	Non-Edible	Least Concern	_	Carnivorous	Summer and monsoon	Poisonous
		Lagocephalus lunaris (Bloch & Schneider, 1801)	Lunar tail puffer	Non-Edible	Least Concern	_	Omnivorous	Summer	Poisonous
		Takifugu oblongus (Bloch, 1786)	Lattice blaasop	Non-Edible	Least Concern	_	Carnivorous	Summer	Poisonous
	Monacanthidae	*Aluterus monoceros* (Linnaeus,1758)	Unicorn leatherjacket filefish	Non-Edible	Least Concern	_	Herbivorous	Summer	Poisonous

'_' Rarely available; '+' Commonly available; '++' Abundantly available

Table 2. Shellfish species recorded in Junput Mangrove

Order	Family	Scientific Name	Vernacular Name/ Local Name	Economic Value	IUCN Status	Availability Status	Feeding Habit	Season of Collection	Threat to Human
Decapoda	Diogenidae	*Clibanarius padavensis* (De Man, 1888)	Padavan's hermit crab	Non-Edible	Not Evaluated	_	Omnivorous	Summer and Monsoon	Harmless
		Clibanarius infraspinatus (Hilgendorf, 1869)	Orange striped hermit crab	Non-Edible	Not Evaluated	_	Omnivorous	Summer and Monsoon	Harmless
	Dorippidae	*Dorippoides nudipes* (Manning & Holthuis,1986)	Moon crab	Non-Edible	Not Evaluated	_	Omnivorous	Summer	Harmless
	Dromiidae	*Conchoecetes artificiosus* (Fabricius,1798)	Brachyuran sella turcica	Non-Edible	Not Evaluated	_	Omnivorous	Summer	Harmless
	Grapsidae	*Metopograpsus frontalis* (Miers, 1880)	Frontalis Crab	Non-Edible	Not Evaluated	+	Omnivorous	Summer and Monsoon	Harmless
	Leucosiidae	*Arcania heptacantha* (De Man,1907)	Seven-spined spider crab	Non-Edible	Not Evaluated	_	Omnivorous	Monsoon and Summer	Harmless
	Matutidae	*Matuta planipes* (Fabricius, 1798)	Flower moon crab	Edible	Not Evaluated	+	Carnivorous	Winter	Harmless
		Matuta victor (Fabricius,1781)	Common moon crab	Edible	Not Evaluated	_	Carnivorous	Summer	Harmless
	Ocypodidae	*Austruca annulipes* (H.Milne Edwards,1837)	Porcelain fiddler Crab	Non-Edible	Not Evaluated	_	Omnivorous	Monsoon and Winter	Harmless
		Austruca bengali (Crane, 1975)	Bengal fiddler crab	Non-Edible	Least concern	+	Omnivorous	Summer and Monsoon	Harmless
		Austruca perplexa (Milne Edwards,1852)	Lemon-yellow clawed fiddler crab	Non-Edible	Not Evaluated	_	Omnivorous	Monsoon and Winter	Harmless
		Austruca triangularis (A.Milne-Edwards,1873)	Triangular fiddler crab	Non-Edible	Not Evaluated	_	Omnivorous	Monsoon and Winter	Harmless
		Ocypode pallidula (Hombron & Jacquinot, 1846)	Pallid ghost crab	Non-Edible	Not Evaluated	_	Carnivorous	Monsoon and Winter	Harmless
		Ocypode brevicornis (H.Milne-Edwards,1837)	Horn-eyed ghost Crab	Non-Edible	Not Evaluated	_	Carnivorous	Summer and Monsoon	Harmless
		Ocypode macrocera (H.Milne Edwards,1837)	Red Ghost Crab	Non-Edible	Data Deficient	++	Carnivorous	Around the year	Harmless
		Uca splendida (Stimpson,1858)	Splendid fiddler Crab	Non-Edible	Least concern	_	Omnivorous	Monsoon and Winter	Harmless
		Tubuca rosea (Tweedie,1937)	Rose fiddler crab	Non-Edible	Least Concern	_	Omnivorous		Harmless
		Tubuca typhoni (Crane,1975)	Typhoon fiddler crab	Non-Edible	Least Concern	_	Omnivorous	Summer and Monsoon	Harmless
		Tubuca dussumieri (H.Milne Edwards, 1852)	Dussumier's fiddler crab	Non-Edible	Not Evaluated	_	Omnivorous	Summer and Monsoon	Harmless
	Palaemonidae	*Macrobrachium equidens* (Dana,1852)	Rough river prawn	Edible	Not Evaluated	+	Omnivorous	Summer	Harmless

Order	Family	Scientific Name	Vernacular Name/ Local Name	Economic Value	IUCN Status	Availability Status	Feeding Habit	Season of Collection	Threat to Human
	Penaeidae	*Fenneropenaeus indicus* (H,Milne Edwards, 1837)	Indian white prawn/Toni chingri	Edible	Not Evaluated	++	Carnivorous	Monsoon and Winter	Harmless
		Penaeus monodon (Fabricius, 1798)	Giant tiger prawn/Bagda chingri	Edible	Not Evaluated	++	Carnivorous	Monsoon and Winter	Harmless
		*Mier*spenaeopsis *sculptilis* (Heller,1862)	Rainbow Shrimp	Edible	Not Evaluated	++	Omnivorous	Summer and Monsoon	Harmless
		Metapenaeus monoceros (Fabricius,1798)	Speckled shrimp /Pamra chingri	Edible	Not Evaluated	++	Omnivorous	Monsoon and Winter	Harmless
		Metapenaeus dobsoni (Miers,1878)	Kadal shrimp	Edible	Not Evaluated	++	Omnivorous	Monsoon and Winter	Harmless
		Metapenaeus affinis (H.Milne-Edwards,1837)	Jinga shrimp	Edible	Not Evaluated	++	Omnivorous	Summer	Harmless
		Metapenaeus brevicornis (H.Milne-Edwards,1837)	Yellow shrimp	Edible	Not Evaluated	++	Omnivorous	Summer	Harmless
	Pinnotheridae	*Pinnotheres pisum* (Linnaeus,1767)	Pea crab	Non-Edible	Not Evaluated	_	Omnivorous	Summer	Harmless
	Portunidae	*Charybdis orientalis* (Dana,1852)	Oriental swimming crab	Edible	Not Evaluated	_	Carnivorous	Summer	Harmless
		Charybdis feriata (Linnaeus, 1758)	Crucifix crab/Coral swimmer crab	Edible	Not Evaluated	+	Carnivorous	Monsoon and Winter	Harmless
		Scylla serrata (Forsskal,1775)	Indo-Pacific Swamp crab/Mud crab	Edible	Not Evaluated	+	Carnivorous	Summer	Harmless
		Portunus pelagicus (Linnaeus, 1758)	Blue crab/Blue swimmer crab	Edible	Not evaluated	+	Carnivorous	Monsoon and Winter	Harmless
		Portunus sanguinolentus (Herbst,1783)	Three spot swimming crab	Edible	Not Evaluated	+	Carnivorous	Monsoon and Winter	Harmless
	Sesarmidae	*Episesarma versicolor* (Tweedie, 1940)	Violet vinegar crab	Edible	Not Evaluated	+	Omnivorous	Summer and Monsoon	Harmless
		Parasesarma pictum (De Haan,1835)	Mudflat crab	Non-Edible	Least Concern	+	Omnivorous	Summer and Monsoon	Harmless
	Varunidae	*Metaplax elegans* (De Maan,1888)	Orange signaller crab	Non-Edible	Not Evaluated	+	Omnivorous	Summer and Monsoon	Harmless
		Metaplax crenulate (Gerstaecker, 1856)	Metaplax crab	Non-Edible	Least concern	+	Omnivorous	Summer and Monsoon	Harmless
		Metaplax distincta (H.Milne Edwards,1852)	Distinct sea spider	Non-Edible	Not Evaluated	_	Omnivorous	Summer	Harmless
		Varuna litterata (Fabricius,1798)	Peregrine crab	Edible	Not Evaluated	_	Omnivorous	Monsoon and Winter	Harmless
Stomatopoda	Squillidae	*Oratosquilla oratoria* (De Haan, 1844)	Japanese squillid mantis shrimp	Edible	Not Evaluated	_	Carnivorous	Monsoon and Winter	Harmless
Xiphosurida	Limulidae	*Carcinoscorpius rotundicauda* (Latreille,1802)	Mangrove horseshoe crab	Non-Edible	Data Deficient	_	Detritivorous	Monsoon and Winter	Harmless

Order	Family	Scientific Name	Vernacular Name/ Local Name	Economic Value	IUCN Status	Availability Status	Feeding Habit	Season of Collection	Threat to Human
		Tachypleus gigas (O.F.Muller,1785)	Giant horseshoe crab	Non-Edible	Data Deficient	_	Detritivorous	Monsoon and Winter	Harmless

'_' Rarely available; '+' Commonly available; '++' Abundantly available

Table 3. IUCN Red List (2024-1) conservation status wise fin fish species recorded in Junput Mangrove

Order	Number of Family	Number of Species	IUCN Status				
			Not Evaluated (NE)	Least Concern (LC)	Near Threatened (NT)	Vulnerable (VU)	Data Deficient (DD)
Acanthuriformes	2	3	1	2	-	-	-
Anguilliformes	3	4	-	3	-	-	1
Aulopiformes	1	2	-	1	1	-	-
Beloniformes	1	1	-	1	-	-	-
Carangiformes	2	3	1	2	-	-	-
Clupeiformes	2	7	-	6	-	-	1
Cypriniformes	1	1	-	1	-	-	-
Carcharhiniformes	1	1	-		-	1	-
Elopiformes	1	1	-	1	-	-	-
Gobiiformes	3	4	-	4	-	-	-
Mugiliformes	1	2	-	2	-	-	-
Myliobactiformes	1	1	-		-	1	-
Perciformes	6	8	1	5	-	-	2
Pleuronectiformes	1	2		-	-	-	2
Scombriformes	2	2	2	-	-	-	-
Siluriformes	2	2	1	1	-	-	-
Spariformes	2	2	-	1	-	-	1
Tetradontiformes	2	5	-	5	-	-	-

Table 4. IUCN Red List (2024-1) conservation status wise shellfish species recorded in Junput Mangrove

Order	Number of Family	Number of Species	IUCN Status				
			Not Evaluated (NE)	Least Concern (LC)	Near Threatened (NT)	Vulnerable (VU)	Data Deficient (DD)
Decapoda	13	39	32	6	-	-	1
Stomatopoda `	1	1	1	-	-	-	-
Xiphosurida	1	2	-	-	-	-	2

were Least Concern (LC), while 06 species were Not Evaluated (NE), 07 species were Data Deficient (DD) and recorded shellfish species reveals that, 33 species were Not Evaluated (NE), 03 species were Data Deficient (DD), and 06 species were Least Concern (LC). The marine fish population has been analyzed in the northern Bay of Bengal, documented that 66.56 % of unknown species according to IUCN standards 18.47 % of species were under the LC category, 4.46 % of species has certain type of information, 2.23 % VU, 6.37 % NT, 0.95 % CR and 0.95 % EN [47]. However, it is noted that species classified under IUCN-DD status are often neglected in conservation programs [48]. The present study reveals that the order Perciformes (16%) is the most dominant among finfish species in the Junput mangrove, followed by Clupeiformes (14%). Among shellfish, the order Decapoda (93%) is the most prevalent, with Xiphosurida (5%) as the next most common. These findings align with the findings of 148 finfish species and 15 shellfish species at the Digha Mohana fish landing center in West Bengal, where finfish were predominantly from the order Perciformes (25%) and shellfish were largely from the order Decapoda (79%) [49]. The Champa Canal merges with the Bay of Bengal at Shankarpur, forming the same mangrove estuary as Junput [50]. Similar to the findings of the present study, this estuary supports a diverse array of brackish and marine finfish species [51].

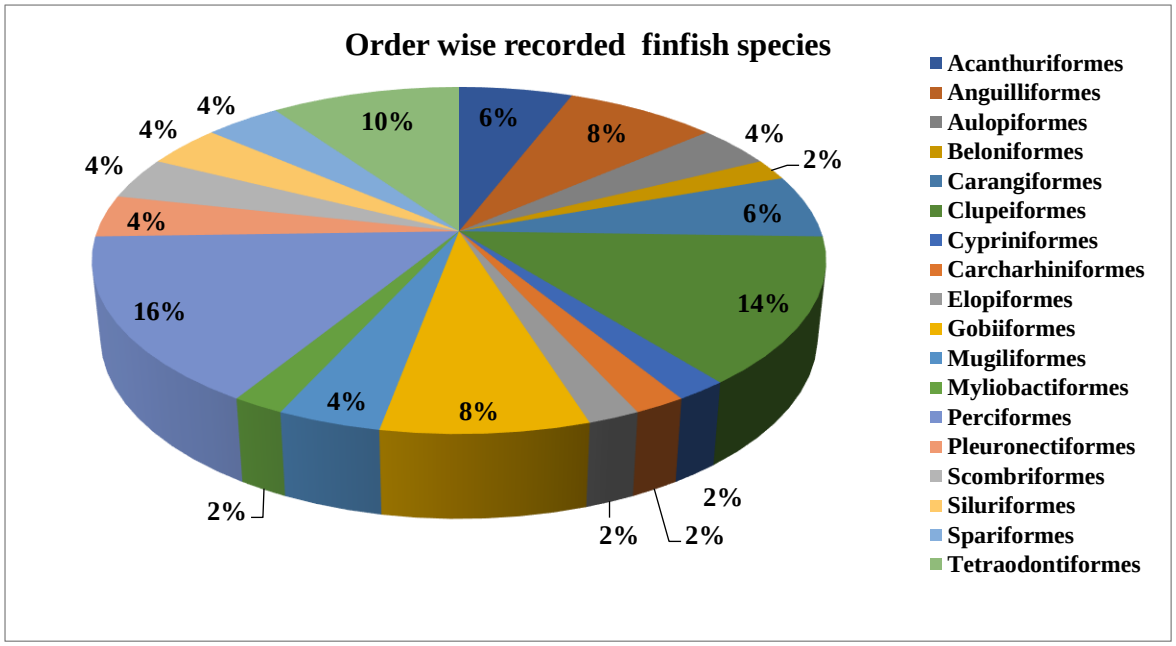

Fig. 2. Order wise fin fish species recorded in Junput Mangrove

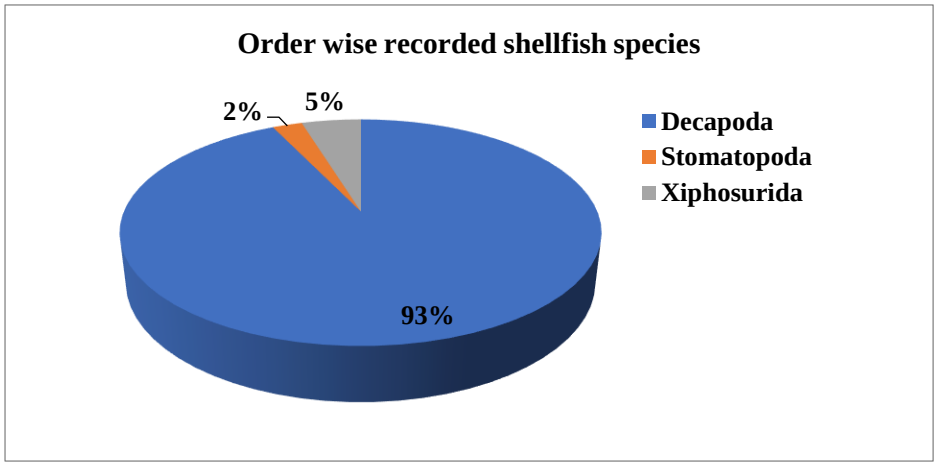

Fig. 3. Order wise shellfish species recorded in Junput Mangrove

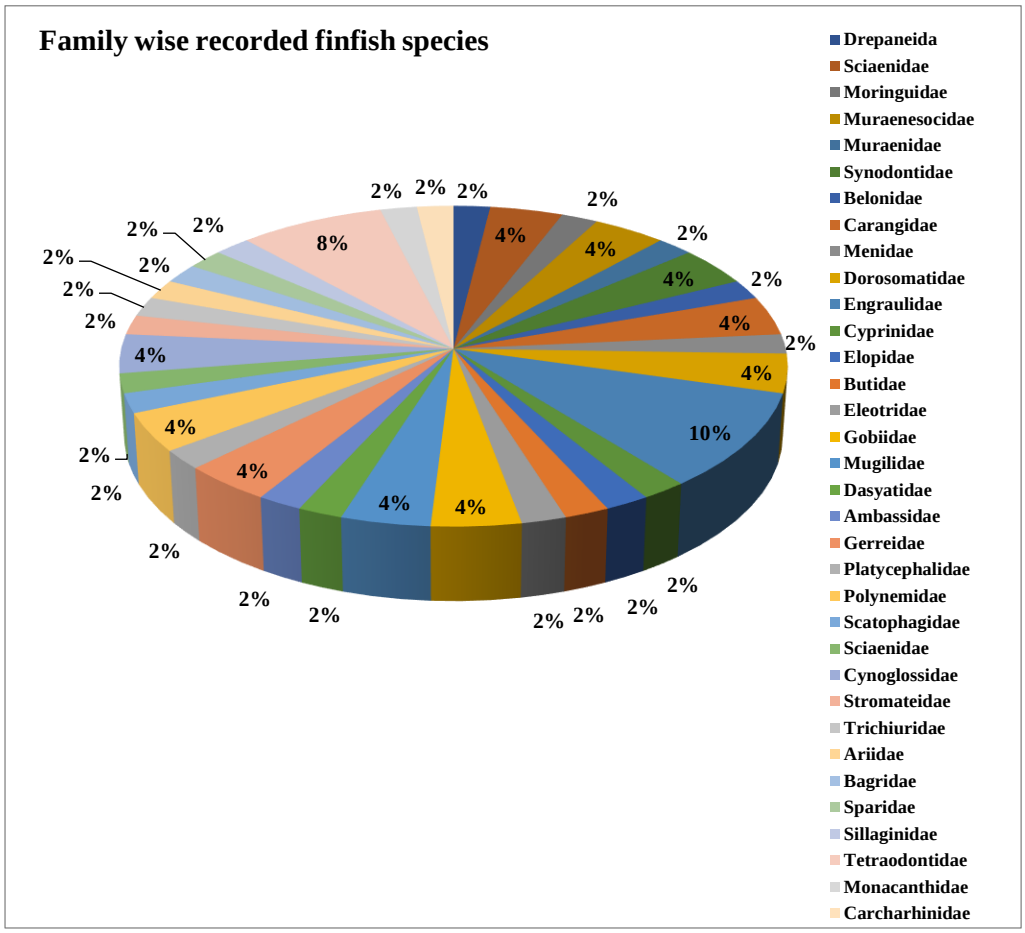

Fig. 4. Family wise fin fish species recorded in Junput Mangrove

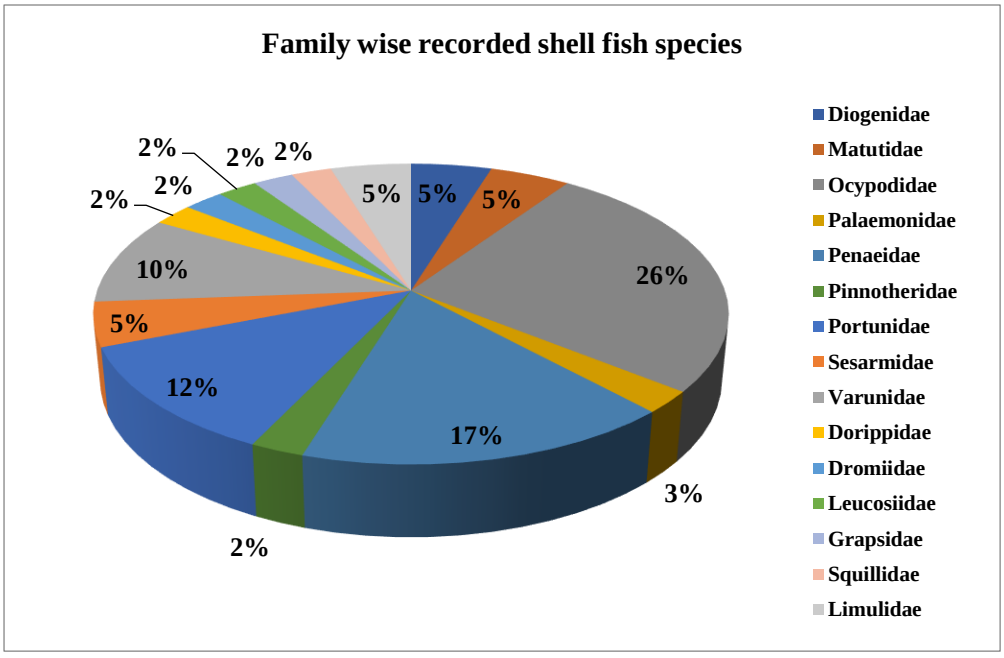

Fig. 5. Family wise shellfish species recorded in Junput Mangrove

In respect of feeding habits, we observed that 50 species of carnivores, 39 species of omnivores, and herbivores and detritivores accounted for 02 species each. As per economic value, out of the total recorded finfish and shellfish edible, non-edible, game fish and both game fish and food value were 60, 29, 03 and 01 species respectively.

During the study period dominant finfish species recorded (Fig. 2) belongs to the order Perciformes (16%), Clupeiformes (14%), Tetradontiformes (10%), Gobiformes and Anguilliformes (8%), Acanthuriformes and *Carangiformes* (6%), Siluriformes, Spariformes, Pleuronectiformes, Mugilliformes, Scombriformes and Aulopiformes (4%), Myliobactiformes, Cypriniformes, Carcharniformes, Elopiformes and Beloniformes (2%). In the case of shell fish order Decapoda (93%), Xiphosurida (5%) and Stomapoda (2%) contribute to the total catch (Fig. 3).

In this study the finfish species were contributed by a total of 34 families (Fig. 4), among them dominant family was Engraulidae with (10%), followed by Tetraodontidae with (8%) contribution. Within the recorded families-Sciaenidae, Muraenesocidae, Synodontidae, Carangidae, Dorosomatidae, Gobiidae, Mugilidae, Gerreidae, Polynemidae, and Cynoglossidae contribute (4%) share. The rest of the families contributes (2%) to the total catch. In shellfishes, the dominant family was Ocypodidae with (26%), followed by Penaeidae with (17%), Portunidae (12%) and Varunidae (10%) contribution. Other families Diogenidae, Matutidae, Sesarmidae and Limulidae contribute (5%) and Dorippidae (3%). The rest of the families contributes (2%) to the total catch (Fig. 5).

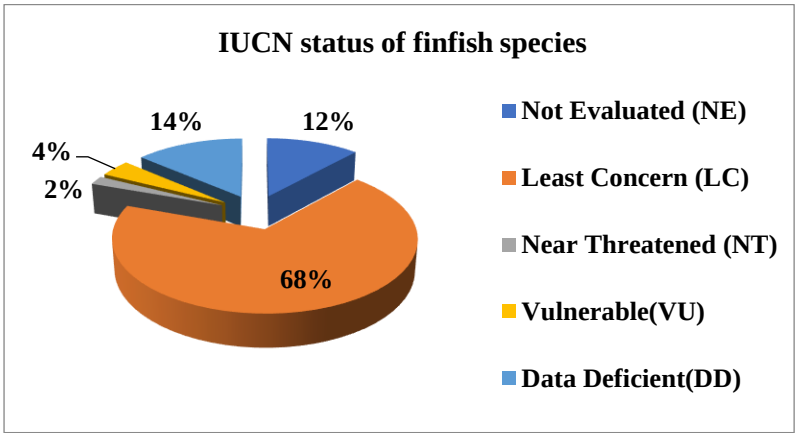

Fig. 6. IUCN Red List (2024-1) conservation status wise fin fish species recorded in Junput Mangrove

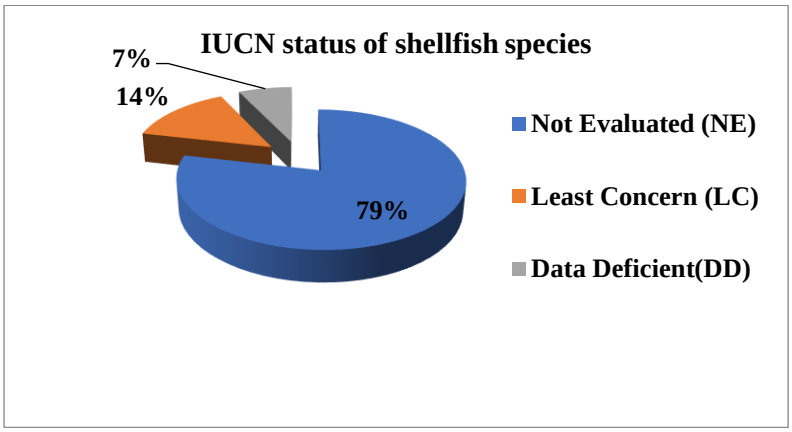

Fig. 7. IUCN Red List (2024-1) conservation status wise shellfish species recorded in Junput Mangrove

Plate 1. 1. *Drepane punctata* (Linnaeus,1758);2. *Pterotolithus maculates* (Cuvier, 1830); 3. *Johnius dussumieri* (Cuvier,1830); 4. *Moringua macrochir* (Bleeker, 1853); 5. *Muraenesox bagio* (Hamilton, 1822); 6. *Muraenesox cinereus* (Forsskal,1775); 7. *Gymnothorax tile* (Hamilton,1822); 8. *Harpodon nehereus* (Hamilton, 1822); 9. *Saurida lessepsianus* (Russell, Golani & Tikochinski, 2015); 10. *Strongylura strongylura* (Van Hasselt, 1823); 11. *Alepes djedaba* (Fabricius, 1775); 12. *Megalaspis cordyla* (Linnaeus, 1758); 13. *Mene maculate* (Bloch & schneider, 1801); 14. *Rhizoprionodon acutus* (Ruppell,1837); 15. *Anodontostoma chacunda* (Hamilton,1822); 16. *Escualosa thoracata* (Valenciennes, 1847); 17. *Coilia reynaldi* (Valenciennes, 1848); 18. *Coilia ramcarati* (Hamilton,1822); 19. *Coilia dussumieri* (Valenciennes, 1848); 20. *Setipinna taty* (Valenciennes, 1848); 21. *Thryssa dussumieri* (Valenciennes, 1848); 22. *Puntius ticto* (Hamilton, 1822); 23. *Elops saurus* (Linnaeus, 1766); 24. *Butis koilomatodon* (Bleeker, 1849); 25. *Eleotris pisonis* (Gmelin, 1789); 26. *Gobioides peruanus* (Steindachner, 1880); 27. *Pseudapocryptes elongatus* (Cuvier, 1816); 28. *Mugil tade* (Forsskal, 1775); 29. *Mugil Cephalus* (Linnaeus, 1758)

Plate 1. 30. *Dasyatis zugei* (Muller & Henle, 1841); 31. *Chanda nama* (F. Hamilton,1822); 32. *Gerres erythrourus* (Bloch, 1791); 33. *Pentaprion longimanus* (Cantor,1849); 34. *Platycephalus indicus* (Linnaeus, 1758); 35. *Polynemus paradiseus* (Linnaeus,1758); 36. *Polydactylus sextarius* (Bloch & Schneider, 1801); 37. *Scatophagus argus* (Linnaeus, 1766); 38. *Otolithes pama* (Hamilton,1822); 39. *Cynoglossus macrolepidotus* (Bleeker, 1851); 40. *Cynoglossus arel* (Bloch & Schneider, 1801); 41. *Pampus argenteus* (Euphrasen, 1788); 42. *Lepturacanthus savala* (Cuvier,1829); 43. *Arius maculates* (Thunberg,1792); 44. *Mystus gulio* (Hamilton,1822); 45. *Acanthopagrus latus* (Houttuyn, 1782); 46. *Sillago sihama* (Fabricius, 1775); 47. *Lagocephalus guentheri* (Miranda Ribeiro, 1915); 48. *Lagocephalus inermis* (Temminck & Schlegel, 1850); 49. *Lagocephalus lunaris* (Bloch & Schneider, 1801); 50. *Takifugu oblongus* (Bloch, 1786); 51. *Aluterus monoceros* (Linnaeus,1758)

Plate 2. 1. *Clibanarius padavensis* (De Man, 1888);2. *Clibanarius infraspinatus* (Hilgendorf, 1869); 3. *Dorippoides nudipes* (Manning & Holthuis,1986);4. *Conchoecetes artificiosus* (Fabricius,1798); 5. *Metopograpsus frontalis* (Miers, 1880); 6. *Arcania heptacantha* (De Man,1907); 7. *Matuta planipes* (Fabricius, 1798); 8. *Matuta victor* (Fabricius,1781); 9. *Austruca annulipes* (H.Milne Edwards,1837); 10. *Austruca bengali* (Crane, 1975); 11. *Austruca perplexa* (Milne Edwards,1852); 12. *Austruca triangularis* (A.Milne-Edwards,1873); 13. *Ocypode pallidula* (Hombron & Jacquinot, 1846); 14. *Ocypode brevicornis* (H.Milne-Edwards,1837); 15. *Ocypode macrocera* (H.Milne Edwards,1837); 16. *Uca splendid* (Stimpson,1858); 17. *Tubuca rosea* (Tweedie,1937); 18. *Tubuca typhoni* (Crane,1975); 19. *Tubuca dussumieri* (H.Milne Edwards, 1852); 20. *Macrobrachium equidens* (Dana,1852); 21. *Fenneropenaeus indicus* (H,Milne Edwards, 1837); 22. *Penaeus monodon* (Fabricius, 1798); 23. *Mier*spenaeopsis *sculptilis* (Heller,1862); 24. *Metapenaeus monoceros* (Fabricius,1798); 25. *Metapenaeus dobsoni* (Miers,1878); 26. *Metapenaeus affinis* (H.Milne-Edwards, 1837); 27. *Metapenaeus brevicornis* (H.Milne-Edwards,1837); 28. *Pinnotheres pisum* (Linnaeus,1767); 29. *Charybdis orientalis* (Dana,1852); 30. *Charybdis feriata* (Linnaeus, 1758); 31. *Scylla serrata* (Forsskal,1775); 32. *Portunus pelagicus* (Linnaeus, 1758); 33. *Portunus sanguinolentus* (Herbst,1783); 34. *Episesarma versicolor* (Tweedie, 1940); 35. *Parasesarma pictum* (De Haan,1835); 36. *Metaplax elegans* (De Maan,1888); 37. *Metaplax crenulate* (Gerstaecker, 1856); 38. *Metaplax distincta* (H.Milne Edwards,1852); 39. *Varuna litterata* (Fabricius,1798); 40. *Oratosquilla oratoria* (De Haan, 1844); 41. *Carcinoscorpius rotundicauda* (Latreille,1802); 42. *Tachypleus gigas* (O.F.Muller,1785)

In this study, the IUCN status for finfish (Fig. 6) was shared by NE (12%), LC (68%), NT (2%), VU (4%) and DD (14%). The data of IUCN status for shellfish (Fig. 7) were shared by NE (79%), LC (14%) and DD (7%).

4. CONCLUSION

Junput Mangrove plays a pivotal role in the economy of local villagers as well as in the economy of East Midnapore. Among the recorded species, different marine and brackish water fin fish and shellfishes especially shrimps and crabs found abundantly in this Mangrove. They prefer this mangrove for their breeding and nursery grounds. In this study we found huge bycatch took place during their fishing operation. As per data recorded in this study, 1 species belongs to the Near Threatened category and 2 species were Vulnerable. So, there is a critical need for proper conservation strategy by the Govt. to protect them and reestablish their population. Awareness programme should be imposed by the Govt. or local NGOs or authorities to stop abundant bycatch and conserve our valuable fishery resources for future need.

5. FUTURE SCOPE

After going through the research article one can get an ornamented idea about the finfish and shellfish species abundantly found in the Junput Mangrove. Since there are no previous elaborative studies on the availability of finfish and shellfish species in this mangrove, other workers or researchers can collect lots of information or data based on the study of that place later on. This research article will serve as a point of observation to evaluate the availability status of finfish and shellfish species in Junput Mangrove.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

ETHICAL APPROVAL STATEMENT

As this research paper does not involve human or animal experimentation, it is exempt from ethical approval requirements. Consequently, no ethical approval was necessary for the completion of this study.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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