



# Freshwater and Estuarine Fishes of Great Nicobar Biosphere Reserve

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## Abstract

In this study, fish surveys were conducted in 11 collection locations comprising streams, river, ponds and estuaries, and over 600 specimens were collected. A total of 53 species have been identified as belonging to 43 genera, 33 families and 13 orders. The orders of Perciformes, Gobiiformes and Mugiliformes supported the majority of fish composition in this area, with 23 species, 5 species and 5 species, respectively. The present survey recorded for the first time five species of fishes for the Great Nicobar Islands, viz., *Heteropneustes fossilis*, *Clarias magur*, *Oryzias javanicus*, *Bunaka gyrinoides* and *Microphis insularis*. Further exploratory surveys on streams, rivers and estuaries may find the accurate species diversity and new species to science.

## Keywords

Freshwater fish · Estuarine fish · Nicobar · Biosphere reserve · Diversity

## Introduction

Fishes constitute slightly more than half of the recognized living vertebrates across the world (Nelson 2006). They make a vital contribution, as animal protein, to the survival and health of a significant portion of the global population. The number of valid fish species recorded so far is more than 34,190 with the addition, at an

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average, of 100–150/year (Eschmeyer et al. 2010; Fricke et al. 2020). The increase in the number of freshwater fish species in the recent years can be attributed to more explorations and expeditions in new areas and application of molecular taxonomy and understanding the importance of biodiversity and its cataloguing. In India, freshwater and marine species constitute 9.7% of the total number of known species about 34,190 species from the world (Eschmeyer and Fong 2016). Freshwater fishes are species that lives all or a critical part of its life in either freshwater inland or brackish estuaries. The number of valid marine fish species (16,764) is almost equal to that of freshwater fish (15,170) (Eschmeyer et al. 2010). In India, a total of 2936 native fishes are reported that include 936 freshwater, 113 brackish water and 1887 marine fish species belonging to 44 orders, 252 families and 1069 genera (NBFG 2016).

The research on diversity of fish fauna of Andaman and Nicobar Islands has been initiated by Blyth (1846) followed by Annandale and Hora (1925), Mukerji (1935), Koumans (1940) and Misra (1950). The freshwater pipefish *Microphis insularis* is known to endemic to south Andaman Islands that described along with other four freshwater fish species (Annandale and Hora 1925). Talwar (1990) works were based upon the compilation of previous surveys and literatures; Rema Devi and Indra (2000) list 667 species which are grouped under 12 orders, 35 families and 149 genera. Palavai and Priya (2009) recorded 33 species from south, middle and north Andaman, which comprise 11 freshwater and 17 diadromous fishes. Rajan and Sreeraj (2013) recorded 23 species from the freshwater streams of Mount Harriet, South Andaman. Rajan and Sreeraj (2014) recorded two eleotrids *Belobranchus belobranchus* (Valenciennes, 1837) and *Belobranchus segura* Keith, Hadiaty and Lord (2012) from hill streams of Mount Harriet National Park. Recently Praveenraj et al. (2017) recorded *Redigobius oyensi* (de Beaufort, 1913) from Car Nicobar Island.

Andaman and Nicobar Islands situated in the Bay of Bengal, between 6°45′–13°45′N and 92°10′–94°15′E with a coastline of 1962 km. The archipelago consists of 572 islands, islets and rocks extending over 800 km of total geographical area 8249 km<sup>2</sup>. These Islands have a continuation with the Arakan Yoma of Burma in the north and Achin Head of Sumatra in the south. The Nicobar group of Islands is comprised of 24 Islands, and the Great Nicobar Islands is the largest in the Nicobar group of Islands. Saint George channel in the north and Great channel in the south separated the Great Nicobar from other Islands. There are five perennial rivers, namely, Alexandra, Dagmar, Galathea, Jubilee and Amrit Kaur, pass on the Great Nicobar Islands. The area is characterized by its high diversity and the unique faunal composition of the freshwater and estuarine fishes. Menon and Talwar (1972) reported 24 fishes from the rivers of Great Nicobar Islands: 3 species from Galathea, 2 from Alexandra River, 15 species from Dogma River and 4 species from Jubilee River. Rao et al. (2000) recorded 539 fish species from freshwater and marine habitats of Andaman and Nicobar Islands. Dhandapani and Mishra (1998) reported 88 species that belonging to 33 families. Rajaram and Nedumaran (2009) reported 258 species belonging to 84 families were recorded from Great Nicobar Islands. However, knowledge and information on the overall diversity of freshwater and

estuarine fishes in these areas are still limited. This paper brings about the updated information on reported freshwater and estuarine fishes from the Great Nicobar Islands.

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## Methods

Fish samples were collected from Great Nicobar Islands during the period of November 2018 to March 2019 at 11 locations (Fig. 12.1). Location, latitude and longitude of the area surveyed were recorded by using Garmin 12-channel GPS. Fishes were collected using cast net, scoop net, hook and line and gill nets. Fresh photographs were taken and preserved in 10% formalin for further taxonomic identification.

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## Results

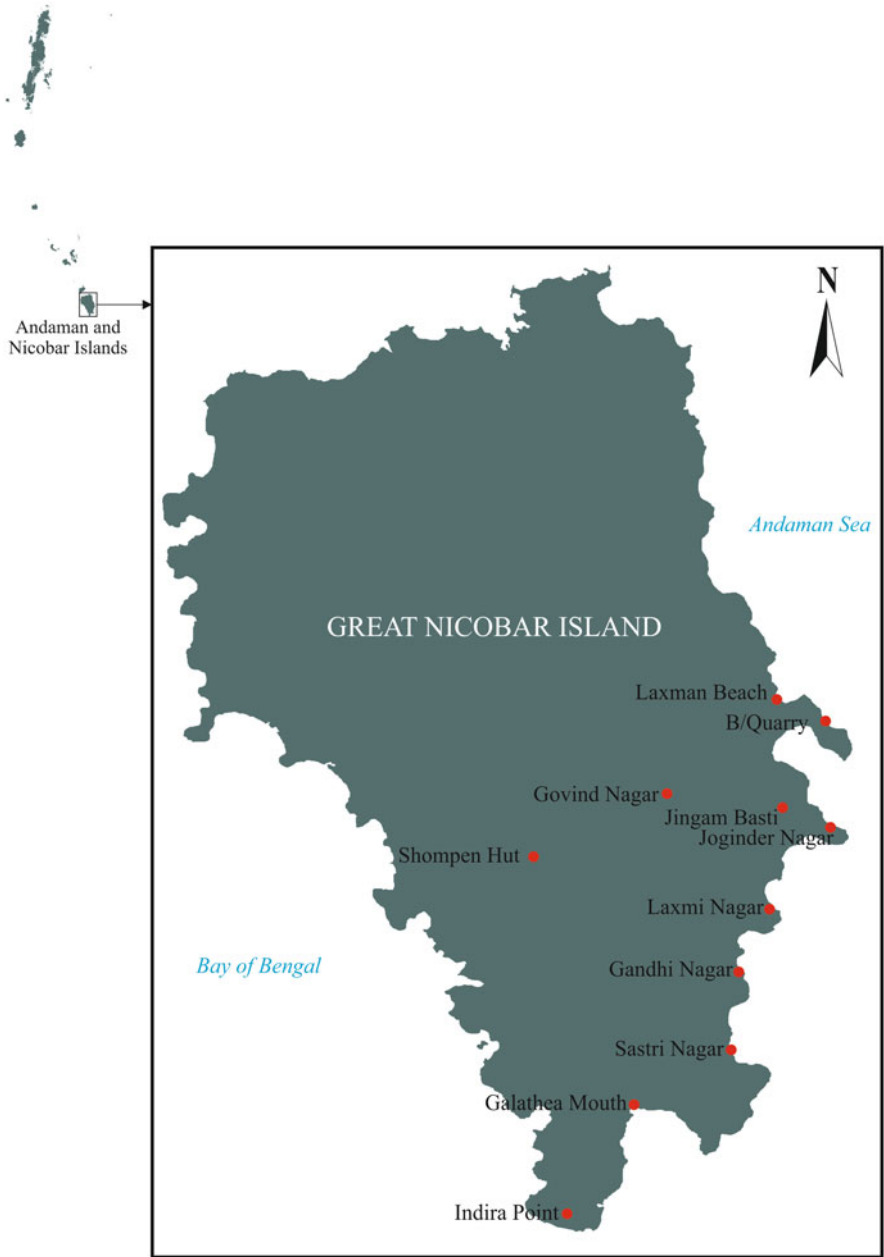
A total of 53 freshwater and estuarine fishes that belonging to 43 genera were identified from the specimens collected from the various rivers, streams and estuaries of Great Nicobar Islands (Table 12.1). The largest order that contributes a maximum number of species (23) was Perciformes with 17 families followed by Gobiiformes with 10 species under 2 families.

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## Discussion

Our knowledge of the freshwater and estuarine fish fauna from Andaman and Nicobar Islands is still scanty. During recent years, the taxonomy of Indian freshwater fishes has been substantially increased due to the detailed revisions and extensive exploratory surveys and increased use of integrative taxonomic approach. In India, a total of 2936 native fishes are reported that include 936 freshwater, 113 brackish water and 1887 marine fish species belonging to 44 orders, 252 families and 1069 genera (NBFGR 2016). Rajaram and Nedumaran (2009) reported 147 species of fishes from Great Nicobar Islands. Of the 147 species recorded, 3 species were confirmed as new distributional records to the Bay of Bengal Sea. Bineesh et al. (2018) compiled the list of freshwater species of 34 species belonging to 7 orders, 13 families and 23 genera were distributed in the rivers and streams of Andaman and Nicobar Islands.

During this study, fish surveys were conducted in 11 collections locations comprising streams, river, ponds and estuaries, and over 600 specimens were collected, the fish fauna of this area, on the basis of our investigations 53 species, belonging to 43 genera, 33 families and 13 orders. The orders of Perciformes, Gobiiformes and Mugiliformes supported the majority of fish composition in this area, with 23 species, 5 species and 5 species, respectively. A freshwater Gobiid fish *Gobiopterus smithi* (Menon and Talwar 1972) was described from Shomben village



**Fig. 12.1** Map showing the collection localities of Great Nicobar Islands

**Table 12.1** List of freshwater and estuarine fish species recorded from Great Nicobar Islands

Order	Family	Species	IUCN status	Status
Anguilliformes	Anguillidae	<i>Anguilla bicolor</i> (McClelland, 1844)	Near threatened (NT)	Common
		<i>Anguilla marmorata</i> (Quoy & Gaimard, 1824)	Least concern (LC)	Very common
Elopiformes	Megalopidae	<i>Megalops cyprinoides</i> (Broussonet, 1782)	Data deficient (DD)	Common
Gonorynchiformes	Chanidae	<i>Chanos chanos</i> (Forsskal, 1775)	Least concern (LC)	Very common
Siluriformes	Clariidae	<i>Clarias magur</i> (Hamilton, 1822)	Endangered (EN)	Very rare
	Heteropneustidae	<i>Heteropneustes fossilis</i> (Bloch, 1794)	Least concern (LC)	Common
	Plotosidae	<i>Plotosus canius</i> (Hamilton, 1822)	Not evaluated	Common
Clupeiformes	Clupeidae	<i>Stolephorus commersonnii</i> (Lacepede, 1803)	Least concern (LC)	Very common
		<i>Sardinella fimbriata</i> (Valenciennes, 1847)	Least concern (LC)	Very common
		<i>Anodontostoma chacunda</i> (Hamilton, 1822)	Least concern (LC)	Common
Atheriniformes	Atherinidae	<i>Atherinomorus duodecimalis</i> (Valenciennes, 1835)	Least concern (LC)	Very common
Beloniformes	Adrianichthyidae	<i>Oryzias cf. javanicus</i> (Bleeker, 1854)	Least concern (LC)	Very common
Perciformes	Kuhliidae	<i>Kuhlia mugil</i> (Forster, 1801)	Least concern (LC)	Common
		<i>Kuhlia rupestris</i> (Lacepede, 1802)	Least concern (LC)	Common
	Latidae	<i>Lates calcarifer</i> (Bloch, 1790)	Least concern (LC)	Common
	Ambassidae	<i>Ambassis ambassis</i> (Lacepede, 1802)	Least concern (LC)	Very common
		<i>Ambassis nalua</i> (Hamilton, 1822)		Very common

(continued)

**Table 12.1** (continued)

Order	Family	Species	IUCN status	Status
			Least concern (LC)	
	Apogonidae	<i>Apogon hyalosoma</i> (Bleeker, 1852)	Least concern (LC)	Very common
	Cichlidae	<i>Oreochromis mossambicus</i> (Peters, 1852)	Least concern (LC)	Very common
	Terapontidae	<i>Terapon theraps</i> (Cuvier, 1829)	Least concern (LC)	Very common
	Carangidae	<i>Caranx melampygus</i> (Cuvier, 1833)	Least concern (LC)	Common
	Gerreidae	<i>Gerres oblongus</i> (Cuvier, 1830)	Least concern (LC)	Common
		<i>Gerres oyena</i> (Forsskal, 1775)	Least concern (LC)	Very common
		<i>Gerres filamentosus</i> (Cuvier, 1829)	Least concern (LC)	Common
	Drepaneidae	<i>Drepane longimana</i> (Bloch & Schneider, 1801)	Not evaluated	Very common
	Lutjanidae	<i>Lutjanus argentimaculatus</i> (Forsskal, 1775)	Least concern (LC)	Very common
		<i>Lutjanus fulvus</i> (Schneider, 1801)	Least concern (LC)	Common
	Leiognathidae	<i>Eubleekeria jonesi</i> (James, 1971)	Least concern (LC)	Very common
		<i>Leiognathus striatus</i> (James & Badrudeen, 1991)	Least concern (LC)	Very common
	Scatophagidae	<i>Scatophagus argus</i> (Linnaeus, 1766)	Least concern (LC)	Very common
	Siganidae	<i>Siganus javus</i> (Linnaeus, 1766)	Least concern (LC)	Common
	Anabantidae	<i>Anabas testudineus</i> (Bloch, 1792)	Least concern (LC)	Common

(continued)

**Table 12.1** (continued)

Order	Family	Species	IUCN status	Status
	Sillaginidae	<i>Sillago</i> sp.		common
	Monodactylidae	<i>Monodactylus argenteus</i> (Linnaeus, 1758)	Least concern (LC)	Very common
	Toxotidae	<i>Toxotes jaculator</i> (Pallas, 1767)	Least concern (LC)	Very common
Scorpaeniformes	Platycephalidae	<i>Cociella crocodilus</i> (Cuvier, 1829)	Least concern (LC)	Rare
Mugiliformes	Mugilidae	<i>Ellochelon vaigiensis</i> (Quoy & Gaimard, 1825)	Least concern (LC)	Very common
		<i>Valamugil seheli</i> (Forsskal, 1775)	Least concern (LC)	Very common
		<i>Valamugil buchanani</i> (Bleeker, 1854)	Least concern (LC)	Very common
		<i>Mugil cephalus</i> (Linnaeus, 1758)	Least concern (LC)	Very common
Gobiiformes	Gobiidae	<i>Glossogobius giuris</i> (Hamilton, 1822)	Least concern (LC)	Very common
		<i>Redigobius tambujon</i> (Bleeker, 1854)	Least concern (LC)	Rare
		<i>Redigobius bikolanus</i> (Herre, 1927)	Least concern (LC)	Rare
		<i>Redigobius oyensi</i> (de Beaufort, 1913)	Least concern (LC)	Rare
		<i>Glossogobius aureus</i> (Akihito and Meguro, 1975)	Least concern (LC)	Rare
	Eleotridae	<i>Butis butis</i> (Hamilton, 1822)	Least concern (LC)	Rare
		<i>Butis amboinensis</i> (Bleeker, 1853)	Least concern (LC)	Rare
		<i>Eleotris fusca</i> (Bloch and Schneider, 1801)	Least concern (LC)	Very common
		<i>Giuris margaritacea</i> (Valenciennes, 1837)		Very common

(continued)

**Table 12.1** (continued)

Order	Family	Species	IUCN status	Status
			Least concern (LC)	
		<i>Bunaka gyrinoides</i> (Bleeker, 1853)	Least concern (LC)	Common
Syngnathiformes	Syngnathidae	<i>Microphis insularis</i> (Hora, 1925)	Vulnerable (VU)	Very rare
Pleuronectiformes	Bothidae	<i>Bothus pantherinus</i> (Ruppell, 1830)	Least concern (LC)	Common
	Paralichthyidae	<i>Pseudorhombus arsius</i> (Hamilton, 1822)	Not evaluated	Common

*Bunaka gyrinoides* (Bleeker, 1853)*Giuris margaritacea* (Valenciennes, 1837)*Microphis insularis* (Hora 1925)*Megalops cyrinoides* (Broussonet, 1782)*Scatophagus argus* (Linnaeus, 1766)*Heteropneustes fossilis* (Bloch, 1794)**Plate 12.1** Freshwater and estuarine fishes of Great Nicobar Islands

area of Dogma River, Great Nicobar Islands, with current status as uncertain. The present study fails to collect samples from the type locality. More research surveys should be conducted to the type locality River to know the validity of *Gobiopterus smithi* using integrative taxonomical approach. The present survey recorded for the first



time five species of fishes for Great Nicobar Islands, viz., *Heteropneustes fossilis*, *Clarias magur*, *Oryzias* cf. *javanicus*, *Bunaka gyrinoides* and *Microphis insularis* (Plate 12.1). Annandale and Hora (1925) have recorded five fish species from freshwater streams, in which the pipefish *Microphis insularis* is endemic to Andaman Islands. However, the present record of *Microphis insularis* from Great Nicobar Islands shows the wider distribution of pipefish species. The ricefish *Oryzias* cf. *javanicus* was recently reported from estuary of Tamil Nadu and marks the *Oryzias carmaticus* distribution in the Andaman Islands (Angel et al. 2019). However, our recent collections from various estuaries of Great Nicobar Islands and South Andaman Islands confirm the occurrence of *Oryzias* cf. *javanicus* for the first time for Andaman and Nicobar Islands. More research surveys are needed to explore the freshwater rivers, their streams to know the exact species composition and their phylogenetic position from the Great Nicobar Islands.

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