

## Intertidal ichthyofaunal diversity of Agatti island, Lakshadweep

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### ABSTRACT

Agatti is one of the fast-developing Islands in the Lakshadweep Archipelago. The region faces severe environmental problems due to anthropogenic impacts and specific development strategies need to be developed. This region, usually well exposed during low tide, will have severe impacts if the envisaged development of the airport becomes a reality. Preliminary information collected from a survey among the local fishermen points toward the fact that the diversity and abundance of fish are diminishing on Agatti Island. It is also evident that tourism and improper developmental activities altered the ecosystem. Therefore, an attempt has been made to survey and document the fish diversity in the intertidal region of the Agatti Atoll from October 2018 to March 2019. Fish counts, and sampling was done with snorkelling from fifty-line transects laid in Agatti island's intertidal area during high tide. The survey revealed the presence of 77 species of fishes categorised under two orders, 14 families and 39 genera. The species-rich fish families were Labridae (22 species), Pomacentridae (13 species) and Acanthuridae (11 species). The families viz. Chaetodontidae (7 species), Balistidae (5 species) Tetraodontidae (3 species) and Blenniidae (3 species). Apogonidae (1 species), Holocentridae (1 species) and Zanclidae (1 species) were also represented. Most of these species are listed as ornamental fishes in the international marine ornamental fish trade. High promotional tourism activities and the proposed extension of the existing airport may lead to the destruction of the Agatti Island habitats in general and the intertidal zone, particularly the natural habitat of fishes and many other marine organisms. Therefore, the study emphasises the need to implement environmental laws and development strategies to reduce the impact of anthropogenic activities in the lagoon and intertidal areas to protect a highly diverse region. The development of conservation strategies and sustainable utilisation of these living resources in a sustainable manner is also discussed.

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### 1. Introduction

The intertidal zone is always subject to tidal fluxes and consequent variations in temperature and turbidity (Smale *et al.*, 2012; Davis *et al.*, 2015). The intertidal area is also a region directly affected by human activities as it is within easy reach to collect marine organisms during low tide as a source of food and revenue (Smale *et al.*, 2012). Human impacts on rocky shores have also received increasing attention, demonstrating the often devastating effects of trampling (Beauchamp & Gowing, 1982) and exploitative activities such as shellfish collection (Duran *et al.*, 1987).

Coral reef fishes use their habitats non-randomly and are often closely associated with a particular substrate type, such as live coral (Faria and Almada, 2001; Garpe and Öhman, 2003). Extreme environmental conditions are observed in the intertidal areas compared to those encountered in the areas that stay submerged throughout the tidal cycle (Metaxas and Scheibling, 1993). The Ichthyofauna of Lakshadweep attained particular interest for a very long. The first concerted attempt to document fish from these islands was made by Jones and Kumaran (1980). Agatti Island consists of a prominent lagoon on the western (windward) and intertidal areas on the eastern side. High promotional tourism activities and the proposed extension of the existing airport may lead to the destruction of various habitats of Agatti Island in general and the intertidal zone in particular, which are the natural habitat of fishes and a multitude of other marine organisms. Therefore, the study emphasizes the need to implement environmental laws and

adopt sound development strategies to reduce the impact of anthropogenic activities in the lagoon and intertidal areas to protect this highly diverse region.

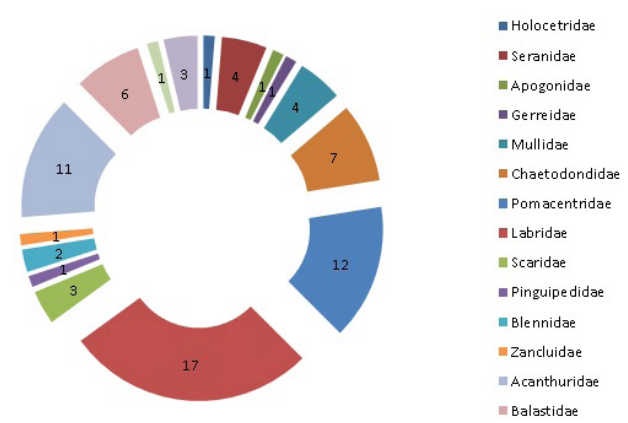
Agatti lies between 10° 48' and 10° 53' N latitude and 72° 09' and 7° 13' E longitude, having an area of 3.84 sq km, with a maximum length of 10 km and a width of km. It has a northeast, southwest trend with a long tail on the south. The lagoon area of this island is 17.50 sq km. Belt transects (Brock 1954) and timed swim techniques were adopted to monitor the population of fish effectively. Transects were laid horizontally along the substratum, and data was collected along each transect by visual census supported by photography. Around 50 transects were laid in the intertidal area on the leeward side of Agatti Island inside the low tide line during high tide. Give an account of similar works in Lakshadweep.

Balan (1958) created the first focused attempt at documenting the fishes of Lakshadweep islands. He identified 80 different fish species from 65 different genera. In an additional investigation of the fishing sector at Minicoy, Jones and Kumaran (1959) listed 154 species of fish from the lagoon and reef. Jones (1969) expanded the list once more and developed a "Catalogue of Fishes from Laccadive Archipelago". Later Jones and Kumaran (1980) published a comprehensive account describing 603 fishes of Lakshadweep followed by Murthy *et al.*, 2001; Ajithkumar *et al.*, 2012; Vinoth *et al.*, 2012; Kumar *et al.*, 2012, 2013; Prabhakaran *et al.*, 2013; Randall and Bineesh, 2014; Idreesbabu *et al.*, 2014; Noushad *et al.*, 2014; Rajan *et*

al., 2021; CR Sreeraj, 2022 and Kar et al., 2023. Concerted attempts to document the intertidal ichthyofaunal diversity are very limited in this area.

### 2. Results and Discussion

The survey revealed 74 species of fishes categorized under two orders 16 families and 39 genera (Table 1). The species-rich fish families were Labridae (17 species), Pomacentridae (12 species) and Acanthuridae (11 species). The families include Chaetodontidae (7 species), Balistidae (5 species), Tetraodontidae (3 species) and Blenniidae (3 species). Apogonidae (1 species), Holocentridae (1 species) and Zanclidae (1 species) were also represented (Table 1). The percentage occurrence of various families of fishes recorded from the intertidal zones of the study region is also elucidated (Fig. 1).



**Fig. 1.** Percentage occurrence of various families of fishes recorded for the intertidal zone of Agati Island, Lakshadweep

**Table 1.** Checklist of fishes documented from the Intertidal zone of Agatti (new records may be marked)

No.	Family	Species
1	Holocentridae	<i>Neoniphon sammara</i> (Forsskål, 1775)
2	Serranidae	<i>Epinephelus merra</i> Bloch, 1793
3		<i>Epinephelus quoyanus</i> (Valenciennes, 1830)
4		<i>Lethrinus harak</i> (Forsskål, 1775)
5		<i>Lutjanus fulvus</i> (Forster, 1801)
6	Apogonidae	<i>Ostorhinchus cookii</i> (MacLeay, 1881)
7	Gerreidae	<i>Gerres oyena</i> (Forsskål, 1775)
8	Mullidae	<i>Parupeneus barberinus</i> (Lacepède, 1801)
9		<i>P. cyclostomus</i> (Lacepède, 1801)
10		<i>P. macronemus</i> (Lacepède, 1801)
11		<i>P. trifasciatus</i> (Lacepède, 1801)
12	Chaetodontidae	<i>Chaetodon auriga</i> Forsskål, 1775
13		<i>C. citrinellus</i> Cuvier, 1831
14		<i>C. decussatus</i> Cuvier, 1829
15		<i>C. meyeri</i> Bloch & Schneider, 1801
16		<i>C. trifasciatus</i> Park, 1797
17		<i>C. xanthocephalus</i> Bennett, 1833
18		<i>C. vagabundus</i> Linnaeus, 1758
19	Pomacentridae	<i>A. septemfasciatus</i> (Cuvier, 1830)
20		<i>A. sexfasciatus</i> (Lacepède, 1801)
21		<i>A. vaigiensis</i> (Quoy & Gaimard, 1825)
22		<i>Chrysiptera biocellata</i> (Quoy & Gaimard, 1825)
23		<i>C. brownriggii</i> (Bennett, 1828)
24		<i>C. caeruleolineata</i> (Allen, 1973)
25		<i>C. unimaculata</i> (Cuvier, 1830)
26		<i>Chromis viridis</i> (Cuvier, 1830)
27		<i>Dascyllus aruanus</i> (Linnaeus, 1758)
28		<i>D. carneus</i> Fischer, 1885
29		<i>D. trimaculatus</i> (Rüppell, 1829)
30		<i>Plectroglyphidodon leucozonus</i> (Bleeker, 1859)
31	Labridae	<i>Cheilio inermis</i> (Forsskål, 1775)
32		<i>Gomphosus caeruleus</i> Lacepède, 1801
33		<i>Halichoeres hortulanus</i> (Lacepède, 1801)
34		<i>H. marginatus</i> Rüppell, 1835
35		<i>H. melanurus</i> (Bleeker, 1851)
36		<i>H. scapularis</i> (Bennett, 1832)
37		<i>Hemigymnus fasciatus</i> (Bloch, 1792)
38		<i>Labroides dimidiatus</i> (Valenciennes, 1839)
39		<i>Macropharyngodon meleagris</i> (Valenciennes, 1839)
40		<i>Novaculichthys taeniourus</i> (Lacepède, 1801)
41		<i>Oxycheilinus digramma</i> (Lacepède, 1801)
42		<i>Stethojulis trilineata</i> (Bloch & Schneider, 1801)
43		<i>Thalassoma hardwicke</i> (Bennett, 1830)
44		<i>T. janseni</i> (Bleeker, 1856)
45		<i>Stethojulis albovittata</i> (Bonnaterre, 1788)
46		<i>Halichoeres argus</i> (Bloch & Schneider, 1801)
47		<i>Stethojulis strigiventer</i> (Bennett, 1833)

48	Scaridae	<i>Calotomus spinidens</i> (Quoy & Gaimard, 1824)
49		<i>Scarus globiceps</i> Valenciennes, 1840
50		<i>S. scaber</i> Valenciennes, 1840
51	Pinguipedidae	<i>Parapercis hexophthalma</i> (Cuvier, 1829)
52	Blennidae	<i>Plagiotremus rhinorhynchos</i> (Bleeker, 1852)
53		<i>Istiblennius edentulous</i> (Forster & Schneider, 1801)
54	Zancluidae	<i>Zanclus cornutus</i> (Linnaeus, 1758)
55	Acanthuridae	<i>Acanthurus grammoptilus</i> Richardson, 1843
56		<i>A. leucosternon</i> Bennett, 1833
57		<i>A. lineatus</i> (Linnaeus, 1758)
58		<i>A. nigricauda</i> Duncker & Mohr, 1929
59		<i>A. nigrofuscus</i> (Forsskål, 1775)
60		<i>A. triostegus</i> (Linnaeus, 1758)
61		<i>A. xanthopterus</i> Valenciennes, 1835
62		<i>Ctenochaetus striatus</i> (Quoy & Gaimard, 1825)
63		<i>Naso lituratus</i> (Forster, 1801)
64		<i>N. unicornis</i> (Forsskål, 1775)
65		<i>N. tuberosus</i> Lacepède, 1801
66	Balastidae	<i>Abalistes stellatus</i> (Anonymous in Lacepède ex Commerson, 1798)
67		<i>Balistapus undulatus</i> (Park, 1797)
68		<i>Melichthys indicus</i> Randall & Klauswitz, 1973
69		<i>Rhinecanthus aculeatus</i> (Linnaeus, 1758)
70		<i>R. rectangulus</i> (Bloch & Schneider, 1801)
71	Ocstracidae	<i>Ostracion meleagris</i> Shaw, 1796
72	Tertadontidae	<i>Canthigaster solandri</i> (Richardson, 1845)
73		<i>Arothron stellatus</i> (Anonymous, 1798)
74		<i>Canthigaster margaritata</i> (Rüppell, 1829)

Most of these species are listed as ornamental fishes in the international marine ornamental fish trade. High promotional activities of tourism and the proposed extension of the existing airport may lead to alterations or destruction of Agatti Island's various habitats. The reefs of Kalpitti, a small uninhabited satellite island of Agatti in general and its intertidal zone in particular, which are natural habitats of fishes and many other marine organisms, are also facing similar anthropogenic threats. Destruction of corals are consequent to collecting the boulders and shingles for the construction of houses and other buildings and the cowry and ornamental fish collection for curios and aquarium purposes. Therefore, the study emphasizes the need for strict implementation of environmental laws and formulates a developmental strategy that will reduce the impact of anthropogenic activities and make awareness among the local people about the laws and importance of

the ecosystems in the general intertidal zone in particular, to their existence. It is also recommended that the marine finfish hatchery at Agatti be revived with adequate facilities to take up culture-based farming of reef fishes and other organisms for ranching, which will enhance the wild population of these fishes. This may lead to a viable solution for the destruction of the ecosystem by restoring its functional balance and trophic interaction by reinstating the organisms associated with it.

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