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STATUS OF EDIBLE HOLOTHURIANS ON THE FRINGING REEF FLATS OF NICOBAR ISLANDS, INDIA

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INTRODUCTION

Holothurians, especially Holothuriidae and Stichopodidae, form an important part of multi-species invertebrate fisheries that has been in existence in the Indo Pacific for traditional and subsistence uses for over 1000 years. In India, about 200 species of holothurians have been reported at earlier of which 75 species are found in shallow water depth. Of these only 12 species are commercially important. The commercially important holothurians are found from the intertidal region to a depth of 20m. At earlier, James (1973, 1983) provides the documentation on the holothurians resources of India chiefly based on the intensive surveys along the Gulf of Mannar and Andaman and Nicobar Islands. The harvesting of this resources have developed throughout the Indo- West Pacific and beyond for the preparation and sales of beche-de-mer (MacKnight, 1976; Conand and Tuwo, 1996). This beche-de-mer industry has collapsed throughout the Indo Pacific with many holothurian species now commercially extinct due to over exploitation (Sitwell, 1993; Jenkins and Mulliken, 1999). The potential for over-exploitation is exacerbated by the fact that most countries are currently exploiting the resource without management plans. As a result whole populations have been depleted in many areas (Uthicke, 1996). Very little information is available on holothurians status in Nicobar Islands of Indian subcontinent. The main objective of the present study is to provide a compiled quantitative data on the present status of commercially important holothurians of commonly edible holothurians around Nicobar Islands.

MATERIALS AND METHODS

Nicobar Islands are an archipelagic island chain in the eastern part of Indian Ocean. The coral reef ecosystem of Nicobar Islands is quite adequate in its nature. All reef areas are of fringing type. We selected seven sites named as Western Entrance (Lat. 93°30'37.38E; Long. 07°59'57.72N), Safed

Fig.1. Study area

Balu (Lat. 08°06'56.7N; Long. 93°33'42.00E), Trinket I (Lat. 08°06'26.04N; Long. 93°33'23.58E), Trinket II (Lat. 08°02'08.34N; Long. 93°36'32.64E), Alukia (Lat. 07°59'50.22N; Long. 93°29'49.38E) and Kardwip (Lat. 08°02'17.82N; Long. 93°33'10.38E).

An extensive field survey was made from July' 2011-February' 2012. To assess the holothurians, 50m transect was employed and recorded information 2.5m either side of the transect line. Length and weight of commercially important holothurians species have also been measured. The transects were positioned at 1m, 5m and 10m depth. In addition, the length of each of the holohturian species was measured and noted the habitat information. Each survey site was geo-referenced using a hand-held Global Positioning System (GPS) device. The relative abundance and observation frequency of each species were also calculated (Rilov and Benayahu, 1998).

Relative abundance = no of individuals from one species / total no. of holothurian specimens.

Observation frequency = no. of stations where the species has been observed/total no. of stations.

RESULTS AND DISCUSSION

12 species of sea cucumbers were investigated during the sampling carried out on the fringing reef flat of Nicobar Islands. *Holothuria atra* and *Holothuria edulis* are most commonly abundant that possess the relative proportion of 19.34% and 20.28% respectively (Table 1). These two species were also those with the highest observation frequencies: *H. atra* and *H. edulis* were observed at 27.11% and 20.31% of sampling stations, respectively (Table 1). Among the 7 sampling stations, Western Entrance (24.53%) and Trinket Island I (18.40%) showed higher percentage of species abundance than other sampling stations (Fig. 2). Conversely, Trinket II and Safed Balu represent less abundance of holothurian species with proportion of 2.83% and 7.08% respectively. Out of these 12 species, four species, *Holothruia atra*, *Holothuria edulis*, *Actinopyga mauritiana*, *Stichopus variegatus* are mostly dominant at each station. In terms of abundance, *Holothuria atra* (17 indv/10m^2) and *Holothuria edulis* (8 indv/m^2) are most densely distributed than other species of holothurians. *Bohadschia graffei* (2%) and *Stichopus vastus* (1%) can be considered as scarce species in the fringing reef flats of Nicobar Islands (Fig.4). According to the depth-wise distribution, *H. edulis* mostly found in 5m and 10m depths where as *H. atra* distributed maximum in 10m depths (Fig. 3). *A. mauritiana* and *B. graffei* showed moderate distribution in the depth of 1m. Fig. 5 shows the heterogenous distribution of the four most frequent species (*H. atra*, *H. edulis*, *Stichopus variegatus* and *A. mauritiana*) at the various sampling stations. Only 3 of the 7 stations were concerned by the presence of these each species (Fig. 5). The species *H. atra* shows maximum densities of 30 specimens/10m^2 areas in Kardwip Island whereas in Trinket Island, *H. edulis* shows the mean density of 26 specimens/10m^2 (Fig. 5). The *S. variegatus* are most dominant species found in Western Entrance (10 indv/10m^2).

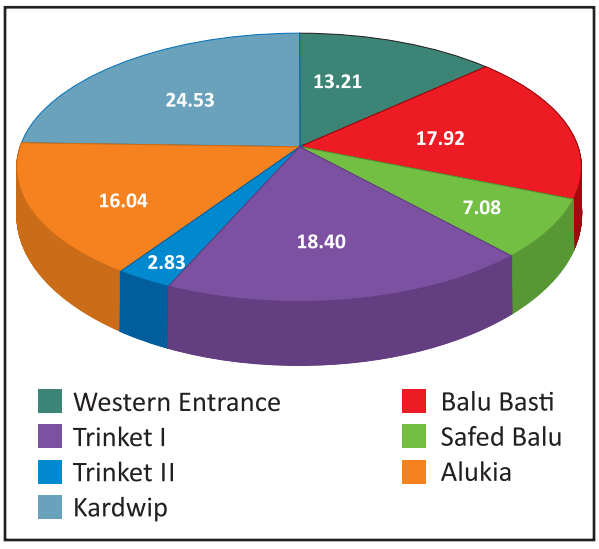

Fig. 2. Percentage abundance of Holothurian species from Nicobar group of Islands.

The present study encountered only edible holothurians whose status is quite vulnerable due to over exploitation by the poachers. Soota *et al.*, (1983) first listed 11 species as economically important for beche-de-mer industry. In Nancowry group of Nicobar Islands,

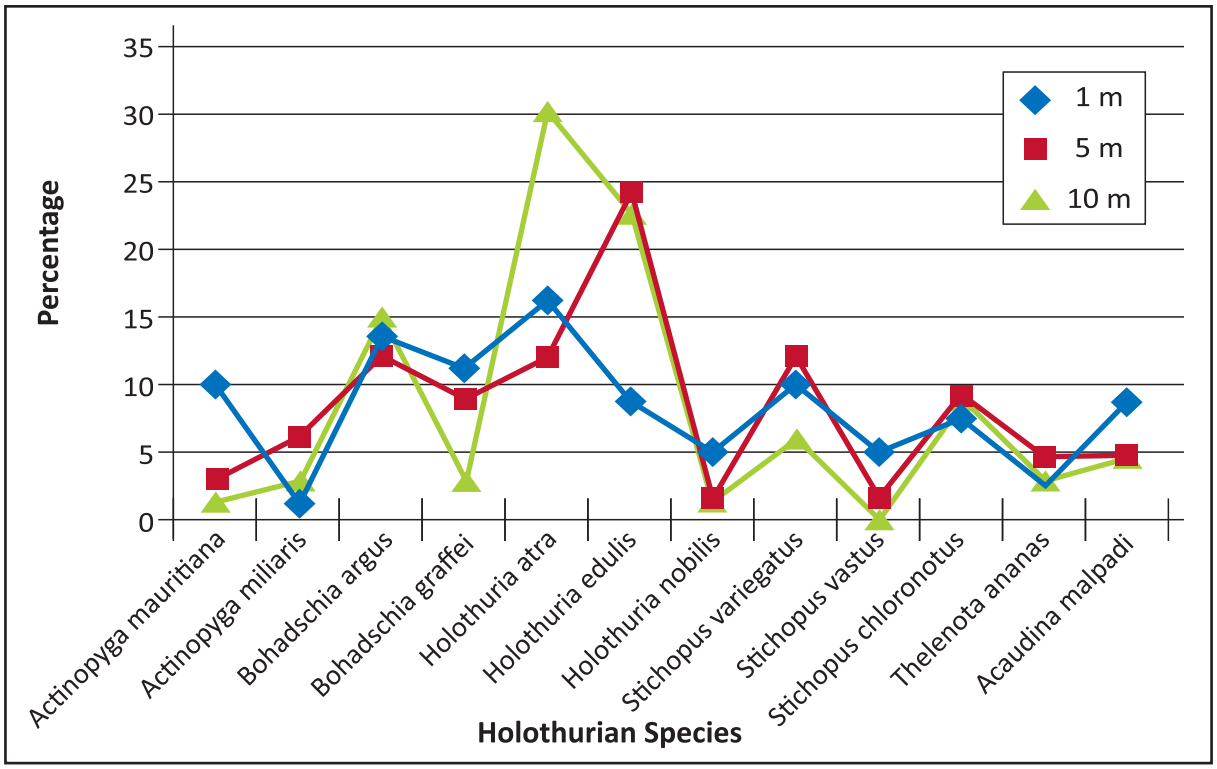

Fig. 3. Depth-wise distribution of Holothurian species

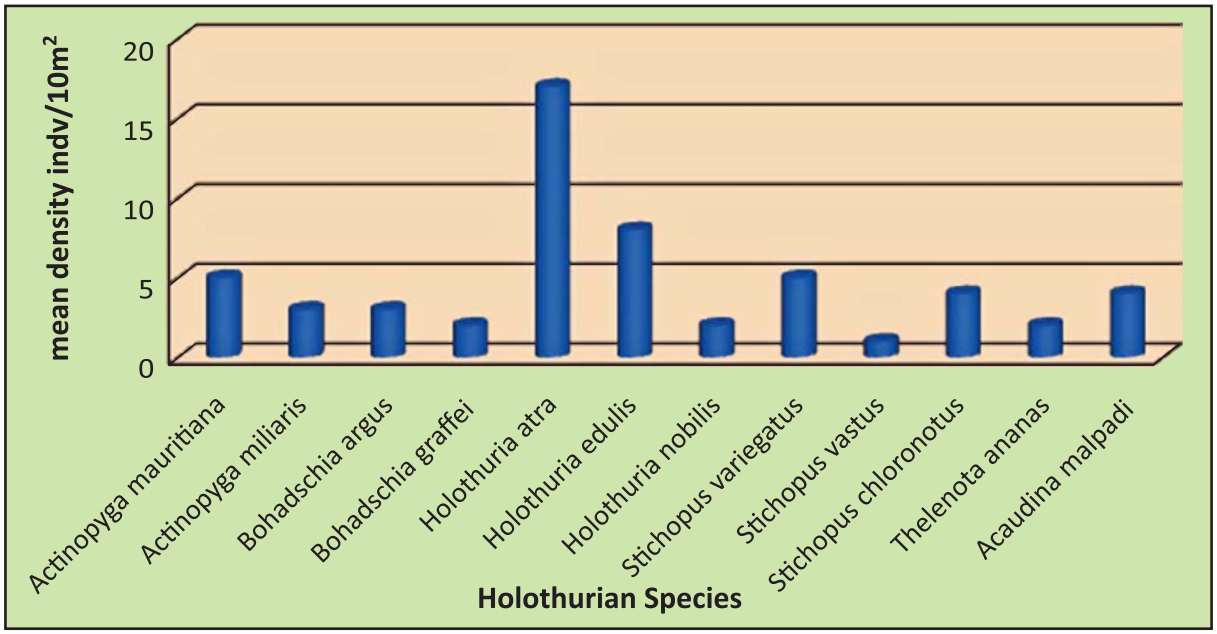

Fig. 4. Density of Holothurian species (individual/10m^2)

present study reported 12 species of which 8 species are commercially more important. The holothurian densities observed during the survey appears to be lower than those recorded from other islands of Nicobar. The densities and abundance of holothurians species are higher in Kardwip area of Nancowry Islands with proportion of 56 individuals/10m^2 and 24.53%. During 1990-1994, Holothurian species *Holothuria scabra*, *Actinopyga mauritiana*, *Actinopyga echinities* were harvested for using in beche-de-mer industry (James & James, 1994). But *Holothuria scabra*

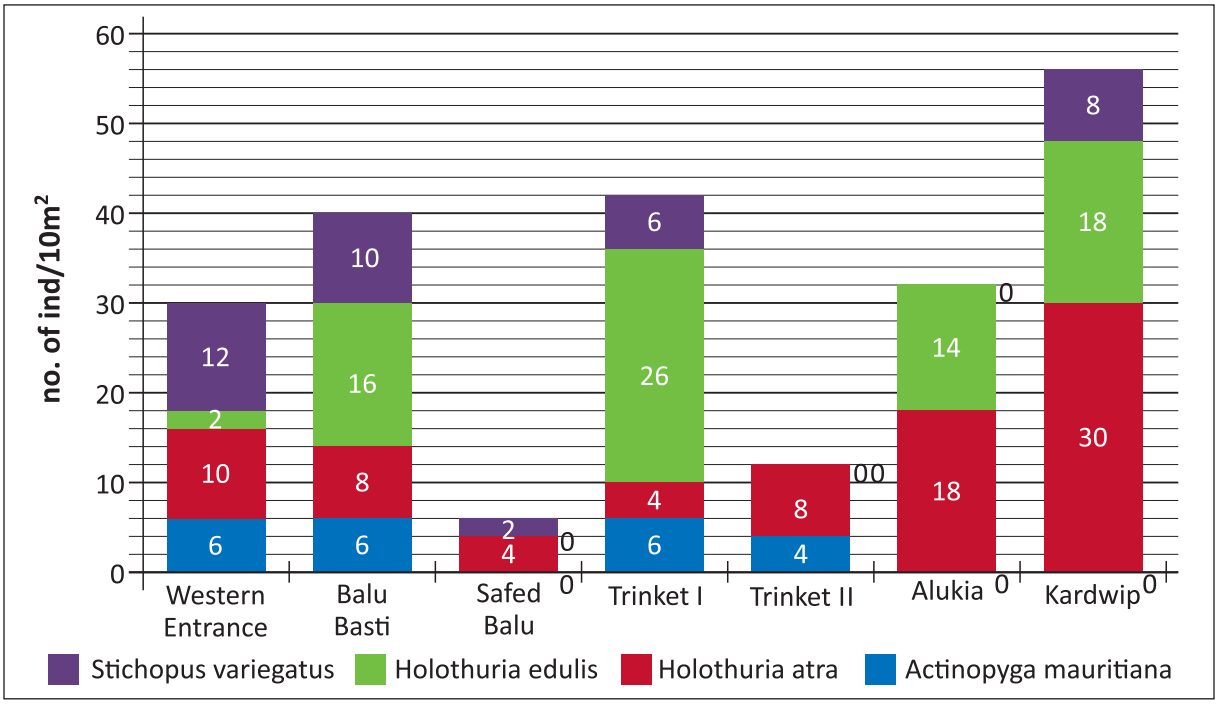

Fig. 5. Distribution of dominant species at different sites of Nicobar group of Islands.

and *Actinopyga echinities* have not been found in Nicobar Islands during our survey. The depth wise distribution of dominant species like *Holothuria atra*, *Actinopyga mauritiana*, *Holothuria edulis* are found in between 5m-10m. Among all the Holothurians found in Nancowry group of Nicobar Islands the genus *Stichopus* found density of very less. The mainly prefers sea bottom (James, 1994) with algae cover, but in Nicobar Islands, most of the area are fully rocky sea bottoms which is the suitable habitat for the species *Holothuria edulis*, *Actinopyga mauritiana*, *Bohadschia graffei*. The species *Stichopus variegatus* are equally distributed at each depth of the study sites. The holothurian resources in the seas around India are varied and diversified in species. *Holothuria scabra* and *Holothuria spinifera* are the two important species which are abundant in Gulf of Manner and

Table 1. Relative and Observation frequency of Holothurian species.

Species	Relative frequency	Observation frequency
Actinopyga mauritiana	5.19	3.00
Actinopyga miliaris	3.30	5.71
Bohadschia argus	13.68	11.52
Bohadschia graffei	8.02	10.00
Holothuria atra	19.34	27.11
Holothuria edulis	20.28	20.31
Holothuria nobilis	2.83	11.41
Stichopus variegatus	9.43	15.10
Stichopus vastus	2.36	6.35
Stichopus chloronotus	8.49	6.11
Thelenota ananas	3.30	2.58
Acaudina malpadiodes	6.13	3.79

Palk Bay (James, 1994). *Bohadschia argus* and *Stichopus chloronotus* are exceedingly abundant in some of the lagoons in the Lakshadweep. The species *Holothuria edulis* and *Holothuria atra* is commonly distributed in Nancowry group of Nicobar Islands.

SUMMARY

This survey, carried out on the fringing reef of the Nicobar Islands, revealed the presence of 12 species, of which *Holothuria atra* and *Holothuria edulis* were sub tropic. Sea cucumbers are important components of the food chain in temperate and coral reef ecosystems, and they play an important role as deposit feeders and suspension feeders. Rapid declines in populations may have serious consequences for the survival of other species that are part of the same complex food web, as the eggs, larvae and juveniles constitute an important food source for other marine species including crustaceans, fish and molluscs. The edible holothurian status in Nicobar group of Islands is still stable with composition of 8 species. Research on the population structures (weighing and measuring animals) and regular monitoring would make it possible to introduce sustainable management measures for this resource. The use of a larger number of transects or quadrates along radials perpendicular to the shore might make it possible to gain a better picture of the abundance of these animals on the reef flat.

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