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# Present Status of Holothurian Fisheries in Mullaitivu Coastal Waters in North-East Region of Sri Lanka.

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***ABSTRACT.*** *Present study was carried out at the landing sites at Challai, Puthumattalan and Peppearippiddy in Mullaitivu coastal region of Sri Lanka from May to September 2015. A total of 3 sea cucumber species belong to family Holothuridae and Stichopodidae were identified. Bohadschia marmorata was common in the catches and found in all three landing sites.. Holothurians were harvested through SCUBA diving. Holothuria spinifera and Stichopus naso were dominant in catches at Challai landing site while B. marmorata was dominant at Puthumattalan landing site. During the study period, the estimated highest number of individuals in catches was recorded in June in the three landing centers, Challai (84328), Puthumattalan (73457) and Peppearippiddy (36371), while the number of fishing efforts were 12-17 boats/day, 10-12 boats/day and 6-10 boats/day in the respective three locations. Nevertheless, there was no significant difference between the landing sites and species except for S. naso ($P<0.05$). The highest catch per diver per day of 117.2 individuals was reported in Challai. The estimated total number of Holothurians caught in Challai, Puthumattalan and Peppearippiddy during the present study was 608341. Of these 295373 individuals were caught from Challai, 167485 were from Puthumattalan and 145483 were caught from Peppearippiddy area. The outcome of this study can be used to develop a sustainable and proper management plan in exploring the future prospects of Holothurian fishery in Mullaitivu district .*

***Keywords****: Bohadschia marmorata, fishery dependent survey, holothurians, SCUBA diving*

## INTRODUCTION

The holothurian fisheries are susceptible to overfishing, and have been characterized by boom and bust cycles, with biological over exploitation often occurring before economic over exploitation (Preston 1993; Conand 1997; Kinch *et al*., 2008; Uthicke *et al.*, 2009; Anderson *et al.,* 2010). Holothurians are now considered as an invaluable species worldwide (Conand, 2008), and its recovery of depleted populations is slow and sporadic (Kinch, 2002). Inadequate fisheries management has led to over-exploitation of this resource, and signs of severe depletion have been observed in many holothurian producing countries (Lovatelli *et al*., 2004; Bruckner, 2006; Kinch *et al.,* 2008). Therefore, information on fisheries dependent survey and fisheries independent survey on holothurians and their ecology are essential for the efficient and sustainable management of this resource throughout the world.

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At present, 21 holothurian species are commercially exploited in Sri Lanka, and this is a relatively high number compared with some other countries (Conand 2001; Choo 2008; Kinch *et al*., 2008). As reported by Dissanayake *et al*. (2010) holothurian fisheries in Sri Lanka was restricted to North-Western and Eastern parts of the country ( Holothurian fisheries in Mullaitivu District commenced only about 6 years after the civil war along the North-Eastern coastline from Peppearippiddy to Puthumattalan,. Presently, fishing is conducted in North-East coastal waters especially for medium valued commercial species such as *Bohadschia marmorata* and *Holothuria spinifera*, and it can reduce the fishing pressure for highly value commercial species such as *H. scabra* to some extent during the offseason.

Fishing season for holothurians along the North-Eastern coast of Sri Lanka starts in May and continues up to September during southwest monsoon. Therefore, this fisheries is seasonal and fishing is not carried out when the sea is rough. Almost all the fishermen in North-West coast migrate to North-East coast, especially to Challai, Puthumattalan and Peaparappiddy during the southwest monsoon. Due to this seasonal migration, the local fishers complained that their beach-seine fishing get affected via dive light and fishing nets are destructed by SCUBA divers since holothurians fisheries take place during the night time in the area. Further, fisheries co-operative societies in Mullaitivu District believe that holothurian populations in Mullaitivu coastal area have been over exploited. However, reliable long term fisheries dependent data on commercial landings is not found in this area. Since catch and effort data is important in order to estimate the stock abundance of holothurians, the present study was carried out to investigate the current status of commercially captured holothurian species and their catch and effort details in Mullaitivu coastal waters in North- East region of Sri Lanka.

## MATERIALS AND METHODS

### Catch and effort data collection

Catch and effort data of the holothurians fisheries in the North-Eastern coastal waters of Sri Lanka were collected at the major holothurian landing sites at Challai, Puthumattalan and Peppearippiddy in Mullaitivu from May to September, 2015 (Figure 1). Catch and effort data were collected in the night diving activities by making weekly visits to all the three landing sites in Mullaitivu. More than 90% of the total number of boats operated was sampled randomly as soon as the catch was landed on each sampling day. . Catch of different species, total catch and the number of divers engaged in the fishing operation of the each boat and the total number of boats operated in a particular day were recorded. Species identification was done using the key prepared by Conand (1998).

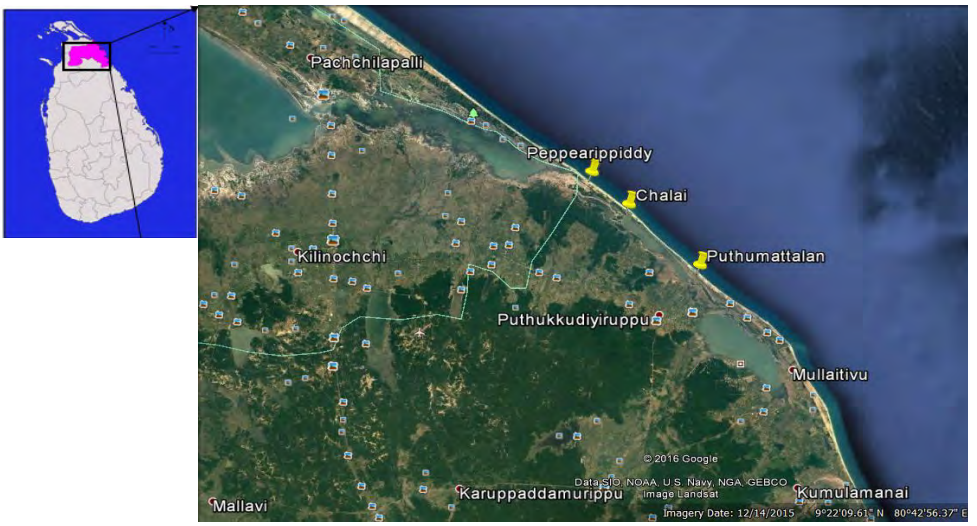


**Fig. 1. Location of the study area**

## Data Analysis

The monthly variation of the total catch and catch per unit effort (expressed as numbers per boat per day and numbers per diver per day, respectively) for each month and the monthly variation of the catch of most abundant species were estimated from the data collected on each sampling day. Monthly total production (MTP) of holothurians was estimated using mean catch (in numbers) per boat (CPUE), mean number of fishing operations per day (NFO) and the mean number of fishing days for respective month (MRD) as follow.

$$MTP = CPUE \times NFO \times MRD$$

The statistical significance of MTP among species and sites was compared using one-way analysis of variance (ANOVA). Statistical analyses were performed using Minitab 15 software.

## RESULTS AND DISCUSSION

Dissanayake and Stefanson (2010) identified 25 holothurian species in North-West and East costs of Sri Lanka, where it was reported that nine species were predominant in East costs among 21 commercially important species found in the area. The results of the present study indicated that only three commercially exploited species were abundant in the study area. All these species belonged to Order Aspidochirotida where*Bohadschia marmorata* and *Holothuria spinifera* belonged to Family Holothuriidae, and *Stichopus naso* belonged to Family Stichopodidae. However, *B. marmorata*, *H. spinifera* and *S. naso* were totally absent in the east costs (Dissanayake and Stefanson, 2012). According to the present study the commercial fishery predominantly relies on three nocturnal species: *B. marmorata*, *S. naso* and *H. spinifera* in North-East costs.

When the monthly variations in percentage representation of holothurian is considered (Figure 2), *B. marmorata* and *H. spinifera* showed significantly high contribution (51 %,

*P<0.05*) to the total landings in June and May, respectively while significantly lowest (*P<0.05*) abundance was reported by *S. naso* (3 %) in May. However, there is a significant difference on catches of holothurian species according to the month.

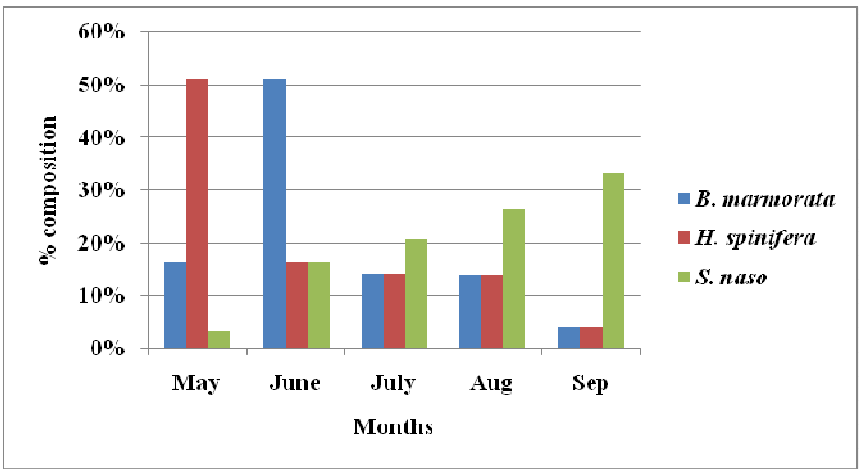


**Fig. 2. Percentage representation of holothurian species in different months during the study period**.

The total production of commercial holothurian species during the present study was 608341 individuals in all three landing sites, and the number of individuals in Challai, Puthumattalan, Peppearippiddy were 295373, 167485, 145483, respectively . Nevertheless, the highest abundance was reported in June compared to the other months of the year in all three landing sites, Challai (84328), Puthumattalan (73457) and Peppearippiddy (36371). In both Challai and Puthumathalan regions, the lowest production was observed in September while in Peppearippiddy it was in May (Figure 3).

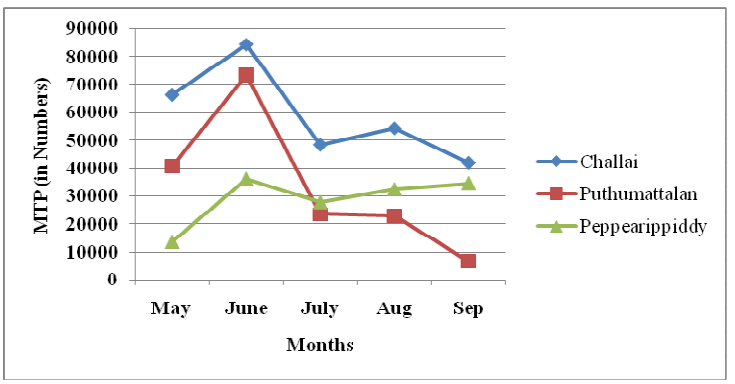


**Fig. 3. Monthly total production (in numbers) in three landing sites.**

Among the three commercial holothurian species, *S. naso* and *H. spinifera* were dominant in the catches in Challai while *B. marmorata* was dominant in Puthumattalan (Figure 4). The species *B. marmorata* was recorded as numerically dominant species among the landing sites in the present study. However, the differences was not significant (P>0.05) between the

landing sites and species except for S. naso (P>0.05). Total production of S. naso is significantly low (P<0.05) in Puthumattalan compared to Challai and Peppearippiddy.

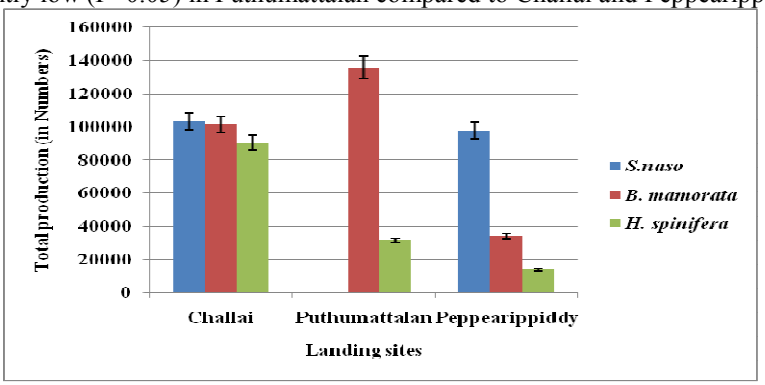


**Fig. 4. Total production of holothurian species in three landing sites.**

According to Dissanayake and Stefanson (2012), holothurians are presently exploited by SCUBA diving with motor boats leading to gradual depletion of holothurian resources in the coastal waters of Sri Lanka. This is because of the exhaustive search for certain species and large size individuals. The present study revealed that, the number of boats operated per day ranged from 12 to 17 in Challai, while in Puthumattalan and Pepparippiddy it was 10 to 12 and 6 to 10, respectively (Figure 5). However, Dissanayake and Wijeyaratne (2007) reported a low number of boats operated per day (7-13) in North-Western coastal region of Sri Lanka during the year 2007 compared to that observed in the present study.

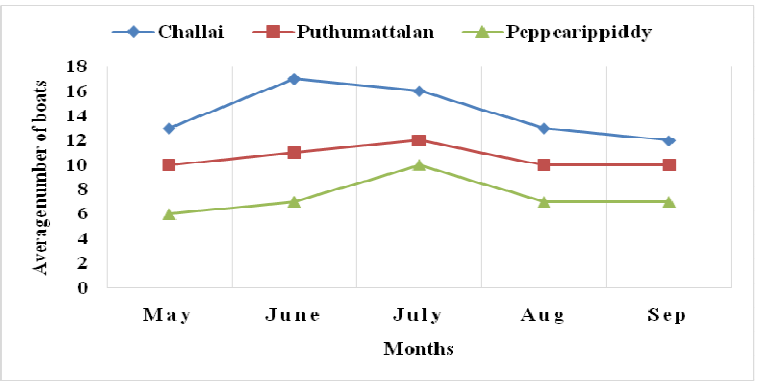


**Fig. 5. Monthly variation of average fishing effort (number of boats per day) in three landing sites.**

The CPUE showed an increasing trend from May to June and then gradual decrease from June to September. The highest CPUE was recorded with the commencement of fishing activities in June and the lowest was at the end of the fishing season in September. While the highest catch per diver per day (117.2 individuals/ day) was observed in Challai compared to the other two landing sites (Figure 6). However, the CPUE values in the present study was

lower than the observation made by Shepherd *et al.* (2004) who reported that holothurian resources have been highly depleted in Galapagos Islands having observed the CPUE of 125 individuals per day.

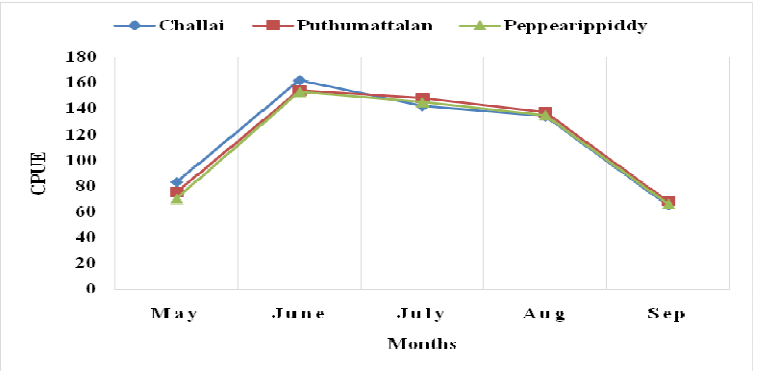


**Fig. 6. Monthly variation of catch (in individuals) per diver per day (CPUE) in the three landing sites.**

## CONCLUSIONS

*Bohadschia marmorata, Holothuria spinifera* and *Stichopus naso* were commercially captured holothurian species and *B. marmorata* was the dominant catch in Mullaitivu coastal waters in North-East region of Sri Lanka. According to monthly catch Challai was the leading landing site in the study area. The abundance of species varies according to the month. Detail evaluations on population parameters and seasonal changes are needed for the sustainable utilization of this resource in the future.

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