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Impact of Tsunami on echinoderm diversity at Gulf of Mannar

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Abstract
In the present study, the Echinoderm species were collected month wise from August 2005 to January 2006 from two fishing centres of Tsunami affected areas in Tuticorin district and identified at the laboratory. The coastal areas of the entire Tamilnadu were negatively affected as a result of tsunami waves with serious negative impacts on coral reefs causing considerable destruction of echinoderm diversity. However the present investigation revealed that the echinoderm diversity of study areas was not much affected due to the presence of coral reef and mangrove forests which might have acted as barriers against the Tsunami waves.

Keywords: Tsunami, coral reef, Echinoderm, mangrove forest.

1. Introduction
Taxonomic measures of diversity might be more sensitive to environmental disturbances than conventional diversity in dices [1]. The effects of refinery effluent on biodiversity of echinoderms have been reported by [2]. Echinoderms are sensitive to changing water quality and are useful indicators of environmental quality for environmental monitoring [3]. Several studies have been made in Indian water on Echinoderms by various authors [4, 5, 6]. All these studies show that some changes in species composition have taken place so that detailed investigations on reproduction, spawning, behavior, fecundity and so on will be helpful for conserving these declining resources. Now a days, studies on Indian Echinoderms have gained momentum and many reports on their diversity have been reported by many investigators [7, 8, 9].

Echinoderms include five living classes with about 6000 living species which are widely distributed from Artic to Antarctic regions. Though the coral reef are favorable habitats for Echinoderms, they also occupy habitats like rocky, sandy, muddy and mangrove areas [10]. The Tsunami that occurred on 26th December 2004 hade devastating effects on the coastal areas of all the 13 coasts of Tamilnadu. The present study was planned to evaluate the impact of Tsunami on Echinoderm biodiversity through month wise record in Gulf of Mannar.

2. Materials and Method
In Gulf of Mannar, 21 Islands located between Rameshwaram and Tuticorin from August 2005 to January 2006 covering an area of 623 hectares with 3600 species of flora and fauna have been declared as “Marine Park” by Government of India. This area is endowed with combination of ecosystems including Mangroves, sea grass, sea weeds and coral reefs. It include about 15 important fishing areas among which Tharuvaikulam and Vellapatty are small coastal fishing Villages in Tuticorin district.

Collection was made with added advantage during the night with a petromax lamp since all the echinoderms are nocturnal in habit and it was done by snorkeling in the shallow water. Deeper water forms were collected by using SCUBA. The holothurians were collected through skin diving and by -catch, whereas Asteroidea and Echinoidea were collected only as by-catch. The echinoderm thus collected were transported to our college laboratory, keeping them in cold storage containers. In the laboratory they were dried for identification.

Proreastor sp: Identified based on the lack of spines on the marginal plates present between the arms.
Pentaceraster sp: Look with a large number of short spines covering the surface area.
Salmaces sp: Long curved spines in the upper side lighter.

Goniodiscostor sp: Body with fairly large disk and five rather short strip and tapering arms.
Stomopneustus sp: Identified easily by long black spines.
Clypeaster sp: Identified with short spines cover the body. The five pointed star pattern is visible in the back.

3. Results and Discussion

The present survey reveals that there were only 3 echinoderm species namely *Protoreaster sp, Pentaceraster sp,* and , *Salmacis sp,* in Tharuvaikulam landing centre, where as in Vellapatty landing centre six echinoderm species namely *Protoreaster sp, Pentaceraster sp goniodiscaster sp.salmacis sp, Stomopneustus sp* and *Clypeaster sp* were recorded Of them, *Pentaceraster sp* and *Samasis sp* were abundant and the distribution of *Protoreaster sp* and *Goniodiscaster sp* were normal with rare collection of *Clypeaster sp* and *Stumopneustus sp*. Thus less species diversity and abundance were recorded in Tharuvaikulam was compared to Vellapatty where six species of echinoderms were collected.

The Echinoderm diversity was found to be highly affected by Tsunami in various places [11], nearly 48.5% live coral covers was reduced to 36% in Gulf of Mannar. This could be due to serious negative impacts on coral reefs as most of the echinoderms use the crevices of the coral reefs as their abode, thus resulting in a considerable destruction diversity. In addition, partially leached, disease infested, silt smothered, recently killed, broken and upturned corals as well as sea grass damage were also recorded [11].

However the present investigation indicates that the destruction of echinoderm population was less in the coastal areas of Tuticorin and Ramanad districts. The coral reefs and the mangrove forest of these areas might have acted as barriers against the Tsunami waves. Moreover the Island Nation Srilanka as well as many islands could have protected Tuticorin and Ramanad districts in Gulf of Mannar.

Table 1: Number of Echinoderm species in two landing centers during study period

Echinoderm Species	Centers					
	Tharuvaikulam			Vellapatty		
	Abundant >75	Normal <75 and >50	Rare <50	Abundant >75	Normal <75 and >50	Rare <50
Protoreastor sp.		•			•	
Pentaceraster sp.		•		•		
Salmaces sp.		•		•		
Gonidiscostor sp.					•	
Stomopneustus sp.						•
Clypeaster sp.						•

The above species collected by examining the cod end material of the trawlers. Night trawling is likely to yield more number of interesting forms. Algal collections can be repeated washed in fresh sea water to collect small brittle stars and sea cucumbers. Scraping of boat bottoms and other structures installed in the sea will yield very interesting material. Dredge collections are extremely useful since some of the species never occur in the inter-tidal region.

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