



Research Paper

DIVERSITY OF ECHINODERMS AT WEST COAST OF GUJARAT, INDIA

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Abstract

The present study reveals the diversity of Echinodermata on the west coast of Gujarat. The study area is covered with microhabitats, predominantly composed of rocky and sandy substrates. The intertidal areas are valuable to decipher and excogitate the ecology and diversity of echinoderms. The study aimed to prepare a baseline data of marine echinodermdiversity on the west coast of Gujarat. During the present study, nine species of Echinoderms belonging to four classes were recorded. It includes two species belonging to class Crinoidea, Ophiuroidea, Asteroidea, and Echinoidea species and single species from Holothuriadeaclass.

Key words: Echinoderms, Microhabitats, Crinoidea, Ophiuroidea, Asteroidea, Holothuriadea, Echinoidea.

INTRODUCTION

Echinoderms are found ubiquitously in the marine environment and are adapted to exist in many habitats, from the intertidal zone down to the continental shelf, deep ocean trenches, and abyssal plains. Earlier research did not distinguish the echinoderms as a group, and placed the echinoderms as a “Mollusca”, a subdivision of “Vermes”[1]. Later various researchers [2],[3],[4] referred name Echinodermata. Ultimately successfully established the Echinoderms as a separate phylum[5]. The superior classification of the echinoderms has been comparatively steady[6],[7]. It has different classes which include starfish, brittle stars, sea urchin, sand dollars, sea lilies, sea cucumber, etc. About 7000 species of echinoderms have been described in the world. They possess a pentamerous skeleton body plan with arms. Most echinoderms are enigmatic and nocturnal. The echinoderms are adapted to live in a fresh environment and barely species can adjust in a polluted environment [8],[9]. The west

coast along the Arabian Sea has distinctive characteristics. The rocky surface is greatly sharp-edged with plentiful puddles. Inter-faunal competition is moderately high as available habitable spaces at different zones are very limited. The research work carried out on the taxonomy of the echinoderms is with little or no detailed information on ecology and other criteria of the echinoderms. The fossils are recorded for around 226 species. About 800 species of echinoderms have been recorded from India [10],[11],[12]. A total of eight species of echinoderms were recorded on Sikka coast, Gulf of Kachchh [13].

MATERIALS AND METHODS

The study concerned transect methods for the echinoderms survey. The transects of 20 m were laid along the coastal area. A total of five transects were laid on the study sites. The observations of the occurrence of echinoderms along the transect line were recorded. The classification of species was acquired from the world register of marine species website. The species identification was carried out in the field and additionally, the photographic documentation was carried out for further detailed examination.

For determining the species richness, the Margalef's Index (D_{Mg}) was calculated.

$$\text{Margalef's species richness } D_{Mg} = \frac{(S-1)}{\ln N}$$

Where, S= Number of species

N=Total number of individuals in sampled area

Study area

The study was carried out at the intertidal zone of Sutrapada, (Dist.-Gir Somnath), Dwarka (Dist.-Devbhoomi Dwarka) and Laku point (Dist.-Devbhoomi Dwarka) west coast of Gujarat. The intertidal zone of Dwarka is rocky with a hard rock layer. The coast of Dwarka has a rocky and sandy shoreline; the intertidal area is more than half kilometre in width. On the Sutrapada coast, rocky intertidal area exposure spans about 120 to 130 m. The area is shallow and showed the occurrence of tide pools with a maximum of 130 to 140 m. Dwarka has a subtropical low-latitude arid hot climate. Laku point is characterised by rocky coast, composed of sand stones and tidal pools. It gives rise to diverse marine habitat.

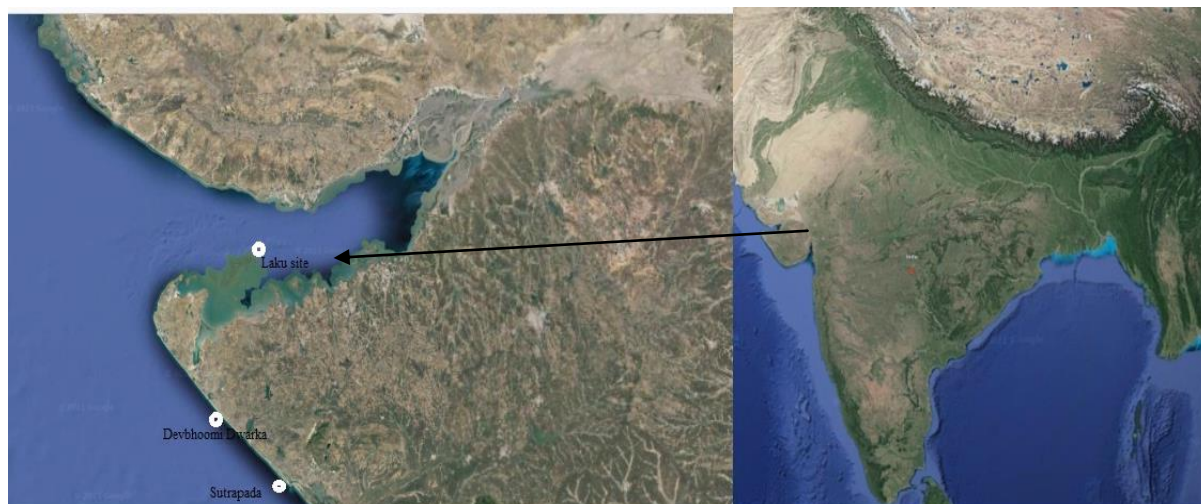


Fig: 1. Study area (A) Lakupoint (B) DevbhoomiDwarka (C) Sutrapada

RESULTS AND DISCUSSION

During the study, we observed a total of nine species of echinoderms represented by Class Crinoidea(22%) followed by Asteroidea (22%) and Ophiuroidea (22%), Holothuroidea (11%), Echinoidea (22%) Fig: 2.

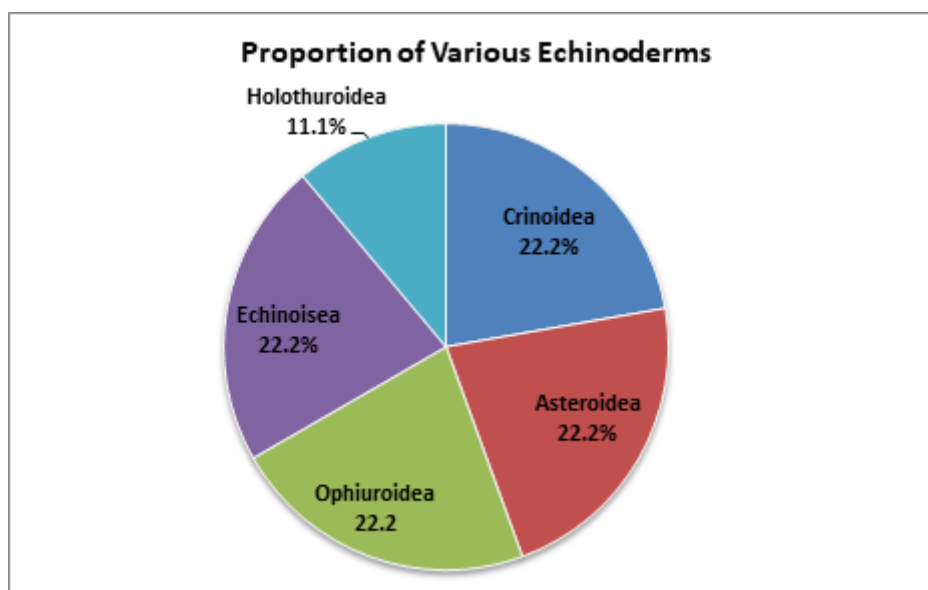


Fig: 2.Shows the proportion of Various Echinoderms

The Asteroidea are often called Sea stars. The Sea stars are common along the shoreline where large numbers may aggregate on rocks. *Asterias rubens* is carnivore, It preys upon a spacious range of living organisms and it includes molluscs, polychaete, and other echinoderms. Seldom, small crustaceans are caught on the suction discs of the tube feet. *Goniodiscaster scaber* is also known as Biscuit Star. They are omnivores; they have sexual reproduction. Class Ophouroidea has marine dweller animals. It is carnivores, filter feeder, and scavengers. Some are mostly gonochoric, others are protandric. *Ophiacantha indica* Can be found benthic region; 20 meters to 290 meter depth. Mostly found in a tropical region. The Colour of *Ophiarachna incrassate* is green

with yellow markings and a dark-ringed white spot. The arm is extended up to 20 cm, while the diameter of the disc is about 5 cm. It is distributed in tropical, Indo-west-central pacific ocean, West Pacific Ocean, etc. The Holothuroidea class is also known as sea cucumber. It is the only class that has a soft body structure rather than hard with well-developed circular and longitudinal muscles. *Holothuria (Microthele) fuscogilva* also known as the white teat fish or white teeth. This species is vulnerable to overexploitation from commercial fishing. They are found in the indo-pacific ocean in shallow water. Class Echinoidea are distributed globally in marine habitats from intertidal to 5000 meters deep. Commonly, it is found on rocky substrates. *Salmacis bicolour f. typical* is found in the west Indian ocean. it possesses an omnivores feeding habitat. It can grow up to 48mm. in length. The crawling locomotion is found. *Jacksonaster depressum tonganense* (L. Agassiz, 1841) the species is normally found in 'flat, clean, sandy substrate'. It is found in Western Pacific and Tropical to Subtropical areas. The Crinoidea are filter feeders. The Crinoidea are live in shallow water as well as deep water. It captures food suspended in the water column to eat, it does not prey of any organisms. *Anneisiabennetti Muller, 1841* is widespread in the indo-west pacific, to the Maldives, the Marshall Islands from china to the Australian region, Indonesia etc. usually it is found between five to twenty-five at depth. *Pontometra andersoni* is The most common color form of *P. andersoni* is solid black, which upon closer examination sometimes is dark reddish-brown or dark brown. *P. andersoni* shows to represent a secondary reversion to the stalked condition. These cirri do not so much wrap about objects. *P. andersoni* forms a parabolic filtration fan from its elevated position. The Margalef index value is 2.035.

Table: 1. Checklist of Echinoderm species recorded during the study

Class	Order	Family	Species
Asteroidea	Forcipulatida	Asteriidae	<i>Asterias rubens</i> (Linnaeus, 1758)
	Valvatida	Goniasteridae	<i>Goniodiscaster scaber</i> (Moebius, 1859)
Ophiuroidea	Ophiacanthida	Ophiacanthidae	<i>Ophiacanthoides indica</i> (Ljungman, 1867)
		Ophiomyxidae	<i>Ophiarachnoides crassata</i> (Lamarck, 1816)
Holothuriada	Holothuriida	Holothuriidae	<i>Holothuria (Microthele) fuscogilva</i> (Cherbonnier, 1980)
Echinoidea	Cammarodonta	Temnopleuridae	<i>Salmacis bicolour f. typica</i> (Mortensen, 1904)
	Clypeasteroidea	Laganidae	<i>Jacksonaster depressum tonganense</i> (L. Agassiz, 1841)
Crinoidea	Comatulida	Comatulidae	<i>Anneisiabennetti</i> Muller, 1841
		Colometridae	<i>Pontometra andersoni</i> (Carpenter, 1889)

Plate: 1 Glimpse of Echinoderms



Asterias rubens



Salmacis bicolor



Goniodiscaster scaber



Jacksonaster depressum tonganense



Holothuria (Microthele) fuscogilva



Pontiometra andersoni

CONCLUSION

The study aims to prepare a database of the echinoderms and the present ecological status of few prominent echinoderm species. During the present study, a total of nine species of echinoderms were observed, belonging to class Asterozoa, Ophiurozoa, Holothurozoa, Echinozoa, and Crinozoa. Moreover, the rocky habitat and

shelters were found in favourable environmental conditions. The present work provided a list of echinoderm species with their taxonomic position and habitat ecology. To record the occurrence of a vulnerable species according to IUCN redlist i.e., *Holothuria (Microthele) fuscogilvans* also a significant observation during the study. Moreover, detailed studies on the echinoderm larval identification may also be implemented as the larva of echinoderms have quite a different symmetry than that of the adults. Additionally, the species wise breeding season study may provide us with Gujarat specific data and sensitive phase of their lifecycle in order to frame out conservation measures.

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