

## **Community structure and coral health status across the depth gradients of Grande Island, Central west coast of India**

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### **Abstract**

The Grande Island, located at the central west coast of India is one of the less studied coral reef systems in India. In this study, we provide a comprehensive description of the coral community structure and health status of corals across the spatial scales at different depths in Grande Island. Such descriptions provide a baseline for evaluating future community changes and effective conservation in the face of changing climate scenario. Individual benthic components and the coral health were quantified using line-intercept transects and belt transects respectively along three depth zones: shallow (< 5 m); mid-shelf (5-8 m) and deep zone (> 8 m). Average live coral cover was high in the mid-shelf zone ( $8.05 \pm 3.98\%$ ) compared to the shallow ( $1.92 \pm 2.01\%$ ) and deep zones ( $2.12 \pm 0.05\%$ ). In total, 15 genera of corals were recorded in Grande Island of which 14 genera were present in the mid-shelf and shallow zone and six genera in the deep zone. *Turbinaria* and *Goniopora* spp. were dominant in the mid-shelf zone. Whereas, *Pseudosiderastrea* and *Porites* spp. were dominant in the shallow and deep zones. Potential threats to the corals in Grande Island include diseases and competition posed by algal turf and boring sponges. An average of 53.2% of the live corals was affected by algal turf intrusion; 2.7% by boring sponges and 2.6% by diseases that include white plaque disease and trematodiosis. Understanding the physical processes around Grande Island will reveal more about the distribution and colonization of coral communities and their vulnerability to changes in the future.

**Keywords:** Coral; Community structure; Grande Island; Sedimentation; Turf algae; Boring sponges

## 1. Introduction

Coral reefs are biodiversity hotspots that provide numerous ecological and economic benefits [1]. India comprises four major coral reef formations along its 7500 km vast coastline viz. Gulf of Kachchh and Lakshadweep archipelago on the west coast and Gulf of Mannar & Palk Bay and Andaman & Nicobar Islands on the east coast. Coral reefs cover an approximate area of 2375 km<sup>2</sup> in India [2]. Lakshadweep reefs are the coral atolls, and the other major reefs are of fringing and barrier types. There are also many coral formations located near shore as a small detached patch or platform reefs along the central west coast of India comprising Maharashtra and Goa between 15°33'N and 73°27'E [3, 4]. The biological structure and ecological status of these patch reefs remain relatively less studied compared to the other major reefs in India. In this study, we addressed the gap in knowledge by undertaking the first broad-scale survey of the patch reefs along Grande Island, an exposed rocky island, located off Marmagao Port in Goa focusing on the coral community structure (diversity, density and taxonomic composition of scleractinian corals) and health status of reef building corals.

Sexual mode of reproduction and ensuing larval dispersal by the ocean currents had enabled the corals to colonize distant marine habitats such as isolated islands [5, 6, 7] and establish their population. This process of larval dispersal from a parent reef and its subsequent settlement and growth in a remote habitat is termed as connectivity, and it determines the distribution, genetic structure and population dynamics of corals in distant shallow marine habitats [8, 9]. The Grande Island in Goa (15.352°N; 73.773°E) comprises natural habitats such as coral patches, submerged rocks encrusted with corals, sandy bottoms and artificial habitats such as shipwrecks. The complex habitat structure provided by the coral patches and submerged rocks acts as a habitat for breeding, feeding and shelter for variety of benthic organisms including reef fishes [10].

In general, the isolated islands that lack any human impacts are characterized by rich biodiversity dominated by corals and fish communities. Any variation in the structure of reef communities is more likely to be attributed to the natural factors such as habitat availability, predation [11], sedimentation [12, 13], light availability [14], and species competition [15]. However Grande Island in Goa is a tourism hotspot witnessing an average of 6-7 boats comprising 7-12 tourists every day during the peak tourist season between October to April (Personal communication). The wealth of marine life had invited a variety of anthropogenic stressors such as uncontrolled tourism activities like recreational SCUBA diving, snorkelling and recreational fishing. In addition, overfishing, discarded fishing nets and littering also exaggerate the risk to corals in Grande Island.

In this study, our primary aim was to provide a comprehensive description of the coral community structure across depth gradients of Grande Island. Specifically, we compare and contrast the coral communities in the shallow (<5 m); mid-shelf (5 – 8 m) and deep zones (> 8 m) around the Grande Island. Secondly, we examined the relationship between the depth and the average percent cover of various benthic components such as corals, soft corals and macroalgae. Furthermore, we assessed the health status of live corals and potential threats to the corals in Grande Island. Documentation of the diversity and community structure of corals in a region is essential to identify areas for conservation, recreation and evolving specific management principles. Also, such data will serve as a baseline for evaluating changes in the future due to the changing climate and environmental scenario.

## **2. Materials and Methods**

### *2.1. Study site*

The study sites around Grande Island were selected randomly across different depths and the number of study sites at each depth zone was determined based on the visibility. The substratum around the Grande Island was categorized in to three distinct zones based on depth. The shallow zone (<5 m), that largely comprises rocks with intermittent sand patches. This was followed by a mid-shelf zone (5-8 m) that comprise a flat sandy substrate with small rocks and deep zone (>8 m) that comprise rocks further up to the depth of 14 m. In total, 15 sites were selected in the shallow zone; 10 sites in the mid-shelf zone and 5 sites in the deep zone (**Fig. 1**). Each study site was parted by atleast 50 - 100 m and located at an average distance of 10 m to 50 m from the shore.

### *2.2. Benthic surveys*

Underwater surveys were carried out using SCUBA diving at all the study sites. We used the line intercept transect (LIT) method [16] to determine the average percent cover of different benthic components. Two 20 m transect lines were laid, one parallel and the other perpendicular to the shore at each study site. Different benthic forms that fall under the transect points were recorded and the coral colonies were photographed in the underwater macro mode using Olympus underwater camera (Model:  $\mu$  tough 8000) for identification. The corals were identified to the genus level following the standard keys [17]. Species-level identification of corals was not possible due to the legal restrictions on the collection of coral samples in India. The density of corals was estimated following the quadrat method. Quadrats of 1 m<sup>2</sup> (n=10) were placed randomly in each study site and the total number of colonies within each quadrat was counted. Each quadrat has been put at least 5 m apart. The coral density is reported as the average number of colonies m<sup>-2</sup> in each study site. The taxonomic

composition of the corals was calculated as the average percentage of corals in each genus relative to the total number of corals in the other genera.

### *2.3. Coral health assessment*

Belt transect method was employed to determine the status of the live coral colonies in the study sites. A 30 m transect line was laid parallel to the shore at each study site and the observations were made following the belt transect survey, with a swath of 2.5 m on either side of the transect making the effective width of the transect as 5 m. Coral colonies, either live or partially alive that falls within the effective width of the transect were considered. The live coral colonies were categorized as healthy live corals (HLC), live corals colonized by turf algae (LC/TA); macroalgae (LC/MA); infested with diseases (LC/D) and boring sponges (LC/S). The status of live coral colonies was reported as the average percentage of corals in each of the above categories.

### *2.4. Analysis*

The data was analysed by comparing the generic richness and density of corals between the study sites at each depth zone and also across different depth zones. The mean density of coral colonies at shallow, mid-shelf and deep zones were calculated by averaging the density of coral colonies across the study sites within each zone. Univariate indices such as Shannon diversity index ( $H'$ ) and species evenness (Pielou's  $J$ ) (loge based) were calculated for each study site as a measure of determining the degree to which the corals of different genus at different depth zones are related to each other. One way Analysis of Variance (ANOVA) was done to test for significant differences in the average coral cover between the study sites in different depth zones. The data on average live coral cover was log transformed and checked for their normality and homogeneity of variance. The significance of differences in coral density between different depth zones has been individually compared using the two sampled t-test. K-dominance curve was plotted for species abundance data to determine the patterns of relative species abundance in different depth zones.

Bray-Curtis cluster analysis under the paired linkage was done to test the similarity in benthic composition between the study sites across different depth zones in Grande Island. The data was fourth root transformed to reduce the effect of dominant community forms on the data analysis. Analysis of Similarity (ANOSIM) was used to test for the significance of differences in benthic cover (percent cover) among the study sites in each depth zone and also between the different depth zones. The test was performed using the same similarity matrix generated for Bray-Curtis, calculated using fourth root transformed data. Similarity percentage (SIMPER) was used to know the average dissimilarity in the taxonomic composition of live coral colonies between the different depth zones

and to determine the contribution of individual species to the observed differences in the taxonomic composition. All the analysis was performed using the PRIMER statistical software version 6.1.15 [18, 19].

### 3. Results

#### 3.1. Coral diversity

In total, 15 genera of corals were recorded from the Grande Island of which 14 genera were present in both shallow and mid-shelf zone and 6 genera in the deep zone (Table 1). Correspondingly, the diversity Index ( $H'$ , loge based) was high in the mid-shelf zone ( $H' = 1.86$ ) compared to the shallow and deep zones ( $H' = 0.9$ ). *Pseudosiderastrea* and *Porites* spp. were abundant in the shallow zone. Dense patches of *Turbinaria* and *Goniopora* spp. dominated the mid-shelf zone. Different genera of corals were more evenly distributed in the mid-shelf zone (Evenness ( $J$ ) = 0.89) compared to the shallow ( $J = 0.86$ ) and deep zones ( $J = 0.81$ ). Corals of *Pseudosiderastrea*, *Siderastrea*, *Favites*, *Plesiastrea*, *Coscinarea* and *Dendrophyllidae* spp. were present at all the depth zones. *Pocillopora* sp. was found only in the shallow zone. New recruits of *Dendrophyllidae* sp were abundant in the deep zone. Difference in the generic richness at different depth zones was shown in Fig. 2 where the cumulative percentage of dominance of different genus is ranked on a logarithmic scale. The highest generic diversity was evident in the mid-shelf and shallow zone.

#### 3.2. Coral density

The mean density of corals (no. of colonies  $m^{-2}$ ) were high in the mid-shelf zone ( $4.8 \pm 0.13$ ) (Mean  $\pm$  SD) compared with the shallow ( $3.4 \pm 1.26$ ) and the deep zone ( $2.4 \pm 1.13$ ). The two sampled t-test revealed no statistically significant differences in coral density between the shallow and mid-shelf zone ( $t_{stat} = -1.85 < t_{crit} = 2.07$ ) and between the shallow and deep zone ( $t_{stat} = 1.24 < t_{crit} = 2.2$ ). However, the coral density differs significantly between the mid-shelf and deep zone ( $t_{stat} = 2.98 > t_{crit} = 2.22$ ). The average percentage of contribution of different coral genera to the total generic composition at each depth zone was presented in Fig. 3. *Porites* sp. was dominant in the shallow zone contributing 36.3% to the total generic composition of corals followed by *Siderastrea* sp (20%) and *Pseudosiderastrea* sp. (18.3%). However, *Porites* sp was absent in the deep zone and is dominated by the *Dendrophyllidae* sp (55.2%) followed by *Coscinarea* sp (14.4%) and *Pseudosiderastrea* sp (14.3%). Corals of the genus *Pseudosiderastrea*, *Siderastrea*, *Coscinarea*, *Turbinaria*, *Plesiastrea* and *Goniopora* spp. contribute  $>10\%$  to the total generic composition of corals in the mid-shelf zone.

### *3.3. Community structure*

The average percent cover of different benthic forms around Grande Island was presented in the Fig. 4. The average live coral cover was low in the deep and shallow zones and they contribute  $1.92 \pm 2.18\%$  and  $2.12 \pm 2.88\%$  respectively to the total benthic composition. The live coral cover was high in the mid-shelf zone ( $8.05 \pm 3.95\%$ ). The live coral cover differed significantly between different depth zones (One-way ANOVA,  $df = 2$ ;  $F = 9.62$ ;  $F_{crit} = 3.35$ ;  $p\text{-value} = 0.0006 < 0.05$ ). The live coral cover at the study sites at different depth zones was presented in the Fig. 5. Rocks form the major benthic component in the shallow zone accounting for  $87.61 \pm 37.2\%$  followed by sand ( $8.3 \pm 26.9\%$ ). The flat sandy substratum accounts for  $46 \pm 10.8\%$  and  $51.2 \pm 16\%$  in the mid-shelf and deep zones respectively. Rocks in the deep zone were smothered by a thick mat of turf algae. Whip corals were abundant in the deep zone contributing  $22.2 \pm 14\%$  to the total benthic composition. However, it is scarce in the mid-shelf zone ( $2.5 \pm 5.7\%$ ) and absent in the shallow zone.

As per the results of Bray-Curtis cluster analysis, the study sites at Grande Island were grouped in to nine individual clusters based on the benthic composition (Fig. 6). Benthic composition at the study sites within same depth zone are highly similar and are grouped under the same cluster with few exceptions. Study site 24 at mid-shelf zone is merged with the study sites 13 and 17 at the shallow zone with a mean similarity value of 93.9. Similarly, study sites 22 and 23 are merged with the study sites at deep zone with an average similarity value of 83.4 and 87.8 respectively. The difference in benthic composition among the study sites in the same depth zone was not significant as revealed by One-way ANOSIM ( $p\text{ value} > 0.05$ ). SIMPER analysis showed that the benthic composition was highly dissimilar between the shallow and deep zone with an average dissimilarity value of 42.75. Sand and Rock are the major benthic components contributing 29.7% and 23.6% respectively to the observed dissimilarity values. Similarly, macroalgae and whip corals contribute 22.8% and 20.9% respectively to the observed dissimilarity value of 32.3 between the mid-shelf and deep zone. Average dissimilarity value between shallow and mid-shelf zone was 27.9 and sand and rock are the major contributors to the observed differences (Table 2).

### *3.4. Coral health assessment*

The proportion of live coral colonies affected by various stressors across the depth zones in Grande Island was presented in the Fig. 7. Turf algae affects majority of the live corals compared to the other stress factors. In total,  $68 \pm 14.72\%$  of the live coral colonies in the deep zone were smothered either partially or wholly by the turf algae. Similarly  $48.8 \pm 4.48\%$  and  $43.03 \pm 10.25\%$  of the live corals were affected by turf algal smothering in the shallow and mid-shelf zone respectively. Coral diseases

were more prevalent in the mid-shelf and shallow zone. In total,  $3.98 \pm 1.32\%$  of the live corals were disease affected in the mid-shelf zone;  $3.1 \pm 0.44\%$  in the shallow zone and  $0.9 \pm 1.76\%$  in the deep zone. Trematodiosis was common among the *Plesiastrea* sp (Fig. 8a) and White plaque disease was common with *Pseudosiderastrea* (Fig. 8b) and *Coscianrea* sp (Fig. 8c). Boring sponges smother  $5.06 \pm 2.36\%$  of the live coral colonies in the shallow zone and  $3.03 \pm 0.33\%$  in the mid-shelf zone. Corals of the genera *Pseudosiderastrea* (Fig. 9a) and *Favites* sp (Fig. 9b) were predominantly affected by the boring sponges.

#### 4. Discussion

The generic richness of corals in Grande Island is comparatively lower than the other major reefs along the west coast of India. In total, 36 species of 20 genera and 91 species of 34 genera were recorded in Gulf of Kachchh and Lakshadweep Islands respectively [20]. The coral formations around Grande Island are uneven in their distribution, as the maximum live coral cover was observed in the mid-shelf zone. There is no continuous reef-like structure and dense patches of corals were found in very few locations around Grande Island. Variation in the spatial distribution of corals is largely determined by the settlement choice of coral larvae, availability of hard substratum and other physic - chemical parameters [21].

Various physical factors such as light, sedimentation, salinity and substratum availability can be attributed to the variation in the taxonomic composition of corals between different depth zones in Grande Island. In general, distribution of corals in a particular depth zone largely depends on their substrate [22] and light preferences [23]. Changing with its intensity and spectral quality with depth [24], light is an important environmental factor that determines the optimal depth range for the hermatypic corals. In Grande Island, live coral cover and coral density was low in the shallow zone despite the maximum availability of light and hard substratum. However it was high in the mid-shelf zone despite low light availability and low hard substratum cover. This might be due to the photosensitive nature of the coral larvae. Various studies reported the photosensitive response of coral larvae [25] and experimental evidence also indicate that the optimal light regime for the settlement and metamorphosis of coral larvae could be species specific [23, 26]. A photo-positive larva, sensitive to the changes in the light intensity can revert to a photo-negative one and tend to aggregate in the deep zone.

Live corals mostly occurred as small patches on the vertical substrate of the rocks in the shallow zone of Grande Island. This can be attributed to the competition posed by turf algae, macroalgae and zoanthids for space. Other factors such as excessive sedimentation, increased temperature and

reduced salinity also affect the settlement and behaviour of coral larvae [27, 28]. There are no reports on the physicochemical nature of the waters of Grande Island. However, the coastal waters of Goa have been reported to experience low salinity during the southwest (SW) monsoon [29, 30]. The elevated topography of the Grande Island and the immediate discharge of rain runoff waters in to the shallow zone during SW monsoon will further reduce the salinity of the waters around Grande Island. The coral density and its species richness have been reported to be low under conditions of reduced salinity [31]. The immediate discharge of runoff waters from the Grande Island also increase the sediment load in the shallow zone which could smother the corals and hinder the light available for performing photosynthesis. Corals in the Grande Island are affected by high sedimentation as evident from the deposition of thick layer of sediment over the coral colonies. Excessive sedimentation can disrupt the ability of the coral larvae to settle and survive and also tends the larvae to settle in a vertical substrate [32].

Analysis of the health status of live coral colonies revealed that the corals are under stress mainly due to algal turf smothering that in turn lead to the deposition of a fine layer of silt and sediment. In general, algal turf colonizes the corals under the conditions of nutrient enrichment and reduced herbivory [33, 34]. Once established, the turf algae can overgrow corals rapidly reducing their photochemical efficiency [35], reproductive output [15] and their recovery potential after a stress event [36]. Certain corals like *Porites* sp are reported to be successful against turf algae under the influence of nutrient enrichment [37]. However, the response of a particular coral species cannot be generalized to the other coral species.

The boring and excavating sponges can affect the corals in a variety of ways leading to their mortality and permanent loss. Sponges that encrust the carbonate substrate compete with live corals for space [38, 39]. In Grande Island, the boring and excavating sponges spread as a thin mat over the live corals and covers them completely. The coral polyps lying adjacent to the vicinity of sponges were dead and covered with a thick layer of sediment and turf algae. Though the average proportion of coral colonies colonized by sponges appeared to be low compared to the colonies affected by other stressors, it needs much attention. Once established, these sponges can occupy the available substratum aggressively dominating the corals and displace the live corals tissue [40]. Recent studies have shown that the sponges secrete toxic metabolites that kill the live coral tissue [41]. Colonization of sponges has been reported to occur more commonly on the reefs with high coral mortality [40]. However, the scenario was different in Grande Island as the sponges were observed to colonize the healthy live corals. In another way, physical contact between a coral fragment colonized by sponge



and a healthy coral, induced by an external force like storm also paves the way for massive sponge colonization over corals in a reef [42].

The presence of corals and its associated fishes made Grande Island, a tourism hot spot in Goa. Various recreational activities like SCUBA diving, snorkeling, and other water sports activities were practiced in Grande Island. Intensive tourism is often associated with physical damage to the corals [43]. However, no physical damage was observed among the corals in Grande Island. Intensive tourism activities in coral reef areas also found to elevate the prevalence of diseases among corals [44, 45]. In Grande Island, white plaque and trematodiosis disease were prevalent among the corals. The link between tourism activities and prevalence of these diseases among corals in Grande Island needs further investigation.

In summary, the distribution of coral communities around Grande Island differs considerably between different depth zones, with high proportion of live coral cover in the mid-shelf zone followed by the shallow and deep zones. Though numerous biotic and abiotic factors would act synergistically in shaping the community structure of corals and their distribution in Grande Island, the relationship between them is unclear. Such factors include light and substratum availability, sedimentation, level of tourism activities and pollution, monsoonal effects and biological competition. Future research should focus on the physico-chemical and biological processes around Grande Island that determine the patterns of distribution of coral communities. Understanding the above processes around the Grande Island will reveal more about the distribution and colonization of coral communities and their vulnerability to change in the face of global warming and its associated impacts in future.

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### Figure captions

**Figure 1:** Map showing the study locations around Grande Island at different depth zones.

S1 –S15 (shallow zone); S16 – S25 (mid-shelf zone) and S26 – S30 (deep zone).

**Figure 2:** K-dominance curve plot showing the difference in the generic richness across different depth zones in Grande Island. Highest generic diversity of corals was evident in the shallow and mid-shelf zone.

**Figure 3:** Taxonomic composition of different genera of corals at different depth zone in Grande Island. Error bars indicate standard error.

**Figure 4:** Average percent cover of different benthic forms at different depth zones around Grande Island. LC – Live coral; RCK- Rock; MA- Macroalgae; OT – Others; S- Sand; WC- Whip coral. Error bars indicate standard error.

**Figure 5:** Map of Grande Island showing the average percent cover of corals at the study sites corresponding to the depth (in parenthesis).

**Figure 6:** Bray Curtis cluster analysis of the study sites around Grande Island. shallow zone (1-15); mid-shelf zone (16 – 25); deep zone (26- 30).

**Figure 7:** Average percent composition of live corals existing in different states across different depth zones in Grande Island. HLC – Healthy live coral; LC/TA – Live coral colony affected by algal turf smothering; LC/MA – Live coral colony affected by Macroalgae overgrowth; LC/D – Live coral colony infested with disease; LC/S – Live coral colony affected by sponge intrusion. Error bars indicate standard error.

**Figure 8:** Figure plates showing corals affected by Trematodiosis (8a- *Plesiastrea* sp) and White plaque disease (8b- *Pseudosiderastrea* sp; 8c- *Coscinarea* sp).

**Figure 9:** Live corals of *Pseudosiderastrea* sp (9a) and *Favites* sp (9b) encrusted by sponges.

**Table 1** Distribution of corals of different genera across different depth zones in Grande Island. (+) indicates presence; (-) indicates absence.

<b>S. No</b>	<b>Genus</b>	<b>Shallow</b>	<b>Mid-shelf</b>	<b>Deep</b>
1	<i>Acanthastrea</i>	+	-	-
2	<i>Coscinarea</i>	+	+	+
3	<i>Dendrophyllidae</i>	+	+	+
4	<i>Favia</i>	+	+	-
5	<i>Favites</i>	+	+	+
6	<i>Goniastrea</i>	+	+	-
7	<i>Goniopora</i>	+	+	-
8	<i>Leptastrea</i>	+	+	-
9	<i>Montastrea</i>	-	+	-
10	<i>Plesiastrea</i>	+	+	+
11	<i>Pocillopora</i>	+	+	-
12	<i>Porites</i>	+	+	-
13	<i>Pseudosiderastrea</i>	+	+	+
14	<i>Siderastrea</i>	+	+	+
15	<i>Turbinaria</i>	+	+	-

**Table 2** Results of SIMPER analysis and One-way ANOSIM (R value and Significance level) on the abundance (percent cover) of different benthic forms at different depth zones in Grande Island.

**Shallow vs Mid-shelf zone**

R value = 0.354; Level of Significance (%) = 0.1; Avg. dissimilarity = 27.95

<b>Benthic component</b>	<b>Average abundance</b>		<b>Average dissimilarity</b>	<b>% contribution</b>	<b>Cum %</b>
	<b>Shallow</b>	<b>Mid-shelf</b>			
S	0.96	2.49	11.09	39.69	39.69
RCK	3.04	2.28	5.63	20.13	59.82
LC	1.04	1.60	4.21	15.05	74.87
MA	0.74	1.09	4.06	14.52	89.39
OT	0.81	0.82	1.53	5.48	94.87

**Shallow vs Deep Zone**

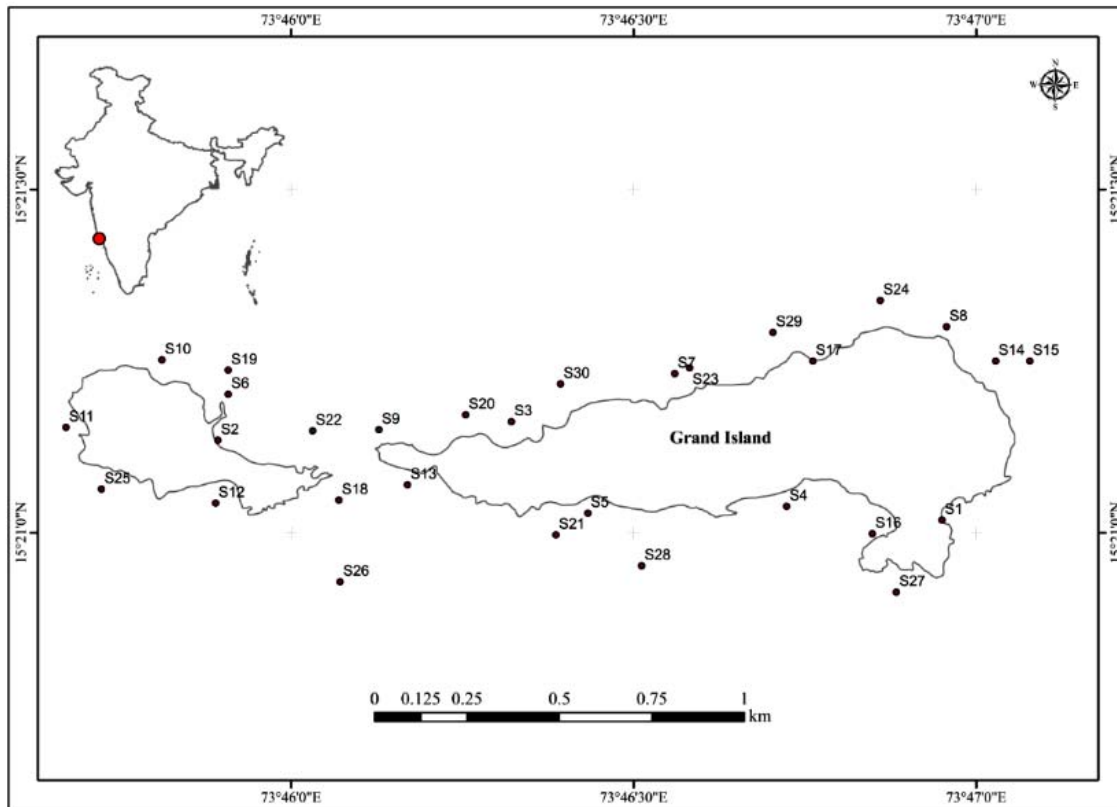
R value = 0.741; Level of significance (%) = 0.1; Average dissimilarity- 42.75

<b>Benthic component</b>	<b>Average abundance</b>		<b>Average dissimilarity</b>	<b>% contribution</b>	<b>Cum %</b>
	<b>Shallow</b>	<b>Deep</b>			
S	0.96	2.44	12.73	29.77	29.77
RCK	3.04	1.77	10.12	23.67	53.44
WC	0	1.09	7.2	16.85	70.29
MA	0.74	0	5.31	12.42	82.71
OT	0.81	0.63	4.28	10.02	92.73

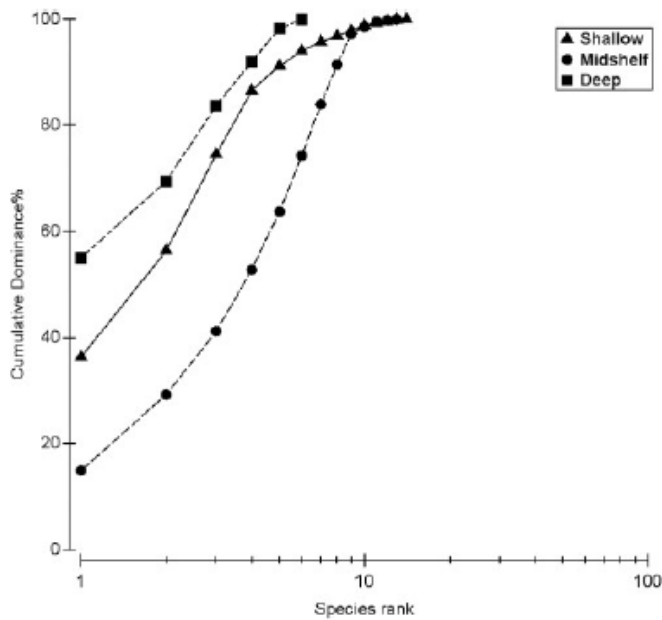
**Mid-Shelf vs Deep Zone**

R value = 0.543; Level of significance (%) = 0.2; Average dissimilarity- 32.34

<b>Benthic component</b>	<b>Average abundance</b>		<b>Average dissimilarity</b>	<b>% contribution</b>	<b>Cum %</b>
	<b>Mid-shelf</b>	<b>Deep</b>			
MA	1.09	0	7.14	22.08	22.08
WC	0.22	1.09	6.76	20.9	42.98
RCK	2.28	1.77	6.72	20.77	63.75
S	2.49	2.44	4.36	13.48	77.23
LC	1.6	1.1	3.77	11.66	88.89
OT	0.82	0.63	3.59	11.11	100

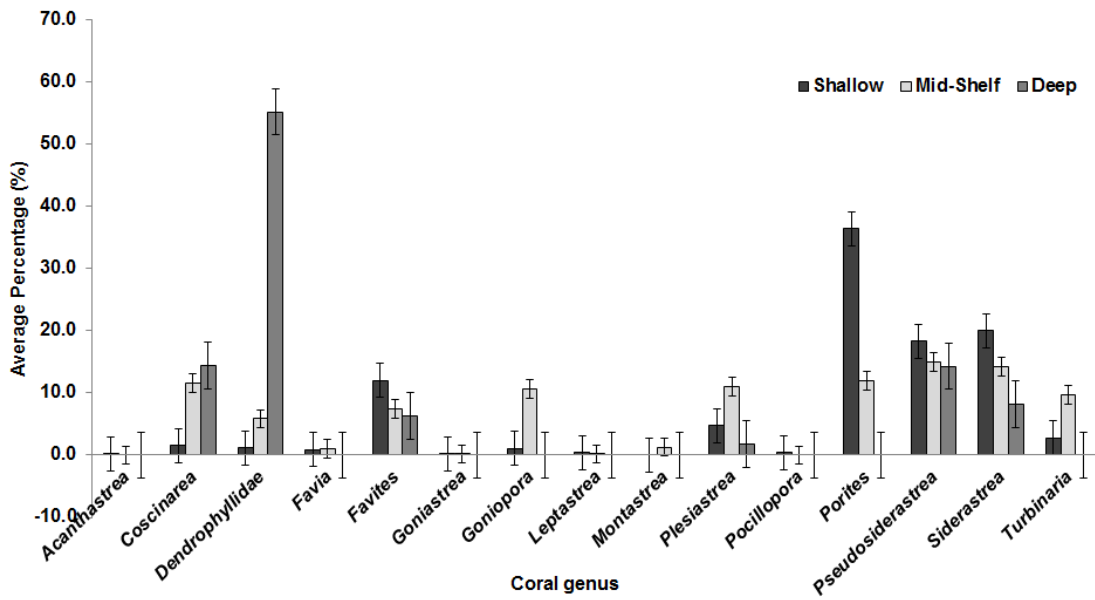


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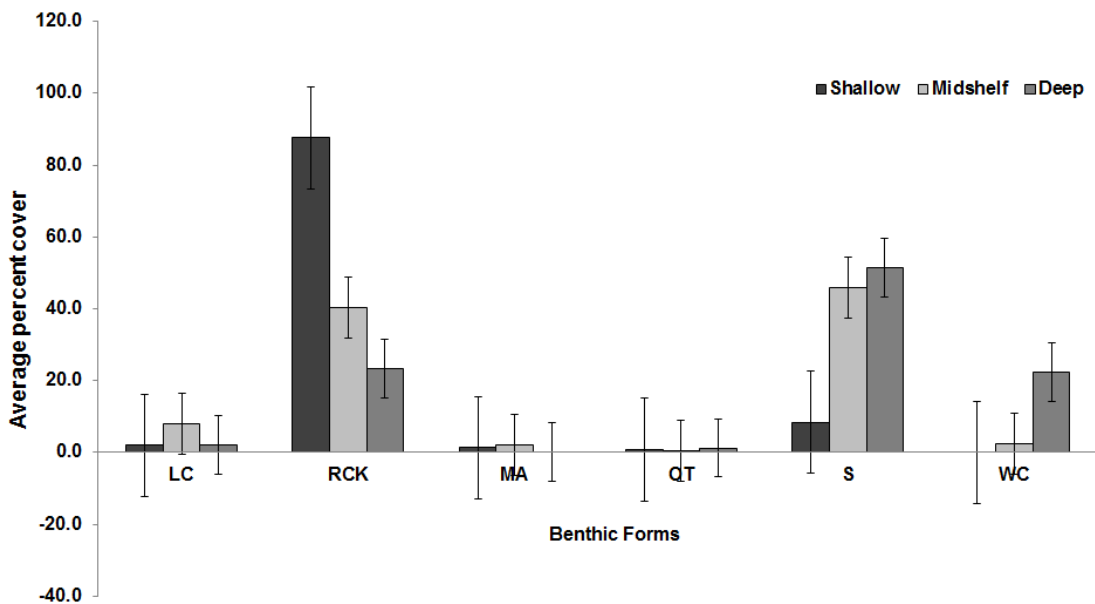


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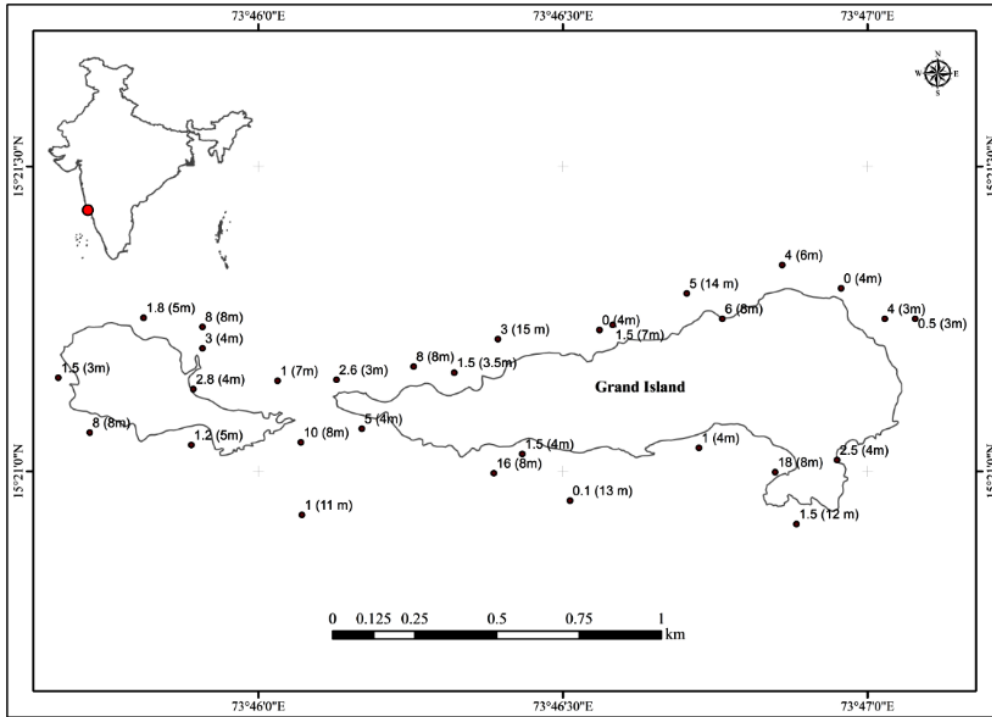




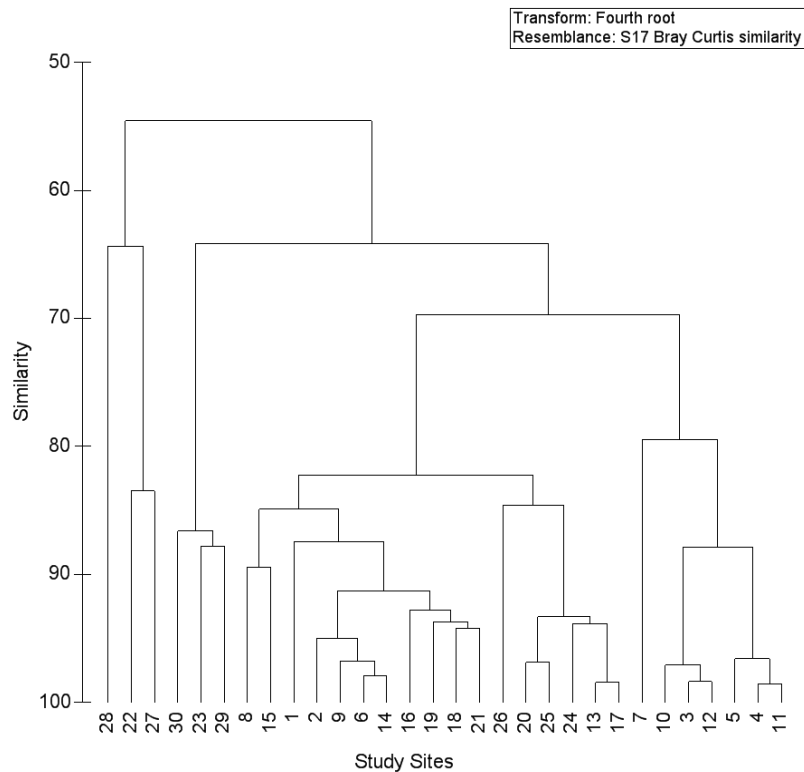
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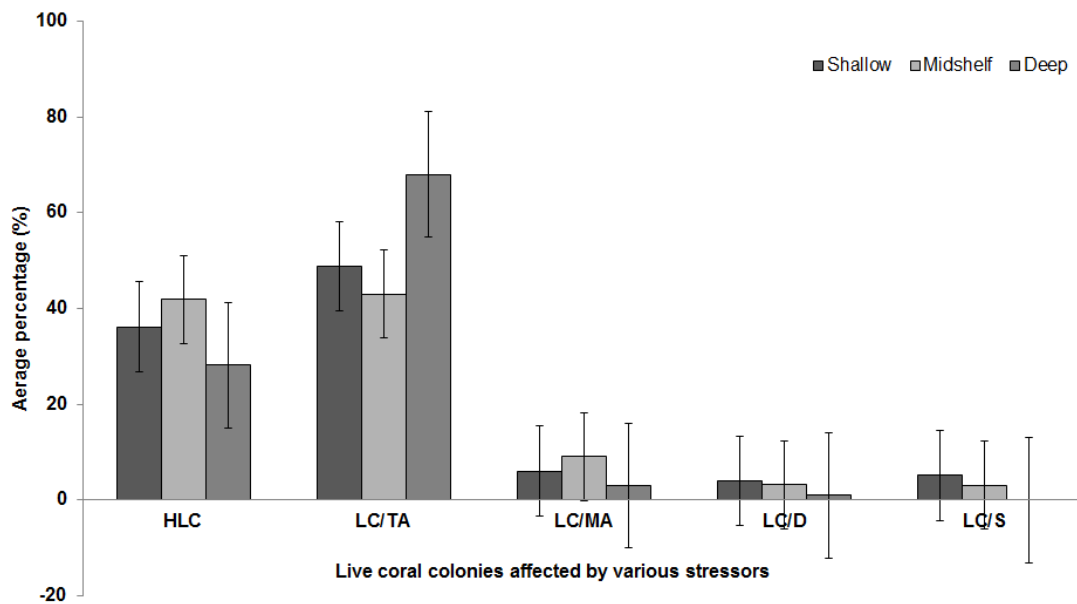
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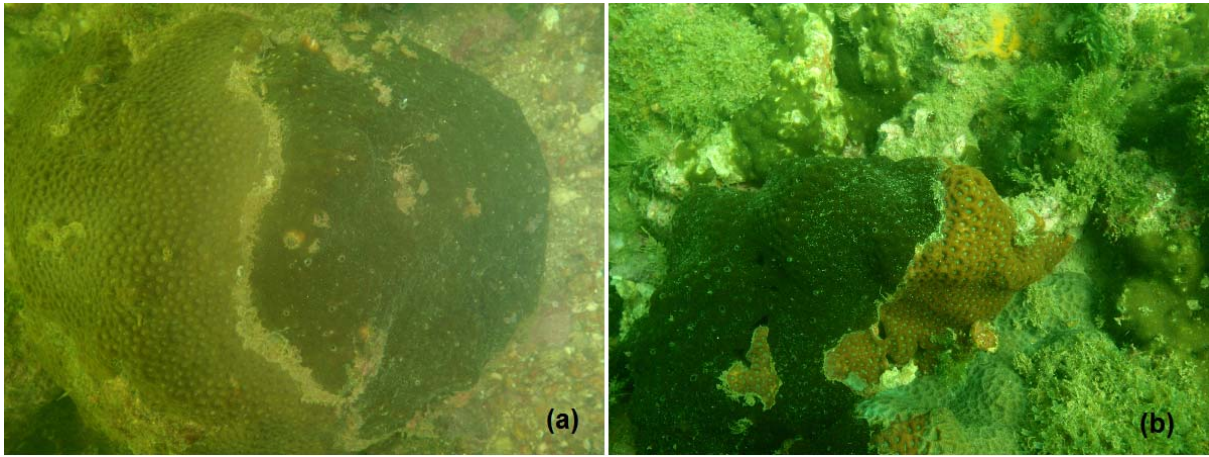
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