

An inventory of zooxanthellate scleractinian coral diversity at East Coast Park Area B1

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Abstract. The East Coast area of Singapore was extensively reclaimed several decades ago, resulting in the loss of natural shore ecosystems including coral reefs. Subsequently, hard corals have naturally recolonised a stretch of East Coast Park Area B1, where a rock bund that extends to Marina Bay East provides suitable substrate. At least 15 species of hard corals are recorded from there, with most colonies coming from the genera *Porites* and *Turbinaria*. Despite low diversity and an unremarkable species composition, the easy accessibility of such mainland sites compared to the Southern Islands may make it valuable for educational and recreational purposes.

Key words. East Coast Park, hard coral, Scleractinia, Singapore, species list

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INTRODUCTION

The East Coast area of Singapore was reclaimed over a period of 20 years from 1966 to 1986, adding 1,525 ha to Singapore's land area (Omar, 2008). In the process, Singapore's longest stretch of sandy shore was lost and the intertidal area buried, causing massive loss of the marine biodiversity there. Over the past few decades, marine life has naturally recolonised the new reclaimed shoreline, including a number of hard corals at East Coast Park (Tan, 2015) and at Tanah Merah Ferry Terminal (Tan, 2013). As Singapore has lost 65% of its live coral cover since 1986 (Chou, 2006), this is an encouraging development, suggesting that reclaimed shores may be able to recover much of the biodiversity they used to host if given sufficient time.

The National Parks Board (NParks) has previously carried out marine habitat enhancement works on the mainland, including making seawalls more inhabitable by marine organisms (National Parks Board, 2015). The fact that hard corals have been able to successfully colonise artificial seawalls at the abovementioned two sites, and in high density (Tan, 2013, 2015; Y. H. J. Tan, pers. obs.), is thus of interest to marine conservation in Singapore.

It is also interesting to note that the artificial coastal defence structures at East Coast Park and Tanah Merah Ferry Terminal are different (Y. H. J. Tan, pers. obs.). At Tanah Merah, the corals are on an intertidal reef flat at the bottom of a sloped seawall, whereas at East Coast Park, they grow on top of a long rock bund stretching to Marina East that is entirely submerged except at low tide. The latter thus resembles somewhat a fringing reef/reef crest environment in terms of wave action and occasional exposure to air during low tides (Y. H. J. Tan, pers. obs.)

In order to have a better understanding of the hard coral community at East Coast and its value to marine conservation in Singapore, it would be useful to know the hard coral taxa that have settled there naturally. A trip was made to a site at East Coast Park Area B1 (Fig. 1) to survey the coral taxa there and draw up a species list. The taxa composition of the hard coral community based on the relative abundance of their colonies was also recorded.

METHOD

Study site. Herein known as East Coast Park Area B1, the study site is located at either end of the mouth of a canal that runs from Fort Road through the western end of East Coast Park (Figs. 2, 3). A rock bund stretches from either end of the canal mouth, running parallel to the shoreline. On the east side, it is over 100 m in length, while on the west side it stretches approximately 2.5 km to a breakwater at the western end of Marina East.

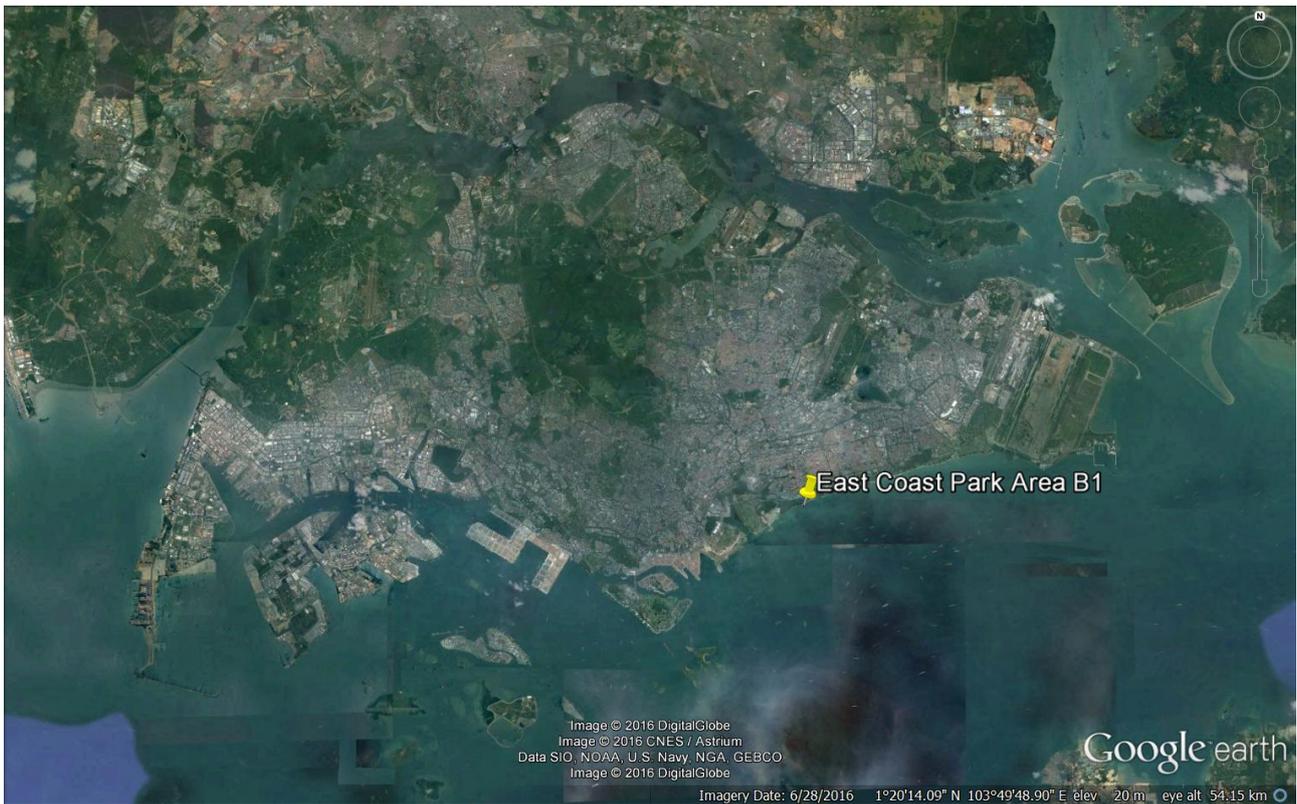


Fig 1. Satellite map indicating the location of the study site in Singapore. (Map: Google Earth. Image©DigitalGlobe. 28 June 2016).



Fig. 2. Satellite map of the study site. The faint dark line parallel to shore is the rock bund. (Map: Google Earth. Image©CNES / Airbus. 29 June 2016).



Fig. 3. Habitat photo of the site, including corals, taken in May 2016. In the background is Marina East, where the rock bund stretches to. (Photograph by: Yong How Jonathan Tan).

Past records. Photographs from a previous survey of the site by the first author in May 2016 were examined and the hard coral colonies identified to the lowest possible taxonomic level. These records were added to the list of taxa.

Field survey. The survey was conducted on 4 August 2016 during a predawn low spring tide from 0500 to 0700 hours, by laying a transect tape along the bund and recording specimens within 1×1 m quadrats laid at 5-m intervals with photography. The rock bund was surveyed on both sides of the canal mouth, each time for a 50-m stretch. Zooxanthellate scleractinian coral species were identified from the photographs taken during the survey to the lowest possible taxonomic level. The number of coral colonies per species/genus was also recorded from the photographs taken during this survey to provide an indication of the relative abundance of different taxa.

RESULTS

Ten genera and six families of zooxanthellate scleractinian corals were recorded from the site, with at least 15 species present. Of the 15 species, seven species were identified from photographs taken during the transect field survey. One species (*Goniastrea retiformis*) was not previously recorded at the site until the transect survey. The species found constitute at least 5.88% of the known coral species (255) and 17.9% of the known coral genera (56) in Singapore as listed in Huang et al. (2009). The full list of species identified can be found in Table 1.

Table 1. Zooxanthellate scleractinian corals identified from photographs taken from an earlier survey (May 2016) and during the present transect survey (August 2016) of East Coast Park Area B1.

Species	Previous survey	Present survey
Acroporidae		
<i>Acropora</i> sp. (Oken, 1815)	X	
<i>Montipora</i> sp. (Blainville, 1830)	X	
Dendrophylliidae		
<i>Turbinaria irregularis</i> (Bernard, 1896)	X	
<i>Turbinaria mesenterina</i> (Lamarck, 1816)	X	X
<i>Turbinaria peltata</i> (Esper, 1794)	X	X
<i>Turbinaria reniformis</i> (Bernard, 1896)	X	X
<i>Turbinaria stellulata</i> (Lamarck, 1816)	X	
Merulinidae		
<i>Favites</i> sp. (Link, 1807)	X	
<i>Dipsastraea</i> sp. (Blainville, 1830)	X	
<i>Goniastrea retiformis</i> (Lamarck, 1816)		X
<i>Platygyra</i> sp. (Ehrenberg, 1834)	X	X
Poritidae		
<i>Porites lobata</i> (Dana, 1846)	X	X
<i>Porites lutea</i> (Milne Edwards & Haime, 1851)	X	X
Scleractinia incertae sedis		
<i>Plesiastrea versipora</i> (Lamarck, 1816)	X	X
<i>Oulastrea crispata</i> (Lamarck, 1816)	X	
Total	14	8
Total number of species observed: ≥ 15		

Poritid corals of the genus *Porites* were found to dominate the hard coral community (Table 2), accounting for 67.9% of the colonies counted in the transect survey. These were followed by dendrophylliid corals of the genus *Turbinaria*, which accounted for 22.6% of the colonies.

Table 2. Number of colonies of zooxanthellate scleractinian corals observed during the transect survey of East Coast Park Area B1.

Species	Number of colonies
Dendrophylliidae	
<i>Turbinaria mesenterina</i> (Lamarck, 1816)	3
<i>Turbinaria peltata</i> (Esper, 1794)	8
<i>Turbinaria reniformis</i> (Bernard, 1896)	1
Merulinidae	
<i>Goniastrea retiformis</i> (Lamarck, 1816)	2
<i>Platygyra</i> sp. (Ehrenberg, 1834)	2
Poritidae	
<i>Porites lobata</i> (Dana, 1846)	26
<i>Porites lutea</i> (Milne Edwards & Haime, 1851)	10
Scleractinia incertae sedis	
<i>Plesiastrea versipora</i> (Lamarck, 1816)	1
Total	53

DISCUSSION

Porites lobata and *Porites lutea* are both described by Veron (1986) as very common and dominant on back reef margins, lagoons and fringing reefs. Of the *Turbinaria* spp., *Turbinaria peltata* is described as common in a wide range of habitats, while *Turbinaria mesenterina* is described as being found in shallow turbid-water habitats (Veron, 1986). These were the numerically dominant colonies at East Coast Park (Table 2), making the hard coral community there rather unremarkable given its resemblance to a fringing reef habitat (Y. H. J. Tan, pers. obs.) in the turbid waters (Tun, 2012) of Singapore. While the data for this paper were recorded in 2016, field observations by one of the authors during a recent visit to the site in 2020 suggest that the community has remained unchanged, but the coral diversity presented here may be an underestimate given the rapid nature of the previous surveys.

As a reference point, 55 species of hard corals from 29 genera were recorded from Sisters' Island by Huang et al. (2009), which today is the site of Singapore's only Marine Park. Of these, 46 species from 28 genera could be considered intertidal (i.e., not exclusively found on reef slopes and deeper water) based on habitat descriptions from the Australian Institute of Marine Science (2013). The (at least) 15 species from 10 genera recorded so far at East Coast Park (Table 1) thus cannot compare in terms of diversity to relatively pristine reefs in Singapore, which is unsurprising considering that the corals have had only a 30-year window to settle there since reclamation was finished in 1986 (Omar, 2008). However, it is worth noting that the genus diversity was comparable to that found by Ng et al. (2012) on intertidal seawalls in the Southern Islands (10–14 genera). Subtidal surveys at a mainland seawall at Tanah Merah Ferry Terminal also recorded 51 species from 30 genera, higher than many natural reefs in Singapore (Wong et al., 2018). This suggests that mainland seawalls have potential comparable to that of natural reefs and seawalls in the offshore islands in supporting diverse coral communities. A more comprehensive intertidal survey and/or subtidal survey at this study site is likely to reveal greater diversity than what this brief study has found.

The total reef area in Singapore stands at 1,325 ha, of which 1,199 ha is intertidal and 126 ha is subtidal (Tun, 2012); almost all of this is found in the Southern Islands. On mainland Singapore, the last remaining natural reef is found at Labrador Park Nature Reserve, with a subtidal reef area of a mere 1.06 ha (Tun, 2012) and another 1.93 ha of intertidal reef (NParks, unpublished data). An estimate for the reef area at East Coast Park Area B1, assuming that the whole stretch of the rock bund is habitable for corals, is approximately 2.5 ha (NParks, unpublished data). The rock bund at East Coast Park is thus of limited conservation value from the perspective of the overall health of Singapore's coral ecosystems given the small area and low diversity, but represents a significant addition in coral habitat to mainland Singapore.

From the perspective of education and recreation, mainland hard corals such as those found at East Coast Park can play an important role. Located on the mainland and at relatively accessible public parks/nature reserves, these corals and the intertidal life they support can be more easily viewed by members of the public. They are therefore valuable in raising awareness of marine biodiversity in Singapore, encouraging the public to appreciate marine life, and educating the public about the threats it faces. In the long term, conservation of corals in Singapore can materialise only if Singaporeans feel a tangible sense of ownership for them, and the closeness to home of mainland corals would be helpful in that regard. The location of the East Coast Park corals on the mainland thus makes them of particular interest to marine conservation in Singapore despite the relative paucity of species. Future developments that involve Singapore's coastal and marine environment could thus factor in the possibility of accommodating such habitats, where corals colonise man-made engineered structures and are easily visible and accessible by the general public.

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