Seasonal variation of giant clam, *T. maxima*, in the waters of Rodrigues Island: A case study between two protected areas

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Abstract:

Giant clams are the largest of all bivalve molluscs, partly due to their symbiotic photosynthesising micro-algae (zooxanthellae). Unlike other marine molluscs, which filter feed on plankton from the seawater column, giant clams achieve their large size through the photosynthate supplied by the dinoflagellate algae (Symbiodinium) that live in their mantles tissues. These cryptic organisms have been subjected to both natural and anthropogenic impacts for decades leading to the rapid decline of these ‘vulnerable’ classified (CITES) species. However, little is known about their distribution in the waters of Rodrigues. This study, thus, investigated the seasonal variation of the giant clam *Tridacna maxima* during winter (July) and summer (December) seasons in three consecutive years: 2016, 2017 and 2018 in two protected areas in the South East (South East Marine Protected Area) and North (English Bay Marine Reserve) regions of Rodrigues Island.

The giant clam *T. maxima* was morphologically identified. The number of *T. maxima* individuals were quantified along 25 m x 10 m belt transects (n=3) at the two different sites and the individuals recorded were classified into two main length size classes: juveniles (shell lengths, 0.1–79mm) and shell lengths ≥ 80 mm for adults. The survey revealed that there has been no significant decrease in *T. maxima* abundance (both adults and recruits) during both winter and summer for the three years at South East Marine Protected Area (SEMPA). However, at the English Bay Marine Reserve (EBMR), a significant decrease (P < 0.01) was observed in adult *T. maxima* from 2016 to 2018 in both winter and summer. The study also showed that no recruit was recorded in EBMR. The study showed a non-significant negative correlation (r=-0.347, p=0.360) between the overall *T. maxima* population during both summer and winter period in SEMPA while a strong positive relationship (r=+0.930, p=0.01)
between the overall giant clam population in the EBMR during both its winter and summer period was observed. The results of this research indicate that conservation and protection measures are working better in the SEMPA as compared to the EBMR which could lead to declines in giant clam populations in the EBMR over time. Further investigations on impacts of exploitation and environmental changes over time are needed to identify the causes of such declines in these threatened Tridacnid populations.

**Key words:** *Tridacna maxima, protected areas, density, seasonal variation, Rodrigues*