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Vanishing giants: An assessment on the population status of giant clams across Malaysia

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ABSTRACT

The iconic giant clams are known for its multifaceted importance throughout the Indo-Pacific –for functional, ecological, or cultural purposes. In Malaysia, habitat destruction and illegal poaching were main reasons behind the declining populations of giant clams. As previous surveys date back to 1990 s, an update on the status of giant clam populations in Malaysia is overdue. Using the extensive monitoring data from Reef Check Malaysia, we analysed and provided an assessment of population trends of giant clams between 2007 and 2021 in Malaysia. This study showed a decline in giant clam population in the east coast Peninsula and Sabah, while their abundances have always been low in the west coast Peninsula and Sarawak. In the east coast Peninsula, *Tridacna maxima* and *T. crocea* were most common (2.7 ± 7.3 and 1.4 ± 7.6 clams per 100 m^2, respectively), followed by *T. squamosa* (0.7 ± 1.4 clams per 100 m^2), and *Hippopus hippopus* (0.3 ± 2.5 clams per 100 m^2). The boring species, *T. maxima* and *T. crocea*, typically displayed highly aggregated populations, reaching densities of 41.5 and 70 clams per 100 m^2, where a reciprocal abundance shift between both species was observed between northern and southern sites of east coast Peninsula. The demography of *T. maxima* and *T. crocea* is either positively skewed or normally distributed, indicating abundant recruits that correspond to their higher densities. In contrast, *T. squamosa* showed a negative skew, suggesting poor recruitment rates. Findings here underscore the need to tailor conservation strategies for respective giant clam species in Malaysia. Proposed initiatives include establishing conservation zones in key areas like Perhentian, Lang Tengah, Redang, and Tioman Islands, which have significant *T. maxima* and *T. crocea* recruit populations. Also, targeted restocking efforts are necessary for *T. squamosa* and *H. hippopus* to ensure long-term viability of populations.

1. Introduction

Giant clams are a traditional marine resource in many coastal communities throughout the Indo-Pacific region as subsistence proteins (Shang et al., 1990; Neo et al., 2018, 2019; Abd-Ebrah and Peters, 2022), local gourmet (Shang et al., 1990; Tisdell et al., 1994), and later became highly valuable in aquarium (Shang et al., 1990; Mies et al., 2017) and ornamental trade (Larson, 2016). In Malaysia, the giant clam is expressed in various vernacular languages by different ethnic groups such as '*siput kima*', '*kima gergasi*', '*kerang gergasi*', '*kimo*' or '*kima*' (Albert et al., 2017; Abd-Ebrah and Peters, 2020), reflect its cultural importance. Giant clams have been utilised as daily health supplements and ceremonial ornaments by several ethnic groups, such as the Rungus and Bajau people residing in Sabah (Albert et al., 2017; Abd-Ebrah and Peters, 2020).

Malaysia's coral reefs is known to host seven of the 12 known species of giant clams: *Tridacna crocea, T. maxima, T. squamosa, T. derasa, T. gigas, Hippopus hippopus,* and *H. porcellanus* (Mohamed-Pauzi et al., 1994; Yasin, 1996). Despite the strong cultural ties to these large shellfish, studies on giant clam populations were sporadic, with most works conducted between 1994 and 1998 (Mohamed-Pauzi et al., 1994; Tan et al., 1998; Yasin, 1998, 1996). The most recent survey was

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