



# Assemblage structure, distribution and habitat type of the grapsoid crabs (Brachyura: Grapsoidea) of the coastal forested swamps of northern Borneo

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## ABSTRACT

Several intertidal and supratidal systems were investigated in the Brunei Bay to assess the diversity and assemblage structure of grapsoid crabs (Brachyura: Grapsoidea) in different salinity and substrate conditions, type of vegetation, and distance from water bodies. The structure of the assemblages differed remarkably across and within sites, and several taxa were not previously recorded from this region. Diversity decreased towards more terrestrial conditions, with systems closer to the sea supporting more diversified assemblages. High and low intertidal areas also hosted different assemblages in terms of taxonomic composition. Most of these species can be considered habitat specialists, and only occurred in a small number of the investigated areas. A small number of habitat generalists were found in several areas, exhibiting eurytopic ecological traits. A time-based sampling method was used to estimate population densities. A few habitat specialists were recorded in high densities, suggesting adaptations to specific environmental conditions in which these species can bloom. These results highlight how the diversity of these assemblages needs to be considered in management plans, to prevent local extinctions and loss of diversity in the area.

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## 1. Introduction

Grapsoid crabs (Brachyura: Grapsoidea) are dominant components of the intertidal macrofauna of mangrove forests and other wetland ecosystems of the Indo West Pacific region (IWP; Lee, 1998). Grapsoid crabs are ancestrally marine organisms, that successfully colonised semi-terrestrial and terrestrial systems, such as mangrove and peat swamp forests, limestone caves, and rain forests (e.g. Ng and Lim, 1987; Lee, 1998; Davie and Ng, 2007). Despite the key role of these species in ecosystem functions and processes, their ecology and diversity are poorly known (Hogarth, 2007; Lee et al., 2017). The taxonomy of the large family Sesamidae, which dominates these assemblages, is in a state of flux (e.g. Ng and Schubart, 2002; Davie and Ng, 2007; Ng et al., 2008; Rahayu and Ng, 2009; Naderloo and Schubart, 2010; Rahayu

and Li, 2013; Cannicci and Ng, 2017). The autecology of wetland grapsoid crabs has been investigated only in a few species, mainly in Neotropical (e.g. Warner, 1969; Erickson et al., 2008; Diesel et al., 2000) and African systems (e.g. Cannicci et al., 1999; Gillikin and Schubart, 2004; Emmerson and Ndenze, 2007). Data on the habitat environmental conditions of many species are only available from anecdotal information in taxonomic descriptions (e.g. Rahayu and Ng, 2009; Tweedie, 1940, 1950a). There is also a scarcity of studies on the distribution and abundance of grapsoid crabs in mangrove and other coastal ecosystems (Salgado Kent and McGuinness, 2010). This lack of ecological information has been attributed to taxonomic uncertainty and complexity, practical field work limitations, and the challenges posed by population density measurements (e.g. Salgado Kent and McGuinness, 2006; Hogarth, 2007; Lee et al., 2017).

In northern Borneo, the only quantitative study on the community ecology of grapsoid crabs living in forested coastal wetlands is Ashton et al. (2003b). Other reports from this region include annotated checklists (e.g. Choy, 1991; Tan and Ng, 1994; Tweedie, 1950b), qualitative reports (Choy and Booth, 1994), and species descriptions (e.g. Ng, 1995a,b, 2013).

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