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PLANKTON COMPOSITION AND ABUNDANCE IN BRUNEI BAY DURING NORTHEAST MONSOON

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INTRODUCTION

As an important element in the aquatic food chain, planktons are tiny organisms living suspended in the water column with an inability to effectively swim against current. There are generally two types of plankton; phytoplankton and zooplankton. Commonly known as plant plankton, phytoplankton form the base of most planktonic food webs as important primary producers. Through photosynthesis, they produce organic compounds (e.g. carbohydrates) and release oxygen into the atmosphere (Helbling & Villafane, 2007). As such, higher trophic levels are supported by the energy and essential biochemicals produced by the phytoplankton which are greatly correlated with fishery landings and biomass of benthic communities (Herman *et al.*, 1999). Phytoplankton also have a significant influence on the carbon cycle where carbon consumed through photosynthesis is either being transferred to other organisms (Legendre, 1990) or transferred to the seabed in the form of dead bodies and fecal pellets (Castro & Huber, 2010), thus reducing carbon dioxide levels in the atmosphere.

Within the marine ecosystem, mesozooplankton link between both producers (phytoplankton) and higher trophic levels through energy transfer by grazing on phytoplankton (Richardson, 2008). However, there is increasing evidence that some small copepods (microzooplankton) are capable of exploiting heterotrophic protists rather than as grazers of phytoplankton (Turner, 2004).

Situated at the south-west coast of Sabah, Brunei Bay is a predominantly shallow enclosed water area (Linden *et al.*, 1992), shared between Sabah, Sarawak and Brunei Darussalam. 4 main river systems (Klias, Padas, Batang Lawas and Batang Trusan Rivers) drain into the bay, and these river systems plays major role in the coastal zone of Brunei Bay (Saleh *et al.*, 2005), especially during the Northeast monsoon when

heavy rainfall and floods increase the amount of freshwater discharge into the bay. With the presence of paper mill and oil industries in Sipitang, Brunei Bay since the 1990s, the surrounding areas faces the risks of degradation through the introduction of effluents from the activities.

As a part of the South China Sea (SCS), Brunei Bay is affected by two monsoon seasons; Northeast (NE) monsoon (winter) and Southwest (SW) monsoon (summer). During the NE monsoon, cooler, coastal water was pushed down through the Taiwan Straits by the wind, circulating southwards where it will either leave SCS through Karimata Straits (West Kalimantan) or turned northeasterly along the coast of Borneo (Sabah & Sarawak) and Palawan (western Philippines). The flow of current is, however, reversed during the SW monsoon when water enters the South China Sea via the Karimata Straits and is swept up towards the central area before exiting through the Taiwan Straits (Morton & Blackmore, 2001).

Although studies on planktonic community have been previously conducted in the waters of the Brunei Bay area (Linden *et al.*, 1992; Jivaluk, 1998, Waheed *et al.*, 2007), there is still a lack of information on the composition of the planktonic community covering the whole inner Brunei Bay itself. In this study, we aim to investigate the composition and abundance of different size fractions (>200 µm and 60-200 µm) of phytoplankton and zooplankton in Brunei Bay.

MATERIALS AND METHODS

The sampling was carried out for 4 days between 7th and 11th of January 2014 during the NE monsoon. 17 stations were selected within 6 transects situated in the inner Brunei Bay (4° 56′ - 5° 14′ N and 115° 10′ - 115° 31′ E) (Figure 1). Samplings were conducted between 8.00 a.m. and 3.00 p.m. with 4 – 5 stations per day.

Plankton samples were collected by using a 60 µm mesh size Norpac net (diameter of mouth opening ca. 0.5 m). Nets were vertically towed from 1 m above the bottom to the surface layer of the water column. Distance of net towed was determined using flowmeter (KC Denmark A/S) and the actual water depth was recorded for future references. Collected samples were immediately sieved through 200 µm mesh size filter. Samples were transferred into a 500 mL bottle and preserved with 10% formalin to avoid zooplankton grazing. Preserved samples were then brought back to the laboratory for further processing. Samples retained between 60 µm and 200 µm were considered as small, whereas >200 µm as large size plankton.