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Nearshore and Offshore Comparison of Marine Water Quality Variables Measured During SESMA 1

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ABSTRACT Total suspended solids (TSS), dissolved oxygen (DO) and dissolved inorganic nutrient concentrations [ammonium (NH_4), nitrite (NO_2), nitrate (NO_3), phosphorus (PO_4) and silicate (SiO_4)] were measured we measured in offshore sites sampled covered by the first Scientific Expedition to the Straits of Malacca or SESMA 1 cruise. Both TSS and DO showed striking differences between nearshore and offshore sites. TSS was elevated nearshore (> 250 mg l^{-1}) but was < 100 mg l^{-1} offshore. DO was at healthy levels (> 300 μM or 9.6 mg l^{-1}) offshore but were low and sometimes exhibited hypoxia (< 125 μM or 4 mg l^{-1}) nearshore. Dissolved inorganic nutrients were generally higher nearshore and this reflected eutrophication. High TSS, low DO and eutrophication showed how anthropogenic activities are affecting the marine water quality in Malaysia.

ABSTRAK Dalam kajian ini, kami mengukur beberapa pembolehubah kualiti air marin di stesyen luar pantai semasa Ekspidisi Saintifik ke Selat Melaka atau pelayaran SESMA 1. Data yang diperolehi dibandingkan dengan stesyen dekat pantai. Jumlah ampaian pejal (TSS), oksigen larut (DO) dan kepekatan nutrien inorganik larut [amonium (NH_4), nitrit (NO_2), nitrat (NO_3), fosforus (PO_4) and silikat (SiO_4)] diukur. Kedua-dua TSS dan DO menunjukkan perbezaan ketara antara stesyen dekat pantai dan luar pantai. TSS adalah tinggi dekat pantai (> 250 mg l^{-1}) tetapi < 100 mg l^{-1} luar pantai. DO adalah pada tahap sihat (> 300 μM atau 9.6 mg l^{-1}) luar pantai tetapi adalah rendah dan kadang kala mempamerkan hipoksia (< 125 μM atau 4 mg l^{-1}) dekat pantai. Nutrien tak organik larut adalah pada amnya lebih tinggi dekat pantai dan ini mencerminkan eutrofikasi. TSS yang tinggi, DO yang rendah dan eutrofikasi menunjukkan bagaimana aktiviti antropogenik sedang memberi kesan terhadap kualiti air marin di Malaysia.

(inorganic nutrients, tropical coastal waters, eutrophication, suspended solids, dissolved oxygen)

INTRODUCTION

Tropical oceans cover about 40% of the global ocean [1], and yet knowledge of the structure and function of this ecosystem remains limited especially in the Southeast Asia region [2]. A pre-requisite to understanding the marine ecosystem is to determine the health of the marine habitat by carrying out marine water quality studies.

In this study, we sampled several stations along the Straits of Malacca during a research cruise, Scientific Expedition to the Straits of Malacca or SESMA, and measured some marine water quality variables. These offshore waters were located away from anthropogenic activities and pollution. Baseline data from these sites (especially offshore islands) are rare, and will be valuable reference points for marine water quality studies or impact assessments.

In order to determine the effects of human activities on marine water quality, our observations from SESMA were compared with nearshore waters. At present, nearshore waters are in various stages of degradation as they are increasingly exploited by humans for food, recreation, transport and other needs [3]. Marine water quality data are also essential for the future development of a marine water quality standard that is at present not available in Malaysia.

MATERIALS AND METHODS

Study site

The Scientific Expedition to the Straits of Malacca or SESMA research cruise was carried