MODELING NEARSHORE PROCESSES IN UMS COASTAL AREA OF SEPANGGAR BAY

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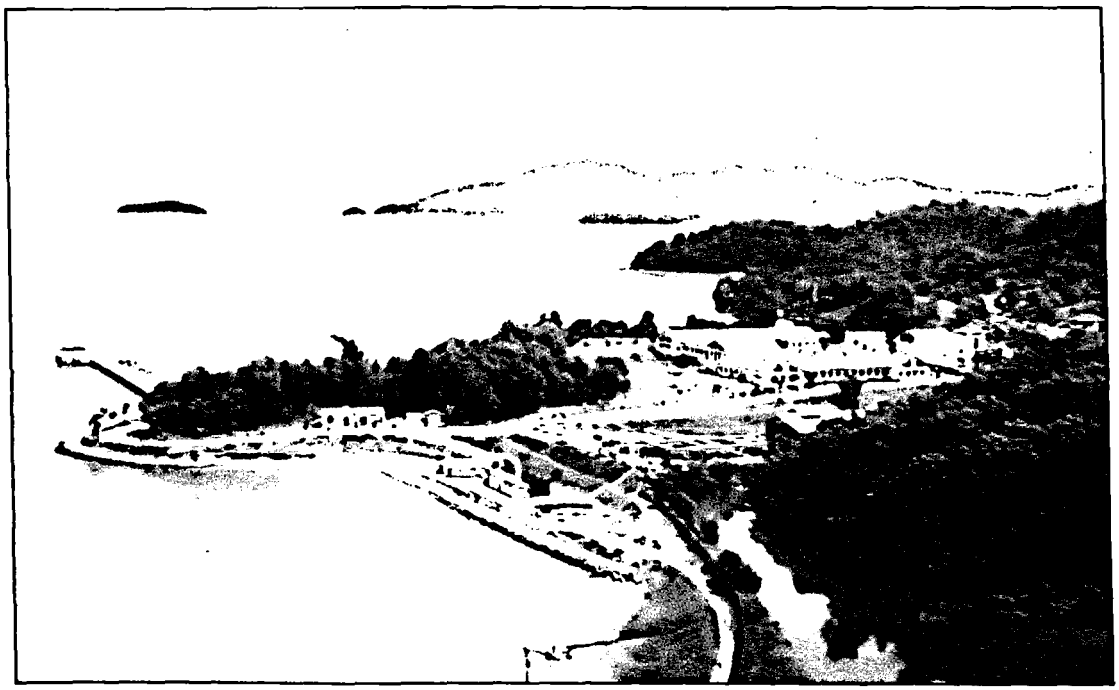

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SYNOPSIS

Nearshore coastal environment in UMS coastal area of Sepanggar bay has been studied through extensive field measurements and model calculations. The study covers the spatial and monsoonal variations of wave climate, water current velocity, suspended sediment concentration, temperature salinity, dissolved oxygen (DO), water transparency, pH, plankton communities and macrobenthos assemblages in the study area. Effects of cage culture and harmful algal bloom have also been investigated. Samples were collected from five sampling stations covering nearshore area, cage culture area and offshore area of the study area covering northeast monsoon, inter-seasonal monsoon and southwest monsoon. Wave dynamics were studied through model calculations using JONSWAP spectral method. Temperature, salinity, pH and dissolve oxygen concentration were measured *in situ* using an YSI meter. Aquadrop profiler was used to measure the current velocity. Water transparency was measured using a Secchi disc. Total suspended solids of collected water samples were determined in the laboratory using the drying, burning and weighing method. Phytoplankton and zooplankton were collected using a 20μm mesh sized plankton net. Grab sampler were used to collect the macrobenthos. A significant seasonal variations were observed in the physical water properties while the differences for spatial variation were found to be statistically insignificant. However, field measurements showed lower velocity in inside cage area which is due to the cage structure. As consequences, the suspended solids were found higher in inside cage when compared to nearshore and offshore areas. Phytoplankton number, abundance and different diversity values showed significant temporal variation (except Margalef's Richness Index) while no significant differences were observed in the spatial distribution of phytoplankton. For zooplankton, significant temporal variation was observed only for Pielou Evenness Index and Margalef's Richness Index. No significant spatial distribution was observed for number, abundance and different diversity values of the zooplankton community. Macrobenthos assemblage showed significant variations both for the temporal and spatial distribution of the number, abundance and different diversity values. Findings of the present study indicate that there is no significant effect of cage culture in the study area. Physical water properties (Temperature, salinity, DO, pH, water transparency) and phytoplankton assemblage during red tide duration were found to be significantly different than those during non red tide duration.

SINOPSIS

Kajian terperinci mengenai sekitaran pesisir pantai UMS, Teluk Sepanggar telah dilakukan melalui pengukuran kerja lapangan dan pengiraan menggunakan model. Kajian terdiri dari variasi ruang dan monsun meliputi iklim ombak, halaju arus air, kepekatan sedimen terampai, suhu, saliniti, oksigen terlarut, kerjernihan air, pH, komuniti plankton dan makrobentos. Persampelan dibuat di 5 stesen kajian yang terdiri dari kawasan pesisir pantai, dalam sangkar ikan dan luar pantai kawasan kajian semasa monsun timur laut, barat daya dan antara monsun. Dinamik ombak dikaji mengunakan kaedah spektral JONSWAP. Suhu, saliniti, pH dan oksigen terlarut diukur menggunakan YSI meter. Manakala Aquadrop profiler dan cakera Secchi masing-masing digunakan untuk mengukur halaju arus dan transparensi air. Sampel air diambil menggunakan *water sampler* dan seterusnya ditapis, kering, dan timbang di makmal untuk menentukan jumlah sedimen terampai. Sampel fitoplankton dan zooplankton diambil menggunakan jaring plankton 20μm saiz mata. *Grab sampler* digunakan untuk mengambil sample macrobenthos. Variasi perubahan monsun dapat dilihat dalam data parameter fizikal air laut. Manakala analisis statistic menunjukkan variasi ruang parameter yang diuji didapati tidak mempunyai perbezaan yang signifikan. Bagaimanapun pengukuran lapangan menunjukkan halaju arus air di dalam sangkar adalah lebih rendah berbanding dengan kawasan lain. Manakala jumlah sedimen terampai adalah tinggi di kawasan ini berbanding dengan persampelan di kawasan pesisir pantai dan luar pantai. Nombor, kelimpahan dan nilai kepelbagaian diversiti fitoplankton menunjukan signifikan dalam variasi jangka masa (kecuali Indeks Margalef Richness) Manakala, tiada perbezaan yang signifikan pada variasi ruang secara statistik. Variasi jangka masa komuniti zooplankton pula adalah signifikan pada Indeks Pielou Evenness dan Indeks Margalef Richness. Tiada perbezaan yang signifikan pada variasi ruang terhadap nombor, kelimpahan dan nilai perbezaan diversitinya. Macrobentos menunjukkan variasi yang signifikan dalam kedua-dua taburan jangka masa dan ruang bagi nombor, kelimpahan dan nilai perbezaan diversitinya. Penemuan kajian ini menunjukkan kehadiran sangkar tiada memberi kesan yang ketara terhadap kawasan kajian. Parameter fizikal air laut (suhu, saliniti, DO, pH, transparensi air) dan fitoplankton semasa musim air merah didapati mempunyai perbezaan yang ketara berbanding dengan semasa bukan musim air merah berlaku.