SPATIAL DISTRIBUTION OF SEDIMENTOLOGICAL CHARACTERISTICS AND HEAVY METAL CONTENTS OF MARANG COASTAL SEDIMENT; A GIS ARCVIEW APPROACH

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By

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Research Report submitted in partial fulfillment of the requirements for the degree of Bachelor of Science (Marine Science)

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LIST OF ABBREVIATIONS

%	percentage
ºC	Degree Celsius
Ø	phi
µm	micrometer
Al	Aluminum
Cd	Cadmium
cm	centimeter
Co	Cobalt
Cr	Chromium
Cu	Cuprum
EDTA	Ethylenediamenetetra Acidic
Fe	Iron
g	gram
GIS	Geographical Information System
ICP – MS	Inductively Coupled Plasma Mass Spectrometry
L	litre
M	meter
mL	mililitre
Mn	Manganese
Pb	Lead
Sc	Scandium
TOC	Total Organic Carbon
Ti	Titanium
Zn	Zinc

ABSTRACT

This study was conducted in order to determine the spatial distribution of sedimentological characteristics and heavy metal contents of Marang coastal sediment. The study area consists of 17 stations and sediment samples had been collected from 9th June till 11th June 2007. The analyzed data of sediment size and metals selected were mapped using Geographical Information System (GIS) with the Arcview approach. In general, the mean size of Marang coastal sediment ranged between 0.05 Ø and 6.81 Ø (fine sand) with poorly sorted (0.72 Ø and 2.00 Ø). Most of the stations were covered with fine sediment and had very positively skewed (-0.21 Ø and 0.68 Ø) that proved an excess of finer grains. This might be due to the nearby river which is responsible to the transportation of sediments. The range of total organic carbon (TOC) content was between 0.12 % and 2.70 %. Concentration of heavy metals that had been detected using ICP – MS ranged from 207.06 to 833.23 μg/g for Mn; 135.88 to 4179.10 μg/g for Cr; 1.12 to 24.95 μg/g for Co; 4.93 to18.44 μg/g for Cu; 13.98 to 90.84 μg/g for Zn; 0.03 to 0.09 μg/g for Cd and 6.01 to 20.82 μg/g for Pb. Correlation between percentage of TOC and particle size showed weak relationship (r=0.1658). While, the correlation between heavy metals and particle size showed moderate correlation relationship (r=0.57 to 0.68). Moreover, the correlation between heavy metals and percentage of TOC showed weak relationship (r=0.18 to 0.29). As a conclusion, heavy metals distribution of Marang coastal area mostly derived from natural sources. This statement is emphasized by the normalization test that had been done in this study.

Penyebaran Ciri – Ciri Sedimen dan Kandungan Logam Berat di Kawasan Perairan Marang; Pendekatan kepada GIS Arcview

ABSTRAK

Kajian ini telah dijalankan untuk menentukan penyebaran ciri – ciri sedimen dan kandungan logam berat di perairan Marang. Terdapat 17 stesen terlibat dan pengumpulan sampel dilakukan bermula 9 Jun sehingga 11 Jun 2007. Analisis data yang mengandungi nilai saiz sedimen dan kandungan logam berat dipetakan menggunakan perisian GIS dengan pendekatan Arcview. Keseluruhannya, saiz sedimen di perairan Marang berjulat 0.05 Ø dan 6.81 Ø (butir-butir pasir halus) dengan nilai sisihan piawaian yang lemah (0.72 Ø dan 2.00 Ø). Kebanyakan stesen diliputi butir-butir pasir halus dengan nilai kepencongan positif (-0.21 Ø dan 0.68 Ø), membuktikan kehadiran butir-butir halus sedimen yang banyak. Ini mungkin disebabkan oleh pengangkutan sedimen dari sungai berhampiran. Julat kandungan karbon adalah antara 0.12 % dan 2.70 %. Kepekatan logam berat yang dikesan oleh ICP – MS berjulat antara 207.06 hingga 833.23 μg/g bagi Mn; 135.88 hingga 4179.10 μg/g bagi Cr; 1.12 hingga 24.95 μg/g bagi Co; 4.93 hingga 18.44 μg/g bagi Cu; 13.98 hingga 90.84 μg/g bagi Zn; 0.03 hingga 0.09 μg/g bagi Cd dan 6.01 hingga 20.82 μg/g bagi Pb. Korelasi antara peratusan karbon dan saiz sedimen menunjukkan kaitan yang lemah (r=0.1658). Korelasi antara logam berat dan saiz sedimen menunjukkan kaitan yang sederhana (r=0.57 hingga 0.68). Korelasi logam berat dengan peratusan karbon adalah lemah (r=0.18 hingga 0.29). Secara natijahnya, taburan logam berat di kawasan perairan Marang kebanyakannya diperolehi daripada sumber semulajadi. Penyataan ini diperkukuhkan lagi setelah ujian penormalan dilakukan.