UNIVERSITI TEKNOLOGI MARA

DRY AND WET SEASONS EFFECT ON HEAVY METALS CONTENT AND SEDIMENT GRAIN SIZE IN PERLIS RIVER

MUHAMAD HANIF BIN HARIF FADZILAH

Thesis submitted in fulfillment
of the requirements for the degree of
Master of Science

Faculty of Applied Sciences

July 2016

AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

Name of Student   :   Muhamad Hanif Bin Harif Fadzilah

Student I.D. No   :   2011889984

Programme   :   Master of Science (Chemical Oceanography) - AS780

Faculty   :   Applied Sciences

Thesis Title   :   Dry and Wet Seasons Effect on Heavy Metals Content and Sediment Grain Size in Perlis River

Signature of Student :

Date   :   July 2016

ABSTRACT

Perlis River is the main river in the State of Perlis and accommodates various human activities such as shipyard, aquaculture, agriculture, boat and ferry activities. However, heavy metals level in Perlis River is not well documented and scientific evidence is very limited. This research was proposed to assess heavy metals distribution level in sediment based on seasonal variation. Sediment samples were collected every month from May 2011 to April 2012 and were analysed for heavy metals concentrations of As, Cd, Cr, Cu, Pb and Zn using Inductively Coupled Plasma Mass Spectrometry (ICP-MS). The recovery of each heavy metal was in good agreement between 100-116%. As a whole, the highest heavy metal concentration observed was Cr which has a range between 65.07-158.23 mg/kg followed by Pb, 20.30-138.04 mg/kg; Zn, 23.27-127.00 mg/kg; As, 10.62-77.50 mg/kg; Cu, 7.32-68.40 mg/kg; and lastly Cd 0.02-0.21 mg/kg. Most heavy metals showed elevated content at the upper stream (ST 6-ST 10) where human activities can be found such as shipyard, dumpsite area, residential house, agriculture and aquaculture activities. Despite having lower average concentration compare to Cr, Pb and Zn, As has the most enrich (EF=24.91) and highly polluted (Igeo=3.42) level in sediment. High level of As might be due to the agricultural activities and from natural sources. Seasonal variation shows interesting result which shows As and Cr reach maximum value during northeast monsoon (NEM) and vice versa for other metals. The correlation of Pearson showed that the concentrations of heavy metals and grain size in the sediment correlate moderate to strongly (r>0.60) during NEM compare to the other monsoon seasons. Furthermore, all metals except As correlate strongly (r>0.80) with organic matter during NEM. These relationships suggest NEM has a great impact on relationship of heavy metals in both mean size and organic matter. Principal Component Analysis (PCA) shows that total variance in southwest monsoon (SWM) for both PC 1 and PC 2 reach 70.10% where PC 1 accounted for 52.50% of variance and the highest loading was Cr.

ACKNOWLEDGEMENT

TABLE OF CONTENTS