

TRACE METAL CONTAMINATION USING
Polymesoda expansa
(BIVALVE) AS BIO-INDICATOR IN KELANTAN RIVER,
MALAYSIA

MUHAMMAD IZZAT BIN KAMARUZAMAN

LP
19
PPSMS
1
2014

SCHOOL OF MARINE SCIENCE AND ENVIRONMENT
UNIVERSITI MALAYSIA TERENGGANU

2014

9836

1100093367



LP 19 PPSMS 1 2014



1100093367
Trace metal contamination using polymesola expansa
(BIVALVE) as bio-indicator in Kelantan River, Malaysia / by
Muhammad izzat Kamaruzaman.

PUSAT PEMBELAJARAN DIGITAL SULTANAH NUR ZAHIRAH
UNIVERSITI MALAYSIA TERENGGANU (UMT)
21030 KUALA TERENGGANU

1100093367

1100093367	

Lihat Sebelah

HAK MILIK
PUSAT PEMBELAJARAN DIGITAL SULTANAH NUR ZAHIRAH

**TRACE METAL CONTAMINATION USING *Polymesoda expansa*
(BIVALVE) AS BIO-INDICATOR IN KELANTAN RIVER, MALAYSIA**

By

Muhammad Izzat Bin Kamaruzaman

**Research Report submitted in partial fulfilment of
the requirements for the degree of
Bachelor of Science (Marine Biology)**

**Department of Marine Science
School of Marine Science and Environment
UNIVERSITY MALAYSIA TERENGGANU**

2014

M.I. Kamaruzaman. (2014). Trace Metal Contamination Using *Polymesoda Expansa* (Bivalve) As Bio-Indicator In Kelantan River, Malaysia. Undergraduate thesis, Bachelor of Science in Marine Biology, School of Marine Science and Environment, Universiti Malaysia Terengganu, Terengganu, 49p.

No part of this project report may be produced by any mechanical, photographic, or electronic process, or in the form of phonographic recording, nor may it be stored in a retrieval system, transmitted, or otherwise copied for public or private use, without written permission from the author and the supervisor(s) of the project.



SCHOOL OF MARINE SCIENCE AND ENVIRONMENT
UNIVERSITI MALAYSIA TERENGGANU

DECLARATION AND VERIFICATION REPORT
FINAL YEAR RESEARCH PROJECT

It is hereby declared and verified that this research report entitled Trace Metal Contamination Using *Polymesoda Expansa* (Bivalve) As Bio-Indicator In Kelantan River, Malaysia by Muhammad Izzat Bin Kamaruzaman, Matric No. UK 26275 have been examined and all errors identified have been corrected. This report is submitted to the School of Marine Science and Environment as partial fulfillment towards obtaining the Degree in Bachelor of Science (Marine Biology), School of Marine Science and Environment, Universiti Malaysia Terengganu.

Verified by:

First Supervisor

DR. ONG MENG CHUAN
Lecturer

Name:

School of Marine Science and Environment
Universiti Malaysia Terengganu
21030 Kuala Terengganu

Official stamp:

Date: **15-06-2014**

.....
Second Supervisor

Name:

Official stamp:

Date:

ACKNOWLEDGEMENT

I would like to express my deepest appreciation to all those who provided me the possibility to complete this report. A special gratitude I give to our final year project supervisor, Dr. Ong Meng Chuan, whose contribution in stimulating suggestions and encouragement, helped me to coordinate my project especially in writing this report.

Furthermore I would also like to acknowledge with much appreciation the crucial role of the staff of Biodiversity Laboratory, En. Manaf and En. Madzan who gave the permission to use all required equipment and the necessary materials to complete the task. Beside, thank a lot to ICP-MS Laboratory Assistant, Mr. Joseph as he teach me to using the machine.

I would like to express my gratitude to my co-supervisor, Mr. Yong Jaw Chuen for the useful comments, remarks and engagement through the learning process of this final year project. Also, I like to thank the participants in my research, who have willingly shared their precious time during the process of collecting samples. I would like to thank my loved ones, who have supported me throughout entire process, both by keeping me harmonious and helping me putting pieces together. I will be grateful forever for your love.

LIST OF TABLES

Table		Page
4.1	The average length, weight (dry and wet) of all samples together with the average concentration of each metals in each station (Station 1 and 2 is non-industrial area and station 3 and 4 is industrial area).	19
4.2	Recovery test show the accuracy of the machine that being used to determine the concentration of metals in each sample.	20
5.1	The result of previous study compare to the current research.	23

LIST OF FIGURES

Figure		Page
3.1	The sampling stations across Kelantan River, Malaysia	13
3.2	The sampling stations near to Kota Bharu town and near to Kampung Pulau Melaka	13
5.1	Correlation of Length (Size) of <i>Polymesoda expansa</i> with the concentration of trace metal.	24
5.2	The correlation between the weights of samples with the concentration of metals in each samples.	26
5.3	The average concentration of metals in each sample at each station (industrial and non-industrial area) along with the safety level of human consumption.	28

LIST OF ABBREVIATION

$\mu\text{g g}^{-1}$	-	microgram per gram
ppm	-	part per million
mm	-	millimetre
g	-	gram
Cr	-	Chromium
Fe	-	Ferum
Zn	-	Zinc
Cu	-	Copper
Cd	-	Cadmium
Pb	-	Lead
ICP-MS	-	Induced Coupled Plasma Mass Spectrophotometer

LIST OF APPENDICES

Appendix		Page
1	The Correlation Between Metals (Cd Versus Metals)	42
2	The Correlation Between Metals (Cr Versus Metals)	43
3	The Correlation Between Metals (Cu Versus Metals)	44
4	The Correlation Between Metals (Fe Versus Metals)	45
5	The Correlation Between Metals (Pb Versus Metals)	46
6	The Correlation Between Metals (Pb Versus Metals)	47
7	The Normality Test (Normality of Data)	48
8	The Anova Test (Significant of The Data)	48

TABLE OF CONTENTS

ACKNOWLEDGEMENT	ii
LIST OF TABLES	III
LIST OF FIGURES	IV
LIST OF ABBREVIATION	V
LIST OF APPENDICES	VI
ABSTRACT	IX
ABSTRAK	X
CHAPTER: 1 INTRODUCTION	1
1.1 Introduction	1
1.2 Objectives	3
CHAPTER 2: LITERATURE REVIEW	4
2.1 Heavy Metal That Used In the Study	4
2.1.1 Cadmium (Cd)	5
2.1.2 Copper (Cu)	6
2.1.3 Zinc (Zn)	6
2.1.4 Iron (Fe)	7
2.1.5 Chromium (Cr)	7
2.1.6 Lead (Pb)	8
2.2 Brackish River in Mangrove Area at Kelantan River	8
2.3 Bivalves (<i>Polymesoda expansa</i>) That Act as Bio-Indicator	9
CHAPTER 3: METHODOLOGY	11

3.1	Apparatus and Reagent	11
3.2	Sampling and Sample Analysis	11
3.3	Map sampling.	13
3.4	Analytical Method	14
3.5	Statistical Analysis	15
3.6	Recovery Test	15
3.7	Standard Sample Analysis	15
3.8	Calculation	16
CHAPTER 4: RESULT		17
4.1	Average Concentration of Heavy Metal in Samples for Each Station	17
4.2	Recovery Test	20
4.3	The Significant of The Data	20
CHAPTER 5: DISCUSSION		21
5.1	The Current Research Compared To Previous Study	21
5.2	The Correlation of Length (Size) and The Concentration Of Heavy Metals.	24
5.3	The Correlation of Weight with Concentration of Heavy Metals.	26
5.4	The Concentration of Heavy Metals in Each Station with Safety Level of Consumption	28
CHAPTER 6: CONCLUSION		33
REFERENCES		34
APPENDICES		42
CURRICULUM VITAE		49

ABSTRACT

Human are easily contact with natural resources and some of marine natural organisms were being consume by human as daily diet. One example of marine organism that become favourite to human is bivalve and easily being captured in upper layer of mud in mangrove or semi-mangrove area. However, the scientists had proven that the bivalve is the organism that the bivalve is significantly inhale or 'consume' whatever the food pass by through the water column. Due to this behaviour, the safety of the consumption of bivalve or marine organisms are argued by people as same as the researcher from the result of unknown sources of food that taken by the bivalve. As the bivalve is acceptable for doing metal toxicity analysis, it is used to know the pollution status of the area of study. The size of bivalve can be relate to the concentration of the metals. So, some metal is increase directly proportional to the size where as some are not. So, this research was conducted to determine the relationship between certain concentration of metals with the size and the safety of human consumption in one of Kelantan River, Kota Bharu, Kelantan, near to huge industrial area.

PENILAIAN LOGAM BERAT MENGGUNAKAN KERANG (*Polymesoda expansa*) DI SUNGAI KELANTAN, MALAYSIA

ABSTRAK

Manusia mudah mengakses dengan sumber semula jadi dan beberapa organisma semula jadi marin telah menjadi bahan untuk diet harian. Satu contoh organisma marin yang menjadi kegemaran untuk manusia adalah kerang dan kerang senang untuk ditangkap di lapisan atas lumpur dalam kawasan paya bakau atau kawasan separa bakau. Walau bagaimanapun, ahli-ahli sains telah membuktikan bahawa kerang adalah organisma yang menyedut atau makan apa sahaja makanan yang ada dalam air. Oleh kerana tingkah laku ini, keselamatan kerang dan organisma marin untuk dimakan diragui oleh orang ramai dan sama seperti penyelidik hasil daripada makanan yang dimakan oleh kerang dari sumber yang tidak diketahui. Disebabkan itu, kerang diterima dalam menganalisis tahap kepekatan dan keracunan logam, dan digunakan untuk mengetahui status pencemaran di kawasan kajian. Saiz kerang boleh berkaitan dengan kepekatan logam. Jadi, sesetengah logam meningkat berkadar terus dengan saiz dan sesetengah jenis logam berkadar songsang dengan saiz. Jadi, kajian ini telah dijalankan untuk menentukan hubungan antara kepekatan tertentu logam dengan saiz dan keselamatan pemakanan kerna terhadap manusia di salah satu kawasan daripada Sungai Kelantan, Kota Bharu, Kelantan, berhampiran kawasan perindustrian yang besar.