

UNIVERSITI TEKNOLOGI MARA

**ASSESSMENT OF CONCENTRATIONS
AND DISTRIBUTION OF
RADIONUCLIDES AND NON-
RADIONUCLIDES ELEMENTS IN
MANJUNG COASTAL WATER AREA**

ANISA BINTI ABDULLAH

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ABSTRACT

Rapid socioeconomic development in Manjung area may contribute to the pollution of the Manjung coastal water area. One of the main causes of marine pollution is the uncontrolled release of pollutants such as radionuclide and non-radionuclide elements mainly from anthropogenic activities. Unfortunately, the pollutants transported to the atmosphere and deposited back over the land or run off to the river and flow into coastal water area and finally enter the food chain. They have potential radiological and health risk to human body. Therefore, this study is focused on assessment of radionuclide (^{40}K , ^{238}U and ^{232}Th) and non-radionuclide (Hg, Cd, Cr, Cu, Pb, As, Se, Fe and Zn) in water, sediment and marine biota from Manjung coastal water area. The measurements were carried out using Energy Dispersive X-Ray Fluorescence (EDXRF) and Inductively Coupled Plasma Mass Spectrometry (ICP-MS). Linkages between seawater-sediment-marine biota potential acts as indicator of pollution level and health risk to the human population of the study area. As results, the pollution trends as revealed by Enrichment factor (EF), Geo-accumulation index (Igeo) and Pollution index (PI) of the radionuclides and non-radionuclides elements in marine sediment were found corresponding to the river sediment concentration level signified that the pollution originated from the Bekah River. The elements of ^{40}K , Hg, Fe and Cu are in the category of low pollution level, while elements Cr, Zn, ^{238}U , Pb and ^{232}Th in the category of medium pollution level, whereas elements Cd, As and Se in the category of high pollution level. Based on Principle Component Analysis (PCA) and Cluster Analysis (CA), the possible sources of radionuclides and non-radionuclides elements are attributed from agricultural, industrial and domestic activities. The possible radiology and the chemical toxic effect of the radionuclides and non-radionuclides elements in seawater and marine sediment could exert the negative effect to the biota and human those consume the biota. Therefore, significant high risk was found for consumption of marine biota due to high concentration of elements ^{232}Th , Cr, As and Pb but the risk depends on intake rate per day and the species of biota consumed. Hence, it is important to carried out regular monitoring of pollution level in Manjung coastal water area in order to provide information radiological and health risk assessment for human population in the study area.

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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF RESEARCH

Marine pollution is described as the condition of marine environmental samples containing relatively high concentrations of various pollutant elements (Nasir et al., 2012). The pollution occurs when pollutants affect quality of marine ecosystems, since marine ecosystem supports millions of habitat-forming marine organisms and humans as last consumers in the life cycle (National Academic of Marine Ecosystem). Pollutants may enter marine environment either in liquid or solid form through wet and dry depositions. Pollutants that came from its various sources will settle in water system. However, these pollutants could not be removed from water and eventually undergo self purification. After that, pollutants will accumulate in reservoir and finally enter the food chain (Ong and Kamaruzzaman, 2009). In most circumstances, this country demands the involvement of all parties to take necessary action in order to avoid pollution becoming more serious.

Pollutant, for example, radionuclides and non-radionuclides level was increased in marine environmental samples primarily from natural processes or by anthropogenic activities. Examples of natural source pollutant elements that naturally occurred, such as erosion of rocks, wind blowing dust, forest fire and volcanic activity. Meanwhile, some anthropogenic activities can cause contamination in marine ecosystem are coming from heavy industrial, agricultural, runoff, waste and toxic discharges from factories, quarries and domestic sewage (Suresh et al., 2013). The anthropogenic activities are giving negative impact for a certain purpose.

Various types of pollutants that enter rivers and coastal water area may in form of essential, hazardous and toxic elements. Radionuclide elements are an atom with unstable nucleus and natural origin. These radionuclides undergoes radioactive decay and emits a gamma ray or subatomic particles radiated from anthropogenic activities or naturally, where a potential radiological risk exposed into the atmosphere and