DETERMINATION OF HEAVY METAL SPECIATION IN KANDY LAKE AND SURROUNDING WATER RESOURCES

A dissertation submitted to the

Faculty of Science & Technology

Uva Wellassa University

In partial fulfillment of the requirements for the award of the

Degree of Bachelor of Science

By

SHARMILA VINAYAHAMUTHTHURASA

Mineral Resources and Technology Degree Program
Uva Wellassa University, Sri Lanka

2014

Abstract

These days chronic toxicity of heavy metals is becoming potential impact on human as well as the aquatic animal. To get the clear understanding of chronic toxicity it is important to study the metal speciation as its divalent ion can be present as a variety of aqueous species, including the free cation, inorganic or organic complexes. So aim of this study was to determine the metal speciation in Kandy Lake and some near water ways around the Lake in order to predict the chronic toxicity for the aquatic organisms as they are more sensitive for elevated concentration of metal. The work was done through the geochemical model called Visual MINTEQ 3.0. The results of this study were shown that metal speciation depends on various factor such as pH, dissolved organic matter and total metal concentration. High pH would reduce the bioavailability of heavy metal. Inorganic and organic complexes would also decrease bioavailability of metal at high pH. 0.5µg/l Cd was found only in intake water for water purification plant and also it showed high Zn concentration as 1776.6 µg/l. It was found that particular point called intake water for water purification plant may have chronic toxicity of metals such as Zn^{2+} 1546.4 µg/l and Cd^{2+} 0.46 µg/l. So it may be harmful to aquatic organisms such as Rainbow trout and green alga as their toxic exposure for Zinc was identified as 110-1970 µg/L and 26-1630 µg/L respectively, while Pb, Ni, Cu have significant level. The Kandy Lake and outgoing canals did not show any chronic toxicity. Inlets showed averagely 0.4µg/l Ni^{2+}, 0.07µg/l Cu^{2+} and 6.1µg/l Zn^{2+}. Kandy Lake showed averagely 0.2µg/l Ni^{2+}, 0.005µg/l Cu^{2+} and 1.4µg/l Zn^{2+} while outgoing canal showed averagely 0.5µg/l Ni^{2+}, 0.08µg/l Cu^{2+} and 5.6µg/l Zn^{2+}. At this moment no any chronic toxicity in lake, canal and river except the point called intake water for water purification plant.