

An analysis of existing groundwater management and policy matters in Industrial areas : A case study from Rathupaswala

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Abstract

Introduction

Due to non availability or inadequacy of surface water resources, groundwater has become more popular in water supplies in past few decades in Sri Lanka. At the same time, pollution of groundwater is one of the major constraints for this valuable resource. Impacts of industrial, agriculture and urban activities have been identified as the major sources for contamination of groundwater(Panabokke and Perera 2005). Among these, industrial activities play a significant role in ground water pollution in the recent past in Sri Lanka. In addition to pollution control development and implementation of ground water policies and reliable ground water management is essential for an effective ground water management in the country. This in turn significantly affected the implementation of a formally approved water policy for the country (Gunatilake and Gopalakrishnan 2002, Samad 2005). A National policy must be flexible and should be able to accommodate the diverse groundwater contamination problems that come across by varying site conditions(Rail 1989). Bacon and Oleckno (1985) highlighted the importance of establishing a groundwater protection program at national level, the importance of revealing the contamination sources, making an inventory and understanding the hydrogeology of respective areas.

Research problem

A major problem related to contamination of the groundwater in the Rathupaswala area was thought to be due to the dumping of factory chemical waste material such as Zinc oxide, Potassium hydroxide, sulfuric acid, Nitric acid etc. Industrial wastes, inevitably generates chemical pollutants that reach their surroundings. However, present groundwater management strategies and policies are still in its infancy to manage the quality of this all-important resource (Villholth and Rajasooriyar 2010). In Sri Lanka there is no single or formally accepted water policy or water law. Only fragments of law exist in a number of legislative enactments among various authorities (Samad 2005). Hence, the pollution aspects of groundwater due to industrial activities were studied taking in to account one of the major conflicts that arose in the Rathupaswala area in Sri Lanka during the year 2014. The existing ground water policies

were reviewed and their loop holes were studied, in order to adopt preventive measures within the frame work of enhanced management strategies.

Objective

The main objectives of this study were to examine the suspected pollution sources that resulted in an increase of the acidity of groundwater in the Rathupaswala area and to understand the existing groundwater policies in Sri Lanka and identify their weaknesses in order to adopt preventive measures with enhanced groundwater management strategies

Research Methodology

The groundwater flow in the affected area was studied using topographical, geological and structural maps. Hydrogeological data including water levels and water quality of forty wells (dug wells and one tube well) and three surface water bodies in the study area were collected. The physico-chemical parameters such as pH, sodium, potassium, nitrate, zinc, chromium, sulfate, phosphate and electrical conductivity were analyzed on site and in the laboratory using standard methods. Data on; depth to the water level, static water level, initial pH and recovery pH were collected from a well cleaning programme. The existing ground water policies and water acts were reviewed.

Key findings

The results did not give clear evidence that the low pH of the area is due to factory effluent. The study area mainly consists of lateritic soil and generally the pH of the lateritic soil varies from 4.8 – 6.5 and also the pH of two samples of rain water showed values of 4.62 and 4.67. Well cleaning programme hinted that the acidity of the dug well inside the industrial factory may have been corrected using an alkali. Water samples taken from the factory dug well and the dug wells in the radius of 300 meters towards the South West direction showed a high concentration of Nitrate and Sulphate values. Geologically & Hydrogeologically, the factory is located in an elevated area which is an unsuitable location which would carry contaminants with the ground water flow.

It was evident that this situation is a result of lack of proper groundwater management policies in the country. It was clear that the present groundwater management strategies and policies are not strong enough to control or eliminate contamination of groundwater due to industrial activities. There is very few number of legislation dealing directly or indirectly with groundwater resources and the legal support and implementation strategies for controlling groundwater pollution are inadequate. As an example, no time series data on water quality sampling system were found in the study area as none of the responsible institutions had time series data of water samples as the governance of groundwater were the task of

number agencies & several ministries covered by a number of parliamentary acts. The diversity of the institutions and legislation, unclear responsibility and accountability and inadequate resources were the main issues in groundwater management.

Conclusion

It is necessary to improve the present groundwater development and management practices and revise the existing groundwater policy matters in Sri Lanka.

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