

UNIVERSITI TEKNOLOGI MARA

**GROUNDWATER QUALITY EVALUATION
USING GROUNDWATER QUALITY INDEX,
ECOLOGICAL RISK INDEX, AND HEALTH
RISK ASSESSMENT IN SELECTED AREAS IN
SELANGOR**

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ABSTRACT

Groundwater quality evaluation is important because there are many people in the world using groundwater as their main water supply. Therefore, this people need quality assurance to ensure that their water and clean and safe for consumption to prevent adverse effects to their health. This research focus on some areas in Selangor, Malaysia, as the study area. Three groundwater quality evaluation method has been conducted by the author including, groundwater quality index, ecological risk index, and health risk assessment. The groundwater quality index categorized the overall quality of groundwater, the ecological risk index identifies the potential impact of heavy metals analyzed on the environment, and the health risk assessment evaluates the health impact of heavy metals exposure due to groundwater consumption. It was found that more than half of the water samples are in the good quality category as 7 out 12 samples showing index score in the range of 70 to 89. Moreover, the ecological risk index depicts that there was no or little ecological impact of the heavy metals as all the samples having an index score of less than 1. Furthermore, it was concluded that drinking the groundwater is safe for health, which has been proven by the results from the health risk assessment as the hazard index was lower than 1. Overall, the quality of groundwater in Selangor is safe and clean, but with only few areas needing some improvement.

Keywords: Groundwater, Selangor, groundwater quality index, ecological risk index, health risk assessment.

CHAPTER 1

INTRODUCTION

1.1. Background

Groundwater refers to the water that is discovered below ground level in the crevices and gaps that are present in the earth, sand, and rock (Babar, 2005). Aquifers are underground reservoirs that store and transport water slowly. Granular materials like gravel, sand, and sandstone, as well as fragmented rocks like limestone, commonly make up aquifers. These materials are permeable to water because of their pore spaces. Rainwater that seeps into pores and fissures below the surface of the soil can recharge aquifers, which means that it can refill existing groundwater resources (Younger, 2009). Groundwater is practically everywhere on earth. Many variables can cause the water table to rise or sink, depending on how deep it is. However, if severe rains occur, the water table may rise. However, if groundwater resources are pumped, the water table may sink deeper.

As droughts grow more frequent in some parts of the world due to global climate change, the quality of groundwater will become increasingly more critical. Irrigation accounts for over 43% of the world's groundwater consumption; the remainder is utilized in households and businesses (Kresic et al, 2009). Countries' groundwater utilization varies widely, in part because of the influence of local weather. Groundwater is mostly used for domestic water supply in nations that receive a high amount of rainfall, such as Malaysia and Indonesia, since the amount of water needed for agriculture is quite low in these countries. More than 2 billion people throughout the world rely on groundwater for their drinking water. Drought-prone nations like Saudi Arabia rely on irrigation for 90% of their groundwater needs (DeNicola *et al.*, 2015).