

Impact of Drought on Ground Water Quality in Langata Sub-County, Kenya

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Abstract A quality decline trend is suspected to be ensuing in the water originating from boreholes in Langata sub-County; a region located to the south of Nairobi, the capital city of Kenya in East Africa. Despite the existence of this worrisome suspicion, no investigation has been conducted to assuage the fears of the exposed population. This situation however contradicts the great augmenting role of borehole water delivered by vendors to consumers as a coping strategy against the pervasive drought induced water shortage challenge afflicting households in Langata. Hence, a question arose as to whether the identified past drought events have had any chance of influencing the ongoing declining trend of the area's ground water quality. The purpose of this study was therefore to assess the impact of historical drought events on the ground water quality in Langata Sub County. The profile of drought indices was superimposed over the area's time series geochemical water quality indices' profile. Further, the computed area's groundwater potability grade was used to estimate the probability of water quality deterioration due to drought impact, returning a value of 43.65%. It was found that indeed, ground water quality in the area is on a declining mode. Since water is an elixir of life; the finding from this study is expected to trigger an establishment of a water quality surveillance initiative as a safeguard to public health.

Keywords: drought, water, quality, decline, surveillance

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1. Introduction

Water is an elixir of all life forms on Earth [1]. Now-a-days; groundwater is a significant source of water for human consumption [2]. It is supplying nearly half of all drinking water in the world [3]. Scholars like those in [4] have argued that, groundwater is a reliable source of fresh water for mankind's water needs. Its slow response to meteorological conditions makes it a big buffer against climate variability including drought according [5,6]. It is estimated that 35% of the earth's surface does experience some form of drought in any given year [6]. This puts into doubt whether groundwater will meet the increasing water demand [7] given the emerging depletion threats from a reduced recharge rate in the face of an increasing demand [8].

Already, in the African continent, almost 44% of the people lacks access to safe water due to the region's susceptibility to rainfall variability [9]. Exacerbating this lack of safe water access is the threat from climate change which is suspected to be fueling groundwater quality decline [10,11,12,13]. Dietary exposure of contaminants

through drinking water is a potential source of nearly 75% of the world's waterborne diseases [14]. In an effort to put in measures to protect groundwater quality; a lot of research work has gone in to investigate the sources of groundwater contaminants with an aim to ensuring the adherence to the World Health Organization's safe drinking water guidelines [15,16,17].

In the mid 1980s, worker in [17] pointed out that pesticide was a potential contaminant of ground water, a claim later affirmed by [19] who added that insecticide residues were also found in soil and fruits thereby affecting farmers' health. In the early 1990s, scholar in [20] added their voice, this time blaming pesticides infiltration into groundwater thereby causing adverse health effects on the exposed people. Weighing in on this point, workers in [21] further emphasized the danger people faced from exposure to pesticides in drinking water. Following this, the American Conference of Governmental Industrial Hygienists, a group of industrial hygienists and other occupational health safety professionals dedicated to promoting health and safety, on their part, recommended threshold limit values for chemical substances and physical agents [22]. That is why the workers in [23] recently recommended for the application of nanofiltration