

**EFFECTS OF VARIATIONS IN RAINFALL AMOUNTS ON THE WATER
TABLE FLUCTUATIONS IN KANO PLAINS, RIVER NYANDO BASIN,
KISUMU COUNTY, KENYA**

**BY
GOR GEORGE ODHIAMBO (B.Sc.)
I56/37531/2016**

**A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF
SCIENCE (HYDROLOGY AND WATER RESOURCES) IN THE SCHOOL
OF PURE AND APPLIED SCIENCES OF KENYATTA UNIVERSITY.**



JANUARY, 2023

DECLARATION

This thesis is my original work and has not been presented for a degree or any other award in any other university.

Signature Date 24/1/2023**Gor George Odhiambo (I56/37531/2016)**

Department of Geography

SUPERVISORS

We confirm that the work reported in this thesis was carried out by the candidate under our supervision.

Signature Date 24/1/2023

Dr. Mary Makokha

Department of Geography

Kenyatta University

Signature Date 24/1/2023

Prof. Joy Obando

Department of Geography

Kenyatta University

ABSTRACT

Groundwater plays an important role in Kano Plains' water supply as it contributes to about 40 % of domestic use. However, the erratic rainfall negatively impacts on the quantity of this resource. Therefore, general objective of this study was to determine the effects of variation in rainfall amounts on water table fluctuations in Kano Plains. Specifically, the study determined Kano Plains' temporal and spatial rainfall variability (1980-2020), assessed water table fluctuations during wet and dry seasons (2011, 2017) and examined the response of water table with regards to rainfall variability. The study used two rainfall stations and nine (9) shallow wells for the analysis. Secondary data were obtained from Ministry of Water, Water Resources Authority (WRA) and Kenya Meteorological Department (KMD) and primary data were collected during the study period. Automatic data loggers were used to measure groundwater levels. Data analysis was done using Microsoft office Excel, Statistical Package for Social Science (SPSS) and Arc GIS. The study revealed spatial rainfall trend within Kano Plains, evidenced by correlation of determinant of 48.54 % between Ahero Irrigation Scheme and Koru Bible Centre. Temporal analysis revealed that, there was maximum mean monthly rainfall during MAM (482.5 mm and 526.7 mm) and minimum mean monthly in the JF (164.5 mm and 160.6 mm) for Ahero Irrigation Scheme and Koru Bible Centre stations respectively. On the other hand, the study revealed trends in water table fluctuations for both Kano wetland wells and Kano midland wells. Kano midland wells water table fluctuations ranges from 7 ± 0.8 m while for Kano wetland wells it ranges from $1.6 \text{ m} \pm 0.3 \text{ m}$ during wet and dry periods. The water table was low during the beginning of the year and reaches the highest level in the month of December. Regarding the third objective, the study revealed maximum and minimum water table coincided with the rainfall pattern of wet and dry seasons. Again, the study revealed that there was significant positive correlation of rainfall and water table 0.82 and $r = 0.583$, p (2-tailed) > 0.05 , coefficient of determinant of 67.2 %. Therefore, the study concluded that rainfall variability was a major factor in influencing water table fluctuations in Kano Plains. Furthermore, the study recommends enhanced rain harvesting and water storing facilities like dams, further study to help understand the difference in water table fluctuation between Kano midland and Kano wetland and further study on the other factors contributing to water table with correlation of determinant of 32.8 %.