

**EFFECTS OF IRRIGATION ACTIVITIES ON THE PHYSICO-CHEMICAL,
BIOLOGICAL AND FLOW PROPERTIES OF WATER IN RIVER PERKERRA,
BARINGO COUNTY, KENYA.**

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DECLARATION AND RECOMMENDATION

Declaration

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

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Recommendation

This thesis has been examined, passed and submitted with our approval as University supervisors.

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DEDICATION

I dedicate this work to my lovely wife, Mercy Cheptesyo Kapeton, and our kids, Mirelle Chepchumba Mading and Reign Kalya Mading.

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ABSTRACT

The quality of water in open water sources like rivers and lakes majorly depend on the physicochemical and biological properties that result from natural or anthropogenic processes. Inland water resources are faced with immense pressure from agrochemicals, municipal and domestic wastes, which cause variation in water quality. The aim of this study was to assess effects of irrigation activities on the physicochemical, biological and water flow properties in River Perkerra, Baringo county, Kenya. The properties that were studied to assess the quality of the river water include; Temperature, PH, Electrical Conductivity(EC), Total Dissolved Solids(TDS), Sulphates, Phosphates, Nitrates, Chlorides, Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), E. Coli counts and water discharge. The results of the study indicated that at the surface level, the mean temperature was 27.10°C, significantly warmer than the 23.98°C recorded during the wet season. The mid-level temperature decreased from 26.00°C in the dry season to 23.98°C in the wet season. During the dry season, pH levels were lower, with means of 5.82 at the surface, 5.61 at the mid-level, and 5.50 at the bottom. The wet season saw higher pH levels, with means of 7.94 at the surface, 7.94 at the mid-level, and 7.93 at the bottom. During the dry season, electrical conductivity was higher across all depths, with mean values of 194.70 $\mu\text{S}/\text{cm}$ at the surface, 192.10 $\mu\text{S}/\text{cm}$ at the mid-level, and 193.00 $\mu\text{S}/\text{cm}$ at the bottom. During the wet season, conductivity decreased to mean values of 166.27 $\mu\text{S}/\text{cm}$ at the surface, 166.14 $\mu\text{S}/\text{cm}$ at the mid-level, and 165.13 $\mu\text{S}/\text{cm}$ at the bottom. During the dry season, TDS values were higher, with means of 97.36 mg/L at the surface, 117.17 mg/L at the mid-level, and 102.18 mg/L at the bottom. During the wet season, TDS values decreased to mean values of 80.88 mg/L at the surface, 118.30 mg/L at the mid-level, and 82.54 mg/L at the bottom. Sulphate concentrations were relatively higher during the dry season, with mean values of 31.00 mg/L at the surface, 31.41 mg/L at the midlevel, and 34.00 mg/L at the bottom. Sulphate concentrations decreased during the wet season, with means of 20.67 mg/L at the surface, 19.85 mg/L at the mid-level, and 20.33 mg/L at the bottom. During the dry season, the mean nitrate concentrations at the surface, mid-level, and bottom levels were relatively close, ranging from approximately 5.97 mg/L to 6.23 mg/L. During the wet season, the mean concentration at the surface was significantly lower at 3.07 mg/L compared to the mid-level (4.23 mg/L) and the bottom level (4.87 mg/L). In the dry season, the chloride concentration was higher across all levels of the river, with mean values of 3.2667 at the top level, 3.7667 at the mid-level, and 5.3667 at the bottom level. In wet season, the chloride concentration was lower at the top level with a mean of 2.5, but higher at the mid and bottom levels, with means of 4.13 and 5.33, respectively. In wet season, the mean COD concentrations were higher across all levels of the river, with values of 2.81 mg/L at the top level, 2.80 mg/L at the mid-level, and 2.76 mg/L at the bottom level. The dry season COD concentrations were lower, with mean values of 2.18 mg/L at the top level, 2.50 mg/L at the mid-level, and 2.19 mg/L at the bottom level. The mean BOD at the surface level was 6.16 mg/L, at the mid-level was 6.40 mg/L, and at the bottom level was 6.63 mg/L. During the wet season, the mean BOD values increased to 7.30 mg/L at the surface, 8.50 mg/L at the mid-level, and 9.40 mg/L at the bottom level. From the questionnaire's interviews, 74.3% of the farmers use pesticides with no proper training. This study therefore emphasized the need to enhance their knowledge on agrochemicals use to improve their production while reducing pollution of water sources.