



UNIVERSITY OF NAIROBI
SCHOOL OF PHYSICAL SCIENCES
DEPARTMENT OF CHEMISTRY

ASSESSMENT OF WATER QUALITY TRENDS USING REMOTE SENSING DATA
“CASE STUDY OF LAKE NAIVASHA IN THE RIFT VALLEY OF KENYA”

BY

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DECLARATION

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

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SUPERVISORS DECLARATION

This thesis has been submitted for review with our approval as supervisors.

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DEDICATION

This project is dedicated to the loving memories of my late grandparents Rev.Dr. & Mth.G. Franklin Holt Sr. and my late father Hon. Charles Jefferson Johnson Sr.

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ABSTRACT

This study was conducted using remote sensing data for the establishment of water quality trends of Lake Naivasha from 2003 to 2011. Laboratory analysis was also conducted for three months from September 2014 to November 2014 by collecting samples from six sampling points. These sampling points were located using the Global Positioning System (GPS) for easy reference. The results obtained from the remote sensing data were correlated with the laboratory analysis using the Chi Square correlation method. Parameters analyzed by the remote sensing method included total suspended matter (TSM), turbidity, chlorophyll a and back scattering suspended matters (conductivity). Water quality information was defined from Medium Resolution Imaging Spectrometer (MERIS). Parameters analyzed *insitu* during the laboratory analysis were: pH, temperature, turbidity, conductivity and dissolved oxygen. Parameters analyzed in the laboratory were total suspended solid, total dissolved solid and coliform.

The study findings showed that the measurements conducted *insitu* on the lake for pH ranged from 6.8 to 7.8. The temperature readings were ranging from 20.6°C to 24.7°C. The dissolved oxygen levels were ranging from 4.53mg/l to 6.79mg/l.

The trends of the Total Suspended matter (TSM) from 2003 to 2011 showed continuous rise and fall with the highest level in November 2006 of 16.61mg/l and the lowest level in November 2011 of 4.27mg/l. The trend in turbidity level from 2003 to 2011 showed rise and fall in the trends with the highest level in 2007 of 14.16FNU and the lowest value in 2011 of 2.31FNU. The trends in the conductivity of the lake showed consistency for 2003, 2005 up to 2010 at the same level of 0.3mg/l. In 2011 the reading was found to be 0.18mg/l and the lowest value recorded in 2004 of 0.15mg/l.

Parameters considered for correlation using the remote sensing data and the laboratory analysis included TSS, turbidity and conductivity using the chi-square correlation coefficient. From the three parameters correlated only turbidity showed a positive or direct correlation. The result from the correlation coefficient was 0.916.

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