

The Limnology, Climatology and Paleoclimatology of the East African Lakes

Edited by

Thomas C. Johnson

*Large Lakes Observatory
University of Minnesota, Duluth*

and

Eric O. Odada

*Department of Geology
University of Nairobi, Kenya*

with the assistance of Katherine T. Whittaker

Gordon and Breach Publishers

Australia • Canada • China • France • Germany • India • Japan •
Luxembourg • Malaysia • The Netherlands • Russia • Singapore •
Switzerland • Thailand • United Kingdom

CONTENTS

<i>Introduction</i>	xi
<i>Acknowledgments</i>	xiii
Tectonic Setting of the East African Lakes	
Tectonic Controls on the Development of Rift-Basin Lakes and Their Sedimentary Character: Examples from the East African Rift System <i>W.A. Wescott, C.K. Morley, and F.M. Karanja</i>	3
East African Climate	
A Review of Climate Dynamics and Climate Variability in Eastern Africa <i>S.E. Nicholson</i>	25
Sensitivity of Subtropical African and Asian Climate to Prescribed Boundary Condition Changes: Model Implications for the Plio-Pleistocene Evolution of Low-Latitude Climate <i>P.B. deMenocal and D. Rind</i>	57
Isotope Patterns of Precipitation in the East African Region <i>K. Rozanski, L. Araguas-Araguas, and R. Gonfiantini</i>	79
X African River Discharges and Lake Levels in the Twentieth Century <i>A.T. Grove</i>	95
Physical Limnology	
Comparison of Hydrology and Physical Limnology of the East African Great Lakes: Tanganyika, Malawi, Victoria, Kivu and Turkana (with Reference to Some North American Great Lakes) <i>R.H. Spiegel and G.W. Coulter</i>	103
o The Present Physicochemical Ecology of Lake Victoria, Uganda <i>F.W.B. Bugenyi and K.M. Magumba</i>	141
o Measurement of Water Currents, Temperature, Dissolved Oxygen and Winds on the Kenyan Lake Victoria <i>P.B.O. Ochumba</i>	155
CTD-Transmissometer Profiles from Lakes Malawi and Turkana <i>J.D. Halfman</i>	169
Combined Effects of Dissolved Solids and Temperature on the Density Stratification of Lake Malawi <i>A. Wüest, G. Piepke, and J.D. Halfman</i>	183

Aquatic Chemistry

Phosphorus Pumps, Nitrogen Sinks and Silicon Drains: Plumbing Nutrients in the African Great Lakes <i>R.E. Hecky, H.A. Bootsma, R. Mugidde, and F.W.B. Bugenyi</i>	205
Pore Water Chemistry of an Alkaline Lake: Lake Turkana, Kenya <i>T.E. Cerling</i>	225
Seasonal Variation in the Nitrogen Isotopic Composition of Sediment Trap Materials Collected in Lake Malawi <i>R. François, C.H. Pilskaln, and M.A. Altabet</i>	241
The Chemical Composition of Precipitation and Its Significance to the Nutrient Budget of Lake Malawi <i>H.A. Bootsma, M.J. Bootsma, and R.E. Hecky</i>	251
Residence Times of Major Ions in Lake Naivasha, Kenya, and Their Relationship to Lake Hydrology <i>B.S. Ojiambo and W.B. Lyons</i>	267

Food Webs and Fisheries

Pelagic Food Webs of the East African Great Lakes <i>J.T. Lehman</i>	281
Molecular Phylogenetic Inferences About the Evolutionary History of East African Cichlid Fish Radiations <i>A. Meyer, C.M. Montero, and A. Spreinat</i>	303
Anthropogenic Impact on Fisheries Resources of Lake Naivasha <i>P.A. Aloo</i>	325
Zooplankton Dynamics in Lake Victoria <i>D.K. Branstrator, L.M. Ndawula, and J.T. Lehman</i>	337
A Review of Lake Victoria Fisheries with Recommendations for Management and Conservation <i>E.F.B. Katunzi</i>	357

Sedimentary Processes and Deciphering the Past in the Large Lakes

Sedimentary Processes and Signals of Past Climatic Change in the Large Lakes of the East African Rift Valley <i>T.C. Johnson</i>	367
Some Aspects of the Physical and Chemical Dynamics of a Large Rift Lake: The Lake Turkana North Basin, Northwest Kenya <i>D.O. Olago and E.O. Odada</i>	413
Comparison of the Isotope Record in Micrite, Lake Turkana, with the Historical Weather Record Over the Last Century <i>M.W. Muchane</i>	431
Distribution and Origin of Clay Minerals in the Sediments of Lake Malawi <i>L.S.N. Kalindekaffe, M.B. Dolozi, and R. Yuretich</i>	443

Characteristics and Origins of Laminated Ferromanganese Nodules from Lake Malawi, Central Africa <i>R.B. Owen, R.W. Renaut, and T.M. Williams</i>	461
Early Holocene Changes in Lake Level and Productivity in Lake Malawi as Interpreted from Oxygen and Carbon Isotopic Measurements of Authigenic Carbonates <i>R.D. Ricketts and T.C. Johnson</i>	475
Late Quaternary Lake-Level Changes of Lake Malawi <i>B.P. Finney, C.A. Scholz, T.C. Johnson, and S. Trumbore</i>	495
Structural Framework, Sequence Stratigraphy and Lake Level Variations in the Livingstone Basin (Northern Lake Malawi): First Results of a High-Resolution Reflection Seismic Study <i>M. De Batist, P. Van Rensbergen, S. Back, and J. Klerkx</i>	509
Recent Ecosystem Changes in Lake Victoria Reflected in Sedimentary Natural and Anthropogenic Organic Compounds <i>E. Lipiatou, R.E. Hecky, S.J. Eisenreich, L. Lockhart, D. Muir, and P. Wilkinson</i>	523
The Formation of Vivianite-Rich Nodules in Lake Victoria <i>J.S. Mothersill</i>	543
Late Pleistocene Lake-Level Fluctuations in the Naivasha Basin, Kenya <i>M.H. Trauth and M.R. Strecker</i>	549
Comparative Paleolimnology in a System of Four Shallow Tropical Lake Basins <i>D. Verschuren</i>	559
Impact of Man	
Anthropogenic Threats, Impacts and Conservation Strategies in the African Great Lakes: A Review <i>A.S. Cohen, L. Kaufman, and R. Ogutu-Ohwayo</i>	575
Anthropogenic Perturbations on the Lake Victoria Ecosystem <i>A.W. Kudhonganika, D.L. Ocenodongo, and J.O. Okaronon</i>	625
Growing Impact of Water Hyacinth on Nearshore Environments on Lakes Victoria and Kyoga (East Africa) <i>T. Twongo</i>	633
Preliminary Studies on the Effects of Water Hyacinth on the Diversity, Abundance and Ecology of the Littoral Fish Fauna in Lake Victoria, Uganda <i>N.G. Willoughby, I.G. Watson, and T. Twongo</i>	643
Historical Note	
Early Research on East African Lakes: An Historical Sketch <i>E.B. Worthington</i>	659