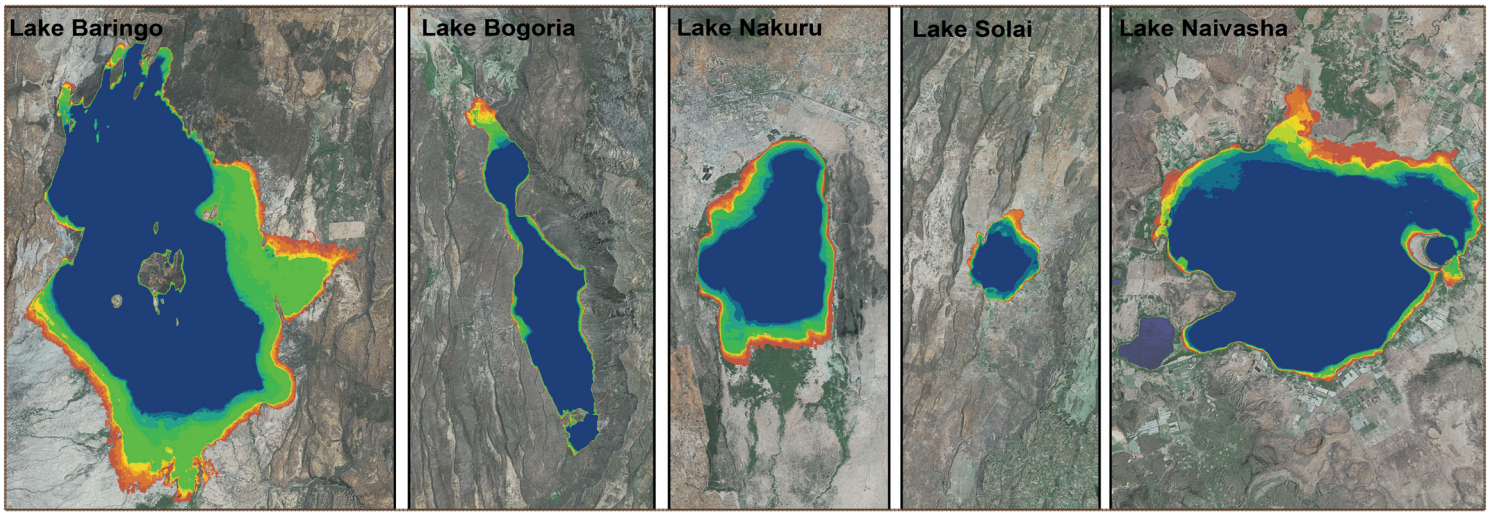
GreatLakes

Water Level Fluctuations and Implications on Local Livelihoods in the Great Rift Valley Lakes of Kenya

Background

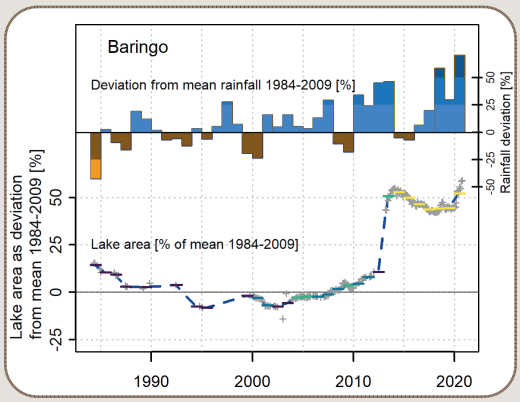
The Rift Valley lakes of Kenya are biodiverse ecozones, classified as RAMSAR wetlands of international importance and UNESCO World Heritage Sites. The lakes have witnessed significant water level rises in the last years, inundating the riparian areas. Homes, schools, hospitals, but also the basis for the local livelihoods and economy such as agricultural fields or tourism infrastructure are under water. Nearly eighty thousand households with 400,000 people are affected[1].



Causes

Potential causes are still under debate. It is speculated that underground seepage, the only outflow from the endorheic lakes, has been reduced by tectonic activities in the geologically highly active Rift Valley. Anthropogenic land degradation, leading to higher erosion and siltation rates, is also argued to have resulted in potential sealing and clogging of the the underground water paths.

A study by Herrnegger et al. 2021[2] recently presented evidence that an imbalance due to changes in rainfall and evapotranspiration characteristics, the major hydro-climatic drivers defining the water balance of the lakes, have probably resulted in the lake water level increases.



1 | Government of Kenya & UNDP, 2021. Rising Water Levels in Kenya's Rift Valley Lakes, Turkwel Gorge Dam and Lake Victoria - Scoping Report. http://www.environment.go.ke/wp-content/uploads/2021/10/MENR_Scoping_Report_Latest-5-07-21.pdf

2 | Herrnegger, M., Stecher, G., Schwatke, C., Olang, L., 2021. Hydroclimatic analysis of rising water levels in the Great Rift Valley Lakes of Kenya. J. Hydrol. Reg. Studw. 36. https://doi.org/10.1016/j.ejrh.2021.100857

DLR
Federal Ministry
Republic of Austria
Education, Science
and Research
oead

Project objectives

The signal of rainfall increase must also be visible in changes in discharge and vegetation characteristics. To test these hypotheses, *i) an analysis of the spatio-temporal discharge characteristics into the lakes* and *ii) an analysis of the spatio-temporal vegetation characteristics in the lake watersheds* will be performed.

Using erosion data from Schürz et al. 2020[3] *iii) an analysis of the potential sedimentation rates and sedimentation depths* will be conducted, with the aim to estimate possible effects of anthropogenic land degradation.

An ecological catastrophe is expected, if the ongoing water level rises continue unabated, since the alkaline Lake Bogoria and freshwater Lake Baringo may merge. One objective of GreatLakes is therefore *iv) an analysis of the overflow potential of Lake Bogoria towards Lake Baringo*.

To assess the implications of the inundations on local livelihoods and the socio-economic impacts of the lake level rises and to provide guidance for policy and decision makers *v) an assessment of Flood Risk and Development of Anticipatory Flood Risk Maps* will be conducted.

Finally, *vi) a prototype of a Hydrological Information System (HIS) for the GreatLakes project* will be implemented for supporting better regulation, development and management of the concerned land and water resources.

Partnership & Contact

Mathew Herrnegger, Gabriel Stecher, Thomas Pulka
mathew.herrnegger@boku.ac.at

Institute for Hydrology and Water Management (HyWa),
Department of Water, Atmosphere and Environment,
University of Natural Resources and Life Sciences, Vienna (BOKU)

Luke Olang, Sospeter Wekesa, Nelly Cherono
luke.olang@tukenya.ac.ke

Centre for Integrated Water Resources Management and Department of Biosystems and Environmental Engineering,
Technical University of Kenya (TUK)

Funding

The project is financed by the Austrian Federal Ministry of Education, Science and Research within the programme „Cooperation Development Research“ administered by OeAD-GmbH / Austria‘s Agency for Education and Internationalisation | Project number: KOEF 08/2020, funding period 09/2021 - 08/2024.

High-resolution TanDEM-X terrain data is provided by the German Aerospace Center (DLR) and was awarded with the proposal ID DEM_HYDR3478.

3 | Schürz, C., Mehdi, B., Kiesel, J., Schulz, K., Herrnegger, M., 2020. A systematic assessment of uncertainties in large-scale soil loss estimation from different representations of USLE input factors-a case study for Kenya and Uganda. Hydrol. Earth Syst. Sci. 24, 4463–4489. https://doi.org/10.5194/hess-24-4463-2020

Maps and figures taken from Herrnegger et al. 2021 | Images: Former Loboi Health Centre at Lake Bogoria by M. Herrnegger, Aerial image of Kampi Ya Samaki acquired within GreatLakes, Field work with the drone by M. Herrnegger | Version 19.02.2022

DLR

Federal Ministry
Republic of Austria
Education, Science
and Research

oead