

Strengthening community-based research for river health and climate change mitigation in Eastern Africa

Uganda (River Mayanja, *Kampala*), Kenya (River Njoro, *Nakuru*)

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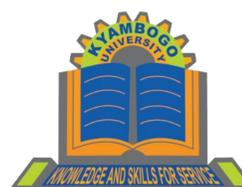
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Austrian African University Network (Africa-UniNet)

Africa-UniNet was initiated by the Austrian Federal Ministry of Education, Science and Research (BMBWF) and launched by the OeAD, Austria's Agency for Education and Internationalisation (OeAD-GmbH) and the University of Natural Resources and Life Sciences, Vienna (BOKU) in order to create a long-term, stable basis for cooperation between Austrian and African universities and research institutions. Africa-UniNet intends to promote new contacts and deepen scientific cooperation

Goals and Tasks

- + Promoting cooperation between academic institutions
- + Initiating research projects and research & education projects based on common interests
- + Establishing a solid communication structure between Austrian and African higher education - and scientific institutions
- + Creating a platform for long-term scientific discourses
- + Establishing contacts with governmental and non-governmental organisations
- + Providing expertise on the higher education and research landscape in Austria and Africa
- + Raising donations and third-party funds
- + Other cooperation, such as in the area of further education



1. Introduction

- **Multiple Crisis** (Hunger, Health, Economic, Climate, Biodiversity) (IPBES, 2021; Ahmed et al., 2022; Armstrong McKay et al., 2022)
- **Lack of access to safe drinking water in sub-Saharan Africa** (UNICEF, 2019; UNICEF, Uganda, 2023)
- **Dependency of water supply from rivers** (Ayanlade et al., 2022)
- **Degradation of freshwater ecosystem** (pollution, loss of habitat, climate change, etc.) (Schmutz et al., 2018; Melcher et al., 2012; Dudgeon et al., 2006)
- **Assessment and monitoring of ecological status** (EPC, 2000)
- **Sustainable socio-ecological transformation**

Project Aims

- **Holistic understanding** of complex river systems in East Africa
- **Conceptual cause-effect modelling** of human impacts on river health („Driver-Pressure-State-Impact-Response“, DPSIR) (Kristensen, 2000)
- **Inclusive and structured learning process** in sustainable water management



Figure 1 Threats of freshwater ecosystem degradation in Eastern Africa. Pictures: Andreas Bauer

2. Study Area

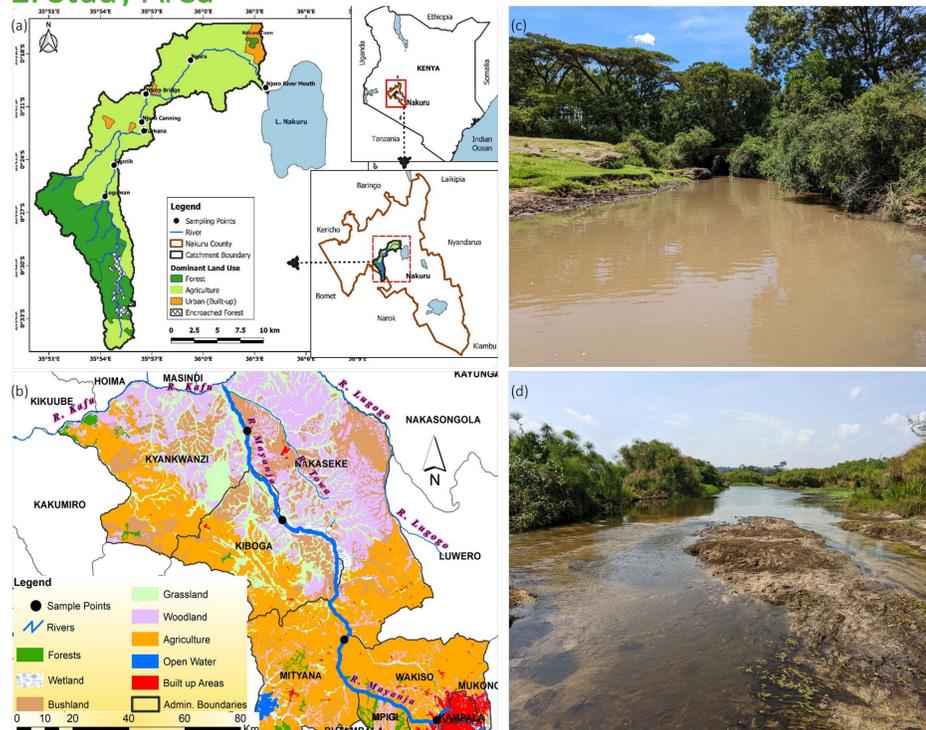


Figure 2 Case Study areas (a) River Njoro (c) Nakuru District, Kenya (b) River Mayanja (d) Mityana District, Uganda

3. Methods – Multiple lines of Evidence

- **Stepwise procedure**
 - 1) Literature
 - 2) Expert judgment
 - 3) Community Knowledge
 - 4) Case study
- **Identification of „Driver-Pressure-State-Impact-Response“**
- **Synthesis – Sankey Diagram**

Table 1 Multiple lines of evidence used to model the human impacts on rivers in East Africa (Uganda, Kenya)

Literature	Expert judgement	Community Knowledge	Case study Evaluation /Validation
Peer-reviewed publications (n = 78) Local publications (n = 5) MSc. Thesis (n = 12) Grey-literature (n = 7)	n = 12 (5 Uganda, 7 Kenya)	n = 3 (2 Uganda, 1 Kenya)	Abiotic (n = 114) Biotic (n = 185) Human Activities + Landuse (n = 4)
Focus Kyambogo University Biotic Indicators Egerton University Abiotic Indicators African Centre for Technology Studies Socio-economic Indicators University of Natural Resources and Life Sciences, Vienna Climate-change Indicators	Kenya County Government of Nakuru Ewaso Nyiro South Development Authority Kenya Wildlife Services Egerton University Uganda National Environmental Management Authority (NEMA) Wetlands Management Department (MWE) Makerere University	Community engagement I River Mayanja (Uganda) Non-academic Stakeholders Community engagement II River Mayanja (Uganda) Academic-stakeholders Community engagement III River Njoro (Kenya) Mixed Stakeholders	Abiotic Data Bank Structure Vegetation Chlorophyll EC Electric conductivity pH T Temperature Turb Turbidity DO Oxygen concentration (mg/l) Q Discharge Biotic Data Benthic invertebrates via MHS Multi-Habitat-Samples Human Activities and Landuse Human activities Type of pollution Waste disposal Landuse
Qualitative- and Quantitative Data	Qualitative Data	Qualitative Data	Qualitative- and Quantitative Data

4. Results

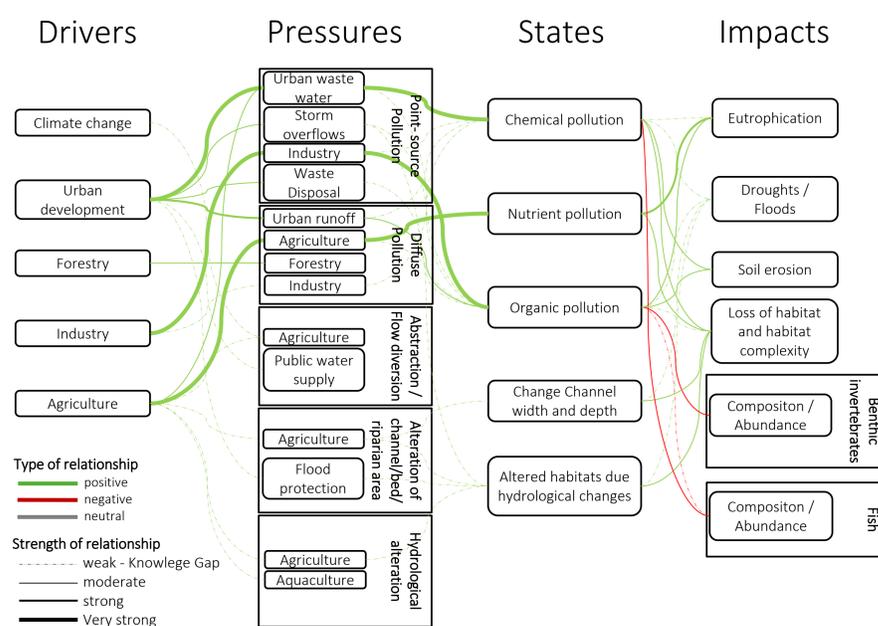


Figure 3 Synthesis of human impacts on river health in East Africa in a „Driver-Pressure-State-Impact-Response“, DPSIR-Framework. Evidence includes 1) Literature, 2) Expert judgment, 3) Community Knowledge, 4) Field data from Case Studies in River Mayanja, Uganda and River Njoro, Kenya.

Conclusion

Agriculture, Industry, and Urban Development as key drivers of river health in Eastern Africa (Kenya and Uganda)

Multiple lines of Evidence - literature, expert opinions, community insights, and case studies - **consistently align**

Is our emphasis on traditional scientific and environmental indicators limiting our understanding of freshwater ecosystems?

What untapped value could sociological insights from local communities bring to freshwater ecosystem management?

