

SCHOLARSHIPS OPPORTUNITIES:



JARAMOGI OGINGA ODINGA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Crisis of Knowledge



Belgium

partner in development

SUB-PROJECT 1:

Management of the Lake Victoria Basin Natural Resources

JOOUST already has basic physical infrastructure to establish specialized laboratories. All the laboratories are equipped with basic equipment for biological and chemical analysis but still lack specialized capacity for microbiology, genomics, detailed nutrient analysis for soil and water as well as inadequate capacity for geospatial analysis. Several departments will be involved in the subproject because of the collaborative nature of research to be undertaken. **Department of Biological Sciences** will undertake assessment and monitoring of ecosystem fluxes, including their controls. This department will also be involved in monitoring of biodiversity;

Department of Physical sciences will be involved in the chemical analysis of environmental variables, including water, soil and plants;

Department of Natural Resource Management will be involved in aquatic ecology, especially the ecology of fish in the lake and its neighbouring rivers. They will also monitor other microbial communities that are linked to water quality;

Department of Engineering and Technology will play an important role in water volume and sediment monitoring of rivers. It will also support in design and construction of some of the equipment that shall be needed for the project;

Department of Physical Planning will conduct spatial analyses of land use changes, constructing digital maps and also modelling of land surface changes of the measured processes. This department will also be involved in stakeholder analysis and engagement, including dissemination of research results for application by the end-users. There will be linkages between ecosystem fluxes, biodiversity and water quality parameters in both rivers and lake in LVB.

Scholarship areas under this subproject will address the following thematic areas:

PhD Position 1: Catchment-scale water, sediment, carbon and nutrient fluxes

This opp area will be achieved through a combination of new data acquisition, existing data compilation (field, remote sensing), and modelling work. It will also quantify and understand water, sediment, carbon & nutrient fluxes in relation to land use and land use changes.

PhD Position 2: Eddy covariance - CO₂, water, and CH₄ exchange in papyrus wetlands

This will be an ambitious aim that will lead to setting up eddy covariance system in papyrus wetlands (+/- the first), highly important system in terms of C sequestration & CH₄ emissions.

PhD Position 3: Lake Victoria water quality and ecology research

The thematic area will achieve long-term data series on eutrophication, anthropogenic impact that are locally high. It will further review impact of land-use change on aquatic ecology and biogeochemistry that will productivity, metabolic balance and greenhouse gas exchange.

SUB-PROJECT 2:

Building Capacity for Transformative Agri-Food Systems for Resilience in the Lake Victoria Basin of Kenya

The goal of subproject is to strengthen the resilience of the cropping and market systems in the Lake Victoria Basin of Kenya through transformative sustainable approaches for food production. The three sites differ in soil types, precipitation patterns and temperatures. This goal will be achieved through:

PhD Position 1: Quinoa research

The scholarship opportunity in this area will focus on genome-wide association study (GWAS) of adaptive traits, and genotype-by-environment interaction of yield and related traits in quinoa under six contrasting agro-ecological environments of LVB. The plant materials will comprise 300-500 diverse quinoa germplasm accessions from Washington State University and Brigham Young University which will be evaluated in six-way non-replicated trials under field conditions during the long and short rainy seasons of 2022 and 2024 crop seasons. Data on morpho-physiological parameters, yield, quality, lodging, preharvest sprouting, nutritional and antinutritional profile, and reactions to diseases and insect pests will be collected; and their heritability values will be estimated. Adaptive traits associated with productive advantages, coupled with GWAS-based genetic architecture of the traits, will be essential for establishment of climate-resilient quinoa breeding programme. The ultimate goal is to lay a foundation of establishment of a climate-resilient quinoa improvement research programme for LVB.

PhD Position 2: Sorghum research

This will involve a baseline survey to determine existing transformative climate-smart approaches in LVB. The research activity will focus on the interactive effects of nitrogen-fixing plant species (cowpea) with poultry manure on physio-morphological traits of grain and sweet sorghum genotypes, including yield and quality under field conditions during the 2022 and 2024 long rainy seasons at three sites with different soil and weather patterns. Soil physico-chemical properties, including fertility, water balance, biological properties, and greenhouse gas fluxes as affected by the transformative climate-smart approaches will also be monitored. Existence and efficiency of the transformative climate-smart approaches will be ascertained and evaluated; constraints will be identified; and best-fit strategies for improved sorghum productivity and soil physico-chemical properties will be selected and tested at farm level.

PhD Position 3: Socioeconomic of crop and livestock adoption and commercialization research

This will focus on adoption determinants, resource reallocation, resource use and economic efficiency, market dynamics, and product design and development to cater for utilization and commercialization aspects. The scholarship will focus on analysis of resource use and economy efficiency of the selected value chains of quinoa and sorghum; and assessment of market dynamics of the two climate-resilient crop species.

PhD Position 4: Small livestock research

This will focus on strategies to mitigate effects of climate change-driven variations in biotic and abiotic factors on development and productivity of goats, rabbits and free-range chicken will be developed based on assessment of resilience of production systems in LVB, including different formulations of feed derived from quinoa, sorghum and cowpea.

SUB-PROJECT 3:

Building Capacity for Research, Management and Control of Communicable and Non-Communicable Diseases

The subproject will build capacity for early-stage researchers and mid-career professionals. Students enrolled in this program will be registered at the School of Health Sciences in JOOUST with all sessions taught at JOOUST. Doctoral students shall register with JOOUST and undertake parts of their training at Flemish HEIs where indicated. This will be addressed through:

PhD Position 1: *Viral oncology research*

Study in this area will estimate the prevalence of Cervical Cancer, liver cancer, T2D and hypertension in the Lake Victoria Basin region, the sub-project will conduct observational studies of cross-sectional study design through the review of aggregated patient data at selected referral facilities of the LVB. The study will review monthly summaries of morbidity at chronic medical conditions clinics and cancer clinics and report on caseloads of target diseases with estimates of prevalence per the catchment population of the facility. Mixed method techniques and modelling will be used to establish service readiness and availability as well as the economic burdens of these diseases and cost effectiveness of interventions. Capacity of primary and tertiary level staff will be strengthened to improve early identification, documentation and referral of cases by staff. These approaches will guide implementation of referral, management, priority setting and resource allocation for intervention of target diseases.

PhD Position 2: Health Systems Strengthening for Diabetes and hypertension

Demonstrations will be carried out at selected referral facilities as study sites to better understand what it would take to establish an accurate digitalized registry of the target diseases. The subproject will collaborate with the ICT project in software development to facilitate accurate recording of diagnostic processes and outcomes of the target diseases in the population.

PhD Position 3: Environmental health research

This scholarship position will determine the impact of human activities on the environment within the LVB and how this influences population health. Environmental contamination (pollutants in food and environment) in relation to communicable and non-communicable diseases such as malaria, respiratory diseases and cancers.



SUB-PROJECT 4

Strengthening ICT infrastructure to Enhance Research, Teaching and Learning (Basic ICT infrastructure and equipment)

The main aim of this sub-project is to strengthen the ICT infrastructure to enhance research, teaching, learning and community outreach. It will involve a collaborative research to increase research capacities in innovations within Lake Victoria Basin and to be open to new fields and different paradigms of innovation. This sub project is considered as a boost for scientific and technological collaboration in all disciplines within the project. The project offers funds for research, education and innovation as well as emerging topics and development of new materials for the future. Researchers can conduct their work on emerging technologies for future challenges such as biotechnologies, data analytics, Artificial Intelligence (AI) and Internet of Things (IoT), E Learning, Digital gender divide, global system science and green technologies. ICT will be integrated across in the four (4) other sub-projects through the following PhD Positions:

PhD Position 1: Application of ICT in management of the Lake Victoria Basin Natural Resources

This will involve Mapping out land cover changes, land uses and climate within the LVB; Carry out mapping, inventory and classification and valuation of LVB biodiversity; Application of ICT in establishing biodiversity monitoring and surveillance system; Application of Soil & Water Assessment Tool (SWAT) to simulate the quality and quantity of surface and ground water and predict the environmental impact of land use, land management practices, and climate change.

PhD Position 2: Application of ICT in teaching and Learning

This study area will involve a research on how Digital and Organisational Innovations can be used in Teaching, Learning, Research, and Transfer through emerging/ future ICTs. It is expected that the researchers will develop frameworks and approaches on how innovative, solution- oriented, and sustainable digital and organizational innovations can enhance Teaching, Learning, Research, and Community outreach.

PhD Position 3: Application of ICT for smart agriculture

Scholarship opportunity in area will carry out research leading to technical support for sustainable food security and resilience building in Lake Victoria Basin.

PhD Position 4: Information support system research

The study in this area will be key in mapping out the CD and NCD epidemics in the LVB to ensure they are not under reported or misunderstood.

PhD Position 5: Digital gender divide

This will focus on the existing digital gender gap by identifying its key factors and trends and studying the role of Internet and ICTs in bridging this gap. It will involve employing a qualitative approach in assessing digital gender gaps among communities using PLA and capability approaches. The three digital gender divide components namely; (1) access and use of digital technologies and the internet; (2) development of the skills needed to use digital technologies and to participate in their design and production; and (3) advancement of women to visible leadership and decision-making roles in the digital will form the basis of this research.

PhD Position 6: Application of ICT in Climate Change Resilience among Communities in the Lake Victoria Basin: This will involve intergrating of ICT applications developing in climate models and predictions to inform decision making processes and raise awareness on the impacts of climate change within Lake Victoria Basin biodiversity. ICTs will provide illustrations, satellite images and photographs related to human and climate change impacts on the environment.



SUB-PROJECT 5

Strengthening Climate Change Resilience among Communities and Eco-systems in the Lake Victoria Basin

The resilience of the LVB communities and ecosystems is strengthened from an interdisciplinary point of view, ranging from a better understanding of climate change impacts and the adoption of solutions to become more resilient at household, farm and landscape scale. In order to get a better understanding of the expected climate impacts, the scholarships will:

PhD Position 1: Climate simulations and real-time forecasts of natural hazards

This will provide new knowledge on potential solutions for communities and ecosystems to become resilient, building on the technologies and practices researched in subprojects 1 and 2.

PhD Position 2: Focus on understanding of the preferences, and drivers behind, the adoption (and dis- and maladaptation) of sustainable technologies and practices by farmers and fishermen.

This position aim at facilitating synergies with PhD1, PhD2 and also conducting researches on the potential of climate and extreme weather warnings to influence farmer and fishermen behavior.

PhD Position 3: Demonstrate the potential of a solar cooker with thermal energy storage The aim of this scholarship is to address environmental degradation caused by use of firewood for cooking and fish smoking by adopting clean solutions. The practical user perspective is combined with a techno-sustainability assessment in which economic, environmental and social indicators are integrated.

PhD Position 4: Study mechanisms to become more resilient at the community and regional scale

This scholarship opportunity will conduct research on the cultural, societal and governance barriers and opportunities that can ensure a just and resilient climate transition.