



MAKERERE UNIVERSITY

MINISTRY OF WATER AND ENVIRONMENT

GLACAM REPORT 2019

1st Great Lakes and Catchment Management Conference (1st GLACAM)

Conference Theme:

“Protecting water and land resources in Africa for climate change adaptation and improved livelihoods



**5th-7th June 2019 Water Resources Institute,
Entebbe, Uganda**

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GLACAM CONFERENCE SECRETARIAT

College of Agricultural and

Environmental Sciences

Makerere University

P.O. Box 7062 Kampala, Uganda

c/oDr. Patrick Musinguzi

Mobile: +256-774-068824

Email: greatlakescatchment2019@caes.mak.ac.ug

<http://glacam.mak.ac.ug>



Importance: Water remains a vital resource for sustenance of life, agriculture production, industrial processes but also for sustainable development in Africa. Effective management of water resources has several benefits including poverty reduction, economic growth and environmental sustainability.

Degradation: The state of water resources in the Great Lakes region is appalling. The critical drivers of water resources degradation are mainly as a result of mismanagement of catchments. Declining water quality and quantity is evidently becoming a major threat to energy, food, income, environment and social security in the Great Lakes of Africa. Pollution of the water resources is high with evidences of sedimentation, weed invasion, and toxic substances.

Drivers of water quality and quantity include increasing human population, the impacts of climate change and unsustainable practices which have orchestrated these impacts.

The main cause of decline in water quality and quantity has been identified as poor catchment management, also referred as watershed management; and climate change uncertainty. Over grazing, massive deforestation, bush burning, inappropriate agricultural practices, over application of chemicals and many human induced land use measures have led to loss of productive soil through erosion; leading to increased siltation and pollution of water systems, and increased threats to fresh water biodiversity.

Indicators and Impacts of degradation: Evidences of reduced fish stock in rivers and lakes, drying streams and rivers, widespread wetland encroachment, reduced soil depth and soil fertility in agricultural landscapes, rapid agricultural land use extensification and increased migrations by abandoning unproductive land, suggest the need for joint efforts to reverse the trend.

Degradation of water resources has increased production risks, reduced hydropower production potential, sky-rocketed maintenance costs of hydropower installations, affected cost of irrigation infrastructure, reduced storage capacity of dams and increasing water treatment costs. These effects are consequently impacting on the livelihoods of millions of people in the Great Lakes region.

The challenge: Global efforts are aware of such threats and considered the sixth Sustainable Development Goal (SDG 6) to address the water challenge. The SDG 6 aims at “ensuring availability and sustainable management of water and sanitation for all”.

The Solution: One sure approach of conserving the Great Lakes and river waters is the integrated catchment management approach. Different research interventions and case studies have been conducted in different countries in Africa to understand measures that can improve water management on the different landscapes and communities. Capacity building and development is crucial. Makerere University has also led in the training of agricultural and environmental scientists, soil scientists, and has recently introduced the Masters of Science in Integrated Watershed

Management in a bid to respond to the training and research needs for improved catchment management. Other approaches have been employed in the different countries and institutions to counter the water-food-energy challenge in catchments.

Problem: There had been limited opportunities to interface with research experts and practitioners on the continent to share watershed management challenges and promising technologies for conserving water and land resources to adapt to climate change and improve livelihoods. The research outputs from different scientists, academicians, private actors, practitioners and policy makers needed to be shared on a common platform to have common vision for reversing the worrying trends.

GOALS AND OBJECTIVES

The 1st GLACAM conference was organised for the first time in Africa to discuss issues on water and land resources protection. The main goal of GLACAM was to provide a platform to water and land use researchers, practitioners, and policy makers to evaluate the inextricable link between water and environment resources as well as reflect on strategic options for achieving SDG 6. Water and environment stakeholders gathered to present and discuss major research findings related to water and land resources and explore existing technologies, innovations for improved management of the resources.

The specific objectives of the conference were to:

- ✓ Share the emerging and most promising catchment management science and technologies for water and land resources protection for climate change adaptation and improved livelihoods
- ✓ Showcase the latest innovations, technologies and developments in the water and soil discipline for increased environmental protection and sustainability
- ✓ Build partnerships among water resource users on the continent for joint water and land resources research and management
- ✓ Develop a long-term shared future strategy for conservation of water and land resources in the Great Lakes region of Africa



Photo. The Vice Chancellor, Makerere University and representative of Minister of Water and Environment officiated the opening of the 1st GLACAM conference 2019

OVERALL THEME OF CONFERENCE

The overall theme for 1st Great Lakes and Catchment Management (GLACAM) was, *Protecting water and land resources in Africa for climate change adaptation and improved livelihoods.*

THEMATIC AREAS

The conference focused on five themes and these were discussed in panel discussions, key note paper presentations, and oral presentations. The major themes included:

1. CLIMATE CHANGE AND DISASTER RISK management

This theme focused on climate variability and climate change and how these dynamics compromise ecological integrity and absorptive capacity of ecosystems and physiological processes. Global temperatures have risen rapidly in the past few decades and there are reports of increasing occurrences of melting of mountain snow caps, increase or reduction in water level levels in oceans and seas, rapid expansion of arid and semi-arid area and drought stress in the production chain. Consequently, we have frequent occurrence of disasters such as floods, storms, famine, loss of lives, pest and disease out-breaks. This theme explored measures which can be put in place by communities, governments and development partners to manage, control, adapt and/or mitigate against disasters associated with climate change.

2. WATER-ENERGY-FOOD NEXUS

This theme focus on the inseparable link among security of water, energy and food which fortifies values, norms, and human well-being of the society. The theme explored means of addressing concerns about the access, security, distribution and availability of food, energy and water and consequently the impact on the control and utilization of these resources on resilience to water catchment. Cross-sectorial issues of policy formulation, synergies between water, food and energy, conflicts and conflict management, water security and scarcity were discussed. Integrated assessment approaches to understand the sustainability of the nexus in relation to achieving the development goals were discussed.

3. POLLUTION CONTROL AND MANAGEMENT

This theme explore the point and non-point sources of pollution in water bodies, and identify strategies for addressing them and developing mechanisms of utilising grey water or dirty water in a bid to increase water use efficiency. Both industrialisation and anthropogenic related impacts on pollution of land and water resources were discussed on their impacts on biodiversity. The participants discussed pollution control, policy formulation, impact of pollution on water transport, human health and sustenance of aquatic life. Innovative and technological methods of water treatment, recycling of grey water, and cost benefit analysis of grey water recycling were also discussed.

4. LAND USE, TECHNOLOGIES & INNOVATIONS on soil, crop, animal, forestry, hydrology and catchment management

This theme analysed the linkage between land use and how technologies and innovations have affected ecosystem health of soil, crops, animals, forests and the water catchment at large. Since a water catchment is a collection of ecosystems such as forests, soils, energy, agriculture systems, animals and people; an integrated approach was discussed and its impacts on ecosystem services. A range of technologies, practices and innovations that have been advanced in these ecosystems to facilitate production processes were discussed. Other advances in technologies such as use of sensors, UAVs, digital appliances and many other technologies to advance the science of water and land management were also presented. The impact of agro-inputs such as organic and mineral fertilizers, herbicides, pesticides and other farm inputs on catchment was discussed. An understanding of how hydrology, soils, forests, agriculture systems or other land uses are responding to innovations and/or technologies in terms of ecological equilibrium, species diversity, optimised production, and sustainability of systems were discussed. Cross-sectoral and multidisciplinary level analysis of the economic and environmental implication of the interventions on forestry, soil, agriculture, hydrology and other land use systems was considered.

5. SOCIAL, INSTITUTIONAL AND FINANCIAL approaches for lake and catchment management

This theme discussed the participatory catchment management approach with an appropriate structure for managing the watershed; identifying tools and approaches for mapping stakeholders, and considering the activities for undertaking and to what extent each of those activities impacts resilience of watershed. The theme addressed the roles of stakeholders within the catchment, strategies for enhancing engagement, and considered the financial tools required to sustain catchment management. Innovative financing options for managing the catchment, the roles of private sector, CSOs, policy makers and academia were discussed. Communally based financing and adaptation mechanism for propelling catchment management mindful of the social and institutional arrangement and significance were also discussed.

PARTICIPATION

More than 200 participants from Uganda, Kenya, Tanzania, Southern Sudan, Mali, Benin, Congo (DRC), Botswana, Nigeria, South Africa, Malawi and German participated in the conference. They included students, academia, practitioners, researchers, farmer's representatives, private sector actors and policy makers.

The conference had seven (5) key note paper presentation from lead scientists in each of the thematic areas of the conference. A panel of discussants gave highlights of the issues that have affected water and land resources protection and development for improved livelihoods, income security and climate change adaptation in Africa.



Photo. Session rooms with different oral presentations during the GLACAM 2019



Photo: One of the farmers' representatives highlighting actual challenges encountered in water and land management during the conference

KEY FINDINGS UNDER EACH THEMATIC AREA

Climate change adaptation and disaster risk management

- ✓ Climate change is no longer a scientific issue but rather a real life threat in terms of food, forage, fuel and income security
- ✓ Increased rainfall variability with short durations of high rainfall intensity evident in most countries in the great lakes region
- ✓ There is low resilience of communities to extreme events due to climate change for some regions such as Mount Elgon in Eastern Uganda
- ✓ Climate change science should be integrated with simple messages to enable explanations to the lay person
- ✓ Need for shared data on drivers of climate change to make the best prediction for management of water and land resources in the region.
- ✓ Research is highly recommended on the most effective adaptation measures to climate change
- ✓ Capacity building is important for communities, government officials, schools, university graduate trainings to target specific problems of climate change incatchments.
- ✓ Use of crop, climate and water models are important for predicting state of future scenarios in terms of impact of climate change on food and water security
- ✓ There is limited data to show how climate change will affect the agricultural pathways systems (crops and animals in the future)
- ✓ Managing climate change requires a multi-disciplinary approach

Water-Energy-Food- Nexus

- ✓ The nexus is very paramount in addressing sustainable development goals
- ✓ Deforestation, sedimentation, lack of energy in households, soil erosion are major challenges in the Water Energy Food Nexus.
- ✓ Incentives in the nexus are effective for environmental protection
- ✓ Increased animal population has also become a factor causing deforestation in search for new pasturelands.
- ✓ Rain water harvesting is not well harnessed yet it is the most promising approach and can act as a supplementary water source of NWSC for domestic and non-domestic uses
- ✓ Farmers/land users' knowledge be harnessed to contribute to the food energy nexus.
- ✓ Building capacity of land users in the nexus can be fundamental in achieving the sustainable development goals.

Pollution control and management

- ✓ Water pollution is a major threat to aquatic biodiversity but also human health
- ✓ Industrials and anthropogenic activities (built up areas and cultivation) are leading drivers of pollution to rivers and other water bodies in the region
- ✓ Chemical contamination has caused lesions and other changes in fish and human health
- ✓ Photo catalytic activity was found to be effective and has a potential to degrade dye and volatile organic compound from waste water
- ✓ Chicken litter in its raw form has high levels of contaminants that can affect the environment –as it contains heavy metals which can pollute water
- ✓ International standards be following by checking the quality of material to be applied in catchment since some materials are intoxicated with heavy metals
- ✓ There is a problem of chlorine that increases stomach ulceration among the human population
- ✓ Consumption of fish affected by pollution can lead to health risks due to biochemical accumulation of chemicals in human bodies over time
- ✓ Composting is vital for dealing with organic materials that can be a threat to water quality
- ✓ Some national organizations such as NWSC doing a commendable work with projects on water resource protection
- ✓ Limited use of legal procedures and information is the main cause for water resource pollution

LAND USE, TECHNOLOGIES & INNOVATIONS on soil, crop, animal, forestry, hydrology and catchment management

- ✓ Major threats to biodiversity come from pollution, introduced species, climate change, global warming, toxic chemicals, eutrophication, and habitat destruction

- ✓ Issues of catchment management cannot be handled in a solitary approach but must have interdisciplinary measures
- ✓ Networks that enhance sustainable catchment management such as hydrological information systems networks are important
- ✓ Promoting trans-boundary management is vital to control poor land management practices affecting water and environment
- ✓ Natural assets in urban centers/cities are important for healthy living and sustainable development of communities
- ✓ Maximum productivity possible from land as long as proper land use planning is done.
- ✓ The UAVs technology be harnessed as it eases planning for precision production and management of catchments
- ✓ Road water harvesting is vital so as to increase water access to communities especially for non-domestic uses
- ✓ Soil mapping in Uganda reportedly has had some progress but not completed due to financial constraints – thus the need for more support on soils to guide land utilization for sustainable development
- ✓ There is need to promote participatory land-slide risk management approaches promoted in communities
- ✓ Modeling water dynamics for sustainable ecosystem management as an important tool in science to guide water demand and supply functions
- ✓ Models can simulate natural environment and predicts the future when subjected to various condition with the changing human activities.

Social, Institutional and Financial approaches for Lake and Catchment Management

- ✓ Increased productivity can be a major interventions for improving livelihoods and increasing resilience of communities facing climate change
- ✓ Ecosystem based adaptation measures crucial for enhancing resilience to climatic stresses
- ✓ Collaborative planning is still a new concept but its important to adopt as an institutional support measure for ecosystem management
- ✓ The quality of partnerships is necessary for sustainable catchment management with special consideration to vision, accountability, institutional leadership and effective communication
- ✓ Restoration and maintenance of ecosystems is important to produce services for local communities amidst climate change impacts
- ✓ The barriers to the social and institutional approaches include lack of; technical skills, market access, financial resources, good infrastructure; and also a challenge of weak national institutions
- ✓ The private sector is a major partner in catchment but is triggered by profitability of investment options
- ✓ Indigenous community/population should always be represented in platform for decision making in catchment meetings
- ✓ Law enforcement is still a problem – and resources such as wetlands are useful and should be guarded by law

- ✓ Everyone has to contribute as far as water resources management is concerned and this is the reason for the need for collaborative water resources management
- ✓ Conflicts arise while dealing with water resources conservation but these can be resolved if leadership structures and social cultural behaviors are considered



Photo. Prof Okumu Okot - lead key note speaker and Dr. Patrick Musinguzi during the GLACAM conference



Photo. Tarryn Quayle highlighting role of cities/urban natural assets and mainstreaming them in catchment planning.

SHORT TRAININGS DURING THE CONFERENCE

The conference had five short training on;

- (i) Sustainable Land Management
- (ii) Freshwater Biodiversity and bio-informatics
- (iii) Modelling water dynamics for sustainable ecosystem management
- (iv) Water sources protection, planning and implementation
- (v) Writing skills and preparations for scientific paper publications



Photo: Training on freshwater biodiversity and informatics during GLACAM



Photo. Some of the participants in the GLACAM short trainings- all participants were awarded certificates of participation

FIELD EXCURSION/TOUR EXPERIENCES

The conference organised field excursions in three major locations around L. Victoria:

- (i) Urban based production system with an effective soil and water management measures for sustainable land use and lake water management**

A farmer owning 6 acres under intensive banana production was visited and demonstrated measures for effective land management thus stopping run-off of soils and other chemicals into L. Victoria. He demonstrated how his good relationships with the community has enabled security of plantation despite being in a peri-urban setting. The concept of balancing productivity while conserving the environment was demonstrated.

- (ii) An Integrated crop-fish-livestock farm with effective resource flows controls:**



Photo. Participants at the pond in a fish-crop-livestock farm near Lake Victoria in Uganda

A commercial farmer demonstrated the importance of using chicken litter (manure) as an important supplementary input for feeding fish. The fertilized water in the fish ponds was later used for irrigation of neighbouring plants. High productivity of crops using the fertilized water in the fish pond was realised. The practice reduces potential loss of agricultural chemicals into the L. Victoria, which is few meters from the farm.

(iii) Critically polluted hot spot areas within the Lake Victoria Catchment near the landing sites

One of the landing sites on L. Victoria was visited. It was noted that the community have challenges of sanitation. There are also bye-laws in the community to control waste (both human and animal) to minimise Lake Water pollution. Another activity on the lake that has been managed is overfishing. There is controlled use of nets and intensive surveillance by the government of Uganda. There was evidence of progress in terms of lake water biodiversity protection.



Photo. At the landing site on L. Victoria where overfishing and poor sanitation are being closely monitored



Photo: Discussion with the community one the landing sites near L. Victoria during the field excursion

PANEL DISCUSSIONS

The conference had panel discussions and these comprised of a team of experts from government and non-governmental organisations. They mainly discussed on (i) water and land resources for improving livelihoods & adapting to climate change in the Great Lakes, and (ii) water and land governance in the great Lakes region - Implications on the water, food, energy and ecosystem nexus. The experts decried the need for community based adaptation protocols to avert challenges of land degradation and water pollution.



Photo. Panel discussants on current water and land management issues in the great lakes.

STATEMENT

FROM THE 1ST GREAT LAKES AND CATCHMENT MANAGEMENT CONFERENCE

HELD ON 5TH -7TH JUNE 2019

AT WATER RESOURCES INSTITUTE, ENTEBBE, KAMPALA

The 1st Great Lakes and Catchment Management Conference took place from 5th-7th June 2019 in Entebbe, Uganda under the Conference theme: “Protecting water and land resources in Africa for climate change adaptation and improved livelihoods, and attended by more than 200 participants comprised of scientists, practitioners, policy makers, academia, research fellows, private actors and students. We delegates assembled here at Water Resources Institute, Entebbe, Uganda have the following key messages to inform deliberations in the great lakes region and beyond:

WE DO HEREBY AFFIRM THAT:

1. Water remains a vital resource for sustenance of life, agriculture production, and industrial processes for cities and rural communities but also for sustainable development in Africa. Effective management of water resources has several benefits including poverty reduction, economic growth and environmental sustainability.
2. The water resources of the Great Lakes region are under increasing pressure. The critical drivers of water resources degradation are mainly as a result of mismanagement of catchments. Declining water quality and quantity is evidently becoming a major threat to energy, food, forage, fiber, income, environment and social security in the Great Lakes of Africa. Pollution of the water resources is high with evidences of sedimentation, weed invasion, and toxic substances.
3. The main cause of decline in water quality and quantity has been identified as poor catchment management, also referred as watershed mismanagement; and climate change uncertainty. Over grazing, massive deforestation, bush burning, inappropriate agricultural practices, over application of chemicals and many human induced land use measures have led to loss of productive soils through erosion; leading to increased siltation and pollution of water systems, and increased threats to fresh water biodiversity.
4. Impacts of degradation include reduced fish stock in rivers and lakes, drying streams and rivers, reduction in groundwater levels, wide spread wetland encroachment, reduced soil depth and soil fertility in agricultural landscapes, rapid agricultural land use intensification and increased migration of people by abandoning unproductive land.

5. Degradation of water resources has increased production risks, reduced hydropower production potential, sky-rocketed maintenance costs of infrastructure such as hydropower installations, roads and water supply systems, affected cost of irrigation infrastructure, reduced storage capacity of dams and increasing water treatment costs. These effects are consequently impacting on the livelihoods and the quality of life of millions of people in the great lakes region.

WE HAVE OBSERVED THAT:

6. There are emerging technologies for catchment management, waste water treatment, judicious use of agro-chemicals, recycling water and nutrients that should be embraced
7. Law enforcement for improved natural resources management in the region and promoting circular economy needs to be strengthened.
8. Partnerships among various stakeholders (Governments, Academia, NGOs, Private sector and the general public) have improved across the region to counter environmental challenges and livelihood limitations in the region. Sustainable partnerships can be promoted to achieve higher impacts that can benefit the intended beneficiaries
9. The ongoing collaborative water resources management efforts with stakeholder coordination structures and social cultural behaviors are commendable. A shared vision with sectoral integration of the thinking is vital for a sustainable environment.
10. A catchment provides the needed framework for interactions between sectors and actors that do not often come together to share knowledge and visions for the future. Attaining the Sustainable Development Goals (SDGS) will therefore require embracement the integrated approach following a catchment with consideration of the water-food-energy- ecosystem nexus
11. There are effort to improve the management of water and land related resources in the region. The efforts should be promoted across different Water Management Zones and catchment in the country to ease access and use of quality water, soils and other land resources
12. A key challenge to scaling up land and water management approaches and measures to address climate change such as ecosystem based adaptation approaches (EbA), is the limited funding especially at the local government level especially for natural resources and environmental management.
13. Over dependency on natural resources at community level is a key challenge that undermines catchment restoration and application of approaches such as EbA, which build the resilience of ecosystems to climate change. The lack of

alternative livelihood sources, is the main reason behind the ever increasing pressure on natural resources.

14. There is limited human capacity to integrate the key tenets of the integrated catchment management approach in the region. The low human capacity in the region has affected advocacy and policy action efforts for boosting approach among stakeholders
15. Social, institutional and financial approaches should focus on increasing productivity, environmental conservation and resource costing for livelihood improvement strategy resilience of communities to drought and other climate stressors
16. Chemical contamination has caused lesions and other changes in fish and human health. Anthropogenic and industrial activities are the main causes of pollution to rivers and other water bodies
17. Land use practices in fragile ecosystems (like the Mountainous areas), especially those of the agricultural sector are contributing to accelerated impacts of climate change and environmental degradation. An example are the continuous landslides within the Mt. Elgon landscape, which are partly due to destabilization of steep slopes through poor agricultural practices.
18. Enforcement of Laws and regulations is still a challenge, and this undermines catchment management efforts. In Uganda for example, the amended National Environment Act (2018) has provided for an Environment police which is independent from the Uganda Police Force. It is anticipated that the independent Environment Police will be more efficient in enforcement of laws and regulations.
19. There is imbalance in the sustainable utilization of catchment with more focus on production rather than balancing production, environmental conservation, income and social acceptability.
20. High vulnerability and low resilience of communities to extreme events like landslides, floods and drought
21. Need for shared data, if better weather and climate predictions are to be made

WE AGREE AND RECOMMEND THAT:

22. Special attention be given to water harvesting technologies such as road water harvesting, controlled run-off systems into water retention ditches etc that maximum re-use of water resources to avert climate change effects. These should be integrated in government policy and strategies.
23. The contribution of land use change monitoring approach on water bodies and river systems using sound datasets should be demonstrated

- 24.**Advanced technologies that enhance biodiversity and conserve systems using modern sustainable water and land management, and agroforestry technologies should be promoted.
- 25.**Governments, NGOs, Private sector and Development Partners should prioritize funding research and training in all sectors dealing with land and water resources management to create the best Integrated Water Resources Management (IWRM) options for the countries in the Great Lakes region.
- 26.**Alternative income generating activities should be fully integrated in catchment management efforts to ensure that the communities have improved livelihoods and do not over rely on natural resources.
- 27.**A consortium or program be created by Makerere University (MAK) and Ministry of Water and Environment (MWE) to coordinate the generation and dissemination of knowledge, innovations and technologies for integrated management of Great Lake Catchments emphasizing communities engagement and livelihoods improvement
- 28.**Great Lakes and Catchment Management (GLACAM) conference be held regularly to bring together the Governments, Academia, NGOs, Private sector and the general public to share practical experiences, knowledge, innovations and practical technologies for integrated management of Great Lake Catchments.
- 29.**Community based natural resource management should be promoted and encouraged that the enforcement of laws, byelaws and regulations is carried out by the community to make enforcement more effective and sustainable.
- 30.**There is need to adopt Catchment based approach to planning and implementation as it provides the needed framework for interactions between sectors and actors that do not often come together to share knowledge and visions for the future
- 31.**Promote and enhance multilevel governance, dialogues and engagements to improve collaboration and partnerships in achieving our collective goals and enhance sustainability on the ground. Working with local and national government, regional networks such as LVRLACC and international centres of excellence such as the Cities Biodiversity Centre and ICLEI-Local Governments for Sustainability
- 32.**A water-food-energy and ecosystem nexus approach should be adopted by all countries as this is key in the attainment of the Sustainable Development Goals and management of water catchments
- 33.**There is need for regular awareness sessions by government and other stakeholders about mindset change in vulnerable communities. This will enable them take a shared responsibility

THE CLOSING CEREMONY

The 1st Great Lakes and Catchment Management Conference (GLACAM) that kicked off on 5th June 2019 at the Water Resources Institute in Entebbe for three days Conference was officially closed by the Director Water Resources Management M/s Florence Grace Adongo on behalf of the **State Minister for Environment Hon. Dr. Mary Goretti Kitutu**. She highlighted for water and land use researchers, practitioners and policy makers to consider advancing the link between water and land resources as strategic resources for achieving the SDGs, climate change adaptation and improving livelihoods.



Photo. Delegates at the closure of the conference on 7th June 2019 at Water Resources Institute, Entebbe Uganda,



Photo: A closing speech from Florence Adong, representing the Minister of State of Environment

PREPARED BY

SIGNATURE SIGNATURE

**CHAIR- GLACAM GENERAL SECRETARY
PROFESSOR MOSES M. TENYWA**

DR. PATRICK MUSINGUZI

ON 7th JUNE 2019

FOR ANY DETAILS, CONTACT

GLACAM SECRETARIAT

College of Agricultural and Environmental Sciences,
Makerere University P.O. Box 7062, Kampala, Uganda
Tel: +256 774 068824

1. Dr. Patrick Musinguzi (musipato7@gmail.com)
2. Dr Callist Tindimugaya (callist_tindimugaya@yahoo.co.uk)
website: <http://glacam.mak.ac.ug>