



The Makerere University Research and Innovations Fund: Achievements, impact and the future



MAKERERE UNIVERSITY

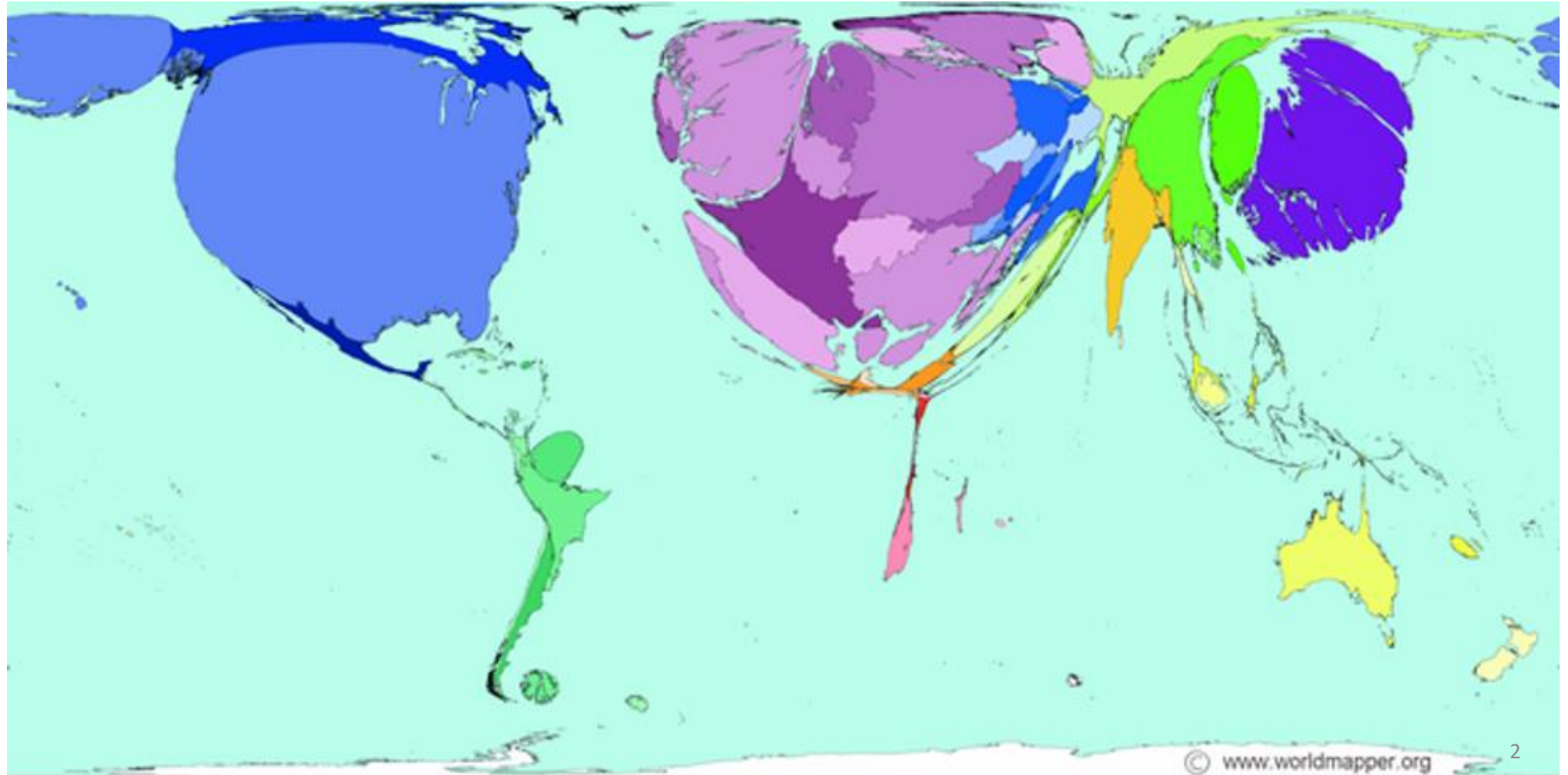


Dr. Roy William Mayega

Coordinator MakRIF

This is made possible with funding from the Government of the Republic of Uganda through Makerere University Research and Innovations Fund (Mak-RIF)

Background: Map of the world's research output
(www.worldmapper.org)



Background

- Makerere University received a first of its kind special funding from the Government of Uganda, earmarked for Research and Innovations
- Objective: To support faculty to conduct R&I initiatives that contribute to national development and transformation
- This FY (2022/23) is the fourth year of the fund, totalling **109 Billion UGX** (30+30+19+30) (**Approx. US\$ 29.5 million**)



Launch of the Automated Communal Hand Water Pumps developed with MakRIF Support

Setting the fund in motion

- Makerere and the Ministry of Finance jointly approved a Framework Document to guide the fund
- A 17 member Grants Management Committee (GMC) was appointed; it developed the fund's guidelines, procedures, and toolkits
- The MakRIF Secretariat was established to manage the grant calls and the awarded projects



The First Lady officiating at a MakRIF stakeholder dissemination of Education Research

MakRIF Grants to date

Round	Call	Applicants	Awards	Completed Projects
Round 1	RIF round 1 - National priorities	704	224	180 (80%)
	Special COVID-19 Grants	356	112	109 (97.3%)
	RIF round 1 Needs Responsive	-	3	3 (100%)
	COVID-19 Needs Responsive	-	10	10 (100%)
	Sub-total committed		(349)	(302)
Round 2	RIF round 2 -National Priorities (Resubmission)	-	67	30(44.7%)
	RIF round 2 National Priorities	386	160	76 (47.5%)
	RIF round 2 Needs Responsive	-	12	7 (90%)
	Sub-total committed		(239)	(113)
Round 3	RIF round 3 -National Priorities	482	126	40 (31.7%)
	RIF round 3- Needs Responsive	-	14	2(14.3%)
	RIF round 3 -Multi-Year RIF-1	51	51	0(0%)
	Sub-total committed		(191)	(42)
Round 4	RIF round 4-National Priorities	298	75	N/A
	RIF round 4- Needs Responsive	-	18	N/A
	RIF round 4-Multi-Year RIF-2	46	40	N/A
	RIF round 4-Scaling/ commercialization	Pending	Pending	N/A
	RIF round 4 –PhD Research	125	125	N/A
	Sub-total committed		(258)	(0)
	Total	2,448	1,037(42.3%)	457(44.1%)

Scope of the grants

- All disciplines provided the research questions align with national development priorities; attention to under-funded priorities
- MakRIF conducted a comprehensive stakeholder consultation to develop a national Research & Innovation Agenda; 14 themes identified
- 2 main categories of grants: Competitive Track (90%) Vs. Needs Responsive Track (10%) and include Research, Innovation, Capacity Building projects



The Minister for Health launches the COVID-19 Rapid Testing Kits developed by Dr. Misaki Wayengera with MakRIF support

MakRIF competitive awards by theme

	Thematic area	Yr1	Y2	Yr3	Yr4	Total	%
1	Sustainable Health	162	79	68	31	340	39.3
2	Transforming the agricultural sector	56	44	20	12	132	15.3
3	Re-imagining Education	32	21	20	22	95	11.0
4	Catalyzing business and enterprise	16	25	11	2	54	6.2
5	Water, sanitation and environmental sustainability	16	15	15	3	49	5.7
6	Harnessing the social sector to drive development	13	5	9	2	29	3.6
7	Energy and Minerals as drivers of rapid economic development	10	11	10	0	31	3.6
8	Leveraging public service and local administration for efficient services	11	9	6	2	28	3.2
9	Harnessing ICT to drive development	7	11	5	3	26	3.0
10	Harnessing tourism, wildlife and heritage to drive development	9	4	7	3	23	2.7
11	Sustainable Planning, finance and monitoring	1	3	8	5	17	2.0
12	Manufacturing, science and technology as tools to accelerate development	9	5	0	0	14	1.6
13	Strengthening law, governance, human rights and international cooperation	3	5	2	1	11	1.3
14	Defense and security: Achieving sustainable peace and stability	4	2	1	1	8	0.9
	Total	349	239	190	87	865	100

Grant principles

- **Results and impact**
- **Equity and inclusion:** *All academic units included; as many researchers as possible funded; women researchers and junior faculty equitably included*
- **Multi-disciplinarity:** *Projects are required to have a multidisciplinary team from the get-go.*
- **Accountability and utilization**
- **Openness, equity, ethics:** *90% by competition; Zero tolerance for corruption; open review*



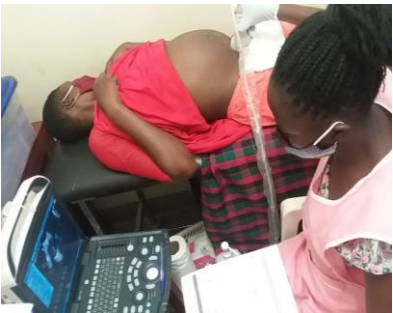
MakRIF: Dry season feeding technologies for different cattle production systems in Uganda

Outcomes and potential impact at a glance

- 457 projects completed to-date
- MakRIF conducted an impact evaluation of the first 178 completed projects...

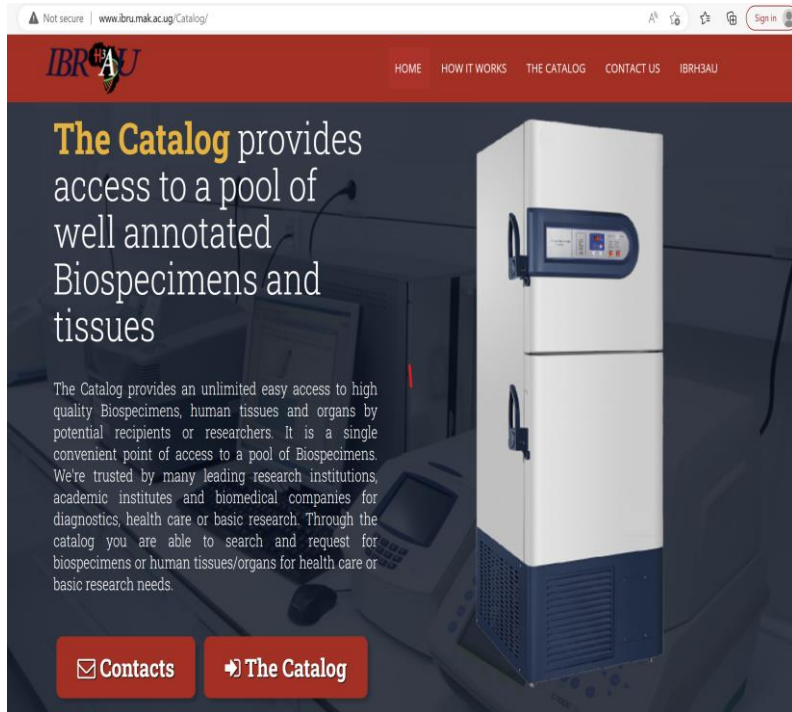
Type of output	Funding Ended at start-up level	Funding Ended at the point of transition to scale	Currently undergoing scale, beying initial funding	Total
Physical Products	3	73	26	102(57.3%)
Policy Advisories	6	23	23	42(23.6%)
Capacity Built	6	15	3	24(13.5%)
Total	15 (9%)	111 (62%)	52 (29%)	178

Spotlight: Sustainable Health



<p><i>The Bulamu Medical Ventilator (ResilientAfrica Network & Kiira Motors)</i></p>	<p>At a price of US\$ 6000 (Vs. US\$ 26,000 for standard ones), this technology will dramatically increase access to critical care (Ventilation and CPAP) in referral units in Uganda; currently undergoing animal testing which will be followed by human tests</p>
<p><i>Solar Autoclaves for Rural Health Centres in Uganda</i></p>	<p>Provides a low-cost sustainable option for health centres to sterilize reusable medical equipment, especially in off-grid areas or unreliable power</p>
<p><i>Bringing antenatal Ultrasound Scans closer to communities (Prof. Peter Waiswa)</i></p>	<p>Ultrasounds at HCIII and IV together with Task-shifting can improve the quality of maternal care; midwives are able to effectively use them</p>
<p><i>E-Medical: A robot medicine and disinfectant dispenser that also collects vital patient monitoring data (Dr. Justine Bukonya)</i></p>	<p>Applicable in emergency treatment spaces for deadly epidemics and pandemics to reduce health worker exposure by limiting their time with non-critical patients</p>
<p><i>The E-Partograph: An electronic partograph (Dr. Justine Bukonya)</i></p>	<p>By making it easier to input and visualize data on labour progress, e-technology can improve monitoring and decision making in obstetrics</p>

Spotlight: Sustainable Health



<p><i>Safety and efficacy of autologous adipose derived stem-cells in the treatment of keloids (Dr. Ronald Mbiine)</i></p>	<p>Preliminary studies show that using stem-cells to treat hypertrophic scars is safe and it shrinks the scars over a 3-month period, as a worthy alternative to Steroids</p>
<p><i>Efficacy of Ceftriaxone compared to the current antibiotics among malnourished children with infections (Dr. Victor Musiime)</i></p>	<p>Ceftriaxone was superior to the currently used combination of Ampicillin and Gentamycin and should be adopted as the new antibiotic of choice</p>
<p><i>Establishing a tissue and organ biobank at Makerere University (Prof. Moses Joloba)</i></p>	<p>By equipping the Molecular Lab, training staff and developing SOPs, Makerere now has the capacity to Biobank and process Umbilical Blood, Ova, Semen and other tissues for medical use</p>
<p><i>Development of High Performance Thin Layer Chromatographic Fingerprints for Standardization of Ugandan Herbal Medicines (Bruhan Kaggwa)</i></p>	<p>10 high performance finger-prints were identified and should be incorporated into the requirements for quality assurance of raw materials and herbal products manufactured in Uganda.</p>

Spotlight: Sustainable Health

<p><i>Catastrophic health expenditure on cancer care among affected persons in Uganda (Allen Kabageni Mulerwa)</i></p>	<p>Patients spend an average of 300,000 UGX (100US\$) on a single visit at UCI; some as high as 800,000 UGX; measures to cut costs are needed</p>
<p><i>A survey of mosquito species diversity and abundance in Uganda's Lake Victoria Basin: Transmission risk of mosquito-borne arboviruses (Dr. Anthony Mutebi Nsubuga)</i></p>	<p>In the current age of pandemics, new pandemic threats need to be anticipated. By knowing the species, genetic characteristics and transmission dynamics of this vector, we are getting ahead in surveillance for potential new pandemic threats</p>



Spotlight:

Transforming agriculture



Participating farmers choose their most preferred technology

<p><i>Enhancing the Grain Amaranth Value Chain for Improved Nutrition, Livelihoods, and Enterprises Development In Uganda (Dr. Dorothy Nakimbugwe)</i></p>	<p>The project developed, tested and put on the market an amaranth flour that is an alternative for all foods prepared with wheat in Uganda; creating a new value chain for 'dodo'</p>
<p><i>Developing dry season feeding technologies for different cattle production systems in Uganda (Dr. Justine Nambi Kasozi)</i></p>	<p>Two types of multi-nutrient crop residue blocks & pellets were made with the potential to improve milk yield and composition, feed intake and storability especially during the dry season</p>
<p><i>Evaluating the technical performance, profitability, and constraints to the adoption of 4 hermetic storage technologies against the conventional woven polypropylene (PP) bags for the storage of beans (Dr. Francis Okori)</i></p>	<p>Hermetic storage technologies (PICS bag, SuperGrain bag, plastic barrel, and metallic silo) were superior to the conventional PP bag storage in the community in terms of Grain damage (GD) and weight loss (WL), live insect infestation, and moisture content. Their scaled use will substantially reduce post-harvest losses in Uganda</p>
<p><i>Product formulation and evaluation of a herbal acaricide containing Albizia coriaria on resistant Rhipicephalus ticks (Aguma Bush Herbert)</i></p>	<p>The stem bark of Albizia coriaria showed considerable acaricidal activity against this resistant tick; mass producing it will substitute the failing synthetic acaricide in addressing the tick challenge in Uganda</p>
<p><i>Monitoring and Mapping Antibacterials used in Livestock Farming Systems in Uganda (Prof. Lawrence Mugisha)</i></p>	<p>The data is extremely important to monitor antimicrobials that are imported and used in livestock; it can also detect overuse, hence potential for resistance</p>

Spotlight:

Transforming agriculture



Optimization of the dosage, adjuvant, and route for a candidate anti-tick vaccine (Dr. Kokas Ikwap)

The optimal dosing for this new tick vaccine made in Uganda has been established. A manufacturer has been engaged to mass produce the vaccine

Epidemiological investigation of brucellosis in selected agro-pastoralist districts of Eastern Uganda (By Prof. Frank Mwine)

Among the 4 districts studied, Ngora has a very high prevalence of Brucellosis that needs to be addressed. Such surveys should be scaled if Brucellosis is to be eliminated

Enhancing Value addition on Potato-Sorghum enterprises for Improved Livelihoods in Uganda (EVaPoSIL) (Prof. Johnny Mugisha)

A range of high-quality potato-sorghum based products (cookies, biscuits & waffles) has been added to supermarket shelves in Uganda; a value chain for otherwise un-marketable small Irish Potatoes in Uganda has been created

Developing an automatically controlled commercial solar-dryer (HSD) for sustained market responsive fruit production in Uganda (Prof. Ahamada Zziwa)

The HSD has been developed and adapted by entrepreneurs to different produce (cassava, amaranth seeds, ginger, & vegetable drying). Lutheran World Foundation has adapted it to Arabica Coffee drying in Kasese

Spotlight:

Transforming agriculture



Deployment of the new Maksoy soybean varieties for on-farm income enhancement, food and nutrition security, enterprise development in Eastern Uganda

This project can reduce malnutrition in children and increase incomes if scaled up and commercialized in districts where soy-bean does well

A Pedal-Operated Seed Cleaner to boost post-harvest grain & legume quality

If commercialized, it will reduce time and labour spent on seed cleaning by women and children, increase school time, and improve quality of produce

Value-added Phytogetic Feed Additives to Replace Conventional Antibiotics In Chicken Feeds

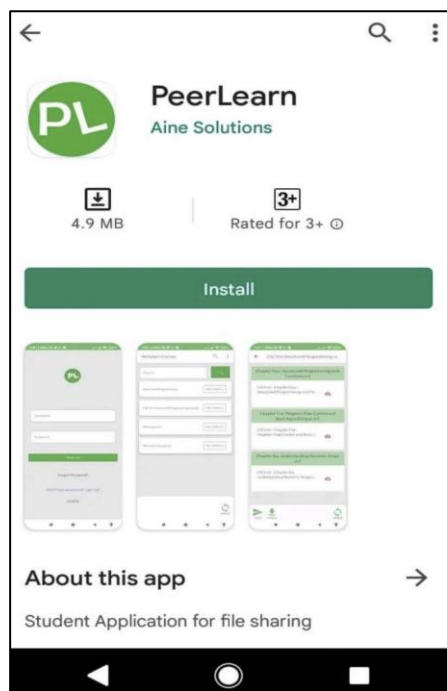
A novel enhanced feed that replaces use of antibiotics for chicken fattening

Design and development of mobile irrigation technology systems for small to medium commercial farmers and pastoralists in the rain constrained areas of Uganda (Dr. Hussein Balimunsi)

The project designed a community customized and self-pressure boosting mobile irrigation system to serve small to medium scale commercial farmers in Nakaseke and Luwero district.

Spot-light:

Re-imagining education



PeerLearn: Peer-to-Peer Offline e-Learning Content Distribution Platform (Alex Mwotil)

A novel mobile learning platform optimised to work on and offline and provides support for peer-to-peer learning resource distribution and sharing; it addresses key barriers to e-Learning in Uganda

Optimising surgical training: Live video recording and remotely relay using smart-glasses (Cathy Kilyewala)

This technology will dramatically increase access to medical education in emerging medical schools in Uganda

Building Inclusive Learning Environments For Marginalised Societies In Uganda (BILE) (Genza Gyaviira Musoke)

An Alternative Basic Education Curriculum for the Batwa (ABEB), a very marginalized population in Uganda was designed; it is recommended for adoption to suite their education needs, similar to what was done for Karamoja (ABEK).

Interdisciplinary enhancement of Science education in the Uganda Primary Thematic Curriculum (Busulwa Henry Ssebuliba)

Local language science terms and folklore are not known to most teachers including names of plants and local animals; Most teachers lack skills to integrate science concepts into learning themes in the local language

Spot-light

Re-imagining education



MAK Timetabling Management System Home Timetables ▾

Timetable by Groups

Academic Year* Semester* Type*

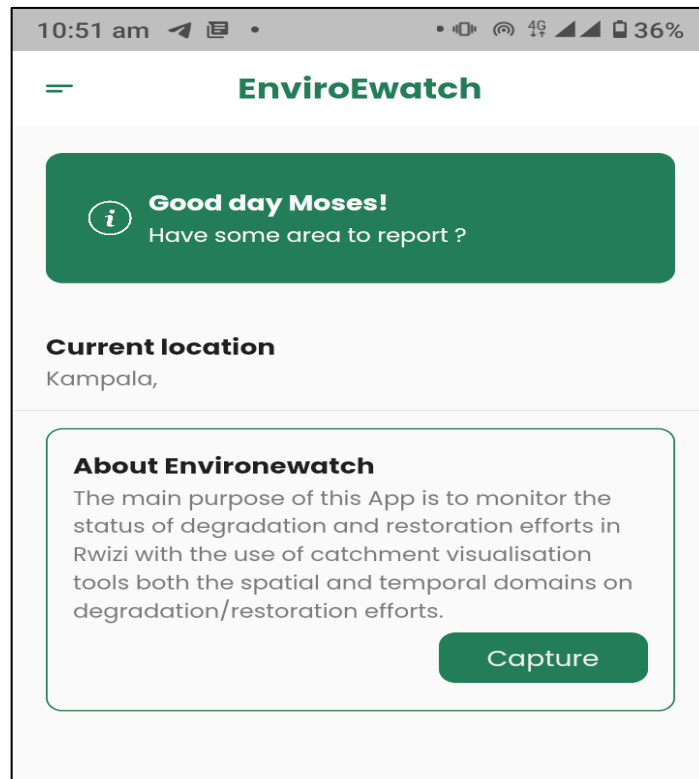
Select - Academic ▾ Select - Semester ▾ Select - Type ▾

Timetable for -

<p><i>Digital Games for Teenage Reproductive and Mental Health Education (Prof. Kizito Joseph Bada)</i></p>	<p>This study demonstrated that students' experiences and concentration in digital game-based learning influences their motivation to learn new things in mental health</p>
<p><i>Pedagogical Leadership in HEIs to Enhance Graduate Work Readiness and Transition to Work (Dr. Ronald Bisaso)</i></p>	<p>The project developed a Post Graduate Diploma Programme that embeds Work-Integrated Learning which is critical for creating graduates that are ready for the world of work; this approach needs to be scaled to all degree programs</p>
<p><i>University-wide Timetabling and Teaching Load Management Information System for Makerere (Dr Agaba Joab Ezra)</i></p>	<p>Like ACMIS, this system needs to be scaled to all public universities for better efficiency, tracking and coordination of teaching</p>

Spotlight:

Water, sanitation & environmental sustainability



<i>Nylon Based Litter Management Trap for Drainage Systems (Dr. Andrew Ayor Ssemakula)</i>	The project designed a flexible nylon mesh sock with an average retention capacity of 55 kgs (Range up to 152 kgs) to capture floating litter and debris in drainage channels. The waste can be easily removed by untying and emptying the sock
<i>An innovative e-community governance model for monitoring catchment restoration and interventions in River Rwizi (Dr Patrick Musinguzi)</i>	An e-based innovation that uses smart phone applications to monitor the community response to restoration interventions in River Rwizi catchment, Mbarara district. It detects any class/category of degradation with more than 90% accuracy, receives reports and photos from the field
<i>Valorization of Waste Chicken Feathers For Water Purification</i>	A drinking water purification system that couples sand filtration with keratin from waste chicken feathers; the quality of emerging water meets the WHO acceptable levels
<i>Solar-powered recyclable water hand-washing facility</i>	Potential utility at public functions or in epidemic situations when rapidly deployable hand-washing units that conserve water are needed

Spotlight:

Harnessing the social sector for development



***Determinants of Death
Registration uptake (Prof.
Leonard Atuhaire)***

The project makes a policy recommendations on the need for increased political/government commitment to civil registration and vital statistics as a key development planning tool and achievement of SDG 16

***Women and Housing
(Architect Assumpta
Nagenda)***

The study found that low-income houses provided under different programs are abandoned by the would-be users; this can be averted by adequate consultation from the communities especially women when designing these spaces; their economic needs should not be ignored.

Spot-light:

Energy and Minerals to drive development



Precious Metal Recovery By Electronic Waste Recycling Using Cyclodextrin From Starch Extracted From Non-Edible Plants (Ibrahim Karume)

The project recovered precious metals (Palladium, Platinum & Gold) from electronic wastes using cyclodextrins from starch obtained from non-edible plants. This approach offers a greener and cheaper alternative to mercury and cyanide

Policy and regulatory compliance with Smart Grid technologies; post electricity sector reform in Uganda (Dr Hassan Bashir)

This study informed the ongoing energy policy review by the Ministry of Energy on adoption of net metering and awareness creation. Stakeholders understood the need for smart grid technologies, positively impacting on the draft upcoming policy

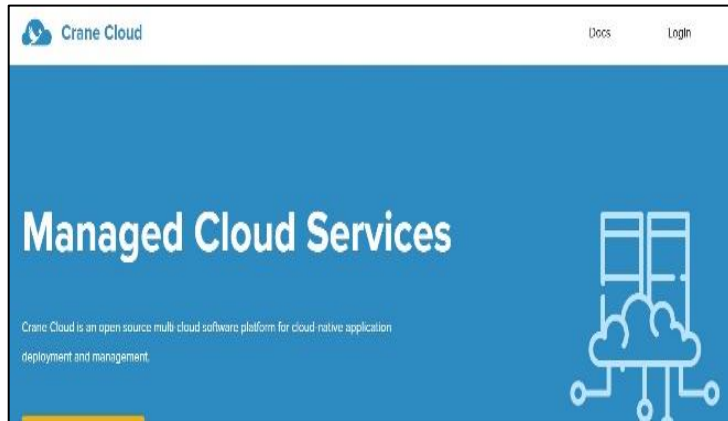
Spot-light:

Public service & local admin for efficient services



A Mobile E- Governance Service Advisor (AMESA): A Citizen Centric Process Alignment to Public Service Delivery (Prof. Gilbert Maiga)	The tool has enhanced citizen participation in the delivery of public services for the sectors of public health, water and waste management.
Assessment of Urban Revenue Mobilization and Service Delivery in Uganda: A case of Municipal Local Governments (Dr. James Wokadala)	The study made recommendations to improve service delivery and revenue generation strategies in Municipal Councils. Use of technology enables the public to link revenue collection to services. Several untaxed natural resource-based economic activities were identified: sand mining, stone quarrying, brick-making
Strengthening Local Governance through adoption of E-Governance Digital applications. (Tonny Kiggundu)	This study explored and developed digital applications (web and mobile) through which governance practices such transparency, accountability, citizen engagement and finances can be improved: https://kasangati.go.ug/ and https://kasanje.go.ug/

ICT for development



<p><i>Crane Cloud: An open-source multi-cloud service layer for highly available cloud-based services in Africa (Eng. Bainomugisha)</i></p>	<p>The project is finalizing an MoU with NITA-U to scale Crane Cloud to the existing NITA-U infrastructure. This will enable government entities host their services such as web applications in Uganda: https://cranecloud.io/</p>
<p><i>An information Portal to Support Gender Based Violence Initiatives (Prof. Gilbert Maiga)</i></p>	<p>The study provided gender sensitive data on women’s increased vulnerability during COVID 19 in Uganda. This data was used by government departments and civil society organizations for post-covid gender sensitive planning.</p>
<p><i>NetFarmX – An agro-e-commerce App (Male Vincent)</i></p>	<p>This One Stop mobile and web-based agricultural social networking platform connects farmers to genuine agro input suppliers, output traders, retailers and consumers through a common marketplace allowing them to find the best deals</p>

Spot-light:

Harnessing tourism, wildlife & heritage for development



Nation branding through tourism (Dr Isa Nsereko)

This Project proposed new ways of branding Uganda's tourism potential for better reputation and national image. They recommend that Government takes up these approaches including a national identification tag-lines for different components of tourism

Spot-light:

Sustainable Planning, finance & monitoring



An assessment of the drivers of the shadow economy and tax implications in Uganda (Dr. Ismail Kintu)

The study documented the need for Ministry of Finance, and the Ministry of Local Government to work together to link government departments to the URA system. Following this study, URA is designing a new tax education strategy specifically for the informal economy

An interrogation of Tax Education Gaps in the Informal Sector and how they can be leveraged in Broadening the Tax Base (Prof. Eria Hisali)

This project recommended avoidance of the one-size-fits-all approach to awareness creation on Taxation in the community. In addition to unpacking the taxation message, deployment of peer mobilisers and partnering with Telecoms are crucial. Important tax gaps include: A large informal economy, low awareness about TINs, and low awareness about tax returns

Spot-light:

Manufacturing, engineering, industry, technology



The EpiTent (ResilientAfrica Network)

A rapidly deployable hospital ward for pandemic emergencies with passive self-cooling technology that cuts ambient temperature by 12⁰C in very hot climates; 13 retrofittable accessories that support medical procedures; Currently deployed to 6 regional referral hospitals; manufactured by Luwero Industries and Tarpo Industries



Spot-light:

Law, governance, human rights & international cooperation/
Defense and security



***Transforming
Presumptive Age
Estimation In Uganda:
Methods, certainty,
and the Law (Annet
Kuteesa)***

This study explored the challenges of age estimation and developed third molar-based dental age estimates which improves the estimation process; The standardized third molar age estimates improved practice in age estimation. The team recommended use of this approach among the juveniles undergoing criminal proceedings

***Promoting
Community Policing
By Integrating Soft-
Skills In Uganda Police
Training Programs (Dr
Badru Musisi)***

The team has built capacity for enhancing soft-skills for in-service and pre-service police officers. Their recommendations were taken up by the Uganda Police Force training school in Bwebajja, Entebbe

And there is much more.....

- The projects spotlighted are only the tip of the ice-berg
- Find out more: Obtain project briefs and detailed reports about completed and on-going projects at: <http://rif.mak.ac.ug>
- You can also contact us at: info@rif.mak.ac.ug

The screenshot displays the website for the Makerere University Research and Innovations Fund (RIF). The header includes logos for the Government of Uganda and Makerere University, along with navigation links: HOME, ABOUT, PROJECTS, GRANT INFO, RESOURCES, and CONTACT US. The main content area features a prominent banner for "Call for Grant Applications" for Round 4, Track 4: Extensions for Multi-Year Projects Financial Year 2022/2023. The banner includes the website URL www.rif.mak.ac.ug/multi-year/ and an application deadline of Sunday, March 19, 2023. A yellow starburst graphic with the text "Apply Now" is overlaid on the banner. To the right, there is a section for "Days of Excellence" from November 17th to 18th, celebrating 20 years of cooperation with Sweden. The footer contains the slogan "We Build for the Future" and the text "Government of Uganda through Makerere University Research and Innovation".

Looking into the Future

- There is a gap in translation, scaling and commercialization of outputs which requires....
 - Enhanced focus on translation/commercialization to amplify impact
 - Strengthening partnerships with government and civil society for policy uptake/ implementation/ scaling
 - Bridge funding for scaling
 - A strong business incubation center to support commercialization and build a start-up culture
 - Strengthening linkages to the private sector

	Ended at start-up level	Ended at the point of transition to scale	Ended while already underg oing scale	Total
Physical Products	3	73	26	102
Policy Advisories	6	23	23	52
Capacity Building	6	15	3	24
Total	15 (9%)	111 (62%)	52 (29%)	178



Looking into the Future

- Revisiting the research agenda (now 4 years old) to integrate emerging areas
 - Strengthening RIF's role in understudying some landmark government programs (e.g., PDM, immunization, thematic curriculum) to contribute to their continuous improvement
 - Identifying and understudying issues of national importance
 - Incorporating the learning agendas of development partners
 - Expanding the involvement of the private sector especially manufacturing
 - Engaging and co-creating solutions with communities



The Solar Powered Recyclable Water Hand washing Facility (Eco-Wash) by MakRIF

Looking into the Future

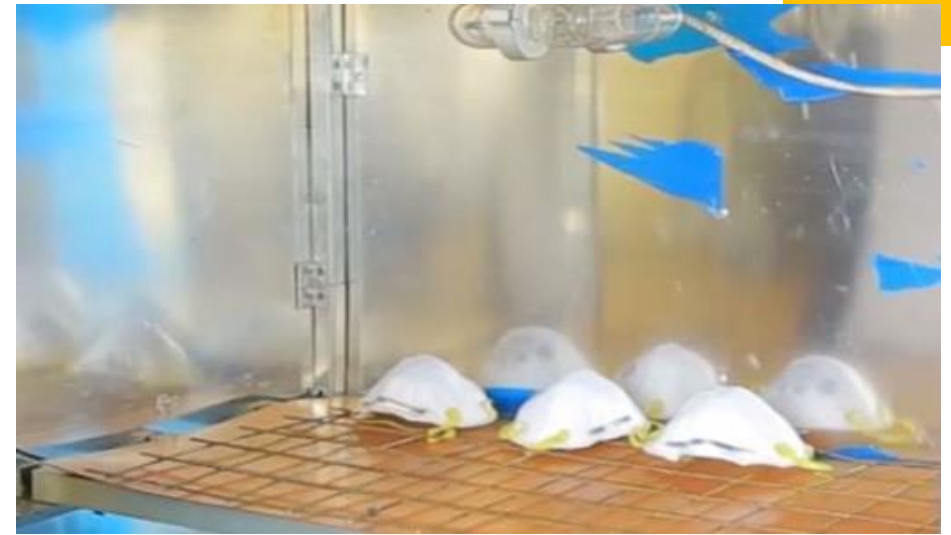
- Strengthening advanced level research and innovation capacity
 - Re-imagine PhD and post-doctoral level training to generate more innovations
 - Maker-spaces: Capital investments into specialized equipment to create high-end maker-spaces to support different innovations



The Low Cost Touchless Handwash Technology (TW-20 Kit) For Public Shared Spaces

Looking into the future

- Growing the fund: Government's investment is only a starting point
 - A call to Development Partners to buy-into the fund and to route their development research questions and Learning Agendas into MakRIF



Decontamination equipment for N95 and cloth masks by MakRIF



Acknowledgements

Special thanks to the
Government of the Republic of
Uganda

*We Build for the
Future*

*Twitter: @RIFMakerere
Facebook: Research and
Innovations Fund*