MISSION STATEMENT
The Mission of Kenyatta University is to provide quality education and training, promote scholarship, service, innovation and creativity and inculcate moral values for sustainable individual and societal development.

VISION STATEMENT
The Vision of Kenyatta University is to be a dynamic, inclusive and competitive centre of excellence in teaching, learning, research and service to humanity.

IDENTITY STATEMENT
Kenyatta University is a community of scholars committed to the generation and dissemination of knowledge and cultivation of wisdom for the welfare of society.

CORE VALUES

PHILOSOPHY STATEMENT
Sensitivity and responsiveness to societal needs and the right of every person to knowledge.
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From time to time and in keeping with Kenyatta University’s Vision, Mission, Identity and Philosophy statements, the Division of Research, Innovation and Outreach highlights research and Innovation activities within the university. In this 10th issue, we not only present research and innovation news but also capture dissemination and uptake activities, mobility, visiting scholars, a glimpse at the available research infrastructure as well as student experiences.

The Editorial team celebrates staff and students for their overwhelming response to the call for contributions to this publication and to the University Management for the continued support. We hope you all enjoy the read.

Merry Christmas and Happy New Year.

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RESEARCH NEWS
Research and Development Grants
(July – December 2022)
Improving food and nutrition security, reducing food-system-related environmental footprint and empowering communities

Prof. Grace Ngare of the Department of Sociology, Gender and Development Studies and the Policy and Advocacy Lead at the KU-WEE Hub is a partner in the 4-year INCiTIS-FOOD (Integrated and Circular Technologies for Sustainable city region FOOD systems in Africa) project funded by the European Commission under Horizon Europe at Approx. Euros 6,000,000. The project not only aims at improving food and nutrition security in African cities and reducing the food-system-related environmental footprint while contributing to circularity but also to empower communities by opening up opportunities for them in agri-food supply and value chains, and achieve environmental justice through transformative food policies.

To achieve this the project will incorporate interdisciplinary research, integrated best-fit technologies, stakeholder led action, capacity-building, research-practitioner-policy collaborative engagement, and Europe-Africa partnership. Prof. Ngare is offering the gender strategy to the project, together with her colleagues Dr. Pacificah Okemwa and Dr. Sheila Mutuma, all from the same discipline.

The INCiTIS-FOOD project will co-create circular agri-food technologies, practices, and business models for an inclusive food system in African cities and towns. These technologies comprise soilless crop farming (hydroponics), recirculating aquaculture systems (RAS), and insect farming. Besides their suitability for the context of African cities as they do not require great access to land, water, or wealth, these circular agri-food technologies are deemed gender responsive as they are accessible to men, women, and the youth.

The INCiTIS-FOOD project will follow a Lean Start-up Methodology to achieve minimum viable products (MVPs) expected to reach a sufficiently high technological, societal, and business readiness level in 2 years into the 4-year project. The MVPs will further be validated in a demonstration phase (800-1000+ start-ups and scalable small and medium-sized enterprises, SMEs) on the basis of 2 Open Calls for the Cascade Fund (FSTP: Financial Support to Third Parties). Beneficiaries of the Cascade Fund will be surveyed to generate empirical evidence on the co-benefits of the INCiTIS-FOOD project technologies and business models, which will guide urban food policy roadmaps for African cities. KU is privileged to host the 3 Day Kick-off Meeting between 29. January – 01. February 2023.
The UK’s Foreign, Commonwealth and Development Office (FCDO) launched its flagship global programme What works to prevent violence against women and girls: impact at scale (What Works 2), a successor to the original What Works programme (2014 - 2020). The aim of the initiative is to scale up evidence-based, practice-informed prevention of violence against women and girls. During the current cycle, the programme has invested GBP 67,500,000 million to prevent and contribute to eliminating violence against women and girls (VAWG).

The Global Women’s Institute (GWI) under the able leadership of Prof. Mary Ellsberg will lead the research consortium. Prof. Grace Wamue-Ngare of the Department of Sociology, Gender and Development Studies will represent Kenyatta University in the consortium. Other partner institutions include; Johns Hopkins University; Children’s Institute-child rights in focus; The Aga Khan University; Breakthrough; 10/Raising Voices; The Equality Institute; Social Development Direct; International Rescue Committee and Care.

This seven-year programme will include dozens of studies that involve impact evaluations, operations research, prevalence studies, systematic and rapid evidence reviews).
Dr. Juliana Kiloi of the department of Food, Nutrition and Dietetics secured a collaborative grant on Health Diets4Africa worth Euro 10,327,804 for a five-year project titled “Combatting malnutrition in Africa through diversification of food systems”. The project brings together 20 partners from Europe and Africa with Justus-Liebig-Universitaet Giessen, Germany as leading partner institution.

HealthyDiets4Africa project is a transdisciplinary consortium that aims at harnessing the potential of diversification of food systems in combating malnutrition and enhancing food and nutrition security in the continent. The team observes that diversifications of different elements of the food chain has the potential of improving nutritional health outcomes and reduce malnutrition levels in Africa, while at the same time entailing economic and ecological benefits.

The overarching objective of the project is to establish diversified food systems in eight Western, Central and Eastern African countries. In line with the aims of the EU’s green deal and the global elements of the EU’s Farm-to-fork-strategy, HealthyDiets4Africa strives to contribute to the transformation of food systems in Africa through diversification to make them more resilient, sustainable and climate-friendly, whilst improving the supply of safe, nutritious and affordable food to combat malnutrition.
Building Striga resistance for food security through genome editing

Prof. Steven Runo of the Department of Biochemistry, Microbiology and Biotechnology (Kenyatta University) jointly with partners from International Service for Acquisition of Agri-biotech Applications (ISAAA) AfriCenter, University of Addis Ababa –Ethiopia, African Agricultural Technology Foundation (AATF), and the Corteva Agriscience from the US have secured funding of USD 3,800,000 million from USAID for the implementation of the “Feed the future striga smart sorghum for Africa- FtFSSSA” project.

The project will use genome editing, a powerful new breeding technology, to develop new varieties of sorghum that are resistant to a noxious weed called Striga (‘Kayongo’ in local dialect). Striga ravages cereal production in most parts of Africa, sometimes leading to a complete loss of the crop.

Having studied striga for close to 20 years Professor Steven Runo’s research group together with his partners identified sorghum varieties that are immune to Striga infection. While other sorghum varieties are easily recognized by the parasitic plant because of the chemical they emit in the roots, the Striga immune sorghum does not emit the chemical as it lacks the genetic trait that produces the chemical attractant to Striga and is thus, unrecognizable by the weed.
Plants and animals constantly adapt to changing environment by modifying their genetic make-up, and the team believes this is what happened to the Striga-resistant sorghum. However, adaptation in nature is a long process that takes hundreds or thousands of years and is imprecise, but with genome editing it can be now replicated in a targeted and efficient manner.

In the Feed the Future Striga Smart Sorghum for Africa (FtFSSSA) project, the team will use genome editing to “delete” the adverse genetic trait in sorghum that makes it susceptible to Striga, accelerating adaptation of sorghum to Striga attack. Fondly naming the future genome-edited varieties ‘Striga Smart Sorghum’.

In addition to impacting food security in Africa, the project integrates local capacity building and bio-entrepreneurship. The project will establish bio-entrepreneurship hubs (AfriBIO-Hubs) to empower the youth and sorghum value chain players with skills for generating decent jobs and high value products from agricultural biotechnology. In the short term, Africans will have capacity to leverage and use biotechnology to tackle local food production challenges. The Afribiohubs component will be led by Dr. Susan Musembi and Mary Mwangi of the Department of Biochemistry, Microbiology and Biotechnology.

FtFSSSA inspires hope for millions of sorghum farmers in Sub-Saharan Africa who have been yearning for a sustainable solution to Striga infestation on their crop.

“If there is any research going on to find a sorghum variety that is resistant to Khayongo (Striga weed), it is welcomed. We are really suffering. We invest heavily in sorghum farming but when it comes to the harvest, there is nothing to be proud of” - lamented Joseph Mialo, a sorghum farmer in Busia, Western Kenya.
Prof. John Mugubi of the Department of Communication, Media, Film and Theatre Studies, together with partners from European Institutions and associations secured Euros 1,645,000 from the European Union to undertake a joint exchange programme for staff, artists and graduate students for four (4) years, (January 2023 – 2027). The aim of the project is to investigate and explore the possibility of an enhanced model of interaction and somatic participation between artists and communities, coming from different cultural backgrounds, both traditional and virtual ones in hybrid environment, including physical, and virtual layers.
The project will develop the concept of Virtual Reality (VR) participation, building the integrated framework for VR-mediated consensus and community in a form of an aesthetic dialogue, geared toward layering and investigating aesthetic experiences through VR technology.

The project’s physical mobilities will be directed towards sharing knowledge and proficiency in different fields such as humanities, arts, technology, and education, focused on the research on communities, arts, and participation in contemporary digital time in countries involved in the project.

Apart from activities realized during the mobilities (workshops, trainings, field research and interviews), the cooperation between partners will be continued in the virtual space. This will be realized with the use of modes of telepresence, Augmented Reality (AR) and Virtual Reality (VR) technologies such as the AltspaceVR platform. The project team will operate in an experimental, hybrid environment to stimulate and research the process of social-artistic interaction. The process will engage artists, communities, and researchers from six countries in Europe and Africa namely: Poland, Portugal, Italy, Greece, UK and Kenya.

Partners in the project are: Jagellonian University, Poland, Polish Aesthetic Society, Polish University abroad (UK), Faculty of Fine Arts of the University of Lisbon, Portugal, Opera Network Cultural Association, Italy, Giacomo Puccini Music Conservatory, Italy, National and Kapodistrian University of Athens – GOA, MIASTOPRACOWNIA SP. Z O.O. City Studios – Krakow, Poland.
Dr. Eric M. Kioko of the Department of Environmental Studies and Community Development, together with Dr. Girma Kelboro Mensuro (University of Bonn, Center for Development Research -ZEF) and Dr. Abiyot Legesse (Dilla University, Ethiopia) secured a four-year (2022-2026) research grant of Euro 1,500,000 awarded by the Volkswagen Foundation, Germany. The project, titled, “Local dynamics and Integration of UNESCO world heritage sites of outstanding universal value: evidence from cultural landscapes in Kenya and Ethiopia” investigates the dynamics and threats affecting cultural heritage sites in Kenya and Ethiopia.

World heritage sites are at risk. For centuries, humans and nature have coexisted and communities have deployed indigenous methods to conserve landscapes that have cultural, social and economic significance. The World Heritage Convention progressively recognized such indigenous conservation efforts by designating these cultural landscapes as sites of outstanding universal value. However, inevitable changes in the local environmental, economic and social structures result in changes in the values, culture and needs of groups of people who are living in the heritage sites and directly depend on it for their livelihoods.

Using the case studies of the Sacred Mijikenda Kaya Forests in Kenya and the Konso Cultural Landscape in Ethiopia, the researchers examine how human-environment relationships have changed in UNESCO-listed cultural landscapes. Fieldwork will follow a bottom-up participatory mixed methods approach to collect qualitative and quantitative data. Specifically, the team will employ ethnographic research methods including life histories, biographical interviews, focus group discussions, transect walks, community/resource mapping, as well as key informant accounts. The project will incorporate four (4) post-doctoral fellows as well as postgraduate and undergraduate student assistants.

Project partners

The Sacred Mijikenda Kaya Forests (Source: National Museums of Kenya)

Kenyatta University students remove their shoes to access holy grounds at Kaya Kidondo, Coastal Kenya
Don explores how land use and management affect riverine water quality

Dr. Fredrick Leshan Tamooh of the department of Zoological Sciences - Mombasa Campus in collaboration with KU Leuven-Belgium, Egerton University and the Kenya Wildlife Research and Training Institute has secured a grant of Euros 279,954 from VLIR-UOS to implement a 5-years (2022-2027) Team Project titled “Understanding the influence of land use and catchment characteristics on riverine carbon and nutrient dynamics for improved water resource management in Kenya”.

The project aims to identify and document the sources of sediment and nutrients from the Aberdares Range (Chania River), Mt. Kenya (Thiba River) and Shimba Hills (Ramisi River), establish sediment quantities from each sub-catchment, provide new scientific insights on how land use and management affect riverine water quality in the region, and develop and consolidate partnerships with stakeholders to propose tangible policy actions to improve land water management. The project will build capacity of one PhD and three masters’ students in addition to providing state-of-the-art equipment that will facilitate the setting up of a lab for biogeochemical studies.

Project partners

Funded by:

Upstream of pristine Thiba river at ~2000 meters above sea level

Downstream of sediment laden Tana River mainstream at ~90 meters above sea level and ~300 km from the river mouth
Expanding Invention Education in Kenya

NEST360 is an alliance of international experts working to end preventable newborn deaths in low-resource settings. The alliance seeks to reduce newborn mortality in African hospitals by 50% through delivering innovation, developing the education ecosystem, and implementing evidence-based care.
NEST360’s Invention Education (IvE) model enables students and faculty to develop and deliver inventions that solve local and global challenges through international collaborations among universities, industries, hospitals, and non-profit organizations. This model leverages design studios, curricular reform, administrative buy-in, a supportive local innovation ecosystem, and a supportive Africa IvE Network to foster local innovation capacity for the next generation of innovators.

In September 2022, IvE expanded to Kenya with Kenyatta University (KU) as the anchor partner. Dr. June Madete and Dr. Kenneth Iloka of the Department of Electrical and Electronic Engineering in collaboration with partners from William Marsh Rice University won a grant of $146,300 in support of expanding invention education in Kenya from the Lemelson Foundation. During the COVID-19 pandemic, the faculty and students leveraged elements of IvE to address the need for an affordable ventilator manufactured in Kenya that resulted in the development of TIBA-VENT. The goal of this partnership is to build on this foundation and strengthen connections between the universities and stakeholders in the broader innovation and entrepreneurship ecosystem. This will expand access to prototyping equipment and infrastructure to support the student-led design of technologies, improve employability for university graduates and expand funding resources to advance prototypes of promising inventions.

Funded By:

The Lemelson Foundation
improving lives through invention

Rice360 Institute representatives during a courtesy call to the VC who was represented by Prof. Vincent Onywera (3rd L) and Prof. Caroline Thouruwa (3rd R) together with from right Dr. Kenneth Iloka, Dr. June Madete and Prof. Maina Mwangi (2nd L)
Dr. George Ochieng’ Asudi of the Department of Biochemistry, Microbiology and Biotechnology was awarded a grant of USD 12,000 by the International Foundation for Science to further his research on the mechanisms of plant-phytoplasma interactions with special focus on Napier grass stunt (NGS) phytoplasma.

The objectives of the study include assessing the NGS-disease in high altitude areas and creating alerts for its potential spread and to discover effective chemicals produced by the plants that will allow them to defend themselves from other competing plants, bugs and bacteria that interfere with milk production due to lack of adequate and nutrient rich feeds.

Dr. Asudi also received GBP 15,480 from the Cambridge Africa ALBORADA to support the research. The ALBORADA fund was awarded in collaboration with Dr. Alexandra Murphy of the Department of Plant Sciences, University of Cambridge, United Kingdom. The Cambridge-Africa ALBORADA Research Fund aims to catalyse new and strengthen existing collaborations between researchers in Africa and Cambridge and support high quality training activities.

(a) Healthy Napier grass, (b) stunted Napier grass with foliar yellowing of leaves and reduced biomass caused by phytoplasma
Dr. Thommas Mutemi Musyoka, of the Department of Biochemistry, Microbiology and Biotechnology was part of the 2022 cohort recipients of the Kenya Education Network (KENET) research grant of up to Kshs. 1,500,000 under the special interest category Computational Modelling and Materials Science (SIG CMMS) for the project titled “Exploration for anticancer natural bioactive compounds in East African plants against known human protein targets using in Silico approaches”. The KENET small grants are meant to catalyze research in some of the emerging priority research areas, promote research collaboration and build the capacity of young researchers.

Dr. Musyoka together with his collaborating partners from Jomo Kenyatta University of Agriculture and Technology, Technical University of Kenya and ICIPE will be mining for novel drug targets in the human proteome that can potentially be used to obtain new classes of anticancer drugs. It is anticipated that upon successful implementation of the project, the participating early career researchers will be well positioned to further their research and expertise in emerging research areas, and subsequently attract more research funding.
Dr. Mary Makokha of the department of Geography secured the Higher Education and the SDGs Challenge Grant of GBP 2,500 for the project titled “Building gender resilience to climate change adaptation in Kenyan drylands”. In Kenya, dryland makes up over 80% of the country, Dr. Makokha will engage dry-land stakeholders to establish vulnerability, adaptive capacity, and the effectiveness of government-led climate change measures in protecting dry-land ecosystems. This will be in collaboration with Raphael Kioko of the ASAL (Arid and Semi-Arid Lands) stakeholder forum in Kenya. The project aims to empower women, who control less than 2% of the land despite providing households with 80% of their food.
Dr. Oliver Mbayi of the Department of Communication, Media, Film and Theater Studies is among the awardees of the Commonwealth Peace and Reconciliation Challenge Grants 2022 worth £2,500 by the Association of Commonwealth Universities. The one-year project seeks to contribute to the integration of the children of urban refugees and asylum seekers within host communities by using storytelling as a therapeutic tool.

The project aims at using participative storytelling to create safe spaces for refugee/asylum seekers’ and host communities' children for verbal expression about their experiences, conflicts, fears, beliefs, thoughts and feelings. Children of refugees encounter stress associated with their families' adaptation and acculturation, family conflict, use of new language in school, social exclusion, stereotypes and discrimination. Helping these children integrate by connecting them to other children within host communities ultimately creates a layer of support system. Adaptation can be by allowing the children to tell their "stories" - experiences, conflicts, fears, hopes by engaging them in participative storytelling the children will adopt the language of curriculum instruction increasing their sense of belongingness and self-worth, deal with underlying trauma and enhance harmony with self and others.
Search for the Striga resistant Sorghum

Ms. Sylvia Mutinda, a PhD student and a research assistant at the Department of Biochemistry, Microbiology and Biotechnology has been awarded USD 15,000 by the International Foundation for Science to undertake a study titled ‘Marker aided selection of Striga resistant sorghum’. Sylvia has been researching on Striga interactions with its hosts (maize, sorghum, pearl millet and finger millet) and nonhosts (cowpea) for the past 6 years.

Ms. Mutinda seeks to study a large panel of sorghum to identify resistant varieties suitable for Striga prone regions of Western Kenya. In her previous studies together with Prof. Steven Runo and PhD researcher Tesfa Michael Mallu, they demonstrated that sorghum harbours great diversity that can be exploited for Striga resistance.

Her current work funded by the IFS is hinged upon the findings that some sorghum genotypes communicate effectively with Striga encouraging parasitism while others are too smart to evade these rhizospheric communication signals (germination stimulants, ‘Strigolactones’) that induce germination. The researcher anticipates to identify durable Striga-resistant sorghum adoptable and adaptable to Striga prone regions of Kenya for increased food production, food security and eventually improved livelihood.
b.

Selected Ongoing Research
The declaration of cancer as the third cause of morbidity and mortality after infectious and cardiovascular diseases brings out the gravity of the situation which has been further amplified by the developed antimicrobial resistance in various microorganisms.

Infections caused by Antimicrobial Resistant (AMR) microorganisms account for over 50% of nosocomial infections resulting in prolonged hospitalization and poor prognosis that have contributed to the higher mortality and morbidity rates for community acquired infections.

Harnessing Kenya’s indigenous medicinal plants in search of alternatives to mitigate cancer and microbial infections

Collected and cut medicinal plant samples from Mt. Kenya and Mt. Elgon regions

Over 30% of the total sub-Saharan African cancer burden has been attributed to infectious agents on a cause-effect relationship.
The need for novel approaches in the treatment of infectious diseases caused by resistant pathogens and different types of cancers cannot be overstated. With more than 7000 plant species, the abundant medicinal flora in Kenya is one of the richest in East Africa. Interestingly, although the use of medicinal plants for the treatment of different diseases around the world has been in practice since ancient times, it is only recently that there has been a growing interest in the possible utilization of these plants as alternatives to common pharmaceuticals in the various regions. More than 70% of the Kenyan population rely on home-made concoctions to treat different ailments. However, scientific evidence on their properties against cancer and microbial infections are quite limited.

Dr. Alphonse Wanyonyi from the Department of Chemistry and Mr. Shem Mutui from the Department of Biochemistry, Microbiology and Biotechnology are undertaking a project funded by the Vice-Chancellor Research Grant that explores plant-based alternatives against cancer and drug resistant microbial infections. The team will oversee the screening of phytochemicals and testing of antimicrobial and anticancer properties of the selected medicinal plants (collected from Mt. Kenya and Mt. Elgon region) against select bacteria, fungi and various cancer cell lines. Findings will provide scientific evidence on the use of these plants in folk medicine, and help policy makers on the market value. Also, results will serve as a basis for further studies in the development of new, safe, and cost-effective drugs.
Kenyatta University trains Africa’s future leaders in Material Science through Regional Scholarship and Innovation Fund

Kenyatta University was competitively selected among eleven African Host Universities (AHUs) to implement the Regional Scholarship and Innovation Fund (RSIF). This is a flagship program of the Partnership for skills in Applied Sciences, Engineering and Technology (PASET). PASET is an African –led initiative funded by African Governments with support from international partners. The initiative was informed by the acute shortage of highly skilled manpower in sciences, engineering and technology especially in Sub Saharan Africa. Consequently, the mandate of AHUs is to accelerate the creation of a skilled and highly qualified labor force to propel Africa’s socio-economic transformation. Currently there are 15 AHUs training scholars in five thematic areas namely - ICT, including big data and artificial intelligence; Food security and agribusiness; Minerals, mining and material engineering; Energy including renewable; and Climate change.
KU was selected to train PhD scholars in the thematic area of Minerals, mining and material engineering and specifically the Material Science Research Group of the Department of Physics led by Dr. Walter K. Njoroge.

The first cohort of RSIF scholars have just concluded their 1st academic year (2021-2022). The selection of the 2nd cohort has been concluded and the awardees are expected to enroll for the PhD in Material Science program in the first semester of 2022-2023 academic year. Another unique aspect of the programme is that RSIF scholars have a chance to be placed in an international Partner Institute (IPI) for a period of up to 24 months during their research work phase. IPIs are advanced universities, research institutes/centres or companies (public or private) that are willing and competent to offer research internship opportunities for RSIF PhD Scholars. Through international collaborations and partnerships with the IPIs, a tremendous increase in academic mobility is expected resulting in an enhanced profile of KU as a world class University.

In addition, RSIF is complementing the PhD training with competitive research and innovation grants awards to faculty members of AHUs to support research that promotes scientific excellence and use of knowledge for development impact. This year (2022) two research teams led by Dr. Mathew Munji of the Department of Physics and Dr. Jacqueline Kisato of the Department of Fashion Design and Marketing respectively were awarded the competitive grants worth USD 50,000 and 80,000, respectively. The two projects are addressing key real life challenges experienced by the populace with innovative-device and products as the expected outputs for commercialization.
The Material Science research group at the Department of Physics with funding from the RSIF cooperability and innovation grant is working towards the realization of a non-invasive system for monitoring diabetes and cancer susceptibility.

Cancer and diabetes are two of the leading causes of death worldwide, with a positive correlation, and a high probability of cancer patients also having diabetes, especially type 2. The two diseases are also associated with influx of hazardous minerals and substances as well as anomalous fluctuations of the body minerals, sugars, and proteins. Evidence has shown that anomalies in the body ions and glucose are potential catalysts for cancers elevated in various tumors.

Currently, there are no established non-invasive devices for early detection of diabetes or cancer susceptibility. One of the challenges is that diabetes and cancer share symptom profiles, such as fatigue, pain, numbness, tingling, and weight loss. The project is motivated by how such intertwined health conditions can be monitored by a non-invasive mechanism and detected early increasing the survival rate. Additionally, because of painful finger pricks and infection risks, continuous monitoring of blood glucose in cancer patients with diabetes is a big challenge. The availability of a non-invasive integrated optical and electro-magnetic field technology for twin testing of glucose and ion anomalies would be valuable for early detection, increased awareness and monitoring of the levels of anomalies (glucose and key electrolytes) linked to diabetes and cancer susceptibility.

The Integrated near infra-red and magnetic field system will be a self-validating, programmable system, its data acquisition and result output will be in real time, and in a format that is easy to understand; with a provision for auto-transmission of results to a central health statistics center for continuous demographic analysis of the prevalence of diabetes and cancer susceptibility, for the planning of intervention measures. Once deployed it will increase awareness, understanding and knowledge on the prevalence of the two diseases and will also lead to increased willingness of communities to undergo continuous/periodic testing for early detection and change in the lifestyles associated with high risks for diabetes and cancer.

The research group is led Dr. Mathew Munji (Principal Investigator), working together with Prof. John Okumu, Dr. Lawrence Ochoo and Dr. Raphael Nyenge. The team is working with collaborators from Kenya Medical Research Institute (KEMRI), University of Johannesburg (UJ) and the University of South Africa (UNISA).

Currently, there are no established non-invasive devices for early detection of diabetes or cancer susceptibility.
Advancing value addition to finger millet-based food products and exploring their efficacy in nutrition management among Type 2 Diabetics

A team of five researchers from Kenyatta University, Jomo Kenyatta University of Agriculture and Technology (JKUAT) and KALRO is carrying out a multidisciplinary research project funded by the National Research Fund. The project aims to formulate bioavailable nutrient dense food-based products from locally available foods (finger millet and oyster mushrooms) to be used in the management of hyperglycemia, hypertension while promoting nutrition security among T2 diabetics.

This project is keen on addressing issues surrounding improvement of nutrient levels in finger millet and oyster mushroom by soil value addition and formulation of food products containing high levels of bioavailable nutrients. There is a need to develop high quality nutrient dense products with enhanced digestibility and absorption of the targeted nutrients (chromium and potassium) for maximum benefits in management of hyperglycemia and hypertension in type 2 diabetes. The food formulation will enhance nutritional status among the type 2 diabetics, and hypertensive population as well as the general population for improved nutrition security in the country. Additionally, the project is working on augmenting the idea of nutrient bioavailability by researching on processing and formulating conditions to come up with nutrient rich food product that combines oyster mushroom with germinated and/or roasted finger millet and meets the safety, acceptance and economic potential requirements.

Phase one of the study has been completed with harvesting different varieties of finger millet and oyster mushroom grown under value addition conditions from four regions in Western Kenya (Oyani in Migori County, Kisii, Kakamega and Alupe in Busia County).
The global consumption of poultry meat is predicted to account for 41% of all proteins obtained from animal sources by the year 2030. The consumption of poultry products and other animal-sourced commodities has dramatically risen with the demand for indigenous chicken (IC) almost doubling over the past few decades. Poultry products are preferred due to their affordability, low-fat content, and lack of significant religious and cultural barriers. In Kenya, poultry farmers prefer rearing indigenous chicken (IC) due to their resilience to harsh climatic conditions, high feed conversion rate, delicious products, ability to scavenge, and potential to reduce greenhouse gas emissions. Despite the high demand for indigenous chicken and its products, the gap between demand and production remains high.

Kenyatta University and partners from Kenya Agricultural and Livestock Research Organisation and Ministry of Agriculture, Livestock and Fisheries, led by Prof. Lucy Kabuage of the Department of Animal Sciences secured a grant from Kenya Climate Smart Agriculture Project to promote improved indigenous chicken breeds among smallholder farmers in Machakos County. The project is working to develop and validate climate smart indigenous chicken technologies across key areas which include, feeding and nutrition; improved brooding, overall management for enhanced productivity, resilience to climate change shocks, and reduction in emission of greenhouse gases.

Commercial poultry rations whose ingredients are expensive and sometimes imported are largely out of reach which compell farmers to let their birds scavenge for feeds with minimal supplementation. Given the erratic rainfall across the country, there is stiff competition for food between humans and livestock more so in the arid and semi-arid lands. Alternative natural feedstuffs such as croton seeds, moringa, Prosopis juliflora, azolla species, among others have been identified by researchers as viable alternatives.
Other alternative feeds that farmers were using included sunflower, Leucaena, white sorghum, moringa, ochonga (type of fish remnants) to provide proteins. Aloe vera and red pepper were also widely used by farmers especially in Yatta and Mbiuni, Mwala constituencies.

Some of the challenges cited by the agricultural extension officers were limited awareness on black soldier fly larvae; seasonality thus leading to resource competition; unavailability of thermostable NCD vaccines; inadequate sizes of icebergs to preserve the available vaccines; limited knowledge and technical skills on operating an incubator despite being availed to the farmers by the county government. To mitigate these challenges farmers were given rainbow roosters and Sasso breeds to improve their breeding stock, they were also trained on use of various brooding techniques (electricity, hot water bottle, and charcoal), feed formulation or supplementation using locally available materials and vaccination.

Key achievements realized by the project thus far include:

1. Development and validation of poultry probiotics (live yeast) and poultry enzymes (phytase) both on station and at the farm level in Machakos County;

2. Identification, testing, validation and adoption of alternative feeds such as croton seeds, moringa, and azolla by farmers in the region.

3. Outreach and dissemination meetings on using alternative feed resources for increased Indigenous chicken productivity with different common interest groups (Matunda-muusandu, Ikonde Women group).

4. Capacity building of postgraduate students 2 PhDs (Christopher Njuguna - JKUAT and Antony Njiru -UoN), and 3 Msc (Miriam Kagwiza -KU Fredrick Munene -KU and Janerose Wanjiru -KU).
ComNetSus-Africa project activities started in August 2021 under the lead of Dr. Peter Wangai of the Department of Environmental Studies and Community Development. The ongoing activities are based on the project’s transdisciplinary approach and the collaborative research action framework. A diversity of stakeholders from Kumasi, Lagos, Kigali, Dar es Salaam, Mombasa and Nairobi cities have been mobilized to create a robust and proactive ‘urban community of practice’.

Stakeholder workshops were conducted in the six (6) target cities between December 2021 and April 2022 targeting urban problems namely; solid waste management, water supply and sanitation, public spaces, energy supply systems, and water and air pollution. In each of the five (5) thematic areas, four guiding questions were used to collect data from participants through brainstorming sessions. This helped to document the challenges facing the residents, success stories, actors involved, and opportunities for synergies. On 20th – 24th June 2022, the project team hosted a hybrid session to present preliminary findings during the 2022 Sustainability and Innovation Congress (SRI2022) in Pretoria, South Africa in a session titled “Cities working towards urban resilience and sustainability: stories from Africa”, which consolidated lessons from the six stakeholder cities.

In separate activities, the project PIs in the six cities have embarked on a mission to understand unique challenges faced by the city’s neighborhoods and residents. Each city has been subdivided into clusters of varying socio-economic characteristics. Focus group discussions (FDGs) and participatory mapping are currently ongoing. Notably, preliminary data from the ongoing activities point to interesting trends, especially the earmarked methodological innovation dubbed ‘locovocalisation’ as a complement to the participatory mapping method of georeferencing social, economic and environmental information through public engagement. Complete trends will be established after the activities are concluded in the next two months.
Urban problems

- Water and air pollution
- Solid waste management
- Water supply and sanitation
- Energy supply systems
- Public spaces
The context of ‘global uncertainty’ in which we are all living requires fundamentally new dispositions and aptitudes of global citizenship for educators and their students. The onset of the pandemic increased the restrictions on academic mobility of faculty and students in African Universities and globally. University students in Africa already have limited opportunities to participate in study abroad programmes and benefit from international exposure. However, with virtual exchange programs an alternative was provided. Virtual exchange (VE) is a technology-enabled, collaborative international pedagogy that has been growing over the past two decades as an alternative to traditional study abroad programmes.

Dr. Daniel Otieno of the Department of Educational Management, Policy and Curriculum Studies has co-organised several cohorts of Virtual Exchanges programs that have provided opportunities for faculty and students within the department to derive the benefits of collaboration with remote partners from other Universities. The first and second phases of the Virtual Exchange projects involved groups of mentees who were partnered with other students from Universities in Germany, Ghana, Portugal and University of Nairobi. Students engaged in both asynchronous and synchronous learning activities. The virtual exchange entailed project-based learning where students recorded videos, interviewed their colleagues across different time zones and engaged in discussions around various thematic areas including family, education, food consumption, sports, happiness and values. The virtual exchange experience enabled students to acquire digital literacy, problem solving skills, collaborative skills, and intercultural competence.

The third and fourth cohorts of virtual exchange participants involved faculty from the Departments of Educational Management, Policy and Curriculum Studies and one from Educational Foundations who were partnered with colleagues from Universities in Europe and USA. The virtual exchanges were patterned along COIL (Collaborative Online International Learning) framework where topics on decolonization of higher education were discussed.

In the context of the ‘Encompassing All Voices’ project, lecturers used virtual exchange to research the power balance in thinking, knowledge and academia. Through reflection they explored ways of incorporating different perspectives and emerging paradigms on decolonization both in the content and in the way they teach.

It is envisaged that VE will become a vital component of teaching at Kenyatta University in the coming years as a way of internationalization at home.
KU Centre for Clinical Legal Research and Sustainable Development Partners with the Konrad Adenauer Stiftung Foundation Rule of Law Programme for Sub-Saharan Africa (KAS)

1. Research on the protection of community land rights in Turkana County in Kenya

The research was conducted for the benefit of Friends of Lake Turkana Foundation and focused on registration of community land, management of unregistered community land by the county government and compensation for compulsory acquisition. Team with some of the community members interviewed in Turkana.


The Centre is undertaking legal research for the Undugu Society of Kenya which seeks to understand the adequacy of Kenyan law in addressing the homelessness status of street children in Kenya. Team with the Children Officer at the Children’s Welfare Office in Eldoret.
This research was commissioned by Haki na Sheria Initiative (HSI) an NGO based in Garissa that seeks to understand the extent and effect of double registration of Garissa residents as part of its citizenship rights program.

The Centre is researching on judicial decisions of the Environment and Land Court (ELC) for the Legal Resources Foundation which is coming up with a compendium on environmental justice jurisprudence in Kenya.

The Centre is researching on enforced disappearances in Kenya for the Independent Medico-Legal Unit.
Kenyatta University Green Education Hub, launched on 11th May 2022, is set to contribute to efforts in transforming universities for a changing climate. The hub is involved in research, co-creation and dissemination of teaching and learning materials on climate change, environmental sustainability and green education. Materials and content co-created with the students and other stakeholders include audio-visuals, creative arts, documentaries and dioramas.

A significant activity of the Hub is the marking of a Green Day every last Friday of the month to raise awareness on climate change. Over 200 students from all disciplines have signed up as ambassadors spearheading the awareness campaigns during the Green Education Days through engagement in activities like sports, art, and guest lectures, training members of society on sustainable lifestyles to combat climate change among others.

Prof. Vincent Onywera (centre seated) Kenyatta University management representative, Climate-U researchers and climate ambassadors during the launch of the Green Education Hub on 11th May 2022.
One of the major achievements of the Kenyatta University GEH is the implementation of Transforming Universities for a Changing Climate project (Climate-U). Climate-U is a multi-country project that is funded by the United Kingdom Research Innovation (UKRI) and implemented in 20 universities across the world. The project was designed with the understanding that the shaping of knowledge, skills and values in a society, and the creation of new ideas and technologies, have an impact on the human and non-human environments and, thereby, on climate change and the ecosystem. It was designed with the recognition that universities, as institutions of higher learning, are oriented primarily towards knowledge creation, thus, have a crucial but complex role in epistemic debates around climate change. The project is implemented through a Participatory Action Research (PAR) approach involving diverse stakeholders in identifying and implementing relevant climate change interventions at each participating university and their communities.

Kenyatta University PAR team, comprising faculty members, university leaders and students, and representatives from the community, civil society and government entities agreed on a curriculum intervention to support the institution’s climate action. The Growing Leaders Programme was reviewed and two topics, Leadership and climate change and Sustainable Development Goals added to the programme. Information on various aspects such as biodiversity conservation, indigenous knowledge, gender and social inclusion, youth leadership and climate change impacts, drivers, mitigation and adaptation were integrated into the course. Diverse delivery modes have been adopted, including practicals, student projects and themed guest lectures to make the course more interactive and therefore impactful. The programme is expected to prepare students to acquire ideal leadership traits to champion climate action and educate communities about climate change.

Climate ambassadors prepare for a climate change awareness walk during the third Green Education Day held on 30th September 2022, at Kenyatta University main campus.

Ms. Sheila Shefo Mbiru, a climate specialist at Climate Interactive, took the students through a World Climate Simulation.
INNOVATION NEWS
Creating solutions for pest management

Farmers collecting infested fruits from the farm and thereafter exposing the bag to direct sunlight for at least 2 weeks or more to kill the pests and stop multiplication of pests such as fruit flies. After which the decomposed fruits are discarded and the bag reused.

Solarbag® is a farm sanitation tool for use in management of fruit flies and other pests in fruits and vegetables. Faina Innovations limited introduced the product which is also used for rapid on-farm production of compost fertilizer and soil sterilization.

Solarbag® comprises of at least two layers of flexible sheet material that are uniquely designed to capture and accumulate solar heat. When pest-infested fruits are placed in the bag the rising temperatures (heat) rapidly kill all life stages of fruit flies and other pests preventing further multiplication of pests on a farm.

The high temperatures generated by the bag facilitate rapid conversion of the fruits and vegetable residues under treatment into quality compost products which are used by farmers for improvement of soil fertility and crop productivity. Farmers can also use the bag to treat small quantities of soils for use in crop and tree nursery propagation.

Faina innovations limited founded by Fredrick Koome is currently partnering with a local manufacturer to produce the solarbag® on its behalf. The startup has adapted a reliable and efficient distribution system that allows more farmers access to the innovation while also exploring the existing commercial pathways and also developing new supply pathways.

Solarbag® benefits include amongst others control of fruit fly species and other pests, its highly effective and efficient, portable and reusable and uses renewable energy while producing high quality farm manure.
Mr. Paul Waweru and Dr. Geoffrey Gitau are building a startup that involves converting commercial gasoline motorcycles into electric powered bikes. The innovators plan to replace some parts of the motorcycle (gasoline kit, the engine, the fuel tank, pedals, accelerators, dashboard, and alternators) among other related components with an electric kit.

The innovation aims at solving the twin problem of reducing the Green House Gas effects of Co$_2$ by about 20,000 metric tonnes per year and the problem of enhancing return on investment for the commercial motorcycle sector (Bodaboda).

Ecomobilus hopes to achieve the conversion to electric motorcycles of at least 40% of the total number of boda bodas in Kenya in the next 5 to 10 years. This will create wealth and reward the effort of the boda boda operators with increased profitability. It will also create direct income for the motorcycle service providers besides cleaning our cities and transport sector with a reduction of 20,000 metric tonnes of Co$_2$ per year.

Ecomobilus will locally manufacture high performance 3Kwh Lithium batteries to yield a maximum of 100km per single charge with load weight of 150Kgs.
Mr. Samwel Wafula is working on an innovative product to promote hygiene and sanitation among children dubbed Alive 365. The innovation is aimed at offering hygiene education through hands on experience. The startup develops board games and Applications where children play and learn proper hygiene and sanitation.

The innovation team anticipates that the startup will be instrumental in promoting positive behavior change and hygiene practices among children by bridging the knowledge gap on proper hygiene and sanitation.

The startup is aiming to change the current system being used for hygiene education with an interactive, effective, reliable and fun system that positively influence the behavior of children towards proper hygiene and sanitation.
Dronecrops facilitating food security

Dronecrops is an Internet of things (IOT) based startup that uses the integration of IoT in drones to offer highly efficient mapping and crop dusting/spraying services for large and middle scale farmers. The startup uses the latest Agricultural drones (DJI Agras T-30 and marvic enterprise) in its endeavor to reduce the cost, labour and time spent while significantly increasing food production per acre for farmers.

The use of IoT devices enable growers to monitor environmental, soil and plant parameters remotely. Through various applications such as crop and soil sensors, farm mapping systems, and aerial drones, farmers detect stresses in crops, including pests and diseases, weeds, soil salinity, nutrient deficiencies, and excesses of trace elements, which together affect crop yield. The sensors also provide critical information concerning the weather and water stress. With these timely insights, farmers can proactively prevent extensive crop losses and ensure optimum yields.

Dronecrops is currently contributing towards facilitating food security by employing the latest drone technology for aerial crop spraying reducing the cost, time and chemicals spent in using conventional spraying methods, while significantly increasing production per acre.

The use of drones and connected analytics has revolutionized the way agriculture is conducted in the world, eliminating hunger by supporting efforts to ensure food security. To date the startup has covered approximately 200 acres in Rift Valley (Kitale, Cherengany area) as a proof of concept.

Drone crops team outside Chandaria BIIC building, demonstrating to a team of researchers from Meru university. Looking on (3rd Left) is the Director, Innovation Incubation and University Industry Linkages, Prof. Maina Mwangi.
RESEARCH DISSEMINATION AND UPTAKE
Prof. Vincent Onywera from the Department of Physical Education, Exercise, and Sport Science has been recognized for his substantial contribution in the growth of Sport and Exercise Science in Africa. Prof. Onywera was honoured by the Department of Kinesiology in Collaboration with the African Studies Centre, Michigan State University, USA. As a precursor to the award, Prof. Onywera delivered the endowed Deborah L. Feltz Lecture on Sport, Exercise, and Human Movement Science in Africa. Prof. Onywera’s lecture titled ‘Moving forward by looking backward: Towards promoting physical activity for health and sustainable development in Africa’ highlighted the physical activity transition taking place in African Countries including Kenya. Prof. Onywera’s public lecture was delivered virtually on the 4th November 2022 in the presence of hundreds of delegates from all over the world.

The endowed lectureship was instituted by Prof. Deborah Feltz, a University Distinguished Professor of Kinesiology at Michigan State University who joined the faculty in 1980, served as department chairperson from 1989-2012, and retired in 2017. Building on her research interests and mentoring experiences, she endowed this lecture in the interest of building collaborative research partnerships with scholars from African countries that will advance science and contribute to efforts to promote the health and well-being of Africans. We congratulate Prof. Onywera on this recognition.
A team of researchers led by Dr. Rubai Mandela and Dr. Francis Likoye of the School of Education launched a new book on ‘Researching with Marginalized Communities in Kenya’. The book launch ceremony was presided over by the University of Nairobi Council Chair and Nobel Peace Prize 2022 Nominee Prof. Miriam Were and attended by numerous professors and researchers from Kenyatta University and other academic/research institutions.

With chapter contributions from eleven authors, the book demonstrates a strong collaboration between Kenyatta University, Women Educational Researchers of Kenya, University of Eldoret, Freie Universität Berlin, Thika Institute of Science and Technology, and St Patrick Secondary School, Maringo.

The book clarifies concepts of research and marginalization and describes the process of becoming a well formed social researcher. It shares lived experiences of researching ‘with’ as opposed to researching ‘on’ various marginalized groups such as children, women, refugees, the poor, and people living with disability. Additionally, the book explores the researchers’ experiences in the Arid and Semi-Arid Lands (ASALs) and informal settlements. The book further commits a chapter each to challenges involved in research resource mobilization for marginalized areas, application of research ethics and researching in times of crisis as was experienced during the Covid-19 pandemic. Most importantly, the book shares good practice on how to navigate the challenges discussed in a manner to promote quality research that would inform policy and designing of interventions that work.
Advancing the conversation on inculcating entrepreneurship in the competency based curriculum

Dr. Linda Kimencu, Department of Business Administration

Entrepreneurial thinking is considered as one of the most important skills that learners need to thrive in the 21st century among other essential skills. In today’s rapidly changing world where innovations are ever-evolving across different sectors, early coaching of children with entrepreneurial skills becomes a necessity as these skills increase adaptability and are extremely valuable for their learning process if taught at a young age.

Education is crucial in determining the level of entrepreneurial activity in a given economy, policy makers and scholars acknowledge the importance of incorporating entrepreneurial education into an educational system as it raises awareness of alternative career options and broadens the learners’ perspectives and opportunities. The Kenyan education system offers entrepreneurial education mostly at the tertiary level which is yet to result in the instillation of an entrepreneurial culture among the young people, perhaps because it has not been effectively incorporated in the earlier levels of the education system.
The Kenyan education system is in a transition period with the roll out of the competency based curriculum (CBC) which focuses more on what learners can do rather than what they know, a shift from content based education outcomes to competency based education outcomes. Dr. Linda Kimencu of the Department of Business Administration with funding from the Vice Chancellor’s Innovation and Research carried out a study that sought to establish the extent to which entrepreneurial competencies are incorporated in the basic education curriculum framework. The study established that the curriculum does incorporate the teaching of entrepreneurial competencies to learners; however, the instruction of entrepreneurial skills is subtle with emphasis being on mastery of course content rather than the experiential learning that is necessary to acquire entrepreneurial skills and competencies.

The review of the curriculum framework demonstrated recognition of entrepreneurship as one of the learning support areas in pre-vocational learning occurring at the senior secondary school levels. Whereas at the lower primary school levels emphasis is placed on inculcating the entrepreneurial personal skills such as communication, collaboration, and empathy which are contributory to enterprising culture and mindset.

The need for the basic education curriculum framework to expand the perspective of opportunity recognition to encompass the entrepreneurial mindset of problem solving and identification of the needs that different skills and competencies can fulfill is among the recommendations that the study provided. This perspective is helpful in shaping the minds of the learners from the attitude of job seeking to job creators.

The study added to an already buzzing conversation in support of incorporating the explicit teaching of entrepreneurship in the schools both through the formal and non-formal curriculum. Formally through incorporation of entrepreneurship as a subject area and non-formally through setting up of entrepreneurship clubs that foster the entrepreneurial mindset. A draft policy document has been developed providing empirical justification of introducing entrepreneurship either as a vocational subject of co-curricular activity within schools for submission to the Ministry of Education. Additionally, entrepreneurial club guides have been developed for use with the guidance of club patrons to ensure that learners are inculcating entrepreneurial skills from an early age and at the basic level of education where both cognitive and non-cognitive skills are built.

How can kids learn entrepreneurship skills?
One of the major problems faced by young people in Sub-Saharan Africa is lack of employment which can be partially alleviated through the empowerment of young people to succeed in their own businesses. Through funding by the British Council, a collaborative project led by Dr. Ambrose Jagongo (PI) and Dr. Fredrick Ndede (Co-PI) working together with partners from the Technical University of Kenya, the Entrepreneurship Educators Foundation for East Africa and North-Umbria University has helped uplift the lives of youth under the “Youth Entrepreneurship Accelerator Program (YEAP)” project.

The recently concluded project sought to address challenges of employment faced by youth in SSA through using Stanford’s 5 Step Design Thinking process. The project leveraged on technology and digital transformation taking place in the region to capitalize on innovation and entrepreneurship development.

A one-stop-digital accelerator platform was set up connecting young rural and urban entrepreneurs to a community of practice with a wide range of ecosystem players including funders, investors, mentors, fellow entrepreneurs and other supportive social networks. Given that funding, mentorship and skills development were identified as three main challenges facing nascent entrepreneurs in the wider East Africa region, the entrepreneurs enrolled in this platform were matched with mentors in their fields and expert entrepreneurship trainers who helped them develop practical skills such as developing their minimum viable product, creating viable business plans and pitching their ideas effectively to attract both seed and scale-up capital.

Funders enrolled in the platform developed innovative financial solutions for viable innovative enterprise ideas, including new concepts for private equity, angel capital, franchising and crowd funding aligned with the SSA context and particularly rural entrepreneurs, who are often excluded from current accelerator/incubator services. The potentially viable concept secured funding for scale up through future partnerships.

Dr. Jagongo (PI) during a training workshop on Entrepreneurship skills at Masogo in Rongo, Migori County
Among the challenges unveiled from the primary research and key informant workshops was the lack of support from the family setups and peer networks as they view entrepreneurship as a fallback for those failing to secure formal employment. The accelerator platform is keen on changing this perspective by availing peer educators and role models of young entrepreneurs who have created viable ventures with great impact on their communities. A virtual library with resources of viable case studies of successful young entrepreneurs from across the world is also incorporated in the platform and facilitators across the education system - university, college, schoolteachers and entrepreneurship educators will be encouraged to use these resources in their classroom instruction with a view to changing individual mindsets on entrepreneurship in the region.

Another key challenge was the lack of a one-stop-shop for advisory services on entrepreneurship processes and entrepreneurs which presented a frustrating process of movement from one place to another to meet the requirements for business set up and management. To address this, a digital library of content with materials from multidisciplinary fields that support enterprise development such as tax policies, IP policies and procedures, business environment policies, registration policies as well as legal procedures and advice are readily available in one place. The virtual accelerator platform provides a structured framework through its various phases (definition, ideation, prototyping, testing and commercialization). Entrepreneurs connected to the platform are grouped into pre-incubation and acceleration cohorts to ensure targeted advice from the various stakeholders.

“The YEAP workshop on resource mobilization and financing helped us acquire the needed skills in this area. This came in handy where we as NEWPLUS applied the knowledge to help us source for funds in our recent contract to supply sanitary bins at Ogarde girls high school. Also as part of the program, our mentors provided valuable and expert perspectives during the sessions”

Winnie Akinyi
Rep, NEWPLUS

Dr. Fredrick Ndede (Co PI)
**Key achievements**

Youth Entrepreneurship Accelerator curriculum developed, benchmarked and piloted for inclusion in the learning management system.

Accelerator platform developed: A one stop online platform providing entrepreneurial ecosystem players networking opportunities with an array of resources for continual learning (www.yeap.co.ke).

Capacity building of participants in diverse entrepreneurial skills; developing viable business plan, pitching their ideas effectively to attract both seed and scale-up capital among others.

Mentorship of young entrepreneurs: Entrepreneurs enrolled in the YEAP platform are matched with mentors in their fields and expert entrepreneurship trainers who assist them in developing practical skills for entrepreneurship.

Facilitated trans sectorial relationships: Project created a network among participants and enhanced their connections to other external communities. Important for increasing the growth and sustainability of the entrepreneurial ecosystem.

Enhanced social networks: using virtual platforms and physical stakeholder engagement workshops for support and extensive social capital.

**Project sustainability**

- Conversion of project beneficiaries to mentors to recruit and train other mentees in the localities;

- Replication of the YEAP in other counties in Kenya and SSA through partnerships with national governments, county governments and financial institutions that nature cooperative movement and SME development;

- Continuous enhancement of entrepreneurship skills and coaching through workshops and other stakeholder engagement platforms such as the learning management system.

- Introduction of the youths with viable business ideas to existing incubation centres for pre-incubation, incubation and post-incubation services;

- Continued research on Business life cycle for the youth entrepreneurship ventures to assess the impact of YEAP and programs.
Banana farming is a major economic activity carried out in many parts of Kenya. However, production has been on the decline. This is attributed to the decline in soil health, limited access to planting materials as well as the high cost of inputs such as fertilizers. Our study aimed at providing production solutions to smallholder farmers in Kisii, Nyamira and Embu counties. The solutions included providing planting materials produced using low-cost banana tissue culture technologies and also issuing them with biofertilizer to boost production as well as soil health. Based on the studies carried out, the application of root-associated microorganism's arbuscular mycorrhiza (AMF) provides a viable option in sustainable farming as it improves nutrient acquisition of plants.

During the first workshop held at Kisii, Nyamira and Embu Counties, the smallholder farmers were sensitized about their soil health and trained on strategies of improving the soil health status. During the second workshop farmers were provided with planting materials as well as arbuscular mycorrhiza fungi (AMF) biofertilizer. They were also trained on how to prepare and apply arbuscular mycorrhiza fungi in their farms to improve banana growth and production.

During the Nairobi International trade fair held from 26th September to 2nd October 2002. The use of low cost tissue culture technology in production of banana plantlets, preparation of AMF biofertilizer and model plants were used to showcase the benefits of AMF biofertilizer use.

Exhibition during the Nairobi International trade fair on production of low cost tissue culture bananas plantlets and use of AMF bio fertilizer to enhance plant survival and growth.
Contributing to research and evidence on improving students’ learning outcomes

Dr. Damaris Kariuki, of the Department of Educational Management, Policy and Curriculum Studies was sponsored by UNESCO-IICBA to make an in-person poster presentation at the GPE-KIX Continental Symposium for Educational Research and Innovation held at the African Union Conference Centre in Addis Ababa, Ethiopia from 4th to 6th October, 2022. The theme of the symposium was “Reimagining education for a better impact on learning outcomes in sub-Saharan Africa”.

The Symposium was organized by the KIX Africa 19 and KIX Africa 21 Hubs to highlight research and evidence on improving students’ learning outcomes in their member states. She made a presentation on ‘Reorienting teacher professional development in Kenya: professional learning communities paradigm’ which focused on teacher experiential and collaborative learning approaches as a bid to address the learning outcome crisis in Sub Saharan Africa. The invited in-person presenters and participants were ministry of education focal points, local educational researchers, local education group policy actors, and GPE KIX researchers from the regions of the KIX Africa 19 and 21 Hubs. The symposium brought together participants comprising researchers, innovators and policy makers from over 39 countries in Africa. One of the outcomes of the symposium was that policymakers committed to support continuous teacher learning and motivation.
KU-WEE Hub holds first International WEE Conference

The Kenyatta University-Women’s Economic Empowerment (KU-WEE) Hub in collaboration with implementing partners hosted an International Conference from 6th – 8th July 2022 at the International Languages and Culture Centre (ICLC) at Kenyatta University. The broad theme of the conference was “Women Economic Empowerment in the 21st Century: What Works?” The purpose of the conference was to disseminate current findings of the project as well as to expand networks, increase visibility and outreach. In that regard, the conference sought to bring together WEE stakeholders, including researchers, scholars, networking groups and partners, as well as policy makers and implementers to share knowledge and experiences pertaining to the broad theme of the conference.

The objectives of the conference were: to share experiences and learn lessons on women’s economic empowerment; to network and collaborate through partnerships that will enhance the development of policy for increased women’s economic empowerment across Sub-Saharan Africa, and to identify knowledge gaps that could be explored during future research, training and programming. The conference, which adopted a hybrid mode of participation, had a three-day program of events, which included several modes of presentations comprising plenary sessions with keynote speakers, thematic parallel sessions, panel discussions and poster displays.

Several speakers from the private and public sector organizations and academic institutions, made presentations sharing their findings on Measuring Women’s Economic Empowerment, Education, mentoring, skilling and innovation for Women’s Economic Empowerment, Enhancing Women’s role in governance and decision making through transformative leadership and inclusivity, Violence, crisis and women’s work, and Creating an enabling environment for Women’s Economic Empowerment in the formal and informal sectors.
From climate change adaptation to climate resilience:
identifying the missing links

Climate change impacts are critical in vulnerable societies in Africa mainly because a climate crisis within no time translates into a humanitarian crisis through acute food shortage, lack of access to safe and clean water, conflict for the limited resources among others. Thus, a team of five researchers led by Prof. Joy Obando, Dr. Raphael Kweyu of the department of Geography, Kenyatta University working together with Dr. Shilpa Asokan from Nordic Africa Institute, Sweden and Dr. Ronald Ndesanjo from University of Dar es Salaam, Tanzania and Dr. Madaka Tumbo from the Water Research Institute in Dar es Salaam held two stakeholder networking workshops in Vihiga County, Kenya and Dar es Salaam, Tanzania respectively in October.

The workshops were aimed at understanding the current state of climate change adaptation policies and practices among vulnerable communities – the smallholder farmers in Vihiga and the urban marginalized poor in Dar es Salaam. The workshops are part of research networking activities supported by funding from the Swedish Research Council.
The Governor H.E. Dr. Wilber Ottichilo officially opened the workshop in Vihiga and outlined Vihiga County’s track record in climate change action planning. The Governor challenged the participants to come up with the best strategies to use to strengthen the community’s resilience to climate change effects.

The two workshops were a follow up on the stakeholder webinar held in August 2021 and targeted farmers groups and other grassroots community-based organizations working on livelihoods, environmental conservation and climate change adaptation. The workshops were followed by field visits to capture the perspectives of the community members on climate change adaptation which elicited discussions on climate information and innovation.

The opportunities for farmers in Vihiga County to harness a raft of on-farm measures to cope with climate risks and shocks include: growing short-maturity and drought-tolerant crop varieties, conservation agriculture, tree planting, water harvesting, fodder conservation, livestock breed improvement and value addition. Furthermore, the County has been able to make use of the early warning information and the formation of cooperatives for easier access to farm inputs, agricultural financing, market information and produce markets. The identified challenges include the need for mainstreaming early warning information for a better access and uptake of agricultural financing and insurance.

In Dar es Salaam, the research networking activities focused on understanding the state of climate vulnerability of communities living in informal settlements in the low-lying coastal areas. Increased informal urbanization is aggravating climate change induced social, environmental, infrastructural and governance challenges in this coastal region. The focus of this project is to understand the state of climate resilience for smallholder farmers, urban marginalized poor in Kenya and Tanzania respectively. The team has continued to co-develop and co-design the research project and will be holding a virtual validation meeting with the stakeholders from the two countries with the research question: What does it take for Climate Adaptation to move forward from pilot projects to more scaleable and sustainable long-term development measures?
Group photo with H. E. Hon Dr. Wilber Ottichilo (seated centre) Governor Vihiga County
AfiHC 2023
Nairobi, Kenya
August 9-11
Virtual & In-person

AfiHC 2023
will be held in collaboration with
Kenyatta University

on the theme

Mitigating Pandemics, Climate Change & Chronic Diseases in Africa:
The Role of Interdisciplinary Collaboration

Sub-Themes

1. Burden of chronic diseases in Africa
2. Community engagement in healthcare delivery in Africa
3. The role of social sciences in strengthening Africa’s healthcare system
4. Progress on achieving the sustainable development goals in Africa
5. Education and training for healthcare professionals in Africa
6. Response strategies to emerging and re-emerging infectious diseases in Africa
7. Climate change and health in Africa
8. Sexual and reproductive health including HIV and AIDS
9. Disaster mitigation, preparedness, response and recovery in Africa
10. Technology and innovations in healthcare in Africa
11. Challenges and opportunities for telemedicine and telehealth in Africa
12. Impact of food insecurity and water insecurity on health in Africa
13. Gender based violence in Africa
14. Mental health in Africa

Abstract Submission will open on January 3, 2023

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VISITING SCHOLARS/ FELLOWSHIPS/ MOBILITY
Professor Margaret Keraka

Professor Margaret Keraka was named the 2022 Robert Glidden Visiting Professor at Ohio University. The Robert and Rene’ Glidden Visiting Professorship program supports short-term academic appointments for distinguished visitors to Ohio University with the aim of exposing Ohio University students and faculty to outstanding individuals.

Prof. Keraka was recognized for her exemplary professional accomplishments and intellectual contribution in the field of public health in Kenya and throughout Africa. Prof. Keraka’s fellowship took place in September 2022 during which she presented her research at the African Studies colloquium Africa@OHIO and a seminar paper on “Reproductive health service provision challenges and opportunities in Kenya”. She also served as a guest lecturer in various courses in the public health and geography departments and met students with whom she discussed her public health career as well as study abroad opportunities at Kenyatta University.

Prof. Keraka worked on a joint research proposal focusing on adolescent sexual and reproductive health with her host Prof. Caroline Kingori, Associate Professor of Community and Public Health and interim Associate Dean for Research and Faculty Affairs in the College of Health Sciences, Ohio University. The two professors explored their keen research interest on reproductive and sexual health issues, particularly among young adults in Kenya which they believe is vital in providing timely recommendations to enhance youth-friendly health services and are working towards developing contextual interventions with focus on technology and health.

Prof. Keraka had the opportunity to interact with various Ohio University faculty across disciplines with talks on exploring partnerships and collaborations between the two institutions. As a result of the visit a number of student staff exchange opportunities were identified and mapping on the implementation strategy is underway as well as discussions with Public Health graduate students and faculty interested in working on projects in public health research in Africa.

“It is worth noting that participation in the Glidden fellowship gave me an opportunity to have a better understanding of US higher institutions of learning work organizational culture and enhanced my pedagogy skills”
Teaching and administration in HEIs: Lessons from two Worlds at Linnaeus University

From right Dr. Adelheid Bwire, Dr. Marguerite K. Miheso-O'Connor, Dr. Beatrice Bunyasi and Dr. Mary Nasibi
Faculty mobility is aimed at extending collaboration in order to develop competences of staff members to increase education quality, mainly concerning pedagogy, research and transfer of know-how and technologies. It also aims at increasing the staff competence in how administration, teaching and learning may differ in diverse academic environments, and become better prepared to work and teach in the multicultural Higher Education Institutions (HEI).

The programme supported by Linnaeus Palme and ERASMUS – ICM grant in the department of Didactics and Teachers Practice, supported five Senior Lecturers - Dr. Marguerite K. Miheso- O’Connor – Project Lead, Dr. Adelheid Marie Bwire and Dr. Mary Nasibi of the Department of Educational Communication and Technology, Dr. Beatrice Bunyasi of the Department of Early Childhood and Special Needs Education and Dr. Winnie Mutuku of the Department of Mathematics and Actuarial Sciences for their outbound mobility from 3rd to 23rd October 2022 at Linnaeus University, Sweden. The programme involved attending meetings, a conference, classes and workshops at Vaxjo and Kalmar campuses.

The team experienced the University’s International Support Centre which hosts the Academic Skills Centre and provides academic literacy skills to all students in their academic life. There was some similarity to the KU’s Communication Skills Unit but their Centre goes deeper to grow all students including those with disabilities in their academic writing skills; creating digital resources through bi-weekly lectures on “How to succeed with your studies”.

The General Support Unit which supports students in accessing recorded course material, training on stress management, supporting in writing (term papers, articles, examination answers); speech synthesis, access to spelling software and oral presentation.

The team presented a seminar on “The Education System in Kenya” analysing the historical development of the Kenyan education system; the Competence Based Curriculum and Inclusive Education. A comparison with the Swedish System was made.

They also gave a lecture on “Catering for Multicultural Classrooms Across the curriculum” to students training to be Special Needs teachers. A recommendation that came out very strongly from this seminar was that Kenya needs more of resources than research!

The team was privileged to attend an International Staff Training on Intercultural Communication: “ Developing Competencies for Transcultural Academic Environments” whose purposes was to develop competencies for transcultural academic environments. The training covered:

- Wellbeing and intercultural communication;
- Four rooms of leadership and management in universities;
- The Cultural University
- Conflict management in intercultural context
- Significance of language in transcultural environments.
Our experience at Linnaeus University, Sweden

A delegation of four researchers Dr. Priscilla Kabue, Dr. Lister Onsongo, Mrs. Elizabeth Ambani and Mrs. Lucy Kithinji from the Department of Community and Reproductive Health Nursing visited Linnaeus University (Kalmar and Växjö campuses) under the Linnaeus - Palme Project which facilitated faculty exchange between Kenyatta University and Linnaeus University.

It is Sweden’s 6th largest University in terms of student population which is about 31,000 of which 1,600 are international students and 500 from various exchange programmes.

The team was hosted by the Faculty of Health and Natural Sciences which houses the department of Nursing, and were privileged to tour various facilities and experience a number of best practices in the area of Nursing and Midwifery. These included:

The Primary Care Centre which caters for over 85,000 patients from the community. The facility was established with the objective of preventing unnecessary hospital visit. The Centre is staffed with medics with different specialties such as Ophthalmologist, a psychologist, a diabetic nurse, an occupational health nurse and a nurse specialized in dementia. Most cases are handled through tele medicine with home visits by doctors done whenever necessary. Self-care is encouraged for basic procedures.

The nursing skills lab is equipped with state of the art equipment and is dedicated to the midwifery program.

Maternity and Renal unit at Kalmar hospital – a well-equipped facility with modern delivery equipment for routine care and emergencies. Midwifery post graduate students had two preceptors in the hospital responsible for their training in the ward. The collaboration between the hospital and university was evident facilitating the training of nurses and midwives. The seamless collaboration is also flourishing among health care providers in the community and hospital resulting in improved patient outcomes.

“Our observation of the practical assessments for undergraduate students revealed some unique and useful techniques for enriching the teaching and learning experiences of both the assessors and the assessee.s”

The team held discussions with colleagues at the Växjö Campus on international virtual mobility and the plans for the next mobility for lecturers and students to be held in January and February 2023 following the successful mobility of the first cohort held in September 2022 and also explored opportunities for Multidisciplinary collaboration for grants application and research.
A delegation of twelve (12) Researchers from Kenyatta University led by Dr. Esther Munyiri, Director, Global Tourism Resilience and Crisis Management Centre – Eastern Africa visited Greece from 18th to 22nd July 2022 for the 4th Erasmus+ International Hybrid Staff Week Consortium of International Credit Mobility themed “New Digitalization Era, European Neighbours, Diversity and Inclusion”. The visit was within the framework of the European Exchange programme, Erasmus+ and was hosted by the University of Piraeus, Greece.

The aim of the visit was to foster and strengthen the existing collaborations as well creating new collaboration opportunities; share knowledge, experience and cultural diversities. Key topical global issues were also discussed during the week long program among them Sustainable Blue Economy that is aimed at contributing to climate change mitigation, development of green infrastructure to preserve biodiversity and landscapes, while benefitting tourism and the coastal economy.

Projects to be spearheaded by the KU team included; carbon sequencing, coastal protection, coastal waste disposal, biodiversity management, geospatial planning, climate change adaptation among other environmental issues.
Dr. Purity Muthoni from the School of Engineering and Architecture visited the University of Michigan from April to July 2022 as a visiting scholar under the University of Michigan African Presidential Scholars (UMAPS) program. The UMAPS Program brings early career faculty from African universities to the University of Michigan where they are paired with a faculty collaborator during their stay and have full access to the University of Michigan’s (U-M) resources to further their research work. During her stay she presented a paper on ‘Environmental Sustainability in Informal Settlement Upgrading Programs’ at the UMAPS research colloquium.

She also established networks and collaborations in research and supervision some of which include: a research collaboration with a faculty member in the School of Environment and Sustainability on informal economies; proposal development with her faculty collaborator, Prof Martin Murray to convene a panel in the European Conference on African Studies at Cologne in 2023—which has been accepted for implementation. Dr. Muthoni was also incorporated into a defense committee in the College of Architecture and Urban Planning for a PhD student who is conducting a study on ‘The Impact of Social Networks on the Spatial Organization of Urban Informality in sub-Saharan Africa. She also joined the Centre for Global Health and Equity University of Michigan, an institution that brings together multidisciplinary faculty and affiliated partners to conduct research in low- and middle-income settings.
Dr. Raphael Kweyu of the department of Geography has been awarded a Research fellowship at the French Institutes for Advanced Study (FIAS) for the 2022/2023 academic year. The FIAS is an international mobility fellowship programme that supports high-quality and innovative research as fellows conduct their research with the greatest freedom and benefit from the strong scientific and extra-academic support by the institutes.

Dr. Kweyu will be based at the Nantes Institute for Advanced study from November 2022 to June 2023 during which he will be undertaking a research study titled; “Investigating the role of mediation in environmental conflicts in the Karamoja cluster of East Africa”.

His study is motivated by the growing need to resolve environmental conflicts that are occasioned by climate shifts and perceived natural resource scarcities. Some of these conflicts are trans-boundary and involve multiple ethnicities competing for shared spaces. One example of protracted and intractable conflict has been experienced in the Karamoja cluster in Eastern Africa.
KU researchers lead, launch and learn at Macerata, Italy

Through a European union funded Research Project, educators from Kenyatta University travelled to the Università Degli Studi Macerata, Italy for a fall secondment in November 2022 that saw them take part in a range of individual and collective activities at the Italian partner institution. Music and dance lecturer Dr. Isaiah Oyugi, Dr. Beneah Azangalala Shapaya from the Department of Communication, Media, Film and Theatre Studies, and Anne Mwiti, an assistant lecturer in the Department of Fine Arts and Design made the trip. They joined Prof. John Mugubi, TPAAE’s regional coordinator for Kenya, who led the month-long delegation.

Prof. Mugubi’s aim in the secondment is initiating an assessment of the sustainability of the creative economy that will look at the economic impact of film screenings in Kenyan cities and towns. Using Macerata as a benchmark, this foundational work will compare activities in Machakos, a town located some 60 km southeast of Nairobi. Numerous datasets will be collected, ranging from screening spaces, frequencies and attendance, to direct and indirect economic impacts and educational opportunities allied to such events.

Dr. Oyugi’s research focus is on music in public space, comparing whether and how music is used in public space in Macerata and in Nairobi. While in Italy, he is tracking the presence and absence of music on public transport, and in restaurants, stores and shopping malls. The study is a two-pronged approach; identifying public spaces that do not employ music in their daily business and the effect of this phenomenon on the business and its clients.

Dr. Shapaya’s research focuses on decoding messages in the graffiti found in Macerata and Nairobi. He is circulating photographs of the works among scholars, soliciting their perception of graffiti art. Focus group at both partner institutions will provide a basis for student engagement, with these discussions determining how audiences view graffiti art. The results are to be published in a paper and a film is planned to document Dr. Shapaya’s research, together with Prof. Rosita Deluigi, and PhD candidate Miriam Cuccu.

Prof. John Mugubi (left), Ms. Ann Mwiti (2nd left), Dr. Beneah Azangalala (2nd right) and Dr. Isaiah Oyugi (right) with Mr. Marino Severini (centre) the leader of THE GANG Band that uses music to conscientize the community and foster change.
Ms. Mwiti is developing an article that evolved from a 2021 mobility and based on a series of her ink drawings themed “The New Normal”. These works, made in 2020, explore the effects of the Covid-19 pandemic on day-to-day activities. Shown to primary school children and to a group of Macerata students, the ways in which these groups experience Ms. Mwiti’s drawings forms the basis of the trio’s written work. In addition, Ms. Mwiti and Prof. Deluigi are exploring the role of art as a tool of pedagogy in early education using paintings made in 2015 and inspired by children.

Collectively, the Kenyatta team attended a community function in Montefano, a town in Macerata Province, to explore how music can be used for Social Change. Facilitated by musician Marino Severini, the leader of a band named “The Gang”, the team experienced music’s ability to inspire people to question and confront authority, and motivate them to act on and redress injustices and inequalities. Kenyatta University researchers are also leading workshops on art and the human condition, and an examination of the multiplicity of artistic language for graduate students in Art History prior to their return to Nairobi in early December.
Mr. Rodrigo Rodriguez

Kenyatta University, Department of Music and Dance was privileged to host a number of guest performers and artists in the last semester. Amongst these guests was a renowned classical guitarist Mr. Rodrigo Rodriguez.

Mr. Rodrigo Rodriguez was born in Quito, Ecuador, South America to a very musical family. He started playing guitar at the age of 9, recording his first live performance at the age of 12. At 16, he started to travel the world to increase his knowledge in the instrument, performing in Venezuela, Spain, France, England and Damascus, Syria. In 1986, he was invited to teach classical guitar by Eastfield College in Mesquite Texas. Rodrigo has recorded 16 CDs, one recorded with the City of Prague Philharmonic.

Mr. Rodriguez has been the solo guitarist for numerous world class orchestras in the US and beyond. He has made concert tours to various countries around the globe and recently, Kenya. In 1992, Rodrigo found a new direction in his life and is now privileged to serve the Lord in full-time music ministry, what he terms as ‘musicianary’.

While at the department of music and dance, students were honored to listen to him play on the guitar, get inspired by his story, and also listened to him and renowned gospel artist Reuben Kigame perform together.
Mr. Laban Migudi, an Administrative Assistant in the Office of the Deputy Vice-Chancellor, Research, Innovation and Outreach was awarded the Administrative Staff Mobility to Addis Ababa University, Ethiopia under the African Biomedical Engineering Mobility (ABEM) project funded by the Intra-Africa Academic Mobility Scheme of the Education, Audiovisual and Culture Executive Agency of the European Commission.

The mobility scheme is modeled on Europe’s well-established and successful Erasmus-Mundus programme aimed at enhancing the contribution of higher education towards economic and social development improvement of the quality of higher education.

The program also builds human and institutional capacity in Africa, supports exchange programs for staff and students of the participating institutions for exchange of best practices, offers participants the opportunity to experience and appreciate different cultures and practices enhance institutional research profiles and inter-university cooperation, and support the development of solutions from an African perspective.
Dr. Ibrahim Macharia Visits Neu-Ulm University of Applied Sciences (HNU), Germany

Dr. Macharia had a very successful and enjoyable visit to Neu-Ulm University of Applied Sciences (HNU) hosted by Prof. Thomas Bayer. The visit primarily aimed at investigating frugal and innovative agricultural value chain business models that can be implemented in developing countries for a circular sustainable economy, pursue collaborations and explore new teaching and research techniques.

Dr. Macharia had the privilege to visit several firms/companies involved in food production, processing, transportation, and research.

Lindenhof Alpaka Company

The 1840 family-owned farm has one of the best business models with clear links to value addition. The farm breeds and sells alpacas breeds and has a distinct farm shop where they sell products made from alpaca wool. They also offers a number of leisure and adventure activities for individuals, groups and companies, such as stable tours, animal-assisted activities and therapies.

“It was nice to see on my way to the companies that most houses use solar energy. Almost 4/10 of the buildings in Neu Ulm have solar panels on the roof. This saves energy and is a good source of renewable energy.”
The company, which was initially established to aid Bavarian agriculture expanded into the construction and energy industries. It was amazing to note how cereal farmers came together to share a go-down before realizing they needed to purchase farm input in bulk to receive discounts. After that, they teamed up in buying construction supplies for livestock stable construction, and they later made investments in the banking and energy industries.

The company has subsidiaries and holdings in more than 50 different countries today. The Group is one of the biggest European businesses in terms of revenues. The company sell all precision farm equipment, construction material, solar, wind, bioenergy equipment and potted plant.

**Münchinger Wood Processing Company**

The company purchases, prepares laminated products, and sells them worldwide. It uses 100% of the wood in an ecological cycle, starting with the cutting of the timber to remove defective parts, moving onto the jointing and gluing of the wood and laminating. All wood wastes, such as sawdust and planning chips, are processed to make briquettes. While the remaining part of the sawmill is used to make biogas, which is then converted into electricity that is sold out to the electricity company. The rest of the gas is used to heat the factory and run some of the machines.

“What I liked about this concept is that it stems from a problem: according to the manager, Münchinger used to allow free collection of sawdust, but after a while, nobody would collect it, so they had nowhere to take the waste but to a landfill. That is how the idea of adding value to wood waste arose”
“It was interesting to learn that the connection with the companies that manufacture those kind of equipment bring the equipment for demonstration. The university also offers short courses for farmers on a variety of topics on a regular basis.”

Dr. Macharia had very enlightening discussions with the staff of the HSWT on current innovations in the food value chain. They discussed the need for cost effective innovation that can be applied by small scale farmers similar to those in Kenya.

HSWT is one of the leading national and international universities of applied sciences and green engineering offering all the infrastructure needed for applied agricultural sciences.

The agricultural courses offered are based on the food value chain concept. Students learn the entire value chain, beginning with sustainable cultivation and ending with the product being delivered to the customer. The courses are divided into three sections. 1) Theoretical part 2) practical learning and 3) own project. A practical semester is mandatory for every degree program. All Departments and Institutes at HSWT conduct interdisciplinary, practice-based, international research.

All farm equipment in the era of precision agriculture are readily available for students to get practical experience. It was nice to understand that the link with the companies that produce those equipment make it possible for them to bring the equipment for demonstration. The university also provides short courses for farmers all the time for specific topics.

The University also runs a livestock teaching farm that is completely automated, from cleaning the stable to feeding and milking the animals. Further, it also runs a biogas plant, which converts gas into electricity that is sold to the grid, with the remaining gas being used to heat the facility. The by-product is composted and used on crop farms.

All farm equipment for precision agriculture are readily available for students to gain practical experience.
Dr. Claus-Ulrich Honold, provided insight into all the production systems of the food system in Germany. It was clear that Germany led in productivity and use of precision agriculture in Europe. The district has about 2,000 farmers and about 4% of farmers have biogas, the main reason for keeping livestock is to produce gas, which they later convert to electricity and sell to the grid.

Around two thirds of farmers keep animals, with cattle, pigs and poultry being the most common. It was fascinating to know that Austrians buy excess electricity from Germany at a cheaper price, use it to pump water, and then generate electricity to sell back to Germany at a higher price. All farmers receive subsidies that are based on area (3 cents per square meter), maize is grown for biofuel. Almost 90% of soya beans are imported from South America and are used for many products and not only for livestock feed. Around 13% of farmers now manage their farms ecologically.

Dr. Macharia was also fortunate to attend about four (4) classes that were going for about three (3) hours each. This was a good opportunity to compare the approaches and quality levels of the faculty and students in HNU with the Kenyatta University.

“*The opportunity to observe Prof. Dr. Jens Uwe Pätzmann seminar-type class was especially valuable for what it taught me about teaching difficult concepts to motivated students. It was such a great experience to witness current advertising methods being critically analyzed by students and discussed in class as teaching examples, with the professor simply making additions and correcting mistakes. Likewise, the bringing of outsiders who have a wider knowledge in specific topics was an eye opener.*”

Take home:

- Engaging students is preferable to lecturing achieved by providing more practical sessions for the students.
- Value chains should be integrated into Kenyan Universities curriculum, this includes covering the entire value chain, from farm to folk, and offering more practical examples than theories.
- Creating targeted short courses for farmers.
- Research should be problem solving for farmers thus, the research conducted should be informed by farming problems and should be directed toward meeting the needs of farmers.
- There is a need for more industry linkages. It is critical to connect schools with industries, particularly those dealing with food-production and processing equipment. Students should also be allowed to work in those firms for one semester each year.
- Inviting stakeholders to take over some of the lecture topics should be encouraged.
Our Mobility experience at University of KwaZulu Natal, Durban, South Africa

We were honored to be awarded a staff mobility scholarship to the University of KwaZulu Natal (UKZN), under the ACADEMY project, that is part of the Intra Africa Academic Mobility Scheme which favors knowledge and culture exchange between higher education institutions in the different African countries.

Our visit began on the 1st of June 2022 when we arrived in Durban, the land of the Zulu people. We were warmly received at the International Relations Office of UKZN, where we attended the reception meeting that entailed a detailed itinerary of our one month stay.

Jane Kariuki - Research Grants and Budgetary Office (L) and Sylvia Anzagi - Centre of Research Ethics and Safety (R) together with the Director International Relations and Academy Project co-coordinator
UKZN has five campuses, we were hosted at the Howard campus where we visited various schools and met the Deans who are the leaders of research in their schools. Three quarters of our stay was spent in the Westville campus where the research office is based. Their Research Division consists of five units: Research Office, Research Financial Services (RFS), Press, Incubate and Libraries. The management of research activities is very similar at both institutions. One distinguishing aspect is the management structure, UKZN has a decentralized system; every college has research administrators who handle funded projects that are less than R1 Million (Approximately Ksh. 7,179,000). Anything above that is administered in the Research Finance Office alongside all other international funded projects, irrespective of their value.

**Strengths/Takeaways:**

- They have a robust post-doctoral program that seeks to encourage local students to take up post-doctoral studies. This includes mentoring and capacity building in all the areas within the research cycle.
- Payment of research incentives which is pegged to research publications and proceeds are reinvested in research activities that in turn serves to wholesomely improve on the research ranking of the university.
- All systems are online and fully automated. This greatly improves turnaround time and efficiency. This was a post COVID development.
- All ethics review committees’ activities are done online, complete with the vetting process, meetings and feedback processes.

**The Cultural Experience**

We were treated to an exciting historical tour of Inanda Township by the international relations office. This is a large settlement north-west of Durban. We went through the Inanda Heritage Route, well known for its rich political history, with the first stop being the Phoenix Settlement, established in 1904 by Mahatma Gandhi, which later became his home.

We also visited Ohlange High School the site where the legendary founder ANC John Dube was buried together with his family and learnt of the intense struggle and lobbying that the ANC leaders played towards the liberation of the South African people.

The visit gave us a deep appreciation of the challenges that the indigenous South African people had to undergo under the Apartheid regime, and applaud them as a resilient people who overcame and continue to soldier on for a better tomorrow.

We concluded our township tour with a Braai that served a taste of South African cuisine, where we got to meet fellow Kenyans pursuing their dreams in South Africa. It was really nice to share and connect with everyone as it gave a sense of purpose even as we travel different paths.

We gathered memorable times in Durban, South Africa, we express our gratitude to the ACADAMY Project coordinated by Prof. Shisanya for providing us with a valuable opportunity, the International Relations Team from UKZN for their warm reception and hospitality through the entire program, for sharing and giving us a truly enriching and memorable experience and to Kenyatta University for granting us the permission to take up the mobility challenge.
Mr. Gilbert Kipkoech, a postgraduate student pursuing a masters of education degree in the Department of Educational Management, Policy and Curriculum Studies, School of Education and Lifelong Learning, competitively won a six months’ study fellowship as a Visiting Experiential Learning Student (VELS) to be hosted at the University of Saskatchewan, Canada from January to July 2023.

The visiting student scholarship was awarded by the Canadian Bureau for International Education (CBIE) on behalf of the Department of Foreign Affairs and International Trade Canada (DFAIT). The fellowship aims to strengthen, diversify and enrich Canada’s education engagement with a diverse range of partners as well as increase opportunities for Canadian post-secondary institutions to welcome international students from a wide range of countries and territories on short-term exchanges for study or research in line with the objectives of Canada’s International Education Strategy.

Mr. Kipkoech is currently finalizing his masters of education thesis titled “Public Vocational Training Centres’ Preparedness for Provision of Competency Based Education and Training in Nakuru County, Kenya” under the supervision of Dr. Jackline Nyerere and Dr. Purity Muthima.

The student intends to achieve the following scholarly objectives during his visit:

• Explore how the Competency Based Education and Training (CBET) is implemented in Technical Vocational Education and Training (TVET) institutions in Saskatchewan, Canada;

• Establish the nature of relationship between Canadian TVET institutions and industry for provision of placement opportunities to trainees and professional development of instructors;

• Determine how CBET Instructors are prepared, and;

• Examine the types and sources of resource that are available for the implementation of CBET for TVET programs in Saskatchewan, Canada;

• Participate in seminars, workshops and conferences.

During his stay at the University of Saskatchewan, Kipkoech will be under the mentorship of Professor Janet Okoko.
Research Equipment at The National Phytotherapeutic Research Centre

**Essential Oil Distiller**

This distiller is a semi-commercial equipment that is used to extract essential oils from aromatic plants and resins through hydro-distillation. Types of essential oils that can be distilled include myrrh, frankincense, eucalyptus, rosemary, lemon grass etc.

**Rotor Mill Grinder**

This Mill is used for grinding dry herbal materials into powder of different mesh sizes. Some of the finely ground herbal materials can also be packaged in form of capsules.

**Oil Expeller**

The Oil expeller is used to extract fixed oils from seeds and nuts. Some of these seeds include canola, chia, sunflower among others. The seed cake obtained after pressing the oil can be further processed to make nutraceutical formulations and animal feeds.
Research Equipment at The National Phytotherapeutic Research Centre

UV-Visible Spectrophotometer (UV-VIS)

Detects chemical compounds that have the ability to absorb UV and Visible radiations. Some of the applications include:
- Structure elucidation of organic compounds in plants
- Quantitative analysis of pharmaceutical substances

Fourier Transform Infra-Red Spectrophotometer (FTIR) - ATR

Detects different functional groups present in chemical compounds by exposing Infra-Red radiation to a sample. No sample preparation is required prior to analysis. Some of the applications of FTIR-ATR include:
- Chemical finger-printing of herbal preparations
- Verification of raw materials

X-Ray Fluorescence Spectrometer (XRF)

A hand-held and portable instrument that determines the composition of essential and toxic elements in a wide range of samples that includes plants and soils. All elements emit characteristic and unique radiations when exposed to X-Rays. Some of the applications of XRF include:
- Elemental constituents of herbal medicines
- Mineral analysis in soil
Research Equipment at The National Phytotherapeutic Research Centre

High Performance Thin Layer Chromatography (HPTLC) Densitometer

HPTLC is used to screen herbal extracts for the purposes of identification and quantification of the chemical constituents present. The densitometer visualizes/represents the different chemical constituents in charts called densitograms. Some of the applications of HPTLC include:

- Phyto-constituents in plant extracts
- Forensic analysis: Adulteration, poisoning, illegal drugs
- Presence of impurities in drugs

Gas Chromatography Mass Spectrometer (GC-MS)

GC-MS separates volatile chemical compounds in the Gas Chromatograph and then detects them in the Mass Spectrometer detector. It is equipped with a rich library of mass spectra for the purposes of identifying unknown chemical compounds present in samples. Some of its applications include:

- Analysis of essential oils and fragrances
- Pesticide residue screening in plants
- Structure elucidation of organic molecules from plants

Liquid Chromatography Mass Spectrometer (LC-MS/MS)

LC-MS/MS separates chemical compounds in the Liquid Chromatograph and then detects them in the Mass Spectrometer detector. The MS/MS detector is very sensitive and can detect chemical compounds present in trace concentrations. Some of the applications of this instrument include:

- Analysis of primary and secondary metabolites in plants
- Anti-doping analysis in sports
- Pesticide residue screening in plants
- Structure elucidation of organic molecules
- Forensic analysis: abused drugs, poisoning
Research Equipment at The National Phytotherapeutic Research Centre

Freeze Dryer

The Freeze dryer removes 95% to 99.5% water with minimum loss of volatile and heat sensitive chemical compounds from raw plant samples and aqueous plant extract. The whole process is aseptic. This process involves freezing samples to -60°C and then subjecting them under high vacuum. The sublimation process happens below triple point of 0.0060atm and 0.010°C.

Rotary Evaporator

The Rotary evaporator is used in the laboratory to dry or concentrate plant extract where organic solvents are involved by employing reduced pressures. The process is advantageous because heat sensitive chemical compounds are not damaged during the process.

Refrigerated Centrifuge

The Refrigerated Centrifuge has the capability to separate particles suspended in a liquid plant extract according to size, density, viscosity of media and rotor speed.
Research Equipment at The National Phytotherapeutic Research Centre

Accelerated Stability Testing Oven

The oven is used to estimate the shelf life of herbal products. The products are subjected to controlled environments of temperature and humidity so as to monitor degradation.

Trinocular Microscope

The trinocular microscope allows the user to take pictures and also record videos. Advantage is that these can be shared digitally with other professionals for consultation and more analysis. Particularly useful in training a trinocular microscope aids an instructor by showing the students what he/she is looking at, or observe how the student is using the microscope.

Automatic Autoclave

Automatic Autoclave provides physical method of sterilization by killing bacteria, viruses, and even spores present in the material put inside of the vessel using pressurized steam. Autoclave sterilizes the materials by heating them up to a particular temperature for a specific period of time. The autoclave is considered a more effective method of sterilization as it is based on moist heat sterilization.
Research Equipment at The National Phytotherapeutic Research Centre

Automated Tea-Bag Packaging Machine

This equipment is used for packaging different herbal materials into standard teabags. The herbal materials are first ground before packaging. Examples of herbal teas that can be packaged include chamomile, mint, lemon grass, rosemary etc.

Sealer Shrink Combi Machine

This sealer is used for wrapping products packaged in bottles, cans and cartons using thin polyethylene films. This prevents adulteration of products after packaging.

Vertical Continuous Band Sealer Machine

This Band Sealer is used to seal a wide range of packaging bags and stand-up pouches of various sizes and lengths so as to prevent tampering and maintain the integrity of packaged herbal materials and products. The stand-up pouches can be used to package various kinds of nutraceuticals.
Laboratory Animals in research

The use of animals in research experiments and classroom instruction is critical for the University to meet its teaching and research goals. Without it, students’ education in many programs, including agriculture, biological sciences, pharmacy, and animal sciences, would be jeopardized.

It has long been established that inquiries/research involving animal use have resulted in significant scientific advances benefiting both the animals’ and humans’ health and welfare, and their continued use in research experiments is critical for future advancement. Importantly, those who use animals have a legal and moral obligation to care for them properly and use them humanely, because animals, like humans, have feelings and experience pain.

Kenyatta University, seeks to consistently deliver quality programs of husbandry and veterinary care as well as provide the foundation that enables valid scientific research. The university through the department of Zoological Sciences has provided facilities, guides and procedures that are valuable and essential to assure high level of animal care and ensuring the humane and ethical treatment of animals used in teaching and research as well as advocate for the use of non-animal alternatives whenever possible.

A glimpse into our lab animal facilities;
The Department also has the capacity to train on several management aspects of these laboratory animals such as: housing, animal welfare, breeding, feeding and nutrition, Safe experimentation and veterinary care. The Department also offers these animals for sale to interested parties at affordable prices.

Weevils being bred in storage jars

Guinea pigs

Incubator for Cockroaches and Desert Locusts

Breeding cages for Rats and Mice
STUDENTS CORNER
Collins Mwiti Kirema’s experience at the EPFL Summer Research Internship Program

Collins Mwiti Kirema, an undergraduate (3.1) student of the Biochemistry, Microbiology and Biotechnology was part of the 20 successful participants selected to join the EPFL 2021 Summer Research Internship Program at the École Polytechnique Fédérale de Lausanne, Geneva, Switzerland. The programme period was between 1st of July to the end of August 2022 and had a total of twenty participants from sixteen different nationalities. The program provides participants with an enriching experience that introduces them to new scientific techniques under the mentorship of faculty and scientific staff at EPFL, allows them to join on-going research in the lab to prepare them for future independent research as graduate students, improve their critical thinking and experimental exposure. The overall benefit is the participants get to experience the excitement and challenges of scientific research gaining insight into what a research career entail. During his internship period, Collins was involved in a research project titled the ‘mechanoregulation of biofilm formation using E.coli GFP 1108 as the model organism’ at the Persat (microbial mechanics) Laboratory headed by Prof. Alexander Persat.

The programme gave Collins a rare opportunity to learn from international scientists at EPFL. He also had an opportunity to visit the Cancer Research Institute and the Blue Brain project. Collins expresses his gratitude to his mentor Dr. Thommas Musyoka of the department of Biochemistry, Microbiology and Biotechnology who was instrumental in getting his application through. Being the only African in his cohort, Collins recounts that the opportunity offered a life changing experience which will go a long way in setting a strong foundation to his future career and aspirations.
Unravelling reasons for resistance of early blight disease to common fungicides

Andrew Nuwamanya, a Masters student in Crop Protection (Pathology) from the department of Agricultural Science and Technology, funded under the East Africa Community Scholarships within the auspices of the Inter-University council implemented his research that sought to determine why the fungus; Alternaria solani does not respond to the two main types of active ingredients (Difenoconazole and Azoxystrobin) in the fungicides most frequently used by farmers.
Tomato is a major crop for nutrition and income in Kenya and the East African Region. Early blight is a fungal disease caused by Alternaria solani on tomato and causes significant yield losses. To control the disease, farmers have to apply fungicides frequently but despite the heavy pesticide use, infection has continued to be high, a possible indicator that the pesticides may not be effective. Resultantly farmers have substantially increased the recommended dosage and spray crops more frequently, causing a ripple effect in relation to cost of production, pollution to the environment and exposing farmers and consumers to health risks.

His research revealed that the disease fungus had mutated and developed some level of resistance to the active ingredients contained in the fungicides. The recommendation from the research to the Pest Control Products Board (PCPB) and pesticide manufacturers was to initiate a programme for the withdrawal of azoxystrobin from the market to allow re-establishment of susceptible isolates as well as conducting sensitivity tests with other fungicide groups.

Andrew was under the mentorship of Prof. Steve Runo and Prof. Maina Mwangi. The research project was co-funded by NRF, KCSAP and student scholarship by IUCEA.


Andrew during one of his lab sessions

Early bright symptoms on tomato in Kenya (Credit: Andrew Nuwamanya)
The beauty of the striga parasitic plant would fool one to believe only good comes from its aesthetics features, but this ‘beautiful witch’ has ravaging effects and a cause of concern to food security.

Striga is a root parasite that infects most crops like maize, sorghum and millet with adverse effects leading to high cereal losses. Calvins Odero a PhD student and an emerging plant health scientist at the department of Biochemistry, Microbiology and Biotechnology has dedicated his research to understanding and highlighting the effects of the parasitic plant. His main interest has been on how the parasite affects maize which is a staple crop in most sub-Saharan Africa countries.
In farmlands, crops usually secrete special biomolecules which are considered as building blocks of life that perform important functions in living organisms into the rhizosphere (the area around a plant root that is inhabited by a unique population of microorganisms) for beneficial symbiosis with good neighbors like fungi. Striga being an opportunistic plant attaches itself to host root vascular system syphoning both minerals and water starving the host of the nutrients vital for its growth and good yields. A heavily infested farmland can experience up to 100% yield losses culminating to complete abandonment by farmers.

Striga seeds can stay dormant in the soil for over two decades, the secretion of suitable molecules by the host plant stimulates their germination.

Just as bacteria are able to develop resistance against antibiotic drugs, crop varieties are also able to develop resistance against this parasitic plant. This may occur just before the parasite attaches to host roots (pre-attachment resistance) or after attachment (post-attachment resistance). Calvins has focused on identifying crop varieties with resistance characteristics against the parasite as a means of management and control. The identification and recommendation of these varieties to farmers as a component of the integrated Striga management strategy can significantly assure a food secure nation.

In his recent study, Collins screened maize varieties cultivated in western Kenya region for their resistance characteristics against Striga. Promising was the fact that varieties such as EH14A, DK8031, H629 and H614D were found to be resistant against the parasite. He recommended that such varieties be incorporated into maize breeding programs for the development of durable resistance against the parasite.

The breakthrough to his promising scientific research journey came when he got an opportunity to join the Kenya University-Plant Transformation Laboratory (Biosafety level II). The laboratory, which is under the management of Prof. Steven Runo and Prof. Richard Oduor, has actualized the dreams of many upcoming scientists. It is his hope that many such objective laboratories can be established in our universities to enable the innovative utilization and upholding of imminent skills and expertise. This can go a long way in exploring and providing lasting solutions to the challenges experienced as a country, region and continent.

Calvins Odero standing over a farm infested by striga
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