



TECHNOPOLICY

AFRICA

This is the official newsletter of the African Technology Policy Studies Network (ATPS)



Highlights:

ATPS Holds a Regional Climate Change Dialogue and Training Workshop

Citizen Science Core in Developing Energy Efficient Biomass Cookstoves

ATPS Receives a New Grant from BioInnovate Africa Program

ATPS Vision:

To use Science, Technology and Innovation (STI) as a means for achieving sustainable development in Africa.

ATPS Mission:

To improve the quality of science, technology and innovation (STI) systems research, policy and practice by strengthening capacity for STI knowledge generation, dissemination, and use for sustainable development in Africa.

Overall Objective:

To build Africa's capabilities in science, technology and innovation for sustainable development.

ATPS Motto:

Building Africa's capabilities in science, technology and innovation policy research, policymaking and policy implementation for sustainable development.

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CHAIRMAN'S MESSAGE

Strategy is always the starting point and a well-crafted one will always help an organisation reach its destination. This year, we continue to implement our new Phase VIII Strategic Plan (2017-2022) which is core of ATPS's five-year strategy in using Science, Technology and Innovation (STI) as a means for achieving sustainable development in Africa. The current plan aligns to the Africa Union's Agenda-2063 that recognizes STI as one of the major drivers and enablers for achieving development goals in the AU and its member states. The AU is currently implementing its ten year Science, Technology and Innovation Strategy for Africa STISA-2024 which aims to accelerate Africa's transition to an innovation led economy and knowledge based economy. Additionally, the Plan mirrors to the global Sustainable Development Goals (SDGs) which calls into action to end poverty, protect the planet and ensure that everyone enjoys peace and prosperity.

As a premier STI institution, ATPS has been on the forefront to facilitate the development of STI policies of regional and national governments in Africa, conducted policy research interventions in over 30 countries and participated in many capacity building initiatives for sustainable development. In the new Strategic Plan, ATPS has identified both thematic/sectoral and programmatic areas which will enable it achieve its mandate of building Africa's capabilities through STI. The thematic/sectoral priorities include: Agriculture, Food and Nutrition; Environment and Climate Change; Energy and Health Innovations while the programmatic priorities include: STI Policy Research, Policymaking and Advocacy; Training, Sensitization and Capacity Building; Youth and Gender Empowerment; Knowledge Brokerage, Management and Commercialization and; Intra-Africa and Global Collaboration and Partnerships.

Under the sectoral priority Agriculture, Food and Nutrition, ATPS will continue to identify and promote appropriate technologies and innovations for improving productivity and resilience, reducing waste and improving value addition along the value chain from farm to table. ATPS is currently outscaling its award winning app LandInfo to farmers and extension agents across Africa. In 2016, ATPS won the prestigious Climate Information Prize for promoting the adoption of the app in Africa; the app produces accurate soil and climatic information that empowers farmers, extension agents and land use planners in decision making regarding agricultural production, land use management and climate resilience. So far ATPS has been able to deploy the use of the app in Nigeria, Malawi and Kenya and in the coming months ATPS will be in Cameroon to capacity build farmers and extension agents.

In the Energy sector, ATPS will promote renewable energy access and its development on the continent; this will be possible by scaling up energy infrastructure to strengthen energy security and climate resilience by providing an enabling policy for it to happen. ATPS in partnership with Jaramogi Oginga Odinga University, Kenya is currently implementing



Mr. Chuma Ikenze

the project, *Market Based Approaches for the Diffusion of Clean Cooking Solutions in Kenya and Tanzania*. The project aims to evaluate and develop strategies for catalyzing the diffusion and adoption of clean cooking solutions. It is expected that the project will provide solutions on how to improve the diffusion of clean cooking solutions and a favourable policy environment to enhance clean cooking solutions.

ATPS is currently implementing its project on Bridging Climate Information Gaps to Strengthen Capacities for Climate Informed Decision-making. The project aims to strengthen the capacities of selected African countries to understand and deploy appropriate climate information and best practices to support decision-making and support development planning, reduce vulnerability of the selected countries and foster a food secure Africa. During the period, ATPS and its partners held a Regional Climate Change Dialogue and Training workshop in Nairobi for policymakers and scientists with the aim of mainstreaming climate change issues at regional level so as to raise awareness about climate change. This project is under ATPS sectoral priority on Climate Change and Environment Management.

In the Health sector, ATPS will integrate research programs on innovations and policies for sustainable health delivery and health risk prevention including health technology and policy studies. ATPS will also support research and development on emerging diseases on the Continent.

Our strategy is to work with different stakeholders who include: researchers, policymakers, private sector, civil society, media & development partners in identifying Africa's key challenges and solving them using science, technology and innovation. Our main challenge is funding which is core and programmatic and we call upon various development partners to support us as we strive to build Africa's capabilities in STI for sustainable development.

Mr. Chuma Ikenze,
CEO Kenzel, LLC,
Chair, ATPS Board of Directors

EXECUTIVE DIRECTOR'S MESSAGE

ATPS will next year mark its 25th year since its existence. It has been a great journey with the number we triumphed overriding the challenges. Overall, we have come to be known as the top Science and Technology Think Tank in Africa according to the Think Tank Index Report which is usually released annually in appreciation of the impact Think Tanks have in the world. This year according to the 2017 Global Go To Think Tank Index Report ATPS emerged as the Best Trans-disciplinary Think Tank network for the fourth year in a row. The rankings were done by the University of Pennsylvania under the Think Tank and Civil Societies Programme.

We are also proud to say that we are an accredited institutional member of the African Union Commission (AUC). ATPS provides inputs to the specialized Technical Committee on Education, Science and Technology of AUC and we are the organisation that launched the first ever *African Manifesto for Science, Technology and Innovation* that provided a road map for attaining socio-economic development in Africa through investments in science, technology and innovation.

Today, we are implementing our Phase VIII Strategic Plan which was adopted last year after wide consultation with various stakeholders. In the next five years, ATPS will focus its work on four sectoral/thematic priorities which include: Agriculture, Food and Nutrition; Energy; Climate Change and Environment Management and; Health with cross-cutting objectives in STI Policy Research, Policymaking and Advocacy; Training, Sensitization and Capacity Building; Youth and Gender Empowerment; Knowledge Brokerage, Management and Commercialization and; Intra-Africa and Global Collaborations and Partnerships.

In line with the above thematic and programmatic theme, ATPS in partnership with Lancaster University, UK hosted the Air Pollution in Emerging African Mega-Cities: Sources, Evolution and Impacts workshop in Nairobi, Kenya. The workshop brought together talented Early Career researchers from UK, Kenya and South Africa to explore the current status of air pollution research in sub-Saharan Africa and to develop a roadmap for advancement. A detailed report of the workshop is available on the ATPS website.

ATPS and its partners Stockholm Environment Institute (SEI) Africa Centre, IGAD Climate Prediction and Applications Centre (ICPAC), Observatoire du Sahara et du Sahel (OSS), AGRHYMET Regional Centre (ARC) and the Regional Centre for Mapping Resource for Development (RCMRD) organized a three day workshop in Nairobi, Kenya under the project, "Bridging Climate Information Gaps to Strengthen Capacities for Climate Informed Decision-making." The workshop provided an opportunity for stakeholders to reflect on the progress of the project and challenges experienced in target countries in terms of climate change adaptation and mitigation through timely provision of climate information and services, and how policy interventions are aiding or abating this process. Delega-



Dr. Nicholas Ozor

tes increased their capacity on how to use climate information and technology tools for adaptation planning and decision-making.

We also took our capacity building initiative of the LandInfo mobile app to Lilongwe, Malawi and in the coming months the ATPS team will be in Cameroon to train farmers and extension agents on the use of the app. The LandInfo is a community driven app that enables users to instantaneously access climatic and soil information; and interpret them in the context of local conditions. In recognition of our work in outscaling the use of the app, we have been nominated for this year's Tekeleza Prize which is a category in the Climate Information Prize. In 2016, ATPS won the Wazo Prize for its continuous work in deploying the use of the app in decision making to improve agricultural productivity, land-use planning and climate resilience.

In November 5-9, ATPS in collaboration with Scinnovent Centre, South Africa's National Research Foundation (NRF), Canada's International Development Research Centre (IDRC) and United Kingdom's Department for International Development (DFID) will host the Science Granting Councils Initiative of sub-Saharan Africa (SGCI) and Global Research Council (GRC) at Azalai Hotel Abidjan, Cote d'Ivoire. The forum will provide an opportunity for Science Granting Councils (SGCs) to interact with other key science, technology and innovation system actors, including policymakers and the private sector with a thematic focus on, "New Approaches of Funding Research and Innovation in Africa." The GRC will focus on two themes: impact and open science, and aims to facilitate and coordinate Africa's position on these two themes in preparation for the GRC Annual Global meeting to be held in May 2019.

I take this opportunity to extend my gratitude to the ATPS Board, National Chapter Coordinators and network members who offered their strategic guidance and attended some of the events we hosted during this period.

**Dr. Nicholas Ozor,
Executive Director, ATPS**

ATPS HOLDS A REGIONAL CLIMATE CHANGE DIALOGUE AND TRAINING WORKSHOP



Delegates who attended the Regional Climate Change Dialogue and Training Workshop which was held at Best Western plus Meridian Hotel in Nairobi, Kenya

By Sharon Anyango

ATPS in partnership with Stockholm Environment Institute (SEI) Africa Centre, IGAD Climate Prediction and Applications Centre (ICPAC), Observatoire du Sahara et du Sahel (OSS), AGRHYMET Regional Centre (ARC), and the Regional Centre for Mapping Resource for Development (RCMRD) under its project, Bridging Climate Information Gaps to Strengthen Capacities for Climate informed decision-making in Africa held a Regional Climate Change Dialogue workshop from 25th-27th June 2018 at Best Western plus Meridian Hotel in Nairobi, Kenya. The Chief guests were Hon. Sam Onuigbo, Chairman of the Committee on Climate Change, Federal House of Representatives, Nigeria and Dr. Alice Kaudia, Environment Secretary, Kenya.

The workshop aimed at mainstreaming climate change issues by raising awareness; conducting training and outreach to increase the use of climate resilient and adaptation best practice at various levels; disseminate project outputs so far produced and to strengthen the understanding and mastery of climate information and services.

Hon. Onuigbo informed delegates that Nigeria battle with the issue of Boko Haram took so long because the country did not take early action to tackle climate change for instance, around Lake Chad hundreds of people depended on water but due to drought and desertification the lake started drying rapidly and proactive action was either not deployed properly or information may not have been available at that time. Individuals therefore ended up in cities and started making tools to cause trouble. He further noted that Nigeria had passed a bill on climate change which has the potential to tackle climate change issues in the country.

Dr. Kaudia emphasized on the need for researchers to identify the nature of climate information gaps and device ways to bridge them. Additionally, information needs to reach people at the right time and in good quality, if it cannot reach the people then research work will not have any impact.

Dr. Nicholas Ozor, ATPS Executive Director noted that the dialogue was very timely because of the current effects of climate change in Africa which has been occasioned by low capacities in adaptation. He further added that Africa contributes 10% greenhouse emissions, which is the lowest but unfortunately it bears most effect of climate change.

Delegates were taken through various topics relating to climate information use so as to equip them with adequate climate information and capacity needed to promote a development pathway that is climate-resilient at institutional, national and regional level. The delegates noted that the production and access to climate information is on the rise in African countries unfortunately, consumers still face a myriad of challenges in the application of climate information due to low quality of information products, lack of segregated information at appropriate scales and difficulties in communicating and interpreting information for planning and decision making from national through community level. In addition, the success of bridging climate information gap will depend on the ability to institutionalize two-way communication between producers and end users; establishing partnership and networks creates a common platform for the generation of well harmonized and consolidated climate information for decision-making and foresight studies will allow countries to effectively plan,



Mr. Christian Teghe, a representative from Cameroon addressing delegates on climate change information during the three day workshop

organize and implement multiple climate-proof projects in a coordinated way for future adaptation and resilience.

On the issue of funding, delegates were of the opinion that African countries must build their capacities (institutional, human resource, and technical capacity) in order to access the various components of the Adaptation fund and Green Climate Fund.

Mr. Mathew Immulia, ATPS IT consultant also introduced the ICE platform to delegates. The ICE platform is an online interactive platform that enables users to share or disseminate information. The platform aims to strengthen the capacities of African countries to understand, develop and deploy appropriate scientific knowledge on climate information access, use and management on the continent. Some of the components of the ICE platform include: social media platforms, a wiki (knowledge repository), a virtual market place and an enhanced search functionality on adaptation plans, technologies, policies and different projects.



Mr. Mathew Immulia ATPS IT consultant answering questions from delegates on the ICE platform

The workshop was successful in bringing together different stakeholders with different climate expertise and interest together on the same platforms to learn, share and connect to understand each other and to promote climate information use for decision-making and planning. Additionally, it improved the capacity of policymakers, scientists, extension agents, and farmers to use climate information and technology tools for adaptation planning and decision-making and lastly, it strengthened information exchange and improved networking among stakeholders working on climate change adaptation in selected countries.



Delegates during one of the break out sessions discuss one of the chosen topics on climate change issues

ATPS AND LANCASTER UNIVERSITY HOST THE AIR POLLUTION IN EMERGING AFRICAN MEGACITIES WORKSHOP



Researchers having a discussion after visiting Mukuru kwa Njenga, a slum in Nairobi, Kenya; the team analysed the air monitoring tools in the area which is surrounded with industries which cause air pollution.

By Ruth Oriama & Mutai Kipkoech B. [PhD]
Remote Sensing and Air Pollution Meteorologist

From the global to local level, urban air quality is worsening due to the rapidly growing metropolises. Moreover, there is increasing evidence that the impacts of such urban-related air pollution are affecting the health of the population. Due to other vulnerability factors, such impacts are felt much more at the local level especially in sub-Saharan Africa. Furthermore, since both the temporal and spatial evolution of air quality is strongly reliant on weather, it is sensitive to climate change. Therefore, the fight against air pollution can only be won through concerted efforts that bring together research from different fields.

Towards this end, the African Technology Policy Studies Network (ATPS) in partnership with Lancaster University, UK held a Trilateral Researcher Links Workshop on *Air pollution in emerging megacities: Sources, evolution and impacts* a trilateral workshop from the 16th to 20th April 2018 funded by the British Council Newton Fund, National Research Fund-Kenya and National Research Fund South-Africa. The workshop targeted Early Career Researchers (ECRs) from the United Kingdom (11), Kenya (14) and South Africa (9) with the objective among others, to establish the current state of science and future needs of the atmospheric research community to address the growing issue of air pollution, climate change and their impacts on society in and around emerging mega cities.

In order to achieve its objective, the workshop consisted of a series of presentations from expert practitioners, in-depth discussions and intensive group work to explore the themes

raised, including air quality (AQ) monitoring, modelling and policy issues in air quality in Sub-Saharan Africa (SSA).

Eventually, the workshop established a cohort of ECRs in chemistry-climate and air pollution research in with the potential to become future research leaders, and facilitate cross-boundary networking and identify common experiences on which to build future collaborative partnerships with fellow ECRs, established scientists, policy makers and stakeholders.

Concretely, the ECRs under the guidance of the workshop mentors and facilitators will establish a platform to facilitate knowledge sharing on issues of air quality, produce a short informative documentary describing the workshop and highlighting the key issues of air pollution in mega-cities, produce a promotional poster that will be used to highlight the activities of the ERCs in future events, as well as publish short reports on the aims, activities and outcomes of the workshop in the International Global Atmospheric Chemistry (IGAC) project platform, Integrated Land Ecosystem-Atmospheric Processes Study (iLEAPS) and ATPS publications.

Additionally, the knowledge and skills gained through the workshop shall also form an integral part of the ECRs day-to-day activities. Deliberate attempts will be made to disseminate the research output generated from the workshop and research conducted by the ECRs through other air-pollution related conferences, workshops and other academic fora.

TRANSFORMING LIVES OF FARMERS AND EXTENSION AGENTS USING THE LANDINFO MOBILE APP TECHNOLOGY IN MALAWI



A cross-section of participants who took part in the LandInfo app training which was held on 11th September in Lilongwe, Malawi

By Alfred Nyambane

The African Technology Policy Studies Network (ATPS) conducted a Training of Trainers Workshop on the use of LandInfo Mobile App at Lilongwe University of Agriculture and Natural Resources (LUANAR) Malawi.

In attendance were: Prof. Kanyama-Phiri, Vice Chancellor LUANAR, Mr Alick Manda- Director of Planning, National Commission for Science and Technology, Malawi (NCST), Dr. Kingdom Kwapata-ATPS National Chapter Coordinator, ATPS staff, farmers, extension agents and staff from the University.

Prof. Kanyama-Phiri expressed confidence that the LandInfo app will produce the much desired knowledge and information that explicitly define land potential by identifying climatic and non-climatic conditions such as rainfall and temperature distribution, average annual precipitation, available water capacity, elevation, longitude and latitude, length of growing period in days and the aridity index and the type of soil at any given location.

“The partnership between LUANAR, NCST and ATPS is ideal and strategic and will yield the desired objectives and outcomes to empower and build capacities of agricultural extension agents and farmers for farm decision-making and land use planning for agricultural production and climate change resilience in Malawi,” added Prof. Phiri.

Mr. Manda on behalf of Mr. Anthony Muyepa- Director General NCST appreciated the effort made by ATPS in Africa and choosing Malawi as one of the countries to benefit from the LandInfo app training. He further noted Malawi needs to embrace Science and Technology in order to effectively comp-

ete with other african countries and NCST will continue supporting such initiatives in Malawi.

LandInfo app allows users to use smart phones to determine land potential by assisting farmers to determine the average weather conditions of a given point and the soil type. This helps them narrow down on the best crops to grow in a given soil, topography and average weather conditions. The app operates on google and android platforms; site-specific data include: temperature, rainfall, estimated amount of water the soil can store for plants (aridity index) and growing season length. Participants are expected to train others at the local levels on the use of the LandInfo mobile app in an effort to boost agricultural production in the country.

ATPS has been successful in outscaling the use of the app in Kenya, Nigeria, Malawi and in the coming months the team will be in Cameroon to promote the use of the app among farmers and extension agents. The trainings have been supported by the African Development Bank under the Clim-Dev Special Fund on the project, Bridging Climate Information to Strengthen Capacities for Climate-Informed Decision-Making which the ATPS is currently implementing.

CITIZEN SCIENCE ROLE IN DEVELOPING ENERGY EFFICIENT BIOMASS COOKSTOVES



Different prototypes of the wood burning stove

By Dr. Tafadzwa Makonese & Chris Bradnum
Sustainable Energy Technology and Research
Centre, University of Johannesburg, South Africa

There is a long history of products being developed as solutions to challenges within developing communities without the end user being involved in the design process. Steps were taken towards addressing this limitation in the design discourse by examining principles used to design and develop a wood-burning stove through direct engagement with people in the HaMakuya District, Limpopo Province, South Africa. This project was conducted through the Tshulu Trust, an NGO that facilitates research projects in this rural region.

Knowledge gap exists in areas of contextually relevant participatory design methodologies for co-design and co-creation in Southern Africa. There is an opportunity to contribute to the methods and approaches required to train non-designers to co-design and to co-create. Thus, the stove development project followed a user-centred design process combined with co-design workshops as methods to include end users as decision makers in appropriate phases of development of the stove. The lessons learnt from completing this inclusive design process are useful for the improvement of similar projects in the future.

In HaMakuya, households use open wood fires with a driepoort (three-legged pot rest) in closed cooking houses for daily household cooking and heating. This cooking practice is a direct cause of respiratory illnesses, with women and children being the worst affected. Thus, the project aimed to improve the safety of the community when cooking; reduce the amount of exposure to harmful emissions; use the energy sources sustainably, and develop an economically viable and appropriate cooking technology.

When discussing open fire cooking, participants raised some

crucial points about the size of pots and the size of wood that could be used on the standard driepoort cooking. However, they did recognise that open fires were an inefficient use of wood and a safety and health hazard. After designing the prototypes, participants were asked to comment on the stoves. Participants also raised valuable points about the stove's component that required improvement, these included the need for the handle position to be changed to allow the user to move the stove in and outdoors during the cooking process. Majority lamented on the lack of a thick material in the stove body area, a need for a more substantial wood inlet, and improving the stability of the stove when large pieces of wood are loaded into the burn chamber. Some of these improvements would increase the costs of a commercial stove, and some might have safety concerns however, all are worth considering going forward.

An obvious problem that was overlooked when making the stove prototypes is that households require two dishes of food to be cooked simultaneously per meal. It was found that nearly all of the families supplied with the stoves were using them for one component of the meal and reverting to the open fire and *driepoort* for the second component, thereby invalidating the logbooks and data related to wood usage.

During the field-testing of the stoves, ten were mistakenly distributed to households in the nearby village of Tshikalini, which meant that only five were available for participants in Mutshikalini. This immediately caused problems of trust as expectations were raised and promises had been made concerning participation in the project. The village Headman then called the men of the village together to decide how to handle the stoves. Even though the likely stove users would be the women in the village, the men were required to determine the distribution of the stoves. The patriarchal nature of this society and traditional social norms and practices are an additional complexity that needs to be managed by researchers

within the study region. The positive outcome of this mistake was that, of all the villages asked to participate, Tshikalini had the highest level of engagement and some of the best-recorded data. Unfortunately, Mutshikalini recorded the least participation levels for the project. It is essential to understand the dynamics of the villages and how these can influence the quality of the *citizen science* likely to be obtained.

Empowering community members to become problem finders and problem solvers was possibly the most beneficial component of this project. Results of this research pointed to the need for improved communication between citizens and technical experts, as well as for narrowing the gap between the designer and the users by encouraging meaningful engagement and inclusion.

KENYA LAUNCHES ITS FIRST SATELLITE INTO SPACE



Photo: Pulselive.co.ke

A nano-satellite into space. Kenya launched its first satellite into space from the International Space Station in Florida, US

By Sharon Anyango

Kenya made history on 11th May, 2018 by launching its first satellite into space. The University of Nairobi (UoN), School of Engineering (kibicube Team) in collaboration with University of Rome (Italy), Japan Aerospace Exploration Agency (JAXA) and the Kenya Space Agency under the United Nations Office for Outer Space Affairs developed the Nano Satellite Precursor Flight (1KUNS-PF).

The satellite which is (1U CubeSat=10cm x 10cm x 10cm) was deployed into the International Space Station in Florida by Japan Aerospace Exploration Agency (JAXA) at Tsukuba Space Centre in Tokyo, Japan. It consists of two commercial cameras to capture images and experimental web broadcast which is capable of limited earth observation and audio broadcast.

Prof. Jackson Mbuthia, Dean School of Engineering and the Principle Investigator noted that the satellite will be approximately 4,000 kms from earth and its weight is 1.2kgs. He further added that the estimated life span of the satellite is between 12-18 months upon which it will disintegrate and into debris.

It is expected that these will help develop the capacities of space engineers to develop other big satellites. The Kenyan satellite will be used for weather forecasting, earth mapping, climate change, environmental and wildlife observation and guard against deforestation.

Other African Africans who have launched its satellite into space include: South Africa, Egypt, Nigeria and Morocco. In 2017, the African Union passed the African space policy which supports outer space program and the adoption of satellite communication for economic progress.

THE HIDDEN FORTUNE IN WASTE



A commercial biogas plant at the eco-resource centre in Karen, Nairobi, Kenya.

By Yvonne Kirema
Flexi Biogas International

Deforestation is not only a Kenyan menace but also a continental one. A study by a non-governmental agency, Green Africa Foundation revealed that Kenya loses 5.6 million trees daily despite numerous campaigns advocating for afforestation. The study further reveals that about 8.7 million households depend on firewood as their cooking fuel; this scenario also represents what happens in other African countries.

Mr. Dominic Wanjihia Kahumbu, founder of Biogas International Ltd has been on the forefront to address this menace. He was given the challenge by friends of Nairobi National Park to come up with a solution for human wildlife conflict around the Park, being an innovator and having many years of experience in the biogas sector, Mr. Wanjihia came up with a portable biogas plant which he designed to meet all the inefficiencies of the conventional biogas plants and most importantly suit the Masaai who are a nomadic community to reduce the human wildlife interactions. Initially, the digesters were not well received by the Masaai community but later on, it was picked up by communities from the Central part of Kenya who related more with the technology. From this built his company Biogas International Ltd with the aim of alleviate poverty by providing tools to help its clients to earn income from biogas.

Flexi Digesters

Flexi digesters are 100% pre-fabricated and no construction is needed. They consist of a digester bag that is laid on level ground with an inlet and an outlet, the digester is covered with a greenhouse covering to ensure temperatures within the digester are constantly warm. The design of flexi digesters has put into consideration aspects that ensure efficiency, ease in maintenance and affordability. At the inlet, the digester is first fed waste which is stirred with water (It must not be clean water from the tap), waste from animals like cows, chicken and pig can be used.

The mixture flows into the compressor which is longitudinal in shape to allow the mixture to move slowly and also to increase more time for better chemical re-action. The process can take several days and the end result is the production of biogas which when ready, one will notice that the digester rises an indicator that its full of gas which then tapped out of the digester through specialized pipes to where it will be stored and can used for domestic or commercial purposes.

The other output from the biogas digester is the residual waste which is known as bio-slurry and it is collected from the outlet. Bio-slurry is the food ejected from the digester after the completion of the digestion process. Surprisingly, it does not smell. Bio-slurry is very rich in nutrients and it can be used as an organic fertilizer, pest repellent and feedstock for animals. This product is currently fetching a very good market price at the moment with 5 litres of the packaged bio-slurry retailing at 4.5 dollars.

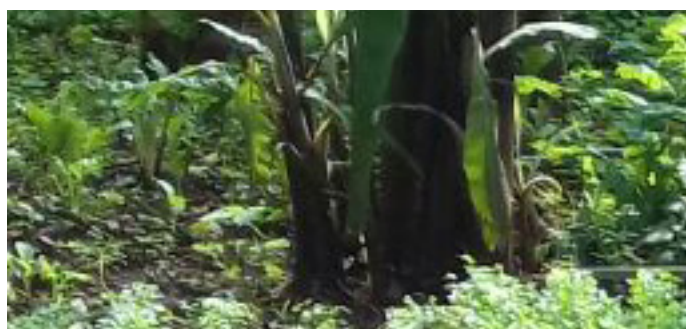


Bio-slurry ejected from the outlet of the biogas plant.

What is even more appealing about these digesters is that one can use any bio-degradable material as feedstock and not only cowdung which the most preferred; different feedstock have different gas production capacity and surprising even enough cow dung produces the least amount of gas. The higher the calorific value of the feed, the higher the gas producing capacity.

Biogas can be used to generate electricity, however one will need large volumes of biogas making it unsustainable. One can however install solar panels placed on manual tracker for lighting purposes and to increase its efficiency.

Permaculture



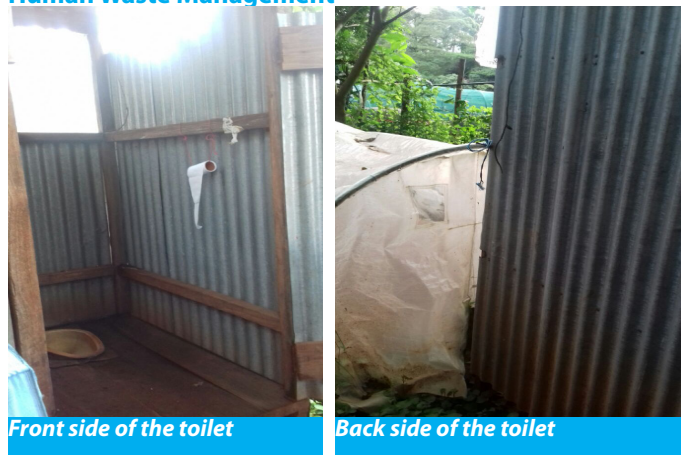
If you have a kitchen garden, one can practice permaculture which tries to mimics nature. This kind of farming reduces the cost of farm input and maximally utilization of all the available resources in this case bio-slurry and compost manure. Plants that are grown using the bio-slurry are very healthy and the slurry too can be used as a pest repellent.

Hydroponic



Hydroponic (growing of crops without soil) is also practiced at the Eco-resource centre, For instance, one can grow wheat to feed cows. The wheat seeds are put in a sac which has open pores, it is then dipped into water, removed and left in the open for two days. During the two days they are dipped in water twice preferably in the morning and in the evening and then left in the open again. Thereafter it is placed in a tray and watered three times a day and when the vegetation is ready it can be fed to cows. The aim is to identify the most simple, effective farming practices for farmers to increase their livestock produce.

Human Waste Management



The human waste management plant is branded as BioSanGas digester; it is designed to sustainably manage human waste and produces gas. These plants solve problem caused by pit latrines that often contaminate ground water and cause waterborne diseases.

Commercial Biogas



The commercial biogas plants are branded T-Rex because of their high biogas yielding. These digesters are also 100% prefab assembled on ground and are designed for high energy needs institutions like hotels and restaurants, schools, hospitals and farms. These plants were designed after the realization that institutions like schools, factories and restaurants are the highest fuel consumers and use tones of firewood yearly for cooking and heating. The adoption of these plants in such facilities completely eliminates the use of firewood and greatly reduces the rate of deforestation.

Since the inception of the company in 2011, Biogas International have installed about 2,000 domestic flexi digesters for approximately 500 plants in Zambia, Zimbabwe, South Africa, Mali, Senegal, Nigeria and Ghana. In Asian countries Cambodia, India and Nepal so far they have received about 50 digesters.

SOLAR ENERGY AND POST-HARVEST LOSS REDUCTION IN ROOTS AND TUBERS



A cross section of harvested cassavas in the farm

**By Kingsley Ukoba- University of KwaZulu,Natal
Njiru Prudence-Kenya Industrial Research and
Development Institute**

The world's growing population is estimated to be at 9.8 billion by 2050, this means there will be increased demand for food, energy and a cleaner environment. 60% more of food will be needed to sustain life on earth therefore, there is need to reduce food losses, increase production and improve distribution in order to increase food availability and access to all.

Globally according to the United Nations about 1.3 billion tons of food is lost annually. In developing countries these losses are at post-harvest and processing stage. Approximately, 120-170 kgs/year of food is lost in Sub-Saharan Africa and South/Southeast Asia. In Uganda, approximately 27% of all milk produced is lost which is equivalent to US\$23 million/year. South Africa food loss is estimated to be about 10 million tons every year which represents 210 kg per person per year representing 33 % of the 31 million tons of food produced annually. The losses consist of 44% fruit and vegetables, 26% grains, 15% meat, and 13% roots, tubers and oilseeds. The bulk of this loss occurs at the initial stage of the food supply chain, post-harvest losses contribute to 50%, processing and packaging 25%, distribution and retail 20% and 5% at the consumer level.

Root and tuber crops are staple foods to approximately 200 million people in Africa, their annual production exceeds 550 million tonnes which is about two-thirds that is harvested. These crops are grown by peasant farmers because they require less labour for cultivation.

Post-harvest Losses

Cereals, roots, tubers and plantains constitute over two-thirds of staple foods in the average sub-Saharan African diet in terms of energy. Root and tuber crops are currently the second most important food crop category in several parts of Africa especially West Africa and Kenya after cereals however, the current poor weather conditions that are attributed to global warming have led to a reduction in cereals production. Approximately, 70% of Africans are dependent on rain-fed agriculture an activity that is characterized by small-scale, subsistence farms that are vulnerable to a variety of stresses including those associated with climate change. Root and tuber crops are high yielding crops that can grow in diverse environments including the arid and semi-arid lands (ASALs), thus providing a great potential for ensuring food security for the majority of Africans. In spite of the potential for these crops to address food security, a significant proportion of rural communities in Africa are constantly faced with food deficits.

The main root and tuber crops produced in Africa are Irish potatoes, sweet potatoes, cassava, yams and cocoyams. In 2015, the land under cultivation with Irish potatoes in Kenya was 147,780 ha which resulted in a production of 2.9 million tonnes valued at 582 million USD. Similarly, the production of sweet potatoes was 967,879 tonnes from an area of 73,890 ha valued at 310 million USD and in 2009, Kenya produced 820,000 tonnes of cassava on 70,000 ha.

Root and tuber crops are plants that store edible material in subterranean root, corm or tuber and provide energy in the human diet in the form of carbohydrates.



Post-harvest loss in a sweet potato

The important harvested part from cassava and sweet potatoes are the roots while from potatoes, arrow roots and yams are the tubers. Roots, tubers and plantains are rich in highly digestible starch and provide more dietary energy per hectare than cereals however, they are low in protein and other nutrients.

Causes of Post-harvest Losses

The high moisture content of these crops means that they are bulky, highly perishable and costly to transport. Poor harvesting practices and post-harvest handling of roots and tubercrops are the major causes of crop losses. The major practice is poor handling of harvesting tool which often cuts the root-tuber leading to fungal contamination and deterioration especially when the harvest is not consumed or sold immediately. Moreover, farmers do not have access to equipment that could help them process more efficiently.

Root and tuber crops are a source of income for many poor households. Sweet potatoes and cassava particularly can grow under harsh climatic conditions and provide cash incomes to households that would not have had anything else to sell, hence the direct physical loss of the crop, post-harvest deterioration causes a reduction in quality that results in price discounts and so contributes to economic losses.

Processing of Roots and Tubers

Root and tuber crops are generally consumed in their fresh form in households, institutions and food service establishments. Their production and consumption are affected by the availability of other food crops as well as perception, for instance the utilization of cassava and sweet potatoes is affected by the negative perception by some communities who consider them "a poor man's crops". The perception of cassava as a 'poor man's crop' and the fear of cyanide poisoning has greatly affected its status as a staple food crop on the continent. Cases of death due to consumption of raw or inappropriately processed roots are frequently reported, It is unarguable that cassava

contains cyanogenic glycosides which are converted to toxic hydrocyanic acid when the cells are ruptured. However, the cyanide content of the roots can be reduced to non-toxic levels if they are correctly processed. Hydrocyanic acid is a volatile compound that evaporates readily at temperatures above 28°C and dissolves readily in water. This means that simple procedures such as shredding, pressing, washing, fermentation and drying can reduce the cyanide content to non-toxic levels.

The machine fabricators also need to be challenged to produce more advanced machines such as flash dryers, extruders, peeling machines, graters, chippers and hydraulic presses which are expensive to import. According to a recent study by Foreign Policy Research Institute, improvements in the processing sector such as a shift to mechanical peeling could help lower losses in cassava value chain by about 44 percent.

Strategy for Post-Harvest Loss Reduction



A section of some farmers harvesting sweet potatoes from the farm

The major strategy for reducing post-harvest loss in Africa is the behavioural approach. This involves introducing farmers to the concept of post-harvest loss and prevention techniques. The greatest constraint to the processing of powders from the bulky roots and tubers is drying which may take up to 4 days to complete in sun drying. Long drying durations in the sun often leads to heavy microbial contamination. Conventional electric tray drying is fast but is inefficient and expensive because of the large amounts of water to be removed coupled with the high cost of energy. This can be ameliorated with affordable, stable and sustainable power supply. Renewable energy is a viable solution to ending the global electricity problem as it exceeds world electricity demand. Renewable energy includes solar, wind, geothermal, oceanic, hydro, biomass and other energy sources. Solar energy can be converted to use direct current electricity using solar cells.

Post-Harvest Loss using Solar Energy



Farmers using a solar energy drier

The roots and tubers loss can be minimized by providing the right environment for storage and preservation.

Preservation:

The preservation using drying basically involve moisture content reduction in the roots and tubers. It enhances the shelf life and eases transportation of the product and it also reduces the space needed for storage of the crops. Root and tubers can be dried using Open sun drying or/and solar dryers. This open drying can either be direct sun or shade drying. Open sun drying is common practice among subsistence farmers in Africa for preserving agricultural products. Although, this method encourages losses in quantity and quality of the dried crops. It also leads to contamination of the product due to exposure to dirt, infestation from animals. Electricity powered dryer is a major solution in post-harvest loss reduction. It helps preserve the crop by drying and improve the quality of the dried product however, the unstable and expensive nature of electricity in developing countries has continued to hamper usage of such dryer, especially by subsistence farmers. With the alternate materials being researched for solar energy, it is possible for developing countries to be able to benefit from cheap and stable electricity generated from solar energy.

Classification of Solar Dryer

(1) Sun or natural dryers: The root and tubers are placed directly under hostile climate conditions like solar radiation, ambient air temperature, relative humidity and wind speed to achieve drying. This tends to contaminate the dried product.

(2) Direct solar dryers: In these dryers, the root and tubers are placed in an enclosure, with transparent covers or side panels. Heat is generated by absorption of solar radiation on the product itself as well as the internal surfaces of the drying chamber. This heat evaporates the moisture from the drying

product and promotes the natural circulation of drying air.

(3) Indirect solar dryers: In these dryers, air is first heated in a solar air heater and then ducted to the drying chamber.

(4) Mixed-type solar dryers: The combined action of the solar radiation incident directly on the root and tubers and the air pre-heated in the solar air heater furnishes the energy required for the drying process.

Storage



A solar-powered warehouse

Products that are required in the fresh state, drying is not an option. Solar powered storehouses or silo are therefore designed to help preserve them in their harvested state. This requires a lot of electricity to keep the crop fresh for the duration required. A breakthrough in low-cost solar cells and panels will afford the peasant farmers access to such facilities at a reduced cost.

Solar technology can help reduce the post-harvest loss experienced on the continent especially in staple crops like roots and tubers. A little more investment and research/development are needed in the development of solar technology starting from solar cells and panels production. A reduction in the post-harvest loss will produce more food to feed the hungry, improve the standard of living, more foreign direct investment and a host of others benefit.

AFRICA GRAPPLES WITH HIGH NUMBER OF ARTHRITIS PATIENTS AND FEW RHEUMATOLOGISTS



A diagrammatic illustration of parts of the human body that are most likely to be affected by arthritis

By Sharon Anyango

The prospects of treating patients with arthritis in African countries is hindered by the number of few rheumatologists available and individuals preferring to take painkillers instead of seeking medical advice. Surprisingly, Ethiopia has no adult rheumatologist and Africa's most populous country Nigeria has only 30 rheumatologists who serve about 170 million people.

Rheumatoid Arthritis is autoimmune; it involves the breakdown of cartilage which protects end surfaces of bones at the joints leading to the loss of smooth glide at the joint during movement. It is a silent disease which when not treated may lead to disability. The disease occurs when your immune system mistakenly attacks its own body's tissues.

Little is known about rheumatoid arthritis because very few studies have been conducted about the disease; because of lack of information on the disease, patients begin treatment late while others are unaware of the symptoms and treatments currently available. At the moment, there is no cure for rheumatoid arthritis, patients are advised to take precautionary measures, those who are diagnosed with the disease are usually given anti-inflammatory drugs to reduce the pain and stiffness. If the disease continues then the patient is put under anti-rheumatic drug therapy.

Elvis Gathenya, grade seven pupil has been suffering from

rheumatoid arthritis. According to his father Mr. James Gathuo Gathenya doctors informed him that his son developed behcet's syndrome which has made him to be resistant to conventional medication. The doctors have therefore prescribed to him a TNF-inhibitor/ bio-logic medicine which costs approximately \$4,900 for a six months medication period. The family has been forced to request for support from well-wishers to enable them meet their son's cost of treatment.

Dr. Christine Wangia, a lecturer at Jomo Kenyatta University of Agriculture, School of Pharmacy-Department of Pharmacology has been on the forefront in finding a medication on rheumatoid arthritis. Recently, she was awarded by the Kenya Industrial Property Institute (KIPI) during the World Intellectual Property Day for using scientific methods to patent her work which has a special code GMC10. Dr. Wangia has discovered a plant which has some properties that can be used to treat rheumatoid arthritis. I caught up with her and here is how the interview went down.

Dr. Wangia was shortlisted among the three out of twenty women who had filed for patents of their work and honoured by the Kenya Industrial Property Institute (KIPI) for using scientific methods to protect her invention which is the discovery of a plant that can better manage rheumatoid arthritis compared to the conventional medicines, which are costly, with a lot of adverse effects ranging from gastrointestinal irritation and bleeding, bone marrow suppression, chronic kidney failure among others.



Dr. Christine Wangia showcases some of the certificates she has received in honour of her work.

1. How would you best describe yourself?

I am a pharmacist by profession and currently a senior Lecturer in the Department of Pharmacology and Pharmacognosy, School of Pharmacy-Jomo Kenyatta University of Agriculture and Technology. I am also a Director at the Chebu Pharmaceutical Ltd, a Retail community pharmacy. I like to empower people by mentoring them to bring out their talents. I also have passion for helping the needy people in my society. I believe that I should share what God has given me with the less fortunate people in my community. Lastly, I am a God-fearing woman, married and blessed with five children.

2. You have been doing a lot of scientific research on rheumatoid arthritis. How would you best define the disease and why focus on arthritis and not any other disease for instance Cancer, Malaria and HIV/AIDS which have killed millions of people in Africa?

Arthritis is the inflammation of the joints. There are many types of arthritis, such as: osteoarthritis (OA), rheumatoid arthritis (RA), and gouty arthritis. Rheumatoid arthritis is an autoimmune disease, where the body fights against its own tissues, including joints, especially the small joints of the hands, wrists, and toes. The body is unable to defend itself and if not treated, the disease may lead to disability. I decided to focus on this disease because there is less attention by various stakeholders on funding, research, and health promotion. For instance, today, HIV patients are being offered free ARV's and stigmatization has reduced drastically. The burden of cancer has also reduced as the National Hospital Insurance Fund has enabled patients to access treatment in public hospitals. There is so

much coverage on both preventive and treatment measures for malaria such as great concern regarding pregnant women and children under 5 years old. In regards to arthritis conditions, there is neither proper health promotion nor funding set aside for these conditions because they regarded as diseases of the elderly which do not need much attention. In addition, there are only 10 rheumatologists in Kenya according to Prof. George Oyoo, a rheumatologist at Kenyatta National Hospital, which is very low considering Kenya has a population of over 40 million people.

3. What are the major causes of Rheumatoid arthritis and how can it be prevented?

RA is a progressive disease, if its diagnosed early it is easier to manage. Unfortunately, patients who experience pain in one or two joints opt to self-medicate themselves, with analgesics and non-steroidal anti-inflammatory drugs. These medicines are symptomatic, can be purchased over-the-counter in pharmacies and tend to reduce the pain and swelling, hence making patients fail to seek proper medical diagnosis. With proper health promotion, people should be educated to avoid self-medication with pain-killers when the joints show signs of pain, swelling and redness, and instead seek proper medical intervention.

4. Briefly tell us about the new Kenyan herbal medicine which you have invented and how did you come to develop interest in medicinal plants?

In India there is a lot of ongoing research on medicinal plants to produce various dosage forms from herbal medicines. In



Dr. Christine Wangia during the interview at the ATPS office.

1983, I received a commonwealth scholarship from the government of Kenya to pursue a Masters degree in Drug Assay at the All India Institute of Medical Sciences (AIIMS), New Delhi. I worked on an Indian species like the Kenyan species. In my study, I discovered that the plant species was safe and possessed anti-arthritic activity using laboratory animals such as mice, rats, cats and dogs. It was from these studies that my interest in medicinal plants grew. Together with my supervisor, we did a lot of research on the plant species and the results proved that the plant had certain properties than can be used to manage rheumatoid arthritis. When I got an opportunity to work in an academic institution, I revisited the research on the Kenyan species.

5. During your period of study, your specimen was the Indian species of the plant, how were you able to trace the Kenyan species of the same plant and did the Kenyan species have the same characteristics as the Indian species?

I visited the Kenya National Museum to find out if the species could be found in Kenya, and if so, what could be its distribution. After finding out the plant's distribution pattern, together with a botanist, I was able to trace and collect it in December 2010. The Kenyan plant species belonged to the same family as the Indian species. I was excited to find out that the Kenyan plant did not have any reported activity in various publications regarding its medicinal uses, nor was it known by the Kenyan traditional practitioners to be of medicinal value. The plant grows wildly along foot paths. The next step was to begin thorough research on this species. It is at this juncture that we started application of patent with KIPI in January 2011, and also registered a pharmaceutical company by the name, Chebu Pharmaceutical Ltd in June 2011. This company has paid for all the patent fees and annual fees to date. We finally got a patent in August 2016.

6. I know at the moment you cannot disclose the exact name of the plant. Out of curiosity, is the plant widely grown in Kenya and will it be sufficient enough to produce enough drugs?

The code of the drug is GMC10. Once the remaining studies are completed and pilot clinical trials are completed, an application of a trade mark of the developed medicine will be made with KIPI. After approval of the trademark, an application will be made with the Pharmacy and Poisons Board of Kenya for registration. Although the plant is perennial, and it can be grown twice a year, my intention is to isolate and identify the pure active compounds, hence mass production of the plant will not be required. My aim is to purchase C-18 reverse phase silica gel for column chromatography, which will enable me isolate and get pure compounds. Normally, the compounds come out from the column in different colours as bands and can be run in an HPLC-MS equipment to get the molecular weight. These compounds will be analyzed using an NMR equipment to elucidate the exact structure of the compounds. The compounds will be subjected to bioassay-guided fraction to determine the active compound (s) which could be manufactured commercially.

7. How has your research journey been and for how long?

In January 2009, I joined Mount Kenya University as the Bachelor of Pharmacy coordinator and lecturer. As an academician, research is part of teaching. I remembered the plant species, and determined I must finalize the research work I started in India. The first thing I did before investing in research was to begin the process of patenting, through Chebu Pharmaceutical Ltd. In April 2014, Chebu Pharmaceutical met expenses for me to attend a Drug Discovery and Design course at the University of Washington in Seattle USA. The patent certificate was granted in August 2016. It has been close to nine years as of this writing and I am optimistic that the final output will be great. I am also grateful for the support I have received from various institutions namely, The Jomo Kenyatta University of Science and Technology (JKUAT), Chebu Pharmaceutical and Japan International Cooperation Agency, Kenya.

8. What are some of the lessons you have picked along the way?

The Importance of IP protection. When one has a vision, one should be committed to it. In addition, grand ambitious require long-term commitment. Value the support from your circle, I got a support team from my company, family, and friends. Jomo Kenyatta University of Agriculture and technology gave me some financial support.

9. What is your message to upcoming scientists/researchers?

Scientists should be clear about their problem statement. What is it that they would like to solve? What are the practical solutions? And lastly, they must protect their IP.

10. What would you say are some of the strides Kenya has done in helping patients suffering from rheumatoid arthritis and what more needs to be done even on the Continent?

Kenya has not made enough efforts in addressing the problem of non-communicable diseases such as RA both research wise and financially. There is need to promote health education regarding arthritis conditions through media, seminars so that people are informed. There is also need to train more rheumatologists to serve the 47 counties, as currently there are only 10 who serve the nation. This number is just “a drop in the ocean”.

11. When will the clinical trials begin and what are your major expectations?

Clinical trials are scheduled for less than one year as of this writing. Currently, we are on the pre-formulation stage to establish a stable dosage form. The findings will determine the shelf-life of the plant and oral dosage form. Depending on the pre-formulation study results, an oral dosage form will be formulated, whose stability and shelf-life will be determined. Later, we will focus on bioassay-guided isolation, characterization, and structure elucidation to determine the active compounds. The results will be compared to the plant extract. The most active compound(s) will be commercially produced on a large scale. The trade mark active medication will be registered with KIPI and later registered with the Pharmacy and Poisons Board of Kenya.

12. What is the process of filing for patent in Kenya?

It took approximately seven years for the patent to be finalized. The procedure is a bit complex and, in my situation, I sought the guidance of a lawyer as there was a lot of paperwork to do.

13. Are there any challenges you faced while patenting the herbal medicine that can cure arthritis?

Conducting experiments is costly, and this made me take longer than I would have if I had adequate funding. Also, while I was in the process of patenting my work, someone from the Philippines claimed that I had allegedly claimed his work. It therefore took another six months to prove the individual wrong. The species of the plants were different, although they belonged to the same family.

14. You are also a Director of Chebu Pharmaceutical Ltd (Chebu). What does the organization do and what is the niche it covers in the healthcare industry?

Chebu is developing a Pharmacy Benefit Management System that increases access to medication at a reduced cost through a cost-effective solution that utilizes mobile phone technology to empower ailing patients in Kenya to purchase legitimate medication before they leave the physician's/clinic. Chebu's core business is in the retail pharmacy market segment. Once this app is fully developed, it will make distribution of the new arthritis medication streamlined.

15. How is Chebu Pharmaceutical Ltd structured?

Chebu is a pharmaceutical company with a strong edge in technology industry. The leadership team has diverse industry experience ranging from healthcare, software development, engineering, and finance.

16. Congratulations by being feted by the Kenya Industrial Property Institute (KIPI) for scientifically protecting vital information in regard to your patent on the herbal medicine. So, what should we expect from Dr. Wangia in the next five years?

More attention will be put in promoting health education regarding arthritic conditions in all the 47 counties. I am hoping my research on arthritis will be able to attract my students from JKUAT university to advance in arthritis research activities.

17. Have you published some of your research work? If yes which ones are they?

Some of my published works include:

1. Wangia, C.O., Orwa, J.A., Muregi, F.W., Kareru, P.G., Cheruiyot, K., Guantai, E (2018): Quantitative and Fourier Transform Infrared Analysis of Saponins from Three Kenyan *Ruellia* Species: *Ruellia prostrata*, *Ruellia linearibracteolata* and *Ruellia bignoniiflora* available at <https://waset.org/publications/10009093/quantitative-and-fourier-transform-infrared-analysis-of-saponins-from-three-kenyan-ruellia-species-ruellia-prostrata-ruellia-linearibracteolata-and-ruellia-bignoniiflora>

2. Wangia, C.O., Orwa, J.A., Muregi, F.W., Kareru, P.G., Cheruiyot, K., Kibet, J (2017): Anti-Oxidant Activity of Aqueous and Organic Extracts from Kenyan *Ruellia Prostrata*. <http://ijpsr.com/bft-article/anti-oxidant-activity-of-aqueous-and-organic-extracts-from-kenyan-ruellia-prostrata/?view=fulltext> (10.13040/IJPSR.0975-8232.8(3).1282-86)

3. Wangia, C.O., Orwa, J.A., Muregi, F.W., Kareru, P.G., Cheruiyot, K., Kibet, J (2016): Comparative Anti-Oxidant Activity of Aqueous and Organic Extracts from Kenyan *Ruellia linearibracteolata* and *Ruellia bignoniiflora*. *European Journal of Medicinal Plants* 17(1): Article no. EJMP.29853 (<http://sciencedomain.org/review-history/16834>)

18. Your favourite quote

With God, all this are possible- Matt 19 verse 26

RENEWABLE ENERGY ACCESS IN LIMPOPO, SOUTH AFRICA



Renewable Energy

By Eng. Charles Muranda & Mannini Mafa School of Electrical & Electronic Engineering, Uni-versity of Johannesburg

A significant number of households in rural South Africa lack access to clean energy sources. Most of them continue to rely on traditional fuels such as firewood, crop residues and animal waste to meet their basic energy needs. The continued use of traditional fuels in inefficient and poorly designed cook stoves leads to household air pollution and increased morbidity and mortality rates. In light of this, the government of South Africa through the Department of Energy and the Department of Environmental Affairs has advocated for households to shift from the use of traditional fuels to cleaner energy sources such as LPG and electricity.

The University of Johannesburg, through the School of Electrical and Electronic Engineering Sciences under the guidance of Prof Johan Meyer, embarked on a project to empower remote villages in South Africa through enabling energy access from a suite of locally available renewable energy sources. Gwakwani village, in the Vhembe District of Limpopo, was selected to benefit from this scheme. Limpopo Province is considered an impoverished area and has the highest percentage of people living under the poverty line.

Gwakwani popularly known as the “Forgotten village” is so remote that help seldom reaches them. The village is home to approximately 70 to 100 inhabitants and has minimal socio-economic development hence the villagers heavily depend on government/ social grants; because of its remoteness villagers do not have access to electricity as it proved too expensive for

the electricity company to provide grid electricity in the area. In addition, it will not be profitable for the utility company to supply electricity, as the people will not afford to pay for the service. Government grants are too little to meet this basic need.

Naturally, agriculture would be the best way to sustain families however, the village has no water available even for their basic needs like drinking; people walk for long distances to get water and schools located in Matatani village about 5 - 10 kilometres away from Gwakwani. The older children that attend primary to high school have to walk to school in the early hours of the morning and return at night. The younger kids that are not yet in school or old enough to walk long distances stay at home. There was no form of pre-education school in Gwakwani before the intervention by the University of Johannesburg. The project has provided a solar-powered crèche equipped with a modern TV set connected to a digital satellite decoder (Dstv).

In 2015, the University of Johannesburg and various stakeholders including Schneider Electric, and the Industrial Development Corporation (IDC) installed a solar-powered water pumping system, bakery, and creche. The initiative was a huge relief to the community as it solved the water crisis in the area and provided them with communal water taps. They no longer had to walk long distances to fetch water, before the University went into Gwakwani, the households in village depended on water supply from the nearby river. They did not have access to a running water supply. The river is infested with crocodiles and there have been reports of crocodile attacks on livestock during water drinking episodes. As such, wealth has been lost resulting in those affected households sinking deeper into poverty and being entangled further in poverty traps.

Gwakwani had a high prevalence of malaria infections, villagers reported of being excessively bitten by mosquitoes as they walked back and forth the river to fetch water for domestic and agricultural needs. Since the establishment of the solar borehole scheme, villagers have reported reduced incidences of malaria, and livestock loss in the village.

A few months later, the University and the stakeholders installed solar-powered lanterns to each household to ensure that each households had adequate lighting during the night. School going children in the village acknowledged that the solar lanterns were important to help them study at night.

THE STATUS AND FUTURE OF CLIMATE SERVICES IN AFRICA



Photo: Courtesy

The Kenya Meteorological Department

**By Victor Ongoma PhD Climate Change Expert,
South Eastern University, Kenya**

Climate affects almost all our socio-economic activities on a daily basis. The degree of the effect determines the level of vulnerability of various sectors to effects of the ongoing climate variability and climate change. In general, although climate change is a global phenomenon as a result of global warming, its impact varies greatly for instance, Africa is vulnerable to effects of climate change owing to its over dependence on rain-fed agriculture and other climate sensitive sectors; this makes rainfall the most important climate parameter on the continent.

The continent is currently witnessing an increase in extreme climate events, mainly floods and droughts; although most studies show that rainfall is likely to respond to climate change differently in terms of amount in space, there is general consensus that extreme climate events are likely to increase throughout the 21st century. This problem is exacerbated by the continent's ever growing population that requires an increase in food production which will significantly alter Africa's land use and land cover. The magnitude of the problem calls for proper planning to build resilience to the ongoing and expected climate change impacts however, for practical and effective decisions to be made, there is need for accurate, reliable and timely climate information which will influence decision making.

Do policy makers/opinion leaders have the information? It is unfortunate that most developing countries that are in dire need of climate information do not invest in it. This is exemplified by relatively low density of meteorological observation network, dilapidated meteorological stations, and shortage of skilled staff. All this ruin the quality of meteorological data, eventually affecting the value of information derived from it.

The situation is further worsened by institutional policies in most government institutions that limit data sharing, a common phenomena in most meteorological institutions across the continent.

Despite the various climatological and management challenges, there is ever growing confidence in use of climate model data and satellite products which comes with its own challenges that need to be addressed, for instance, research has shown that Global Circulation Models poorly reproduce climate especially rainfall over East Africa, thus adding uncertainty in the projected climate. The rainfall projections over East Africa have been termed as 'a paradox of East Africa climate'; models project wetness and yet drying conditions are observed. On the other hand, satellite data is ever increasing both in quality and quantity, but requires good observed data for continuous validation and application on daily operations.

The agricultural sector relies heavily on climate information, studies show that the ever increasing temperature and change and/or unpredictable rainfall patterns will adversely affect agriculture. The sector requires tailored climate services such as the timing of the onset and cessation of rainfall, rainfall amount, and possible dry and wet spells; forecasting of these aspects of rainfall is dependent on the quality of historical data. The quality of observed climate data cannot be underestimated, although the initial cost of investment in climate sector is generally high, the benefits outweigh the cost by far. Advancement in space technology and adoption of automatic weather stations will immensely boost the operations of the sector; satellites products such as surface temperature, soil moisture, and vegetation greenness are key in daily operations in agricultural sector. This information is used in estimating crop yield for planning purposes in the context of food security. Various stakeholders need concerted effort to uplift the climate sector by:

- Support data rescue initiatives to facilitate the digitization of archived data that is currently in hard copy form.
- Acquisition of modern weather instruments/technologies to boost data collection, analysis, and dissemination of climate information.
- Promotion of open policy to climate data and information to enhance research and decision-making.
- Collaborative multi-disciplinary research to further application of climate information in the various socio-economic sectors.
- Capacity building- train experts in various specialties in the climate sector.
- Funding of projects on climate service demonstration and climate change adaptation beyond pilot stage.

ENVIRONMENTAL IMPACT ASSESSMENT PROCESS DEVELOPMENT IN AFRICA (A REFLECTION FROM CAMEROON)



Source: QHSE SMART

Environmental Impact Assessment

By Kum Christian Tegha
ATPS-Cameroon Research Coordinator

Since 1960s, there has been growing interest on environmental and detrimental impacts that society has on the global environment which has led to gradual introduction of environmental legislation in an attempt to regulate impacts on the environment. Environmental Impact Assessment (EIA) has become a widely used tool for identifying the potential impacts of new development projects on the environment. EIA is an investigation carried out to determine the impacts of the environment on major developmental projects.

EIA was first developed in the USA and came into operation as the National Environmental Policy Act (NEPA) of 1969. EIA was then introduced in California in 1970 and was later adopted by other Federal States. European countries followed the U. S example of enacting legislation that requires EIAs for all major projects and other countries followed.

In Africa, mainly donor and multilateral agencies conducted EIA until its legislation adoption from the mid-80s. Presently, most African countries have evolved substantially over the past decade due to the introduction of legal requirements and/or general procedures for EIA.

EIA was first legislated in Cameroon under article 17, 18, 19 and 20 of the 1996 law relating to environmental management. It remained non-mandatory until 2005 when the decree No. 2005/0577/PM of 23 February 2005 fixing modalities to carry out EIA was signed. This was followed by Order no.070/ MINEP of 22 April 2005 fixing different categories of operations to be subjected to EIA; Order no. 04/MINEP of 3 July 2007 fixing conditions for approval of Consultancy Firms to carry out EIA

and environmental audit (EA); and Order no.02/MINEP of February 2007 indicating the specific elements for terms of reference.

Since the emergence of EIA, there has been a growing interest in examining its effectiveness as an environmental tool due to the high cost involved and the diversity of environmental problems and consequences on human health and ecosystems. However, almost two decades of mandatory EIA practice in Africa has raised serious questions about unjustified and unnecessary time delays and monetary costs and a desperate need for improved efficiency and effectiveness. The problems in developing countries such as Cameroon are often more acute by the virtue of resource constraints and economic and political pressures facing the country as well as by the inherent limitations in procedure and legislation.

A recent study carried out within EIA practitioners in Cameroon to investigate its effectiveness indicated a marked gap between policy and implementation. The Cameroonian institutional framework for EIA can be seen as highly centralized, with little scope for developing expertise at the local levels.

There is a general feeling among practitioners that EIA is effective at achieving its main purposes of helping decision makers, helping developers, contributing to sustainable development and reducing environmental impacts of development projects. Other benefits identified by those surveyed are:

- **Promoters and/or sponsors of initiatives:** Reduced cost and time of project implementation; cost-saving modifications in project design ; increased project acceptance; avoided impacts and violations of laws and regulation that could attract sanctions; improved project performance, and avoided treatment/cleanup cost.

- Local communities and/or environment; A healthier local environment and improved human health; maintenance of biodiversity and decreased resource use; fewer conflicts over natural resource use; Increased community skills; knowledge and pride; increased general awareness of environmental issues; generate and/or collect individual research efforts to answer policy/relevant questions, and provide technical advice to decision makers
- The practitioners surveyed also highlighted several weaknesses in the EIA process of Cameroon some of which include: absence of the screening and scoping stages; high cost and ignorance, reluctance by many project promoters to conduct EIA; insufficient man power by government to carry out effective supervision, monitoring and evaluation; ineffective and very low public participation; failure to pay adequate attention to findings at the implementation stage; socio-economic issues are often not paid sufficient attention; the procedure is so bureaucratic and over centralized; ToRs prepared by project

promoter might leave out some details to avoid responsibility; ToR are also often validated without field visits; Poor implementation of management plan and lack of transparency and accountability in the EIA process; Non consideration of the cumulative environmental impacts from small projects that are not subjected to EIA; There is also massive corruption on the credibility of consulting firms as some of the credibility are questionable.

The deployment of technological devices such as MAPP Infor app and capacity building of EIA practitioners into the EIA process of Africa will go a long way to strengthen the EIA process. Additionally, the entire EIA process needs to be reviewed in order to create room for technological involvement and financial confortability.

ATPS RECEIVES NEW GRANT FROM THE BIOINNOVATE AFRICA

By Dr Nicholas Ozor and Ruth Oriama

The ATPS has been awarded a grant by the BioInnovate Africa Programme to develop an Innovation-led Bioeconomy Strategy for the eastern Africa Region. This is within the context of a research consortium comprising of the East African Science and Technology Commission (EASTEKO) as the project lead, with the support of the ATPS, the Stockholm Environment Institute SEI – Africa, the Scinnovent Centre-Kenya and the BioInnovations Company Limited, Uganda as project partners. The grant has been awarded following the Second BioInnovate call for concept notes for sustainable bioinnovations towards value addition and agro/bioprocessing for smallholder farmers and communities in eastern Africa.

The project, named Developing an Innovation- Led Bioeconomy Strategy for Eastern Africa (BiSEA), is anchored on three key pillars i.e. building bioeconomies in eastern Africa, building visions and strategies; and creating a policy agenda and an enabling environment.. BiSEA which will run from 2018-2021 is valued at USD 500,000.00. Its specific objectives are to:

1. establish the status of the bioeconomy in each of the participating countries through reviews of current bioeconomy landscapes identifying key actors, their roles and relationships as well as assess policy options, gaps, and challenges for future biobased economic growth in the region;
2. conduct in-depth assessments and empirical studies of strategic issues, components and factors enabling biobased economic growth in eastern Africa;

3. carry out a highly consultative process of soliciting inputs from all stakeholders to identify strategic goals, approaches and actions for the region that will be integrated into a draft regional bioeconomy strategy and policy agenda for eastern Africa and which can also catalyze and guide the development of national bioeconomy strategies and policies;

4. develop 2 high quality policy briefs based on the status report on bioeconomy in the region and policy that will support and inform the national and regional dialogues on the development of national and regional bioeconomy strategies and policy;

5. With the existing framework of BioInnovate Africa, organize regional and multidisciplinary bioeconomy forum and platform for generating knowledge and insights that could assist countries to formulate and implement strategies and policies in support of bioeconomy development; and,

6. seek approval and adoption of the regional bioeconomy strategy by the relevant organs of the East African Community.

Anchoring on its specific competencies in science policy studies, the ATPS is leading in the implementation of preliminary activities that will feed into the proposed Bioeconomy Strategy for eastern Africa. In collaboration with the National Working Groups, a broad policy review of each of the participating countries (Burundi, Ethiopia, Kenya, Rwanda, South-Sudan, Tanzania and Uganda) will be performed to establish the current bioeconomy landscapes in the region.

The core ATPS activities under this project include:

1. An assessment of bioeconomy related policies and regulatory frameworks. Desk studies will be carried out on relevant grey literature including policy documents from the participating countries, regional policies, economic reports, relevant value chain reports and data among others with a view to understand the policy statuses, what works and what does not and why. This assessment will also analyse the links with the strategy to the broader development framework in the region, including EAC Vision 2050, AU Agenda 2063 and the SDGs.
2. A comprehensive stakeholder analysis in each of the participating countries, identifying key stakeholders and actors in the bioeconomy sector, and where possible, including them in the consultative dialogue forming regional and national bioeconomy strategies. This task will be led by the BiSEA team in collaboration with the NWGs and the National Commissions/Councils for Science and Technology.
3. Identification and assessment of current governance structures, projects, initiatives etc. driving the current developments towards a modern bioeconomy in the region.
4. A review of the broader operating environment (environmental scanning), taking into account factors such as the economy key assets and stakeholder landscape and to collect statistical, demographic information and projections.
5. The ATPS will also develop foresights, scenarios and suggestion pathways for biobased growth in the region. In collaboration with the national working groups and the BiSEA project team, tools will be designed and foresight studies and scenario building applied in STI and bioeconomy development to (a) determine some of the key opportunities for biobased economic growth and the future bioeconomy pathways needs) of the eastern African economies, (b) identify bioeconomy R&D priorities to guide government investments in STI, and (c) benchmark existing capacities against future requirements to guide Bioeconomy development strategies in the region. These three areas will be important pillars of the regional bio-economy strategy. It is premised on the fact that foresighting and scenario building methodologies are increasingly recognised worldwide as a powerful instrument for establishing common views on future development strategies among policy-making bodies. STI foresight studies particularly provide inputs for the formulation of STI policies and strategies that guide the prioritisation of investments (including R&D investments). This will be done iteratively through national and regional stakeholder consultative workshops.

The expected outputs from these exercises include:

- 1) a report on bioeconomy related policies, regulatory framework, governance structure, government and other initiatives in the region to be directly integrated into the strategy;
- 2) a comprehensive stakeholder analysis report and process for the region;
- 3) a report on future potential, opportunities for biobased economic growth and bioeconomy pathways in the six Bio-Innovate countries; and
- 4) a report on bioeconomy R&D priorities and existing capacities against future requirements to guide Bioeconomy development strategies in the region.

Overall, it is expected that the resulting strategy document will provide a clear, shared vision for an eastern African innovation-driven bio-economy and assess the opportunities for its development, including possible policy incentives, and actors and their roles in furthering the objectives of the strategy. In this light, the key outcomes of the project will be an increased knowledge and awareness about the state of bio-economy issues, landscape and development in eastern Africa; and the approval of an innovation-driven bioeconomy strategy for the eastern region by the East African Community (EAC) Governance bodies.

For more information, please refer to the Project's web-site at: <https://atpsnet.org/projects/developing-an-innovation-led-bioeconomy-strategy-for-eastern-africa-bisea/>

SCHOLARSHIPS

SSRC Next Generation Social Sciences in Africa Doctoral Fellowships 2019

The Social Science Research Council (SSRC) Next Generation Social Sciences in Africa are open for applications. The SSRC offers fellowships to support the completion of doctoral degrees and to promote next generation social research in Ghana, Kenya, Nigeria, South Africa, Tanzania, and Uganda. The fellowships support dissertation research on peace, security and developmental topics.

PROGRAM COMPONENTS

- 1. Doctoral Dissertation Proposal Fellowship:** supports short-term research costs of upto US \$3,000 to develop a doctoral dissertation proposal.
- 2. Doctoral Dissertation Research Fellowship:** supports 6-12 months of dissertation research costs of upto US \$15,000 on a topic related to peace, security and development.
- 3. Doctoral Dissertation Completion Fellowship:** Supports a one-year leave from teaching responsibilities and a stipend upto US \$15,000 to permit the completion of a dissertation that advances on peace, security and development topics

ELIGIBILITY

- Be citizens of a sub-Saharan country
- Be a resident of Ghana, Kenya, Nigeria, South Africa, Tanzania or Uganda
- Holds a master's degree

DEADLINE: 15th December 2018

For more information, please visit: <https://www.ssrc.org/programs/view/nextgenafrika/>

OPPORTUNITIES

IFC/MIIC Next 100 African StartUps Initiative 2018 (Fully-funded to Africa Forum in Sharm El-Sheikh)

The Next 100 African Startups Initiative, is a program launched in partnership between the Egyptian Ministry of Investment and International Cooperation (MIIC) and the International Finance Corporation (IFC). This year, the program will select up to 100 promising African start-ups to participate in the Africa 2018 Forum in Sharm El-Sheikh on December 8-10 2018.

Selected start-ups will connect with international investors and financial institutions, government officials and policymakers from the African continent. The initiative's aim is to unlock the region's entrepreneurial potential by showcasing Africa's best and brightest entrepreneurs and start-ups, and creating markets for early stage businesses. The program targets Africa-based startups that have already demonstrated some level of success either by generating revenue or by developing a working prototype.

BENEFITS

Travel and accommodation expenses for startups will be covered by IFC if needed.

ELIGIBILITY

- Open to African startups

SELECTION CRITERIA

- **Stage of Operation:** The Company must either be generating revenue with demonstrated early success, or have a working prototype or a product in the market.
- **Previous Funding:** Typically, the company would have already received one or two rounds of funding and is now seeking Series A or Series B funding in the coming year.
- **Positive Impact:** The company must have the potential to make a substantial long-term impact on African business and society as well as a commitment to improving the region.
- **Viability:** The company should have well-formulated goals and plans for development
- **Leadership:** The company must have visionary leadership with the capacity to drive it towards success.
- **Independent Company:** The company must not be a subsidiary or a joint venture

DEADLINE: 21 October 2018

For more information, please visit: <http://next100africanstartups.com/>

LANDINFO APP TRAINING IN MALAWI



Class Room Sessions: Dr. Ernest Acheampong introduces participants to the LandInfo app, its use , benefits and applications in the field



Participants ready for the LandInfo App field demonstrations



Dr. Ernest Acheampong, ATPS Senior Researcher guides participants through the field demonstrations on how to use the LandInfo App



Mr. Alfred Nyambane (Dressed in a Lab Coat), ATPS researcher assist a participant to test the soil texture at different layers of the soil profile



A participant tests the texture of the soil



Dr. Nicholas Ozor (Left) congratulates a participant for successfully taking part in the training

REGIONAL CLIMATE CHANGE DIALOGUE WORKSHOP



Philip Osano, Deputy Director SEI leads a round table discussion



Prof. Malachy Okwueze gives his opening remarks to the delegates present



From Left: Alex Kaoga, Cornelius Okello and Chidi Magnus Onuoha follow keenly the presentations made during the workshop



Mr. Alfred Nyambane, ATPS Research Officer moderates one of the sessions during the workshop



Networking: ATPS Board Chair Mr Chuma Ikenze (Left) interacts with Khaoula JAOUÏ (centre) and Chokri Mezghanni (Right) during one of the break-out sessions



Mr. Abdi Gedi receives his certificate of participation from ATPS Board Chair Mr. Chuma Ikenze

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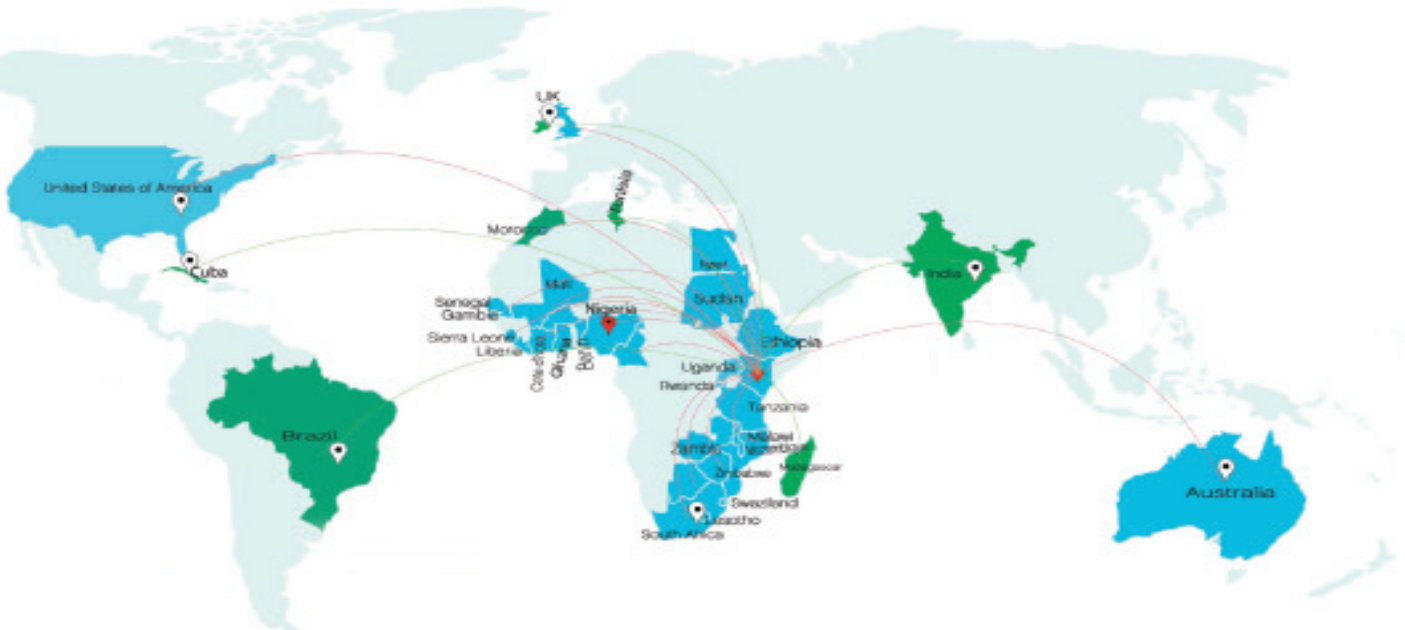


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atpsnetwork's channel

ATPS National Chapters & Focal Points



LEGEND

- ATPS National Chapters/ Country Members
- Chapters/Focal Points
- Regional Representation on ATPS Board
- Representation of ATPS Responsible Innovation Advisory Committee