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About Joto Afrika

Joto Afrika is a series of printed briefings and online resources about low emission and climate change adaptation actions. The series helps people understand the issues, constraints and opportunities that they face in adapting to climate change and improving livelihoods. Joto Afrika is Swahili; it can be loosely translated to mean 'Africa is feeling the heat'.



Ukulima Tec members setting up a vertical irrigation system ©Ukulima Tec

Role of Science and Innovation in Climate Change Response

Editorial

Science, Technology and Innovation (STI) is the major driving force behind global, regional and national efforts to cope with the increasingly severe impacts of climate change and variability. STI is key in the implementation of the Paris Agreement on strengthening the global response to the impacts of climate change and keeping the global temperature below two degrees centigrade.

Kenya's Climate Change Act, 2016 clearly states, "In formulating the National Climate Change Action Plan, the Cabinet Secretary shall be informed by scientific knowledge about climate change, technology and technological innovations relevant to climate change."

The Act promotes adoption of low carbon technologies, improves efficiency and reduces emissions intensity by facilitating approaches and uptake of technologies that support low carbon and climate resilient development. It guides the country's development towards climate resilient and low carbon path including mainstreaming into the STI sector.

The country enacted the Science, Technology and Innovation Act No.28 of 2013 to facilitate the promotion, coordination and regulation of the progress of STI. It resulted in the creation of the National Commission for Science, Technology and Innovation (NACOSTI) succeeding the National Council of Science and Technology (NCST).

The Act also led to the establishment of the Kenya National Innovation Agency (KENIA) which is mandated to develop and manage the Kenya National Innovation System and the National Research Fund (NRF) to ensure funding and implementation of prioritized, quality and relevant research activities.

As early as 2005, Kenya prepared and submitted a Technology Needs Assessment (TNA) Report to the United Nations Convention Framework on

Climate Change (UNFCCC) as a first step towards factoring the acquisition, development and utilization of environmentally sound technologies as a move towards sustainable development and resilience to climate change.

The country is also a member of the Intergovernmental Panel on Climate Change (IPCC). The Panel provides a clear scientific view on the current state of knowledge in climate change and its potential environmental and socio economic impacts.

Kenya is integrating climate change into the education system in order to create awareness and produce skilled labour and experts in climate change. Several universities in the country already offer climate change courses while others like University of Nairobi's (UoN) Institute of Climate Change Adaptation (ICCA) has focused on research and training related to adaptation.

Kenya was the first in the world to establish a Climate Innovation Centre. The Kenya Climate Innovation Centre (KCIC) supports climate change innovation, technologies, research and development of entrepreneurs and plays an important role in developing green technologies in the country.

The National Climate Change Resource Centre (NCCRC) under the Ministry of Environment and Natural Resources (MENR) provides an avenue for the country to showcase technologies and innovations that address challenges related to climate change.

This issue highlights innovative solutions that the National and County governments, various private sector actors, research organisations and universities are involved in to respond to climate change and ensure the country transitions to a low carbon economy.

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Prioritising Science, Technology and Innovation



Kisumu National Polytechnic students displaying products made from water hyacinth during the 6th National Science Week ©NACOSTI

Science, innovation and technology is a vital source of potential solutions to climate change. The availability of new technologies is key to an effective global and national response to climate change. They could help mitigate, or reduce greenhouse gas (GHG) emissions and enable communities to adapt to climate change.

In Kenya, the National Commission for Science, Technology and Innovation (NACOSTI) has prioritised scientific, technological, and innovative climate change response through programs that deal with food insecurity, health and energy. These programs help to mitigate against and adapt to climate change.

The enactment of the Science, Technology and Innovation, Act 2013 heralded a new beginning in promoting, coordinating, regulating and entrenching science, technology and innovation into the national production systems.

It is from this Act that NACOSTI was established to regulate, assure quality, coordinate and promote the science, technology and innovation sector in the country.

NACOSTI contributes to the realisation of Kenya's Vision 2030 and other national development goals, which aspire to transform the country into a globally competitive, newly industrialised, middle-income country.

The Commission has put in place science-based measures to help find lasting solutions to drought, floods, and water scarcity.

Technologies that promote renewable energy, drought tolerant seeds among others now have a higher chance of receiving funding.

The Commission in partnership with government ministries, agencies and private companies has enhanced transfer and diffusion of climate change adaptation technologies in rainwater harvesting, promotion of drought-tolerant sorghum,

and maize seed varieties, which are tolerant to both drought and Striga weed.

The Commission advises National and County governments on science, technology and innovation policy, including general planning and assessment of the necessary financial resources.

Plans are also underway to set up six to eight regional offices in order to reach the whole country. This also includes working with the Council of Governors to ensure the integration of science, technology and innovation in County production processes.

“NACOSTI has put in place science-based measures to help find lasting solutions to drought, floods, and water scarcity.”

The Commission's role in accrediting research institutes and approving all scientific research in the country has seen it issue between 3,000- 4,000 licenses annually in various categories. The Commission also periodically inspects close to 80 registered research institutions to ensure high quality science, technology and innovation in the country.

NACOSTI used to administer the Research Endowment Fund before the function was transferred to the National Research Fund (<http://www.researchfund.go.ke/>). The grant allows Kenyans to get funding to conduct research and undertake innovative projects.

The grants support research and innovations in health, food security, energy and climate change. The grants are also disbursed based on information urgency and on immediate challenges facing the country.

Since inception, the grant has supported more than 2,000 research and innovations in both public and private institutions.

Researchers also send a copy of their thesis and report to the Commission to

include in their research database and to make it possible for others to access and cite.

The Commission has enhanced coordination and cooperation between various agencies through stakeholder engagement and the annual National Science Week. The event enables stakeholders to celebrate achievements and showcase advancements in science, technology and innovation.

This year's National Science Week events under the theme 'Research, Science, Technology and Innovation to address Climate Change' sought to sensitise and motivate Kenyans to come up with appropriate solutions that address climate change.

The event emphasised the importance that NACOSTI places on using science, technology, and innovation to reduce dependence on fossil fuels, contribute to energy security and drive economic growth and competitiveness.

The science, technology and innovation sector in the country can play a critical role in addressing the negative impacts of climate change and other environmental challenges.

More at: <https://www.nacosti.go.ke/>

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Sang'alo Institute of Science and Technology showcasing their innovation-solar pumping system during the 6th National Science Week 2017 ©NACOSTI

Use of Scientific Data to Develop Insurance Products



ILRI engaging various stakeholders in Marsabit County on Index based Livestock Insurance ©ILRI

Livestock systems are a major component of the drylands of Africa and play a key role in the livelihood of local populations. In East Africa and the Sahel, pastoralism is the principal livelihood for over 40 million people and represents up to 60 percent of agricultural Gross Domestic Product (GDP).

Despite the considerable contribution of livestock sector to local economies and to household welfare, pastoralist populations remain extremely vulnerable to climate shocks.

Drought represents the single largest cause of livestock mortality for pastoralists in the region and the increase of climate variability combined with rising population pressure and rangeland degradation makes typical herding strategies such as migration less effective, and informal traditional coping mechanisms strained.

The Index-based Livestock Insurance (IBLI) Program was inspired by the aspiration to find a solution to this pressing challenge: how to find a sustainable way to help pastoralists manage the considerable impact of losing their principal asset and source of income - livestock - during severe drought events, while supporting their adaptation to climate change and reducing their long-term exposure to climate risk?

IBLI has a range of positive socioeconomic benefits. These include: improved capacity to maintain sufficient food consumption for children under five years old; reducing reliance on livestock distress sales when prices are low; reducing their herd size while increasing productive investments in remaining animals and much more.

An innovative solution for overcoming this barrier was found in the use of satellite technologies to feed an index-insurance product. Index-insurance is based uniquely on objective, cheap and difficult to manipulate indices that are correlated with covariate risks. This offers coverage at a small fraction of the administrative and informational costs required for claim-based policies.

IBLI relies on an index obtained by processing Normalized Difference Vegetation Index (NDVI) imagery, which measures the 'greenness' of vegetation, thus being a reliable indicator of the vegetation condition and availability over the pasture growing seasons.

In their current form, IBLI contracts provide compensation against drought-induced forage scarcity, and payments are triggered when the reading of NDVI over a rainy season is below a predetermined threshold defining drought conditions. Payments made to insured households can then be used to protect livestock through the purchase of fodder or feed resources, access to water and veterinary services, and alternative coping strategies.

Since its launch in 2010, the IBLI concept has rapidly evolved and scaled from two pilot studies in Marsabit (Kenya) and Borana (Ethiopia), to a large public-private partnership, the Kenyan Livestock Insurance Program (KLIP), spearheaded by the Government of Kenya, and to an ambitious expansion program in Ethiopia led by the World Food Program, named Satellite Index Insurance for Pastoralists (SIPE).

Currently covering 14,000 households across six Counties of Northern Kenya namely Marsabit, Isiolo, Turkana, Wajir, Mandera and Tana River, KLIP intends to scale to 100,000 households across 12 counties by 2020.

In Ethiopia, SIPE will help expand IBLI access from Borana to the Somali region, adding 5000 households in 2017. A successful effort will see a much more

ambitious expansion that includes the Afar region.

As one of IBLI milestones across the years, the largest proof-of-concept occurred when IBLI-related programs distributed compensation of over two million USD to near fifteen-thousand pastoralists in northern Kenya and southern Ethiopia.

Denge Yattani from Dukana, Marsabit County testified that *"I had forgotten that I was selected to be a beneficiary in one of the insurance program supported by the government until I got M-Pesa message and a call that I was eligible for a pay-out. It was a miracle because I did not expect it. I did not know what I could have done without that money. I used the money to buy livestock feeds which eventually improved my livelihood."*

In the same County, Mama Adhio Tura testified that *"My family was devastated by the severity of the drought. We lost almost everything then came a pay-out that we did not expect from KLIP. I got KSh. 29,400 through M-Pesa which I used to buy water, medicine and fodder for the remaining goats which survived."*

IBLI demonstrates how a simple and innovative concept leveraging on well-established technologies, coupled with a proactive agenda that maintains a continuous feedback loop between scientific research and implementation and develops strategic partnerships with important constituents across the innovation delivery chain, could lead to scalable solutions having significant impacts on the vulnerable rural populations of African drylands.

More at: <https://www.ilri.org/>

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"The (IBLI) program is aimed at helping pastoralists sustainably manage the loss of their livelihood resources from the detrimental impacts of climate change."

Sustainable Charcoal Production Using Improved Technology



Firing a metal charcoal kiln in Garissa County
©KEFRI

The National Climate Change Action Plan (NCCAP) identified improved charcoal production as a key priority for Kenya to successfully transition to a low-carbon, climate resilient growth pathway that includes reduced fuelwood demand leading to lower levels of deforestation.

Direct fuel combustion of biomass, from sources such as fuelwood and charcoal, accounts for almost 70 per cent of primary, non-electricity, non-transport energy demand. This has placed the forests under pressure and has led to the widespread scarcity of biomass, diminished watershed management and rising vulnerability towards climate change.

The Kenyan government formalised the charcoal industry through the enactment of the Forest Conservation and Management Act, 2016. The Act provides for the development and sustainable management, including conservation and rational utilisation of all forest resources for the socio-economic development.

Communities in Garissa, Isiolo, Baringo and other arid counties used to consider *Prosopis juliflora* 'Mathenge' an invasive plant that colonised their ecosystem, suffocated other important vegetation and affected livestock keepers.

However, the Kenya Forestry Research Institute (KEFRI) trained the communities on the economic utilisation of 'Mathenge' for charcoal production. This has helped relieve pressure on natural forests and vegetation ecosystems caused by cutting down trees for fuelwood and charcoal production. It has also helped reduce the invasive species and to respond to the challenges raised by non-sustainable wood charcoal.

In Garissa County, Home Health Solutions Ltd, has prototyped and adopted a cleaner technology of charcoal production that targets use of *Prosopis juliflora* as the main source of biomass.

The technology is of high efficiency and the contribution of charcoal combustion to global warming decreases with

the increase in efficiency of charcoal production technology.

The technology uses a high-efficiency green charcoal carbonisation kiln that employs the gasification technology to convert *Prosopis juliflora* into charcoal.

Observatory tests carried out by KEFRI Garissa Sub-centre office of the Drylands Eco-Forestry Research Programme (DERP) indicated that the kiln has a conversion ratio of up to 40 percent with an average carbonisation period of eight hours per batch of three tons.

Traditional charcoal production methods like earth kilns are more common among communities living in dry areas. These kilns have an efficiency ranging from 10- 25 percent and carbonisation times of more than a week, with a batch of approximately one tonne. This emits 29.7 grams CO₂ equivalent per mega joule based on a 100-year Global Warming Potential (GWP).

“The technology uses a high-efficiency green charcoal carbonisation kiln with a gasification technology to convert *Prosopis juliflora* into charcoal.”

The high-efficiency green charcoal carbonisation kiln has a double high carbon steel plate that is able to withstand temperatures of over 3000 degrees Celsius.

The kiln is designed such that the flue gases that accumulate within the double wall of the kiln drive the combustion of the biomass. Excess flue gases are flared and used to accelerate carbonization in the kilns and are not released into the atmosphere.

The technology has received support from the National Environment Trust Fund (NETFUND) in the design and construction of two industrial scale high-efficiency carbonisation kilns that is

expected to have a 50 percent recovery rate. NETFUND is also supporting the innovation by enhancing the uptake of utilisation of *Prosopis juliflora* by supporting the Garissa county government to formulate supportive policies for the exploitation of the species tree products.

The support is helping to reduce GHG emissions from the charcoal making process through the installation of energy recovery and combustion of the greenhouse flue gases and other carbonisation by-products for the production of heat and electrical energy.

The Kenya Forestry Service (KFS) in Garissa has given special permits to charcoal producers who are restricted to the production, movement, and sale of *Prosopis juliflora* charcoal. This has helped to reduce the spread of the species and reduce the pressure on indigenous trees.

KEFRI recommends the use of fabricated metal kilns which retail at around KSh 20,000 - KSh 25,000. The kilns can yield between 5-7 bags of charcoal in one charge. This would require around 473 Kgs of *Prosopis juliflora* wood.

Replacing indigenous wood-based charcoal with sustainable wood energy production will meet the energy needs of communities in Kenya while reducing GHG emissions.

The technology puts pressure on the *Prosopis juliflora* by utilizing it in charcoal production and therefore increase natural carbon sequestration and supports the communities' ability to respond to the challenges caused by climate change.

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Promoting Energy Saving Jikos to Address Climate Change in Wajir



Jiko Women Group members constructing a jiko in Habaswein ©Natalie Topa, MercyCorps

Households in Wajir still cook using the traditional three-stone open fire hearths, which require huge loads of firewood. Apart from deliberate destruction of the forest cover, these energy sources also contribute significant pollutants including carbon dioxide that are harmful to the environment.

Mercy Corps' Building Resilience and Adaptation to Climate Extremes and Disasters (BRACED) programme – known as PROGRESS – is working in North-Eastern Kenya to enhance the absorptive, adaptive and transformative capacities of vulnerable households and communities to increase their resilience to deal with climate shocks and stresses.

Mercy Corps is promoting the use of energy saving Jikos in Wajir community and its environs through building capacity of groups to invest in the production, use and selling of energy saving Jikos as an alternative income generating activity to build their resilience during extreme climate shocks. This has resulted in increased adoption of clean energy jikos that are cheap to maintain and environmentally friendly.

A report compiled by the Kenya Integrated Household Budget Survey reveals that a staggering 76.4 percent of households in the country's rural population rely predominantly on firewood and charcoal for cooking and heating of the homes.

The innovative production of sustainable energy saving Jikos using locally available materials has helped the pastoralist women group. The pastoralists are the most food insecure, most at risk and with the least capacity to prepare for, respond to and recover from climate-related

disasters to boost their income helping them cope with a changing climate.

Initially, the Jiko Women Group established in 2008 under Kenya Agricultural Productivity and Agribusiness Project (KAPP) used to make the jikos using sand and soil but when they dried them in the kiln, they always found more than half were broken.

"We would put 50 stoves in the kiln only to find that many were broken when we removed them from the kiln after five days. We started making losses but decided to proceed with the production. It was very expensive making them. Most of our money went into buying drums and hiring a rare blacksmith who would flatten the drums and cut them to produce metal stove covers," says Habiba Abdi.

"While, providing an income generation alternative for women entrepreneurs, BRACED is addressing environmental impacts."

With the rising cost of fuel, Mercy Corps helped Jiko Women Group in Wajir to produce energy-saving cooking Jikos using local materials that are easily available and cost effective. Through a new idea from permaculture-that involves use of organic and natural materials, women were taught how to use new ingredients such as dried grass, powdered charcoals, sugar and ash water to make the jikos more sustainable.

"We were taught to add materials such as cow dung, grass, charcoal, ash water,

charcoal dust and colours to the soil before making the Jikos. We were also advised to dry them in the sun instead of using the kiln. It was a success. Our Jikos are no longer breaking and we now have a stable income," Habiba adds.

The Programme has linked the group with a supplier of metal stove covers and a ready market for their products. The group currently sells up to seven stoves in a week. Each stove costs KSh 700 (USD 7).

The group members engage in other livelihood activities such as agribusiness and small trade that reduces their vulnerability during extreme weather conditions like drought.

Households are also turning to these jikos to save on fuel costs and use the money to venture into other income generating activities to improve their livelihoods.

Innovation is critical to ensure that climate change can be addressed without compromising economic growth. It is important that climate and innovation policies provide the right incentives for the development and diffusion of climate-friendly technologies.

More at <http://www.braced.org/>

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Innovative Irrigation System for Urban Farmers



A vertical irrigation system set on a raised garden
©UkulimaTec

The impact of climate change on food security and environmental stability adversely affects the human population, especially in Sub-Saharan Africa. In this respect, vertical farming forms an innovative mitigation mechanism of reducing food shortages in Kenya and across national boundaries while adapting to climate change.

Ukulima Tec Ltd.'s vertical gardens provide resilience for food systems and environmental sustainability despite the extreme effects of climate change. The vertical farming technology is a concept of growing crops in multilayer levels using plastic tubes to generate more planting area in a small or limited space.

The company based at Thindigua area of Kiambu County serves farmers from Kiambu, Nairobi, Kisumu, Mombasa and Mwala. It specializes in the design, fabrication, installation and maintenance of vertical farming systems, tower gardens, kitchen gardens and garden automation. They can do three installations per day for the small gardens and up to three days for larger installations.

Urban dwellers who adopt the innovation do not have to worry about limited space or chemical residues found in food. The innovation enables urban farmers to transform their balconies, verandas, backyard, rooftops, and parking area into a farm.

The system has no weather-related crop failures such as floods or drought hence vertical gardens can be set up in any geographical location.

Instead of having a single layer of crops over a large land area, a person can have stacks of crops going upwards. Crops that can be grown using this system include leafy vegetables, green herbs, and fruits such as strawberry and passion fruits.

Ukulima Tec has adapted to the adverse effects of climate change in agriculture by using drip irrigation system, which saves up to 65 percent of water used

for irrigation. People living in arid and semi-arid areas where there are water constraints are also able to farm.

Farmers can either opt for a manual or automated system for drip irrigation. The manual system requires the client to turn on the water tank placed in an elevated position, which enables water to flow, by gravity through the drip pipes to the crops.

The system uses a Global System for Mobile Communication (GSM) network, Bluetooth link, or the internet. The digital wireless technology is easy to install and can be used remotely.

The application is installed on a smartphone where it communicates to activate the pump, which then irrigates the crops at a touch of a button on the app menu. Once the crops are watered, the farmer presses 'Pump off' to stop the irrigation. One also has an option of using

“The irrigation system uses a (GSM) network, Bluetooth link, or the internet to operate the easy-to-install irrigation system for vertical farming, tower and kitchen gardens and general garden automation.”

a timer. The auto-irrigation model is solar powered and facilitates irrigation in a more energy efficient and convenient way.

Farmers can also use the app to open or close valves and to query data from the farm like soil moisture content, and water levels in the reservoir.

A standard structure, retails at KSh 20,000 (USD 200). A four feet garden with four vertical pipes which is suitable for small balconies retails at KSh 15,000 (USD 150) while a 10 feet garden with six vertical pipes retails at KSh 30,000 (USD 300). The price also differs depending on the need of the client.

To make the vertical garden, Ukulima Tec buys plastic containers, PVC pipes and

metal bars from local hardware stores. The company then makes the structure of the garden using the metal bars or wood and then fills up the plastic containers with soil mixed with organic manure. The drip irrigation system is then set up before planting seedlings or seeds. The company does their own fabrication of the system.

Plister Omondi, a customer of Ukulima Tec has installed the vertical garden in Komarock, Nairobi said that system is efficient since her house help does not need to dig the whole day in the backyard and the produce from the technology is of high quality.

She says that she is now able to get affordable, accessible and healthy vegetables from her backyard.

“I am now able to irrigate, manage and control my farm system remotely through the touch of a button,” says Ms. Omondi.

Ukulima Tec has implemented climate smart agricultural practices in their vertical garden systems in order to enhance agricultural productivity. With vertical gardens, small-scale vegetable farmers can practice minimum tillage and crop rotation on their land in order to maintain the sustainability of arable land while maximizing output for increased incomes.

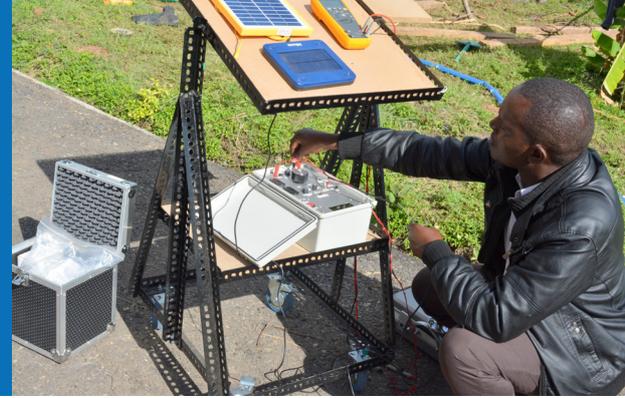
Limited arable land in the country poses a challenge to food security hence there is need to incorporate alternative agricultural practices to ensure enough food is available to every household while combating climate change in the process.

Support for innovations like Ukulima Tec is crucial in mitigating climate change and increasing agricultural production.

More at: <http://ukulimatech.co.ke/>

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Providing Solutions in Renewable Energy



Strathmore Energy Resource Centre staff setting up a solar PV system ©SERC

The Strathmore Energy Research Centre (SERC) response to climate change focuses on achieving Sustainable Development Goals (SDGs). The response includes: research and consultancy for the renewable energy sector; training of solar photovoltaic (PV) technicians; and testing of solar PV products.

Established in 2012, the Strathmore University based Centre has supported projects that include the 600 kW Grid connected Solar PV rooftop which was completed and commissioned in June 2014. This project now caters for all the electricity needs of the university.

It is the biggest commercially viable rooftop solar PV system in Kenya. It reduces greenhouse emissions by replacing consumption of less clean sources such as diesel engines.

The plant helped to reduce the university's carbon footprint while the energy bill has been lowered by 51 percent. The plant supplies 31 percent of the university's energy needs.

The Centre has also commissioned a 10 kW carport hybrid solar/diesel grid connected system through support from Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH Pro-solar program.

The Centre uses the system to train solar technicians' leading to more quality solar installations that lasts longer, encouraging the adoption of this alternative source of energy.

In 2014, the Centre collaborated with GIZ and Kwale County Government to set up a 1.6 Kw solar standalone system in Wasini Island.

The power plant provides the community with access to electricity, cell phone charging, solar lighting, cybercafé services and deep freezer. This move has improved livelihoods and encouraged the use of renewable sources of energy.

The Centre is currently collaborating with the National Commission for Science,

Technology and Innovation (NACOSTI). They are carrying out a research on the replacement of kerosene lighting systems in the rural areas of Kenya with solar Pico-PV products.

Quality components lasts longer when properly installed. On the other hand, poor quality goods make people shun solar and stick to traditional sources such as kerosene lamps which are pollutants and large emitters. Quality products means more adoption and lesser changes in temperatures at the turn of the century.

“The 600 kW grid is the biggest commercially viable rooftop solar PV system in Kenya”

The Centre also champions the development and implementation of the solar PV outreach-training module for capacity building of Technical Training Institutes and equipping them to conduct T1 and T2 training. This is through the Partnership for Enhanced Engagement in Research (PEER) project that the Centre is implementing with GIZ through funding from the United States Agency for International Development (USAID).

The trainings are conducted to ensure quality and reliability of the products to encourage the use of solar which reduces emissions.

In 2014, an influx of substandard products into the market led the Centre to start a laboratory-testing project. The laboratory has high precision equipment's that provide accurate and reliable results.

The predominantly female engineers in the project test products and components in the laboratory and then issue provisional certificates to the organization or agencies that require the service. They also send their recommendations to the Kenya Bureau of Standards (KEBS).

The Centre is currently working on

acquiring the ISO 17025 certification, which will enable it to provide testing services in the country through KEBS and other stakeholders.

The Centre has also held more than ten training courses for women entrepreneurs in collaboration with Women in Sustainable Energy and Entrepreneurship (WISEE). The 50 percent subsidized training has ensured that most of the 300 female-trained technicians have now acquired licenses from the Energy Regulatory Commission (ERC).

The licenses entitle the technicians to carry our solar PV system installation for small, medium and advanced projects. The monthly courses benefit Kenyans with technical backgrounds and interest in solar PV installation.

Recently the Centre's 600kW solar PV project won the Private Sector Award in the Kenya Association of Manufacturers (KAM) Renewable Energy Project Awards 2015 during the Kenya Clean Energy Conference.

Some of the challenges the Centre faces include inadequate access to finance especially for the Lab and acquiring the ISO certification. For the last two years, the Centre has offered solutions in the energy sector thus helping reduce carbon emissions and consequently global warming.

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Write to us!!

We welcome your feedback on this issue 21 of Joto Afrika (<http://www.alin.or.ke/Joto%21Afrika>) Please send us your thoughts using the contact details on Page 12. Please include your full contact address or email. A selection of letters will be printed in the next issue.

Strengthening Multi-Stakeholder Adaptation Planning for Resilient Development



A community member catching up on climate advisories in Garissa, Kenya ©Eric Aduma

Climate information is gaining ground as a resource to support adaptation decision-making, helping farmers, pastoralists, local government organisations, sectors services, and non-state actors to anticipate and plan for the coming seasons.

However, scientific climate information can be hard to access, complex, and presented in ways that are difficult to relate to the local context and therefore difficult to use. Confidence in local knowledge of forecasting is being eroded as climate change brings new uncertainties.

Participatory Scenario Planning (PSP) uses seasonal climate forecasts and is a multi-stakeholder, sub-national approach, which enables the actors to access, understand and develop trust in forecasts from National Meteorological and Hydrological Services (NMHS). Participants collectively interpret probabilities of rainfall in a seasonal forecast into scenarios and advisories, turning the forecast into localised and usable information that relates to decision making in a season.

Seasonal PSP processes facilitate, flexible forecast-based planning which enables different actors to anticipate and adapt to seasonal variability, while at the same time building evidence and capacity for integrating adaptation into longer-term development planning and risk management systems.

The Adaptation Learning Programme (ALP), implemented in Africa by CARE International innovated the PSP approach in Garissa County, Kenya, during the 2011 October to December rainfall season, as a component of its adaptation action planning work. By 2017, PSP has become a mainstream seasonal County event led by the Kenya Meteorological Department (KMD) and the Agriculture Sector Development Support Programme (ASDSP).

Flexibility in PSP approach in Kenya has also led to its implementation at County, Sub County and community level. The approach has helped include; dealers and buyers to make decisions for investment

and extension advice, and linkages to micro-finance and insurance providers.

The key innovation in the PSP approach is facilitating collective interpretation of climatic knowledge drawn from community reviews of the past season, scientific and local forecasts and focusing on creating an understanding of risk and uncertainty. This leads to lasting relationships built between all actors.

“Through my participation in PSP, I have learned to combine local and scientific meteorological seasonal forecasts. At first, we disbelieved the scientific approach, but after discussions and comparison with the traditional forecasts, we now accept the information.” Chief Nanighi, Garissa County, Kenya.

“Nowadays we make decisions based on PSP advisories, for instance, planting the right crop and saving pasture. We also use advisories to select crop varieties we should be planting to avoid losses from pests and heat stress.” Kotola Bidu, an agro pastoralist from Oromia Region, Ethiopia.

“PSP has increased our understanding of users’ needs, so as to provide them with the required information.” Noah Eledi, Bungoma County Director of Meteorology, KMD.

Dialogue and knowledge exchange on all forecast probabilities helps to increase willingness and confidence in using seasonal forecasts and advisories from PSP in decision-making and planning and creating demand for forecasts at daily, monthly and yearly timescale.

Balance in participation and voice of communities as well as sectoral departments, results in co-production of high quality, technically sound and forecast-based advisories with a strong influence from local knowledge. Co-production of new knowledge also enables development of potential solutions and actions that respect a plurality of interests and plans are made so that actions are mutually supportive and coordinated. The multi-stakeholder PSP platform inspires the generation of new solutions to dealing

with seasonal climate, making it more meaningful to adaptation planning.

PSP provides a learning and innovative platform from which links are being made to new climate services for short-term information; improvements in local weather stations and plans for new channels of communicating advisories to the wider community. It also creates the link and relevance for climate science to contribute to adaptive capacity for broader adaptation and development planning.

Some of the crosscutting challenges raised by partners using PSP include; gaps in linking and interpreting scientific climate information at different timescales, need for systemised feedback loops to evolve responsive climate services, need for governance structures that overcome sectoral silos, and strengthening knowledge brokering as a needed skill in facilitation and creating linkages for open and inclusive dialogue.

Structured facilitation of multi-stakeholder interaction around a seasonal forecast has created space for reflection, localisation and finding relevance in applying scientific information, combined with local and technical knowledge in defining plans for adapting to climate variability. Such information can help communities respond to the impacts of climate change.

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FURTHER RESOURCES:

ALP: <http://careclimatechange.org/our-work/alp/>

ALP/CARE's Climate Services: <https://www.weadapt.org/knowledge-base/adaptation-learning-programme/courting-complexity-in-climate-services-lessons-from-participatory-scenario-planning>

Adaptation for Food Security and Ecosystem Resilience in Africa



Building the capacity of Agriculture Extension Officers through field training ©Sarah Ndonge

Climate change causes negative global impacts on food security and ecosystem services evident in sub-Saharan Africa. Adaptation to climate change requires adjustment of processes, practices and structures to control potential negative outcomes while benefiting from opportunities associated with the changing climate.

The Adaptation for Food Security and Ecosystem Resilience in Africa (AFERIA) project is a two-year initiative coordinated by the International Centre of Insect Physiology and Ecology (ICIPE), with funding from the Ministry for Foreign Affairs of Finland.

AFERIA implements research-based interventions through climate change adaptation action plans, technology transfer and capacity building to support food security and reduce vulnerability of smallholder farming families in the highland ecosystems of Taita Hills and Murang'a in Kenya, Mount Kilimanjaro in Tanzania, and the Jimma Highlands in Ethiopia.

AFERIA also disseminates and communicates the results of a previous research project (CHIESA-Climate Change Impacts on Ecosystem Services and Food Security in Eastern Africa) to rural communities, extension agencies and scientists working with climate change-related issues in Africa while strengthening their capacities to monitor and adapt to the climate change.

This goal has been achieved through scientific synthesis. Research results on the impacts of climate change in the highland ecosystems have been synthesised to make them adoptable and adaptable to specific user groups as well as to the public.

This synthesis has produced the Multifunctional Agricultural Landscape Mosaic (MALM), a visualized digital agricultural land use matrix. It combines scientific findings, stakeholder observations and prioritized actions from community-based climate change adaptation action plans. This is to support current and future land use planning to

generate climate-smart landscapes.

Local agricultural extension officers from Murang'a and Taita Hills in Kenya and Kilimanjaro in Tanzania have been trained on useful agronomy practices, such as Integrated Pest Management technologies for different crops and conservation agriculture. They then disseminate and further train local farmers in their respective areas.

“Research results on the impacts of climate change in the highland ecosystems have been synthesised to make them adoptable and adaptable to specific user groups as well as to the public.”

Over 9,000 indigenous tree seedlings have been planted on individual farms in the Iyale-Ngangao corridor in the Taita Hills and along the Miwaleni Springs in Tanzania to help improve water catchments, biodiversity, and connectivity between the scattered cloud forests, and to increase forest cover through farm forestry. It is expected that this intervention will advance the efforts to rehabilitate native forests that have been cleared.

To reach a wider audience with information on research-based interventions for adaptation, AFERIA uses the local media in the project areas to disseminate this information. The CHIESA project trained journalists from both local and national media representing Kenya, Tanzania and Ethiopia on climate change reporting. The project also uses local radio stations that broadcast in vernacular to reach a wider local audience.

In the different agro-ecological zones of the highland ecosystems in Kenya, Tanzania and Ethiopia, the AFERIA Project, in partnership with locally based organisations, has implemented activities that aim at building the adaptive capacity of the smallholder farmers.

These include: demonstration sites for drip irrigation where AFERIA has installed a total of 16 small scale farmer drip irrigation kits; enhancing rainwater harvesting and

storage to improve water use efficiency by installing four roof rainwater harvesting tanks in Taita Hills and Kilimanjaro; bee keeping, conservation agriculture, farm forestry where more than 7000 indigenous trees of six different varieties and 398 avocado seedlings were planted in 200 households along the Iyale - Ngangao indigenous forests in Taita Hills.

Also included is the training of extension officers on skills in Integrated Pest Management of coffee, maize, avocado and crucifers (green leafy vegetables). Demonstration sites with these interventions are set up in individual and institutional farms as a learning avenue for farmer communities.

In addition, more than 50 coffee farmers in the Taita Hills underwent two-day training on coffee agronomic practices and the management of coffee pests (with focus on the coffee stem borer); and on improvement of water use efficiency and minimizing wastage in food production through AFERIA Project.

The project has strengthened the capacities of relevant professional and local partners. They are now able to further communicate and demonstrate climate change adaptation technologies among smallholder farmers.

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FURTHER RESOURCES

<http://chiesa.icipe.org/>
http://chiesa.icipe.org/images/TaitaHillsMSFMay2017/AFERIA_MALM%20platform.pdf

Supporting Clean Technology Start-ups



A team installs solar powered roofing tiles on a residential house ©KCIC

The Kenya Climate Innovation Center (KCIC) has been in the forefront in supporting innovations that seek to mitigate against and adapt to climate change effects. Working in three main sectors: renewable energy, water and agriculture, the organization has overseen the growth of businesses, some from the prototype stage to fully-fledged businesses. The organization provides business advisory services, access to finance, information and facilities providing an enabling environment for business.

The overriding goal is to provide enterprises with an opportunity to scale up their green-tech businesses and contribute significantly to the mitigation of the effects of climate change.

The Green-Tech Accelerator Program was launched in April 2017 in order to address rapid business growth of enterprises and make them investment ready through a raft of services including gap analysis, mentorship, investor pitch training and forums. The six months' program targets businesses in the growth stage.

Over the years, KCIC has incubated over 150 enterprises and 80 of them are now selling products in the market. These enterprises have created 1,544 direct and indirect jobs and raised a total of KSh 1.3B (USD 13 million) from external sources, including debt, equity and grants.

Interested applicants with innovations in green technology can apply through the KCIC website. The applicants are informed within 21 days whether they have been successful or not. The incubation program runs for 12 months and targets start-ups and early stage enterprises that have a prototype.

In the renewable energy sector, KCIC has been on the forefront in their efforts to support significant contributors to the green economy. One of the businesses that the organisation has offered its support to is Maa Briquettes, which produces briquettes in an effort to reduce deforestation.

Another business is Strauss Energy, which is in the business of making and installing solar power tiles, and makes use of Building Integrated Photovoltaics (BIPV), which is a modern alternative to installation of solar panels. It consists of energy-producing solar cells fitted into functional parts of a construction.

“The overriding goal is to provide enterprises with an opportunity to scale up their green-tech businesses and contribute significantly to the mitigation of the effects of climate change.”

In addition, the support has been extended to Ukulima Tec Ltd, a company that provides vertical gardens to urban and peri-urban residents by allowing them to grow vegetables on small portions of land and balconies. The vertical gardens are very economical in the amount of water used and can even be irrigated remotely using a mobile phone.

Another innovation that KCIC is supporting is by Hydroponics Africa. The technology involves growing crops without soil. Mineral nutrients in water are used in place of soil. A shade net is employed in order to control the temperatures. This also ensures that water is conserved in the process. With this kind of technology, a farmer is assured of consistent supply of fruits and vegetables, which can be grown all year round.

Aside from supporting innovations in green tech, KCIC has also been working towards mainstreaming sustainable development in the public and private sector. This is being carried out under the Sustainability Initiative whose mandate is

to equip decision makers, policy makers and practitioners with the relevant skills to deliver institutional value through sustainable strategies, while operating in an environmentally and socially responsible manner.

The initiative is also designed to support companies to realise specific targets outlined by the Sustainable Development Goals (SDGs).

The adoption rate of the innovations remains the biggest concern because government cannot enforce everything. People will adapt to climate change simply by changing their behavior. The decision to adjust and adopt rests upon households or individual farmers.

Creating awareness and supporting innovation can guarantee sustainable energy for all, as envisioned in the SDGs. Innovation is key, and people – especially women – with good ideas deserve all the support they can get.

More at: <https://www.kenyacic.org/>

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FURTHER RESOURCES

Scaling Support for Green Innovations by Kenya Climate Innovation Centre in Joto Afrika April Issue 2016 <http://alin.or.ke/Joto%20Afrika>



Hydroponics: Inspecting the progress of the barley fodder before harvesting ©KCIC

Connecting Developing Countries to Climate Change Technologies



The process of fruit preservation through dehydration as demonstrated at KIRDI ©KIRDI

Identifying, piloting and deploying technologies for energy-efficiency, low-carbon development and climate resilience is the best way to address barriers to the development and transfer of these innovations to Kenya and other developing countries.

The enactment of the Paris Climate Change Agreement and the importance of Kenya realising its objectives as set in the Nationally Determined Contribution (NDC) signifies the importance of the Climate Technology Centre and Network (CTCN) in facilitating accelerated action in ensuring a low emission and climate resilient development pathway.

Through its services, CTCN, which is the operational arm of the United Nations Framework for Convention on Climate Change (UNFCCC) Technology Mechanism, addresses barriers that hinder the development and transfer of climate technologies in developing countries.

This helps to create an enabling environment for the reduction of greenhouse gases (GHG) emissions, climate vulnerability, improved local innovation capacities and increased investments in innovative climate technology projects.

In Kenya, the National Government nominated the Kenya Industrial Research and Development Institute (KIRDI) as the National Designated Entity (NDE). This grants them an opportunity to channel technology related requests to CTCN and thus play a pivotal role as intermediary between the CTCN and national stakeholders. KIRDI's wider scope in terms of transfer of technologies and expertise led to NDE nomination.

The six members of the NDE based at KIRDI have a diverse background that enables them to manage the national request submission process and support the articulation and implementation of CTCN assistance in response to requests made by Kenyans.

The team also works with other stakeholders in the country to identify

priority technologies in line with Vision 2030, Kenya Climate Change Act, 2016, NDC, and Climate Change Policy Framework.

Organisations and individuals in the country can request for advice on identification of technology needs, policies and measures for the uptake of climate change mitigation and adaptation technologies. They can also request for technical support in project preparation, strategies on mitigation and adaptation technologies, research, development and demonstration of climate-friendly technologies.

“CTCN addresses barriers that hinder the development and transfer of climate technologies in developing countries.”

The NDE helps an organisation to develop their proposals based on the kind of technical assistance they require. The support can also be in terms of training, tools and methodologies, project implementation plans, technical assessments or policy and planning support.

CTCN responds to requests for technical assistance submitted by organisations through KIRDI. The six members of the NDE always ensure that proposals reflect national circumstances and priorities and meet the CTCN criterion.

An individual or organisation may contact any of the six NDE members after which they may be invited to have a formal discussion. The discussion includes request generation, request criteria and principles, stakeholder consultation, request submission and processing.

Later, the write up is submitted via email or delivery to KIRDI director's office where it is assessed based on the set criteria. Proposals that meet the set criteria are then submitted to CTCN.

Requests for technical assistance have to address issues of climate change and must fall among the four national prioritised areas, which include agriculture and food security, water services, forestry and energy.

Requests for technical assistance are categorised into two. There are requests for technical assistance in which the cost is up to KSh 5 million (USD 50,000), which takes a shorter time to receive response from CTCN, as it does not go through the long competitive bidding process. Requests for assistance in which the cost is above KSh 5 million (USD 50,000) to around Ksh 25 million (USD 250,000) requires a more detailed response thus it has to go through a lengthy competitive bidding and procurement process. It would take around 6 months to one year to receive such assistance.

Upon receipt of such request by CTCN through the NDE, the centre mobilises its global network of climate technology experts to design and deliver a customised response tailored to local circumstances.

Some of the challenges faced by the NDE include limited resources to facilitate administrative and operational costs. On the other hand, challenges experienced from the applicants include lack of skills in packaging and formulation of concepts; identification of technologies to use to address a particular problem; and huge expectation of Kenyan's who most of the time expect that they would manage funds from CTCN while this is usually through a third party with the responsibility of delivering the technical assistance.

By responding to developing countries requests, the CTCN accelerates climate technology transfer and diffusion to support sustainable development goals. This can help the country to abate GHG emission by 30 percent by 2030.

More at: <http://www.kirdi.go.ke/>

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Championing Energy Efficiency in Kenya



A lumen performance testing experiment at the TERI University laboratory in New Delhi, India ©KIRDI

The demand for electricity in Kenya has been growing at approximately 4% annually. The draft National Energy and Petroleum Policy, 2015 estimates that demand will exceed 23,000MW by 2030. The Country's Nationally Determined Contribution (NDC) has prioritised energy efficiency as a priority in the reduction of Kenya's Greenhouse Gas (GHG) emissions by 30% by 2030.

One of the energy efficiency measures that the government is enforcing is the Minimum Energy Performance Standards (MEPS) and labels. These are a set of regulations prescribing minimum energy performance for appliances and equipment in the market.

It is thus possible to bring about market transformation by removing the most inefficient appliances from the marketplace. Kenya has developed MEPS for refrigerators, air conditioners, electric motors, ballasts and fluorescent lamps.

The Ministry of Environment and Natural Resources through the Low Emission and Climate Resilient Development (LECRD) project is building on efforts of the standards and labelling programme by supporting the development of MEPS for three appliances: televisions, computers and Light Emitting Diodes (LED).

In addition, the project has supported the establishment of an energy efficiency

research and testing facility at the Kenya Industrial Research and Development Institute (KIRDI) that is used for research on lighting products and motors. The facility offers testing services to the National Government and the private sector to determine if their appliances conform to the MEPS standards and for designing cost effective and energy efficient systems.

A team from KIRDI also attended a ten-day training on testing and certification of lighting technologies at The Energy and Resources Institute (TERI) University in New Delhi, India. The institute has a globally accredited laboratory testing solar and LED lighting from the Lighting Global programme of International Finance Corporation (IFC). It is among the few laboratories in the world that adhere to the International Electro Technical Commission (IEC) standards for the testing of Solar Lighting Systems (SLS).

The Indian government has banned the use of Compact Fluorescent Lamps (CFLs) as the bulbs release dangerous amounts of mercury when broken. Kenya too can promote the use of LED bulbs that are more energy efficient and less harmful to the environment. A projection carried out during the development of MEPS estimates that quality LED lighting could save the Country 48MW of power by 2030.

LED lighting is one of today's most energy-efficient and rapidly developing lighting technologies. Quality LED light bulbs last longer, are more durable, and offer comparable or better light quality than other types of lighting.

In addition, there is an opportunity to promote local assembly of solar lighting kits, as there is growing demand for the technology in Kenya. However, there is a need for standardisation of parts for the Pico Solar Systems, which would enable the interchangeability of the parts in case of breakage. This would help users not to be stuck with malfunctioned Pico systems if only one component is not working. Specifically, batteries and the light source (LED) could be replaceable.

Developing the competence of lab staff ensures that they are abreast with globally acknowledged testing procedures. This would complement Kenya's commitments on emission targets reduction and energy efficiency across all sectors.

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