

## Getting the Green Revolution: What are the challenges?



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## *A PhD Programme to Tackle Challenges of Ecology and Livelihoods in the Drylands*

Climate change has impacted on livelihoods, food security and health across wide swathes of Eastern Africa's arid rangelands, producing a tremendous need for new knowledge, technologies, and scientists who are equipped to help the region withstand and adapt to the effects of climate change.

For Dr. Mary Baaru, climate change became a clear and tangible reality when she travelled to an impoverished farming community in Northeastern Kenya to conduct field research for her PhD. Working closely with local farmers, and using Geographic Information System (GIS) techniques, she mapped the water and other resources available to the community, and studied the rainfall patterns in the area over the past 50 years.

"The rivers were running dry, and the forests were disappearing. It was clear that the area was getting worse and worse," recalls Dr. Baaru, who recently earned her PhD through a ground-breaking regional programme in drylands resource management, offered through the University of Nairobi.

The PhD programme, established and coordinated by the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM), an advanced research and training network comprised of 29 member universities from across the Common Market for Eastern and Southern Africa (COMESA) region, reflects how African universities have begun to respond proactively to the pressing development challenges in their midst.

### **Managing Fragile Resources**

Since its inception in 1992, RUFORUM has aimed to strengthen universities' support of small-scale farmers and economic development in agriculture, in large part by cultivating regional, interdisciplinary postgraduate training programmes that equip new generations of African researchers to contribute towards the region's development.

"The challenge for us in Eastern and Southern Africa is perpetual and repeated drought and famine in the drylands. The question is: how can we manage very fragile resources there to sustain humanity and life?" asks Professor Agnes Mwangombe, the Principal of the College of Agriculture and Veterinary Science at the University of Nairobi.

Almost 80% of the Kenya's land is arid or semi-arid. Its impoverished northeastern border rubs against the Horn of Africa, where environmental stresses have triggered seemingly perpetual cycles of drought, famine and conflict. The pastoral communities that live in the drylands areas are extremely marginalised and have long been neglected by policymakers. There are few roads. Water and grassland resources are both fragile and scarce.

Dry seasons are becoming longer. Temperatures are becoming hotter. Rainfall patterns are increasingly erratic, and floods and droughts more widespread. Population growth, meanwhile, is pushing more people into marginal areas, where activities such as herding livestock quicken the pace of desertification.

## **The Complexity of Climate Change**

Many years ago, drylands resource management was considered a relatively simple science, focused primarily on livestock production, explains Dr. Robinson Kinuthia Ngugi, who helped to design the PhD programme.

In the age of climate change, however, the science has become relentlessly complex and multidisciplinary, demanding a new kind of practitioner who grasps all of the nuanced and overlapping dimensions of ecology, economics, and culture that come into play. The topics of students' dissertations in the PhD programme, for example, range from studying camel production systems, to the effects of termites on vegetation, to issues of ethnobotany, genetic biodiversity and conservation.

"We need to prepare the students for an environment of working with a diversity of viewpoints," explains Professor Adipala Ekwamu, the Executive Secretary of RUFORUM. "We are trying to create a group of critical thinkers, who can facilitate processes, and who don't have to know it all, but can learn from communities and other actors."

Much effort went in to designing a programme that would fully capture the dynamic complexities. While most African PhD programmes are exclusively research-based, for example, the drylands resource management programme was designed to include an initial year of coursework.

Drs. Ekaya and Ngugi scoured the RUFORUM network, as well as outlying organisations such as the International Livestock Research Institute and the International Union for the Conservation of Nature, for leading experts who could teach modules in subjects ranging from ecology to policy to philosophy to economics.

### **A New Market for Camels**

For Yazan Elhadi Mohammed, a Sudanese student originally from the region of Kordofan, the wide-ranging coursework has proved invaluable. He was particularly fascinated to learn about the traditional knowledge that resides within communities.

"Traditional rules govern how people cope with their environment," he says. "People don't need the meteorological department to tell them it's going to rain tomorrow. They look at the trees and say, 'it's going to rain after three or four days.' or they look at the grass and say, 'it will be possible to graze here in two or three months' time.'"

Studying drylands livelihoods, he realised that he perhaps had some knowledge of his own that could contribute towards survival and economic development in marginal areas. His dissertation research involves examining the effects of climate change and the role of gender in Northeastern Kenya.

The idea came from a course unit on drylands livelihoods, which dealt with the problem that people are continually losing their livestock herds—which are their sole livelihoods and wealth—during impoverishing cycles of drought.

Camels, he realised, could provide an alternative source of wealth. Kenya has the fifth highest population of camels in the world, but there is no strongly developed market for

camels. Neighbouring Sudan, on the other hand, has bustling camel markets, and a strong value chain that is controlled by women. As hardy desert creatures, camels could withstand tough drought conditions, and provide an alternative market to cushion communities from the devastation they suffer during droughts, he realised.

“In Khartoum, people do extremely well from camel products,” he says. “We can do the same here, and it may be a way out of poverty for many people, but we lack a scientific base from which to convince people that this can work.”

Elhadi Mohammed says he is excited to be part of a new generation of researchers who are in the midst of finding new ways to contribute. The interdisciplinary nature of the programme is ground-breaking, he says, because the large body of research that he and his colleagues are currently producing is being concentrated under a single banner, instead of being scattered across various disciplines, as drylands research always was in the past.

“This programme captures everything having to do with the drylands,” he says. “Maybe in 10 years we will actually see results—at least a pool of information about the drylands that can be studied and used to solve problems.”

### **Top Calibre PhD Training in Africa**

In the past, African universities often failed to produce much in the way of meaningful or relevant research. Hamstrung by poor resourcing and brain drain, they also lacked strong relationships with industry and government which could ensure that the research they did produce fed its way into policymaking.

One aim of the PhD programme has been to help reverse this old trend. Guided by the Comprehensive Africa Agricultural Development Programme (CAADP), the framework of the New Partnership for Africa’s Development (NEPAD) for boosting economic development from agriculture across the continent, RUFORUM has sought to strengthen regional universities’ positions as contributors to development.

In establishing the PhD programme, the organisation had to overcome deep scepticism amongst donors and academics alike that an African university could deliver top-calibre PhD training.

Drawing from the strengths of its network, the organisation poured considerable effort into designing a programme that would respond to the spectre of climate change, and contribute towards strengthening higher education at the same time, recalls Dr. Wellington Ekaya, the coordinator of the regional PhD programme at RUFORUM.

“At the end of the day, it is all about making sure that universities remain relevant and engaged in the broader agenda—that they are strengthening Africa’s contribution to global knowledge, and addressing real needs on the ground,” says Dr. Ekaya.

### **Building on Existing Strengths**

The University of Nairobi already possessed considerable strengths in range science and drylands resource management, upon which the new programme could build. In the

early stages of planning new regional postgraduate training programmes, RUFORUM had engaged a consultant to map the strengths of its member universities—and the exercise had pointed to the need for such a programme within the region, as well as Nairobi's potential to host it.

In the 1980s, another Swedish-funded programme, The Pastoral Information Network Programme (PINEP), supported master's training working with pastoralists in drylands areas. The programme was hosted and coordinated by the Department of Land Resource Management and Agricultural Technology for thirteen years.

Through that programme, a research station was established some 230 kilometers from the campus, which has since provided a valuable resource for research on the drylands. Through PINEP, researchers were trained from Ethiopia, Somalia, and South Sudan—providing a sort of early blueprint for the multidisciplinary PhD programme that followed.

The RUFORUM programme also condensed the course into an ambitious three-year time frame, setting an unheard-of precedent in a region where it is not unusual for students to spend as many as 10 years completing their PhD's, due to a shortage of supervisors, among other constraints.

The programme involves a year of coursework, followed by two years of research and writing to produce a dissertation. In addition, students are required to publish at least two scholarly papers in peer reviewed journals before they graduate. The ambitious model is not only producing more PhD graduates for the university, but it is producing them faster, says Prof. Mwangombe.

In 2011, for example, the programme produced 11 graduates—one third of the PhD graduates produced by the entire university for the year.

The results so far have been beneficial to the university's goal of rapidly increasing the number of PhD graduates it produces—as both an important measure of a world class university, and a counter to heavy attrition, particularly as large numbers of academics at the university approach retirement age.

### **Improving Lives in Drylands Communities**

For Dr. Mary Baaru, who completed her dissertation on improving land productivity through soil and water conservation measures in a community of Northeastern Kenya, the programme provided a precious opportunity to strengthen the links between academic researchers and farming communities.

Working in the Kenyan Ministry of Agriculture for 23 years prior to getting her doctorate, she says, she too held the prevalent attitude that little could be done to reverse the course of climate change in drylands areas.

Working side by side with farmers from the Machakos District, where farmers were so poor that it was not uncommon for them to go several days without eating changed her mind. Working with the farmers, she helped to devise ways of digging trenches to harvest rainwater, and planting trees to help retain soil and protect crops.

“One thing I believe is that life in the drylands with climate change is still manageable,” she says. “We can still organise the resources in the drylands, and people can still earn a good living there. The only thing lacking is capacity.”



Now employed as a lecturer at Jomo Kenyatta University of Agriculture and Technology, she is working to expand on her dissertation research, and to look at developing new cropping systems in the same area. “I believe that we are the drylands people,” she says, referring to herself and her classmates. “We have to give it a voice. We have to do something about it, we can’t just sit on it.”

The last several years have put the University of Nairobi on the map as a destination for research in drylands issues and climate change, sowing the seeds for the programme’s future sustainability, says Dr. Laban MacOpiyo, the programme coordinator. The programme, currently on its third intake, attracted 10 new students in 2012 and seven the previous year.

While the first cohort of 16 students received RUFORUM scholarships, funded by the Rockefeller Foundation and the International Development Research Centre, many of the students from the latter two cohorts are self-supported. From RUFORUM’s point of view, one of the programme’s successes, and an indication of its sustainability, is that the University of Nairobi is now taking ownership of it. Eventually, the programmes must stand on their own two feet, Dr. Ekaya explains.

### **New Opportunities for Replication and Expansion**

The new Centre for Sustainable Drylands, launched in 2011 as a joint project of the University of Nairobi and Colorado State University to support drylands research in the region, supported by USAID, was one fruit of new relationships that developed from the

PhD programme. The Centre will help to connect PhD students in the programme with sources of support, says Dr. MacOpiyo.

The programme is also attracting interest as international NGO's such as Oxfam expand their work with climate change and drylands issues, to address the situation of recurring droughts in the Horn of Africa, he says.

As the programme develops, says Dr. Ekaya, there will be opportunities to replicate it at other universities. At the same time, the programme should be able to harness the resources of the Centre for Sustainable Drylands in order to expand its scope on campus, perhaps through the introduction of new research fellowships, and expanded links to other postgraduate and undergraduate programmes.

The Strengthening Capacity for Agricultural Research Development in Africa (SCARDA) programme, which focused on strengthening national agricultural research systems across Sub-Saharan Africa through providing scientists with postgraduate training, amongst a number of other interventions, meanwhile provides another model for the regional PhD programme, says Dr. Ekaya (see separate Rwanda and East Africa story-lines).

Under SCARDA, agricultural researchers from Burundi, Ethiopia, Kenya, Rwanda, South Sudan, Sudan, Uganda and other countries received training in cohorts, and then returned to their home institutions, empowered to both build up their national research institutions and maintain their regional research networks with one another. With its cohorts of new climate change scientists from different countries and disciplines, the PhD programme has similar potential to foster networks of colleagues and collaborators across the area of drylands resource management in future, says Dr. Ekaya.