STRENGTHENING CAPACITY FOR AGRICULTURAL RESEARCH AND DEVELOPMENT IN AFRICA (SCARDA)

Building the Foundations for Research in Rwanda

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Building the Foundations for Research in Rwanda

As the most densely populated country in the world, Rwanda is currently considered to be food-secure, but faces steep food security challenges because of its population density and its reliance on small-scale agriculture: some 85 percent of the population currently depends directly on farming, and given the scarcity of land, the average holding is only 0.7 hectares.

Population Pressure and Food Security

Currently, a single hectare of land has to produce enough to feed nine people—but not for long. The population is expected to double in another 20 years, meaning that each hectare will soon have to support 18 people. All of this means that the country is highly susceptible to environmental stresses that potentially affect agriculture and food security, such as biotic stresses and soil erosion, says Tona Isibo, a researcher with the Rwanda Agricultural Board, who was responsible for coordinating SCARDA during the programme's later stages: "Our capacity to deal with these issues is a major challenge," she says. "Research is seen as critical."

Rwanda's 1994 genocide left the country with a severe shortage of trained agricultural scientists and researchers. Now realizing the crucial strategic importance of developing and maintaining a robust agricultural system, the government has prioritized agricultural research as an engine for growth. One of the most important and lasting impacts of SCARDA was the sponsorship of six Masters students at universities in Uganda and Kenya.

In all, six Rwandan students received MSc sponsorship: two in plant breeding; one in animal breeding; two in soil microbiology, and one in social economics. These disciplines all answered to direct needs and gaps within the institution, says Ms. Isibo, whose work is closely aligned to both national, regional, and international strategic development plans, such as Rwanda's Vision 2020 and NEPAD's CAADP. "We don't work in isolation; we don't try and reinvent the wheel," says Ms. Isibo.

The processes of institutional analysis and change management contributed much to ISAR, which has since merged with Rwanda's extension services, to form a new organisation called the Rwanda Agricultural Board (RAB), says Vicky Ruganzu, a senior researcher in soil and water management. Despite its recent gains, the organisation still has only around a third of the scientists it needs for maximum effectiveness, he says. The combination of Masters trainings and short courses organized by the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM) has helped to boost both the organisation's managerial capacitates and the capabilities of its scientific staff to conduct research.

Soil fertility is one of the key issues facing Rwanda's agricultural system, says Mr. Ruganzu. Soil fertility is one of the major constraints on productivity: perhaps 60 percent of the country's soils are acidic, and require interventions in order to boost productivity. Rwanda has six priority crops, which the government has identified as being critical to food security: maize, rice, cassava, beans, potatoes, and wheat.

Now, the government is encouraging policies of land consolidation and crop intensification, under which small-scale farmers are encouraged to consolidate their land and work in co-ops with neighbours in order to produce more collectively. One of ISAR/RAB's key successes last year was in releasing 10 new varieties of high-yield beans, three times more productive than previous varieties, with several of the varieties adapted to tolerate drought conditions made increasingly likely by climate change.

Getting More From the Soil

Sponsored by SCARDA, Mathilde Uwizerwa completed her MSc in soil science, specializing in soil biology, at Makerere University in Uganda. Now, she has returned and is responsible for research on the effects of a soil bacteriium called rhizobium on the productivity of soya, working from the Rubona research station, located around a two hours' drive south from Rwanda's capital, Kigali.

The research is challenging in Rwanda, she says, particularly because the tiny country has a lot of climatic variation:

"In the east there are drylands. In the north, there is rainfall in the highlands," she says. "When you go to another site, you get a different kind of environment. When you do research from one area, you cannot recommend the same thing for other areas. One variety can perform here, and when you bring it to another site, it can fail. Even the soil, if you are dealing with soil, the nutrients are not the same for one site as another site."

Now, she is in charge of heading a programme supported by the Clinton Foundation aimed at boosting soya production. Rhizobium is a bacteriium in the soil which can enhance legumes' uptake of phosphorous. Soya is an increasingly important crop for food security: an important animal feed and source of vegetable protein, particularly beneficial to HIV/AIDS sufferers, she says.

Rhiziobium has the same impact as urea fertiliser on soil productivity, but its environmental impacts are gentler, and it doesn't cause things like soil acidification, which commercial fertilisers can. Farmers work the land intensively, increasingly in cooperatives, so there is great need for environmentally friendly solutions like rhizobium, which prevent soil depletion and help to restore the balance of soils. Through her work, she says, she has helped farmers to improve their soil productivity, while reducing the environmental impacts caused by artificial fertilizers.

Since returning, she has been able to pass on her skills to some 20 Rwandan students and others in RAB. For Ms. Uwizerwa, the MSc training has increased her confidence and raised the level of her scientific expertise, and her ability to work independently. Now, she says, she can run projects independently, as well as handle proposals and publications. Previously, she says, she needed far more supervision than she does now.

Preventing Soil Erosion in the Land of 1000 Hills

Another problem facing Rwandan agriculture is soil erosion. As a mountainous country, known as the "Land of 1000 Hills," Rwanda is particularly susceptible to soil loss, due to the combination of its rugged terrain and intense cultivation.

This challenge defines the work of Cyamwesh Rusanganwa Athanase, another SCARDA-sponsored MSc student, who studied soil science at Makerere. Stationed in the western region of the country, where he works for the Soil and Water Management Unit, he implements soil conservation research programmes, which help to guide good practices in mechanisation and the development of infrastructure, ensuring that new development does not exacerbate soil erosion.

His work involves conducting field visits to monitor soil erosion, and collecting soil samples and studying their properties in the laboratory, in order to determine the best interventions. Farmers typically lose around 100 kilograms of fertile topsoil from each hectare they farm every year, he says.

Like Ms. Uwizerwa, he also reiterates how important it is that he can now work with minimal supervision in Rwanda's national research system, where trained scientists are in short supply, and every last person's contribution counts. "Before my MSc training, I was an assistant researcher with limited skills to perform scientific research," he says. "At that time, I was not really efficient. I needed supervision of an experienced person... I can now design a research subject and conduct research with minimal supervision, and that is very important." Mr. Athanase.

Mr. Athanase works closely with extension workers and farmers, helping them to find the best means of conserving soils and increasing their productivity. He also helps with training programmes that help farmers to learn new technologies and soil conservation techniques. He says he enjoys being able to give advice: "We go into the field and listen to the farmers' issues: this field is no longer fertile, this land has been eroded. We advise them about what to do to counteract soil erosion. That is very crucial. You find that farmers really need this advice. We also learn from their experience and insights."

At present, for example, he is working as part of a team to design a protocol to address the issue of low rice productivity. Taking part in the project, he says, he is effectively using many of the skills he obtained through his MSc training: "Now since I'm here I have produced documents, reports— when I go into the field, I easily write report, what is the science I've got... I've acquired communication skills," he says. "I can identify a problem, design research on the problem, and also report on findings. In that way, my country and institution profit from my training. I feel really l proud working in research and knowing that I am making some contribution to my country."

A New Livestock Breeding Programme

Manzi Maximillian has also experienced satisfaction from gaining new skills that allow him to make a solid contribution. Before his MSc training in genetics and breeding for livestock at the University of Nairobi, he says, he felt a bit lost sometimes. Working in livestock breeding, he was responsible for animal breeding, but did not actually understand the scientific principles of his work, he says.

While in Nairobi, he benefitted from the university's proximity to the International Livestock Research Institute (ILRI), where the best animal breeders in Africa are concentrated. His interactions with the continent's most established researchers, geneticists, and breeders was eye-opening at the time, and he established relationships that have continued, he says.

"I had access to the library, and to many of the experts," he says. "I was there on a day-to-day basis, and could exchange ideas and see the projects they were implementing. Being a young scientist and getting that exposure was so valuable."

When Mr. Maximillian returned to Rwanda, he began coordinating the livestock research activities of all the research stations around the country. After the merger which produced RAB, he became the director of animal resources, research, and extension for the country's eastern zone.

He is now involved in a goat cross-breeding programme at one of the research stations, where an imported species of goat is being cross-bred with indigenous goats to produce a hybrid. Rwanda's indigenous animals have low genetic potential, because they have not been bred selectively in the past to produce meat and milk, he says—and as a consequence, Rwanda is a net importer of both. He hopes that the cross-breeding programme will yield a new breed of goats that are both well-adapted for local conditions, and more productive of both milk and meat.

The challenges of his job are steep, both in terms of the science and the management. Livestock has become an increasingly important priority for the government, which for example aims to ensure that every farming family in the country is able to afford at least a cow by the year 2015.

"For livestock and animal breeding, we need to do our best to have the right animal in the right environment," he says. "If you have the right animal in the wrong environment, it will not work. And if you have the wrong animal in the right environment, it will not give you anything. We have to see how you can balance that."

Training and Support for New Leaders

In his new leadership role, as a supervisor of 111 employees, Mr. Maximillian also found the short course trainings provided by RUFORUM and SCARDA tremendously helpful.

In the East African Region, these short training courses took on a unique character. An organisation called the Institute for People, Innovation and Change in Organisations (PICOTEAM) was contracted to deliver training, and took a different approach.

From the beginning, facilitators from the organisation argued that it would be much more effective to focus on the specific challenges faced in the work environments of ISAR and the other two institutions where SCARDA support was focused (the Agricultural Research Corporation in Sudan, and the Institut des Sciences Agronomiques du Burundi), rather than take a traditional classroom approach. Employees from the different organisations were encouraged to bring their own specific situations into the workshops, which then became hands-on "change labs" for the organisations.

While the specific challenges of each organisation differed, there were a number of common threads, says Ed Rege, the PICOTEAM facilitator who provided the trainings: all three institutions to some extent had rigid, hierarchical cultures which provided few opportunities to employees of different ranks to discuss issues frankly, which in turn created blockages and situations of lethargy and frustration within the organisations, which impacted on their effectiveness in delivering and disseminating good science.

"We found there were issues of not knowing what bosses expected of them, not being able to handle the amount of work they had within in the time, and not getting responses they needed to questions they'd raised," says Mr. Rege.

"The other issue was knowing that everybody is at a different level of understanding," he says. "I explained the concept of situational management; which is to allow, facilitate, enable people to understand that if someone is not delivering, it's often because they don't know what's expected of them... The person you are delegating to needs to understand what they are being asked to do, and their understanding (of the task) may change with the situation."

Dr. Paul Kibwika came in Rwanda to supervise the field work himself. This show the seriousness of Makerere Lecturers' follow-up for students coming from different countries. He saw how the Cassava platform was evolving, challenges and opportunities discussed by the IP members for sustainability after RIU support. This platfom was going to be phased out in March 2010. They were getting cassava cuttings/ new varieties resistant to the Cassava Mosaic Disease (CMD).

Mr. Rege also focused on getting the organisations to embed the concept of mentorship into their cultures. He used the example of a boss who receives an excellent report from a young research scientist. When the report is presented to superiors, Mr. Rege says, the boss should actually have the younger colleague make the presentation, in order to share the credit for the achievement, and encourage the younger scientist with the opportunity of presenting at a meeting where customarily only senior people appear. "By allowing your people to shine, you are shining too," he says.

Getting it All to Work

Mr. Dusenge Leonidas collecting data in Cassava platform (GatsiboDistrict), Western Province of Rwanda with SCARDA funds.

Taken together, these short and Masters trainings served to integrate students and employees better into the research systems of their countries, and to empower them to contribute more effectively.

For example, in Rwanda as in other countries where SCARDA gave support, the idea of the agricultural innovation platform has gained credence. Now, Leonidas Dusenge, a former student who received his Masters from Makerere in agriculture extension and education, has been working to bring this approach to Rwanda's agricultural system. The

innovation platform approach involves bringing together all of the different actors in a particular agricultural system, such as maize production, so that there is communication and alignment across the entire value chain, from the producer to the seller to the consumer.

"I put people together when there is a problem to solve… Many actors complete each other, and everybody benefits from what they are doing. They discuss problems and (offer) solutions from their own context," he says. "I like how it involves different people having common interests and different needs."

The approach is particularly important for Rwanda, because it helps to build up systems which collapsed during the genocide, Mr. Dusenge says. He is himself an example of the resurgence of hope and strength in Rwanda, after the long nightmare: in 1994, he abandoned his studies and fled to the Democratic Republic of Congo, where he spent four years in refugee camps.

Now 51, he never expected to have the opportunity of advanced training. Now, since returning from Makerere, he has pioneered the innovation platform approach in Rwanda, establishing innovation platforms for maize, cassava, potatoes, and hillside irrigation in various parts of the country.

Most recently, he put together an innovation platform around the issue of fishing in Lake Kivu, where fish stocks are heavily depleted. In that case, the platform has brought together fishermen, local leaders, researchers, extension workers, police, small traders, and drivers who ferry the fish to Kigali for sale, sellers, and consumers to come up with intelligent ways of exploiting, managing and conserving severely limited fish resources.

Now, Mr. Dusenge is working to deploy the innovation platform model nationwide: "If everybody does the right thing, the value chain is successful. Fishers need sellers, who need consumers—and it works!"

In Rwanda, new training and education empowered students like Mr. Dusenge and his colleagues to bring new energy and ideas into the system, in order to address current and future agricultural challenges in their country. The early successes of these returning students shows that SCARDA's approach of building on RUFORUM's strategy of revitalizing higher education in order to strengthen capacity, is a promising model which could be scaled throughout the continent.