RUFORUM Case Studies

AFRICAN UNIVERSITIES CONTRIBUTING TO AGRICULTURAL DEVELOPMENT

The Case of the Bunda College of Agriculture



Bunda College of Agriculture is one of 29 universities in Eastern, Central, and Southern Africa comprising the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM). This case study, supported by RUFORUM, is one of a series that recognizes the important role that universities play in contributing to the well-being of small-scale farmers and economic development of countries throughout sub-Saharan Africa.

Setting the context

Situated in the scenic Central Region of Malawi, close to the bustling capital of Lilongwe, Bunda College of Agriculture (BCA) was established in 1967 with the objective 'to improve the food production, food security, and nutrition of the people of Malawi. Its initial focus was to train Ordinary level (O-level) school leavers in basic crop and livestock production and extension methods in order to reach smallholder farmers, who produce an estimated 80% of food in Malawi. Over the years, BCA has broadened its focus to include requirements for estate farmers, recognizing that issues of nutrition, food processing, and food engineering technologies, as well as their transfer to farmers, are required for sustainable agricultural production. The 1,500-hectare campus hosts 12 academic departments, residences for staff, students and workers, and over 46 hectares of land dedicated to student farms.

Bunda College of Agriculture's Mission

To advance and promote knowledge, skills, self-reliance, and sound character for:

• Sustainable food production and utilization;

- Improving income, food security, and nutrition; and
- Conservation and management of biodiversity, the environment, and natural resources through the provision of information services, teaching and training, research, outreach, consultancy, and sound management in response to national needs.

The College's dedication to community development is evident in the programmes and structures created specifically to stimulate community and agriculture development in Malawi and the region. The College runs several projects dedicated to enhancing the development of its students, staff, the surrounding community, the country, and the region. This is in addition to curriculum-integrated projects in which students are involved. This case study showcases a sample of these projects. While it is not a comprehensive catalogue of all initiatives at BCA or of all of the work being facilitated by RUFORUM in the country, it provides an excellent illustration of the important role of universities in supporting small-scale agriculture.

Developing students, developing communities

Bunda College of Agriculture offers several four-year undergraduate programmes leading to Bachelor's degrees. The aim of these programmes is to train trainers, administrators, and professional workers in agricultural education, research, and in the planning and implementation of agricultural, agribusiness management, natural resources management, and rural development programmes. In addition, the College offers various postgraduate degree programmes at MSc and PhD levels.

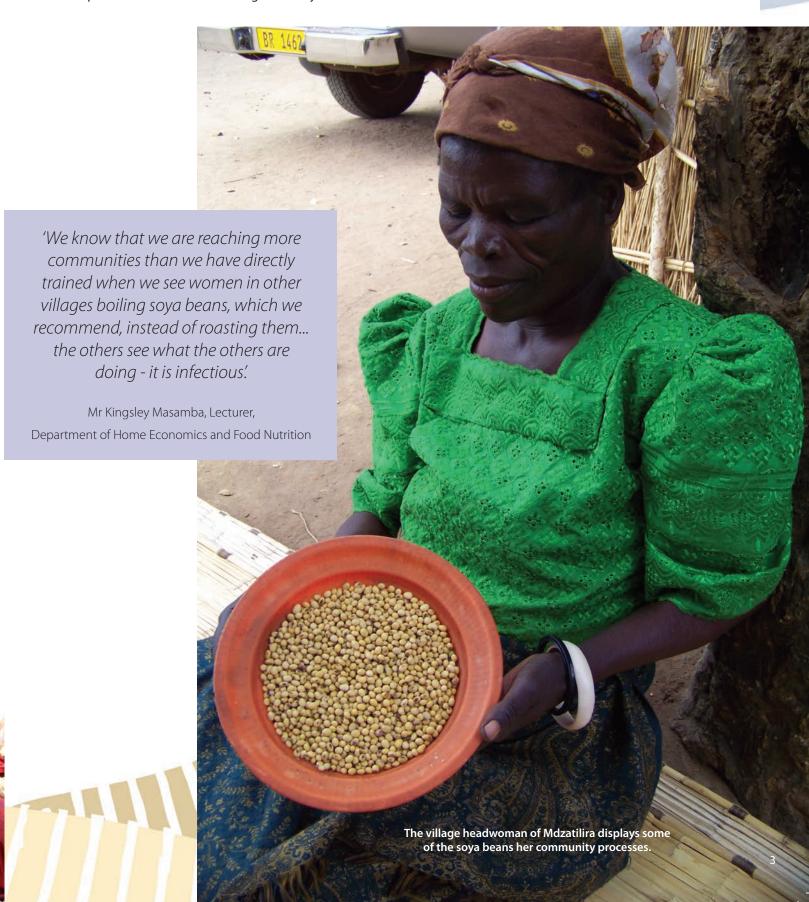
All academic programmes incorporate experiential learning. At the undergraduate level, students are required to participate in internships or field attachments, where they work at a suitable collaborating organization, farm, industry, or agricultural company for a minimum period of two months, usually during breaks between academic years. The Extension Department plays an important role in preparing students for this process by teaching third-year students effective communication skills to foster good community relationships. Almost all third-year students complete courses in psychology, sociology, and communication to prepare them for field attachments during which they go out and transfer technology skills to farmers. These attachments often have a powerful impact on the communities they reach, as is evident from the examples below.

Ida Chithonje, pictured with a group of village children, is one of the women at Mdzatilira Village trained to process soya beans into soya milk.



Combating malnutrition in Malawi

The Department of Home Economics and Human Nutrition requires all students studying a Bachelor of Science in Nutrition and Food Science to complete an attachment programme in their third year of study. One such programme takes place at the nearby Mdzatilira Village, where students are involved in training women to process and prepare soya beans. The project involves teaching community members how to bake bread, biscuits, and snacks with soya bean flour, add soya bean flour to their vegetable dishes, and produce soya milk and porridge for infant-feeding. Whilst soya beans were mainly used for animal feed and for sale in the past, the project has resulted in the community being educated on their nutritional value (essential in the predominantly maize-based diet of Malawians) and various other uses of soya beans for consumption. The communities also learn about the importance of keeping food reserves for their families. Meanwhile, the nutritional status of village children has improved as a result of increasing use of soya beans.



Increasing food production through simple and innovative technology

The Department of Agricultural Engineering is involved in conducting research and implementing development programmes to tackle the vital issue of irrigation. One such project involves introducing rope-and-washer pump technology to small-scale farms at Nswabe village, just outside of the College. The Department has modified the pump to suit the local environment and local resources.

The rope-washer pump is a simple and affordable technology designed to lift water from depths of up to 40 metres. The design consists of a rope with knots and rubber washers placed at intervals. This rope is drawn upwards through a rising pipe by means of a winding wheel with a crank. During operation, the pipe is inserted into water, and water is drawn and discharged.

This initiative involves third- and fourth-year Agricultural Engineering students working on laboratory and field trials to demonstrate the rope-and-washer pump technology to farmers. Students conduct tests on the pump in order to establish the best design parameters. This involves determination of the best combination of washer spacing and pipe size to give the highest pumping rate. Once the ideal design parameters are established, the students, with assistance from farmers, construct and install the pump at a farmer's field for on-field trials and demonstration. The field trials equip farmers with knowledge and skills to enable them to use and maintain the technology.

There have been challenges during implementation of the rope-and-washer pump technology, mainly related to both scarce availability of required parts for the technology and lack of funds. In order to resolve some of these challenges, students and staff are exploring alternatives to using tyres as pulleys, and are considering using wood bearings rather than metal bearings, which will reduce the cost of the pump.

Despite these challenges, the rope-and-washer pump has made a positive impact on the community. It is a much simpler and more effective technology than the treadle pumps which were distributed by the government to farmers between 2004 and 2005. It has a higher output per unit of energy input compared to the treadle pump, and is therefore less strenuous to operate. The Department has demonstrated the rope-and-washer pump to various stakeholders, including government officials, on Bunda College Field Days as one way of promoting the pump to people who can influence its adoption as a cheaper and more effective option than the treadle pump.

Currently, there are three farmers involved in the project. One such farmer is Mr. Adson Daisoni, who uses the rope-and-washer pump to lift water from a shallow well for irrigating tomatoes. Involvement in the project has enabled Mr Daisoni to increase his yields of tomato crops.

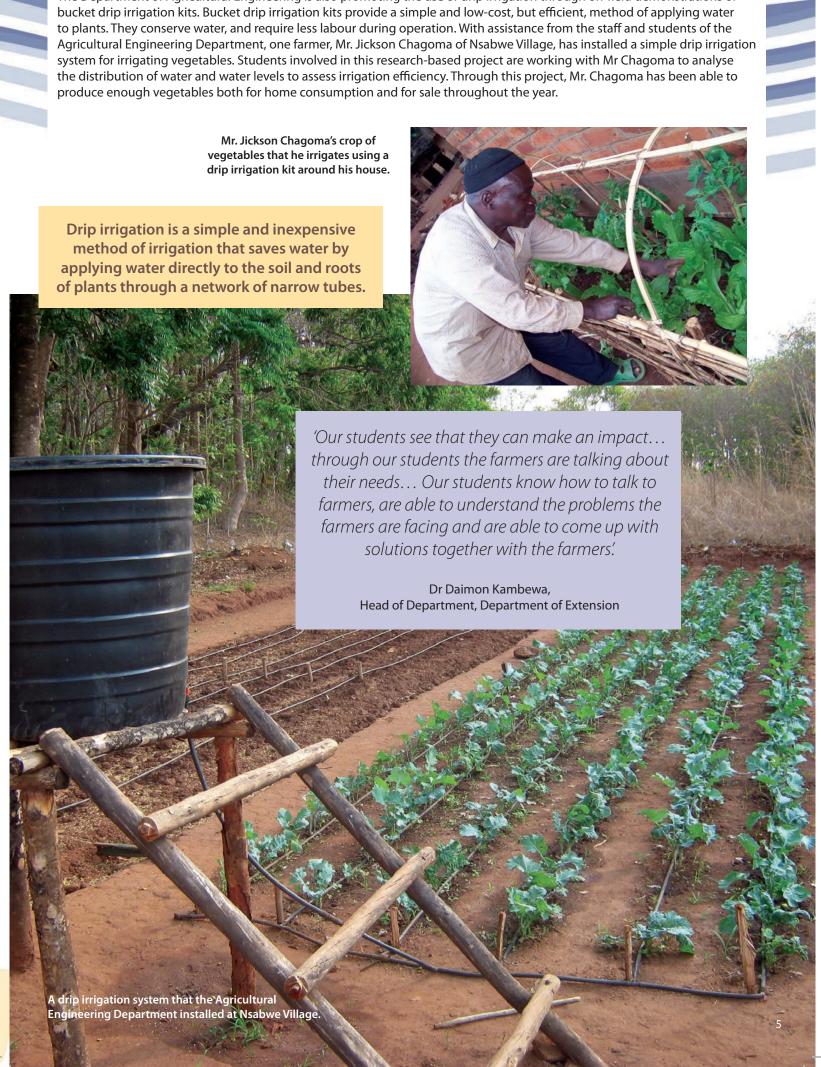


Mr. Adson Daisoni (third from right) with his wife and children pictured with his rope-and-washer pump. The shallow well can be seen behind the pump.



Mr. Daisoni and family, proudly showing their tomatoes.

The Department of Agricultural Engineering is also promoting the use of drip irrigation through on-field demonstrations of bucket drip irrigation kits. Bucket drip irrigation kits provide a simple and low-cost, but efficient, method of applying water to plants. They conserve water, and require less labour during operation. With assistance from the staff and students of the Agricultural Engineering Department, one farmer, Mr. Jickson Chagoma of Nsabwe Village, has installed a simple drip irrigation system for irrigating vegetables. Students involved in this research-based project are working with Mr Chagoma to analyse the distribution of water and water levels to assess irrigation efficiency. Through this project, Mr. Chagoma has been able to produce enough vegetables both for home consumption and for sale throughout the year.



Enhancing community development through research

All academic departments at Bunda College typically incorporate a participatory research approach into their projects to allow the voices of the community to be heard and thereby to inform future interventions. In addition to the above-mentioned examples of curriculum-related projects, all of which incorporate a research element, Bunda College of Agriculture also plays an important role in conducting agricultural research relevant to the region.

For example, BCA was designated as the node on fisheries and aquatic sciences research and development activities for the Southern African Network for Biosciences (SANBio) in June, 2006. SANBio is an intergovernmental network that is managed through the NEPAD African Biosciences Initiative. The node, with an acronym of SANBio-Fish, is housed in the Aquaculture and Fisheries Science Department at the College. The aim of this node is to use 'science, technology, and innovative systems to build and strengthen a network of researchers involved in refining and implementation of projects to enhance fisheries, aquaculture production and biodiversity'.

Vision and Mission of SANBio-Fish

Our Vision is to be a centre of excellence for coordinating and facilitating state of the art research and dissemination on fisheries and aquaculture in the Region.

Our Mission is to use Science, Technology, and innovative systems to build and strengthen a network of researchers involved in refining and implementation of projects to enhance fisheries, aquaculture production and biodiversity.

SANBio-Fish is involved in numerous activities including:

- The BioFISA project to develop Southern African capacities in the area of biosciences and bring new innovative biosciences-related products into the market place in order to alleviate poverty and achieve sustainable development. Currently the programme is supporting implementation of eight research and development projects in 12 countries in Southern Africa.
- Sustainable Aquaculture Research Networks for sub-Saharan Africa (SARNISSA), a three-year project with a consortium of eight partners from Africa, Europe, and Asia and a focus on initiating regular communication among stakeholders (researchers, commercial and market sectors, government agencies, non-governmental organizations or NGOs, and others) in order to initiate and nurture collaborations.
- Partnership for African Fisheries (PAF), which aims to facilitate cooperation, development of knowledge, sharing of experiences, and introduction of information systems to pave the way for policy reform to tackle illegal fisheries production and trade.



Students at Bunda College of Agriculture



Professor Emmanuel Kaunda (Coordinator of SANBio-Fish node)

A notable project that SANBio-Fish is also implementing is RUFORUM's Community Action Research Programme (CARP). The purpose of this programme is to demonstrate innovative approaches towards strengthened university engagement with development practice in Eastern and Southern Africa. At Bunda College, CARP focuses on enhancing fish production and marketing for food security and rural incomes of small-scale producers in Malawi.

The overall objective of the project is to increase fish production for food security. It aims to grow rural income in Southern Africa by disseminating improved Tilapia strains among small- and medium-scale aquaculture producers and by applying 'best practice' aquaculture techniques developed throughout the fish farming value chain. The project aims to re-create the optimal breeding environment of Lake Malawi in small inland fish ponds. It is being implemented in Dowa and Mchinji Districts in Malawi. Central to the project is implementation of low-cost technology that increases the water temperature and thus yields of tilapia, a fish species that contributes to most of the protein in Malawians' diets. The project also involves a credit financing organization to assist in managing farmers' savings, providing soft loans, and linking farmers to other micro-finance institutions.

In addition, the project enhances human capacity by supporting Master's and PhD students. At Bunda College, postgraduate students complete an internship. This is usually a research project, during which students work with, and learn from, communities and other stakeholders. At CARP, three such students, together with the Principal Investigator of the project, Professor Emmanuel Kaunda, the CARP coordinator, Edward Kabaghe, and other collaborators from BCA, NGOs, and Malawi Government have been engaged in this project since 2008.



Chimwemwe Salima stands beside stocks of tilapia fingerlings.



Farmers stock ponds with Tilapia fingerlings.

The project adopts a community action research model, whereby researchers conduct a needs assessment to identify requirements and challenges of the farmers in the two districts. Using this model, research focuses on the effects of the researchers' direct actions of practice within the community, with the goal of improving the performance quality of the community and the way in which fish farming is done.

Having initially started with just two farmers and 12 fish ponds using funds provided by the National Research Council of Malawi and BioFISA project under SANBio, CARP finances have been used to scale up the project to include more than 30 farmers and 160 fish ponds.

'Within a period of two to three years, some farmers in Dowa have changed from food insecurity to food security. The farmers can testify that, whereas they previously could not find financial backing, they are now able to earn money through fish sales to buy fertilizer for maize and have maize throughout the year. This is a huge success story. CARP has used these farmers as a nucleus to multiply the project.'

Professor Emmanuel Kaunda, Coordinator of SANBio-Fish node

In addition, engagement with farmers has helped to shift the mindset of community members from subsistence to commercial farming, as farmers are trained to manage their fish ponds and their income, which has increased through fish sales. Perhaps the most powerful impact of this is that, within just two years, farmers have seen a visible difference in the quality of their life. For example, Mrs. Flora Mwase, on whose farm the research was conducted, owns seven fish ponds. Her husband, Edward Mwase, was encouraged by her to support the fish farming project, and is now constructing new ponds to increase tilapia yields. In 2010, after selling the fish that they harvested, the Mwases used the money to build a house and buy a radio. They have also been able to send their daughter to school.



Mrs. Flora Mwase (seated), posing with her new radio.



Mrs. Mwase's house before she became involved in fish farming activities.



After selling the harvested fish, Mrs. Mwase was able to build herself a new house.

Another potential impact is the possibility of the research process linking to the curriculum. Students involved in research at CARP regularly consult with and record farmers' experience of implementing the different technologies. The findings of their research will be disseminated to the 'Outreach' project, which works to review and implement what has been learned during action research projects back to the curriculum. This review is expected to occur toward the end of the three-year CARP programme. This approach also benefits farmers as it provides them with an opportunity to identify challenges and be part of designing solutions.

'RUFORUM's involvement has allowed BCA to emphasize experiential learning, and what is learned in the field when doing research is now included in curriculum development. That has led to a paradigm shift in terms of how BCA is engaging with communities, researching good practice, and then feeding the results back into the teaching process.'

Professor Emmanuel Kaunda, Coordinator of SANBio-Fish node

In addition, the programme has helped to develop research skills of participating students. An example is that of Chimwemwe Salima, one of 29 African students sponsored by RUFORUM to complete an M.Sc. in Research Methodology at Jomo Kenyatta University of Agriculture and Technology (JKUAT). As part of this programme, students work at a research or education institution during their second year (internship) to practise and consolidate technical and professional skills learned during coursework. Chimwemwe Salima, who is a Malawian, chose the SANBio-Fish node at Bunda College as her attachment site. The aims of the attachment are to provide her with exposure and experience by being involved in working relationships with scientists, assisting with research design and data analysis, reviewing project reports, and providing support for data management. She also hopes that, through this type of engagement, she will more easily be able to find employment.

'I have learned very much. Apart from research-related issues, I have also learned work etiquettes, like how to relate with people/other staff and how to communicate, what is expected of you as an employee at work etc.

More specifically, I have been exposed to data management practically, which has complemented the theoretical part that I did during course work'.

Chimwemwe Salima, MSc in Research Methods

One of the most important outcomes of this exercise has been the collaboration that has emerged between SANBio and JKUAT staff. Supervisors and tutors from JKUAT visited SANBio to assess Chimwemwe Salima's performance, which provided an opportunity for SANBio staff to provide feedback on JKUAT's MSc in Research Methods. Bunda College staff members hope that this is a start of a positive networking relationship between JKUAT and Bunda College.

'Our students are responsive to the issues faced by farmers and come up with research ideas that are practical and realistic...The farmers are very interested in working together with researchers and coming up with solutions to their problems.'

Dr Daimon Kambewa, Head of Department, Department of Extension

Promoting agriculture as a business

Bunda College of Agriculture also inculcates a business and community-centred culture by exposing students to real life systems and by employing community famers in student-run businesses.

Within the Department of Agribusiness, students, staff, and community workers conduct on-campus business projects. Students are given seed capital, and are involved in developing and implementing business plans that target agricultural needs and the needs of stakeholders. There are five business projects currently running at the college: pig breeding, pig fattening, feed manufacturing, poultry layers (raising chickens for eggs), and beef fattening. These business projects were chosen to ensure that the outputs of one business can be used in the others. For instance, the pig breeding business supplies the pig fattening business, while the feed manufacturing business supplies feed for the pig breeding, pig fattening, and layers businesses. Whilst these business projects are student-led, community members are also employed to run the businesses. A departmental bank account, which has both staff and student signatories, assists in monitoring money made through the sale of the business products, and earnings are usually ploughed back into the business.

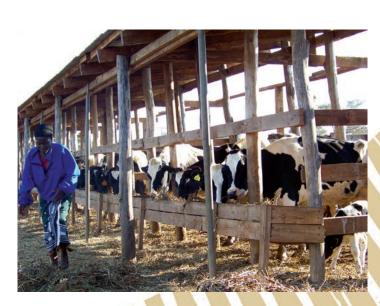
The Department of Animal Science is also involved in running a dairy project to tackle the critical shortage of dairy animals in Malawi. In support of small-scale farmers, the project breeds dairy cows for sale to farmers on a cost-recovery and transfer basis.

These projects and sites act as research and learning centres for the students, are commercially oriented, and aim to inculcate a business mindset in the students and those community members who are employed. Importantly, they help students to have a sense of agriculture as a business, and it is hoped that they will be able to support farmers to undertake commercial farming.

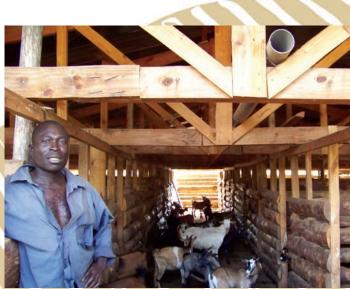
Community outreach

Whilst the above examples demonstrate that Bunda College's teaching and research activities are closely integrated with community development, the College also encourages students to engage in voluntary community outreach activities unrelated to the curriculum. One such project is the goat milk distribution project run by the Departments of Animal Science and Home Economics & Human Nutrition and hosted on a student farm. The project promotes goat milk production to tackle malnutrition among children under the age of five in villages that surround Bunda College. In addition, for over five years, Bunda College has distributed goat milk to NGOs and orphanages. The large demand for this milk has triggered the Department to introduce an initiative to breed goats, also involving community members and training farmers.

Another example of a community outreach programme is that run by the Department of Home Economics and Human Nutrition, which involves airing a weekly 30-minute radio programme in Chichewa, the main local language in Malawi. The programme contributes to the nutritional well-being of Malawians by disseminating nutrition information via radio.



A community member working in the Dairy Project at Bunda College of Agriculture.



A community member working in the goat milk distribution and goat breeding project at Bunda College.

Commitment to research, outreach, and capacity development

At the institutional level, Bunda College of Agriculture's commitment to research, capacity building, and outreach was reflected in the establishment of the Centre for Agricultural Research and Development (CARD) in 1985 and a dedicated Programmes Coordinating Office (PCO) in 1998. CARD has three units: Agricultural Policy Research Unit (APRU), Agricultural Policy Analysis Training Unit (APATU), and Training and Consultancy Coordinating Unit (TCCU). Through these units, the Centres undertake policy-related research and training in a number of areas within the agriculture and natural resources management sectors.

The role of the PCO is to coordinate various capacity building, research, and outreach projects for the College. With funding from several international groups, the PCO plays a central role in managing, monitoring, and evaluating agriculture-related projects and programmes, some of which are at a national level.

'The establishment of PCO was not to implement but to coordinate, monitor, and evaluate and to ensure accountability and transparency; that is the uniqueness of this office.'

Moses Limuwa,
Acting Programmes Coordinator at the PCO Office

Examples of projects that the PCO coordinates include:

- The Bunda College Capacity Development Programme (BCDP), which has a broad goal of improving teaching, learning, research, and outreach to enable the College to play a significant role in Malawi's development. This programme has had wide-ranging impacts such as more than 40 staff being trained at different levels (PhD, MSc, and below), upgrading library material, and increasing the enrolment of female students from 20% to 38%.
- The Agricultural Research and Development Programme (ARDEP), a national project focusing on creating a research and outreach system for agriculture in Malawi. At Bunda College, 19 demand-driven research and outreach projects have been implemented, which have had impressive results, such as a 30 to 50% increase in food production, and increased uptake in technologies being implemented (which also involves at least 20 to 50% women).
- RUFORUM's National Chapter and capacity building activities, which include:
 - PhD programmes in Aquaculture and Fisheries Science and Agricultural and Resource Economics.
 - The Community Action Research Programme (CARP) described above.
 - Support for capacity building through sponsorship and training of staff at PhD level.
 - Support for the neglected crop species project which involves conducting research to promote the use of neglected and under-used species of plants, while training young scientists in research and scientific writing.
 - Support for the Agriculture, Science, Technology, and Innovation (ASTI) Systems Analysis Studies. This programme is an EU-Africa, Caribbean, and Pacific (ACP) project coordinated by the Technical Centre for Agricultural and Rural Co-operation (CTA) in the Netherlands, which involves training-of-trainers workshops in understanding the ASTI concept and its application to various situations. Research projects are conducted after training, with the aim of building ACP capacity to better understand the strengths and weaknesses of the local science, technology, and innovation system in the agricultural sector.
 - Support for the Agricultural and Resource Economics (ARE) department identified as a 'Centre of Excellence' by RUFORUM through acquisition of teaching material and sponsorship of PhD students.
 - Financing the construction of a postgraduate hostel, which houses students from all RUFORUM-supported programmes at BCA.

Moses Limuwa standing outside the PCO
Building. Moses completed an MSc in
Aquaculture & Fisheries Science with support
from RUFORUM. He now plays a key role in
ensuring that lessons are used to improve
projects and programmes run by the College.



What makes Bunda College's approach unique?

Bunda College of Agriculture's approach to community development is an active attempt to meet the needs of the surrounding community, as well as the country. The formal curriculum integrates community engagement and its importance is highlighted in the mission statement of the Departments. For example, the Home Economics and Human Nutrition Department's mission is 'to advance knowledge and promote use of foodstuffs and other resources by families and industry through teaching, research, and outreach activities, in response to the needs of Malawi'.

'I will be there to help in the rural areas and train the farmers to work with technology and to use the resources they have, so at the end of the day they can yield more and our country can be a hunger-free nation.'

Richard Banda, first year BSc in Agriculture student

The College has dedicated structures to ensure effective community engagement, with the PCO focusing on community development by coordinating, evaluating, and assessing projects and programmes and the Extension Department ensuring that every student graduating from Bunda College has the requisite skills to engage effectively with communities. Additionally, the Extension Department is involved in all activities related to outreach and attachment programmes. It assists other departments when technology is taken to the communities by preparing posters, conducting field days and demonstrations, and mobilizing farmers to participate in projects.

'The Extension Department is well-skilled in simplifying technical messages. Where we are not clear, we ask a member of the Extension Department to assist in disseminating the messages. We respect their discipline; they are the bridge between our department and the community'.

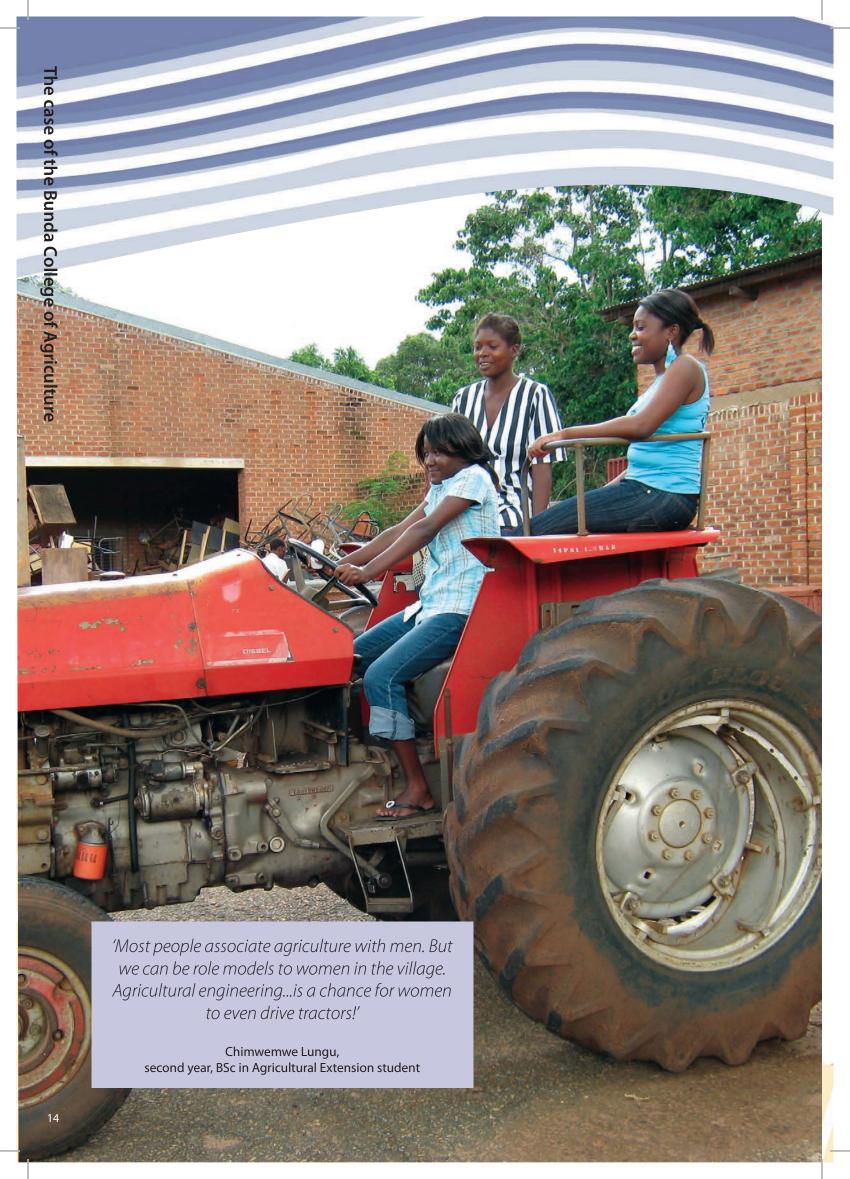
Mr Kingsley Masamba, Lecturer, Department of Home Economics and Food Nutrition

Bunda College places high value on empowering women in agriculture, with several projects (including ARDEP and BCDP) having a specific focus on women empowerment. In addition, it provides bursary incentives for female students, and all departments promote the incorporation of women in programmes and activities. The College's current policy on student recruitment is to have equal representation of males and females. Furthermore, some attachment programmes specifically target the development of women. For example, an attachment run by the Agricultural Engineering Department supports small-scale business women to process groundnut oil.

Projects include a strong research focus to inform interventions and to feed findings back into the curriculum through processes such as the Outreach programme. Participatory research and actively involving famers and community members in all projects is considered essential.

Student field attachment programmes focus on simple, yet innovative, concepts that meet community needs and have resulted in noticeable impact on those involved.

'In terms of our approach to community engagement RUFORUM's grants have allowed us to emphasize action research and community engagement. BCA staff are now able to reach communities through practical action research with an eye to creating sustainable development.'

Professor Emmanuel Kaunda, Coordinator of SANBio-Fish node 

'Communities come to us and tell us that they are interested in our projects. What we then do is assist the community to acquire the required technology.'

Dr. Wellam Kamthunzi,
Senior Lecturer and Head of the Agricultural Engineering Department

The university is engaged in wider African-initiatives through initiatives such as RUFORUM and SANBio, allowing for the creation of greater collaborative projects and partnerships.

'RUFORUM has had a far reaching impact...the competitive grants provided by RUFORUM have assisted in staff retention at BCA. Quite often, staff leave the university because of a lack in funding and financial frustrations but the RUFORUM grants have proved excellent motivation for staff to continue their studies'.

Professor Emmanuel Kaunda, Coordinator of SANBio-Fish node

Key challenges

Like most higher education institutions in Africa, Bunda College of Agriculture faces the challenge of inadequate funding which limits the scope of community research and outreach programmes. In addition, there are several challenges when working with communities:

- Securing farmer buy-in to the projects is sometimes a challenge. For example, in the RUFORUM-supported CARP project, it was difficult to convince farmers to build large ponds rather than using their land to cultivate maize. One way in which this challenge is tackled is through 'role models' or early-adopter farmers displaying the benefits of participating to other farmers. In this case, the tangible evidence of the Mwase's home renovations has encouraged farmers in surrounding areas to join the project.
- Many farmers have never been exposed to technology. Therefore, when new technology is introduced, training is time-consuming as the concepts behind the technology are often not understood.
- Farmers' products attract low prices in the market as they do not always have the knowledge to negotiate for better prices, which is essential to economic growth. High rates of illiteracy exacerbate the very limited technological and business knowledge of the farmers, which is why participatory research, actively involving famers and community members in all projects, is considered essential.
- It is sometimes difficult for staff members to supervise students in their attachment programmes, due to lack of time and finances.
- Another challenge is ensuring the sustainability of projects so that they can continue to run without the support of Bunda College staff and students. For example, one of the sites of CARP is Dowa District. It is located approximately 125km from Bunda College, and thus project members only visit it every four weeks. In order to solve this problem, farmers are trained so that they can maintain the technology and help each other in the absence of the technical staff.

Despite these challenges, Bunda College of Agriculture is committed to community development, and the impacts of its various activities are clearly visible in the enhancement of the lives of the communities they have touched.

'I believe we have great potential. We have good land that is very fertile and 32% of the country constitutes water, yet we are not using it and people still go to bed hungry. [Malawians] are hard working and creative, but we need to give capacity to the people'

Edwin Kenamu, second year BSc in Agricultural Economics student



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