

RUFORUM Case Studies

Participatory Action Research Boosts Incomes
and Food Security through Small-Scale
Aquaculture In Malawi

In Malawi, Participatory Action Research Boosts Incomes and Food Security through Small-Scale Aquaculture

Edward Mwase kneels beside one of his family's fish ponds and threads a pole through a hook, lifting a submerged feeding tray up to the surface of the water in order to check on the size of his fish.

In these waters, a thousand tilapia are feeding and growing. And as the fish mature, Mwase and his family are looking forward to the time, a few months from now, when they will be able to harvest and sell their catch, earning a healthy profit which can then be ploughed back into paying children's school fees, purchasing farming inputs, and expanding their nascent aquaculture business further.

On this day, the Mwase's and their neighbours, who are members of the Khumbirani Club, a group of small-scale farmers pioneering aquaculture in the area, have gathered at an expanse of six experimental fish ponds belonging to Flora Kaliwu, on the lush, green hillside.



Edward Mwase, Flora Kaliwu and grandson Kaliwu Mwase



Tilapia feeding tray

As Malawian farmers face an increasingly uncertain future, due to the combined forces of climate change, soil depletion and the free market, Mwase and his wife Flora are working with researchers from the Bunda College of Agriculture, at the University of Malawi, a leading regional institution for training and research on issues of poverty and food security, to help develop aquaculture as a viable enterprise to improve livelihoods and food security.

The Community Action Research Programme (CARP), as the project is called, is funded by the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM), a non-profit research and advanced training network of 29 universities across Eastern, Central and Southern Africa.

The programme is still young, but the results so far have been impressive. The first harvest, in July, produced a bumper yield of 497,63 kilograms of fish, which sold for 342,080 Malawian Kwacha (about USD \$1,275), a sum which was shared amongst eight participating farmers. The fish yield translates into an average of 1663 kilograms per hectare per year for each farmer, which is double the current productivity of 750 kg/ha/year. This productivity in turn translates into earnings of around US\$ 481 per farmer per year, which already amounts to a significant improvement in livelihoods, in a country where the majority of the population lives on less than 1 US\$ per day.

CARP builds on a long legacy of water and fisheries research at Bunda College, as well as on a long-standing relationship with RUFORUM, which was housed at the College during the first decade of its existence. Since its inception in 1992, RUFORUM (previously a programme of the Rockefeller Foundation, called FORUM, until it formed as an independent entity in 2004) has made grants available for academics within the network to pursue programmes of field research that support the needs of smallholder farmers, who are the economic backbone of the continent.

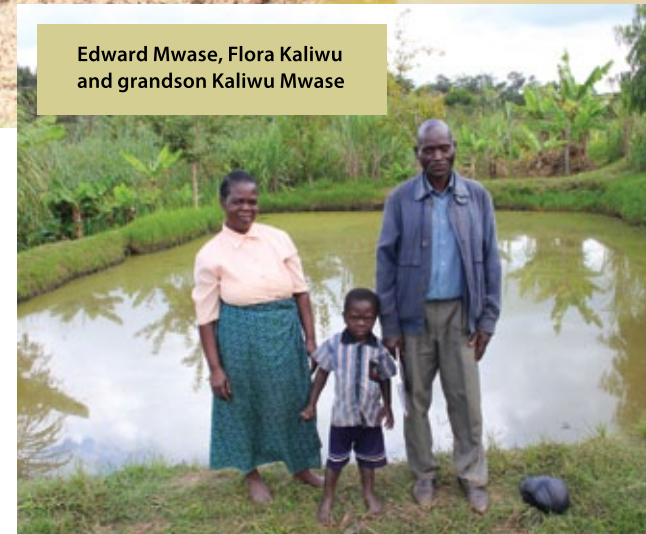
These grants engage postgraduate students in conducting field-based research projects for their MSc and PhD degrees – an approach that has served not only to strengthen the academic and research base of university agricultural programmes, but has also in the process enabled universities to respond to society's most pressing challenges in ways that strengthen their connections to farmers, policy-makers, non-governmental organisations and commercial value chains.



Prof. Emmanuel Kaunda



Dowa Farmers



Edward Mwase, Flora Kaliwu and grandson Kaliwu Mwase

At Bunda College, research support from RUFORUM has enabled academics to publish, build careers, and attract additional research grants from new funding sources (see Competitive Grant Scheme Storyline). The students trained under the research programmes, meanwhile, have gone on to fill key positions within government and the NGO sector, while others have gained opportunities to do PhDs abroad.

As a new iteration of RUFORUM's research grant-making, CARP reflects a new drive within the organisation to build participatory research programmes that will have a deeper and more lasting impact.

In Malawi, with its reliance on small-scale farming, and its abundant water resources – most evident in the massive Lake Malawi, which covers a fifth of the country's surface area – it makes sense to focus this effort on small-scale aquaculture, says Professor Emmanuel Kaunda, the Principal Investigator of the programme. The study looks to future needs, improving resilience in food security and harnessing Malawi's water resources, he says.

"People say that small-scale aquaculture is a non-starter," says Kaunda. "Our conviction is that the reason it's small-scale is that it's not yet linked to markets. With the right technology and the right value chain in place, the potential of aquaculture in Malawi is just enormous."

The programme's focus on small-scale producers, who supply 80 percent of the country's food needs, is equally important. While Malawi is considered food secure, that status is increasingly tenuous as climate change bites, introducing longer dry spells and increased flooding—while at the same time yields are falling due to soil exhaustion, pests and crop diseases, and the ever-shrinking size of smallholder plots due to rising population density. HIV and AIDS are also taking a heavy toll amongst rural farmers.



Against this backdrop, Malawian farmers have also been buffeted by sweeping changes to the market over the past couple of decades, as the country has transitioned from a tightly controlled economy to a free market.

Most recently, the impact of the country's severe economic crisis and crippling foreign exchange shortages over the past couple of years – precipitated by the loss of international donor support, which previously provided around 60 percent of the national budget, has also trickled down to farmers, as subsidies to help farmers purchase seed and fertilisers are scaled back, and produce prices fall.

Historically the presence of Lake Malawi, with its abundance of fish, made it seem pointless for farmers to attempt fish-farming. But due to overfishing in the lake, fish are now increasingly scarce. Catches have dwindled sharply over the past 10 years. Because it's a common resource, available for anyone to harvest, overfishing has been rife. Embargoes on fishing during spawning season have been poorly enforced.

The collapse of Lake Malawi's fish stocks, meanwhile, reflects trends around the continent. Yet as fish provides the primary source of protein and micronutrients for nearly a third of all Africans, alternatives will need to be found sooner rather than later.

According to Lisungu Banda, a master's student under CARP, whose research involves building a value chain around small-scale fish-farming, the protein consumption of the average Malawian has declined sharply since the 1970s, from about 14 kilograms per person per year, to less than half that figure. *"Our population has increased, so basically we're all battling for the same tonnage of fish,"* she says.

Kaunda, a specialist in aquaculture and fisheries science, who was also named the aquaculturist of the year for 2011 by the Aquaculture Association of Southern Africa, was also the recipient of an earlier RUFORUM grant, looking at how cultivation and other environmental impacts affected fish in the Linthipe River, which helped to set the stage for CARP. The research involved two master's students – one looking at the socio-economics of cultivation along the riverbank, and the other looking at the effects of water quality on fishing yields – and began to build a base of knowledge around managing the ecology of the country's water systems and fish resources.



Annie Zidana

For Annie Zidana, who looked at how cultivation along the riverbank contributed to food security for her master's, and now works as a Principal Officer in the Ministry of Agriculture, Irrigation and Rural Development, the research yielded insights which she still draws upon in her role in government.

On the one hand, the Ministry was encouraging farmers to do irrigation and riverbank farming, using methods like treadle pumps. *"In the low season, people even cultivate in the riverbeds, which leads to severe degradation of the riverbank,"* she says.

While such practices help to ensure food security, they also hasten soil erosion and land degradation along the riverbanks, which of course poses a longer term threat to the sustainability of farming in the area.

While Zidana has gone back to her government position, her relationship with the university and with Prof. Kaunda has continued. *"My Master's thesis sharpened my skills as well as my knowledge of how to conduct research,"* she says. *"It gave me courage and confidence."*

It was a small grant with a ripple effect. Due in part to this strong background of research on aquaculture, Bunda College was then designated as the Regional Fish Node for the New Partnership for Africa's Development (NEPAD) African Biosciences Initiative in 2006, making the university a focal point for research and dissemination on fisheries and aquaculture in the region.

The activities of the Regional Fish Node, known by the acronym RFN, extend across the continent, and include networks such as the Aquaculture Working Group and the African Fisheries Experts Network (Afri-Fishnet), which are working to create and influence policies to support the growth of fisheries industries in the region.

Although CARP is a local process, it will have the potential to shape wider regional policies as its outcomes are eventually absorbed into the processes of the RFN.

CARP is being carried out in two Malawian communities: In Dowa, the district where Mwase and his family live, fourteen farming families have been collaborating closely with researchers under CARP. Another group of 54 farmers from the district of Mchinji, a four-hour drive away, is also taking part.

CARP encapsulates RUFORUM's unique approach of building capacity in higher education through supporting the work of postgraduate students engaging directly with smallholder farmers in the field. The programme holds particular promise as an alternative to traditional government extension services for farmers, which are less engaging and interactive than the CARP model, says Kaunda.



Covered farmer fish ponds, Dowa

On a practical level, the university has linked farmers with micro-credit, as well as implements and training in order to build and stock their fish ponds.

Master's student Priscilla Longwe has been looking at the combined effects of introducing both an improved strain of tilapia, along with several new techniques which have been shown in research station trials to improve yields. These new techniques include partially covering the fish ponds with plastic sheeting for warmth; submerging feeding trays in the water, like the one that farmer Edward Mwase was examining, which helps farmers to calculate their fish food needs, and prevents the fish food from sinking to the bottom of the pond; and introducing an inexpensive yet highly nutritious new feed made from maize bran, wheat bran and soya.

In the project design phases, the researchers were able to select from a range of previous research, and incorporate the measures with the best proven results into the programme – an effective way of bringing the fruits of researchers' labours directly into communities, rather than letting the knowledge gather dust on the shelf.

The research testing the effects of covering ponds partially with plastic sheeting, for example, was undertaken by Chimwemwe Salima as part of a RUFORUM-sponsored master's programme in research methods at the Jomo Kenyatta University of Agriculture and Technology, in Kenya. *"A lot of research has been conducted, but often the results are not used,"* says Ms. Salima, who now works as project coordinator for the RFN. *"This can change through programmes like the CARP."*

In addition, the new improved fish strain was developed by a Bunda College geneticist, who cross-bred the slow-growing tilapia strain most popular for fish farming, because of its high survival rate in the ponds, with other faster-growing yet less resilient strains of fish from the wild.

In Dowa, Longwe has set up different combinations of variables in 24 different ponds, and visits the community every 21 days in order to measure fish growth, take water samples, and collect other data. So far, she says, the results are encouraging: after just two months of growth, the new fish are measuring in at about 40 grams, a size that the old strain would have reached only after six months.

"It's very fulfilling to be able to help farmers improve their livelihoods through research," says Longwe. *"It's a combination of problem-solving and coming up with an experimental layout, carrying out the research, analysing the results, and coming back to give people feedback."*



Fish Farmers removing clear plastic pond cover for fish harvest



Dowa Fish Ponds

"I had never interacted with farmers before," she continues. "I was very intimidated at first, but through the interactions, I got to learn what they expected of me in the community... I trained them on the biology of the tilapia, what it feeds on, and its reproduction. They are very quick learners, and a little more capacity building will go a long way. They trained me on what farmers and markets are looking for in a good fish breed".

Yet optimising the fish yields is, of course, only the first step in building a solid enterprise. To complement Longwe's work, the other master's student, Lisungu Banda, will be working on connecting the farmers to the value chain, as they currently lack access to markets beyond the village. While most of the farmers currently sell small volumes of fish within their local communities, the goal is to attract large-scale buyers.

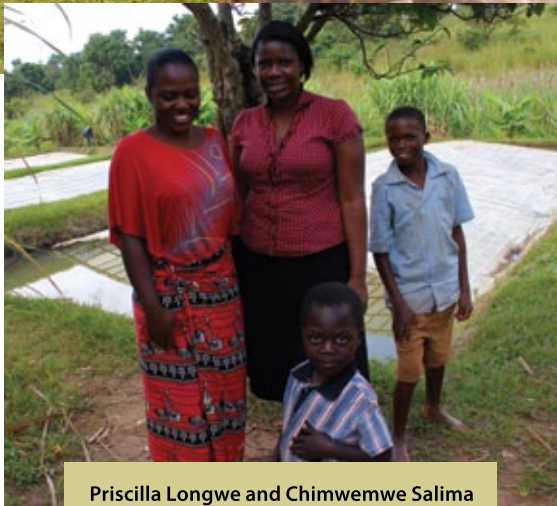
So far, the CARP programme has highlighted a number of farmers' needs for access to transportation for getting their fish to markets, and cold storage facilities at these markets, as well as regulations to ensure that input costs are affordable, says Banda.

The biggest problem for farmers is access to markets, says Banda, who joined the fish node as a volunteer after earning her BSc in agricultural economics, and is now earning her Master's through the CARP. "When you look at the national figures, there is so much demand for fish, and not enough supply. At the same time, the lake fish are depleting," she says.

While the maths of this situation are simple, and imply robust market potential for the farmers – bringing this opportunity to fruition will no doubt be more of a challenge. She will be working with a Kenyan non-profit organisation, Initiatives for Development of the East African Region, in order to build market information systems to link the farmers to the markets.

"I really have the passion," says Banda. "I want what I am doing to help the farmers. I really want to see people move to another level. And personally, I am going to get skills from it. I'm getting to become an expert in marketing."

If farmers are to access commercial markets, however, they will need strong farmer organisations – and that is where the third researcher, PhD candidate Dalo Njera, comes in. Premised on the idea that a strong organisational network of all the various smallholder farmers involved in fish farming will be key to successful commercialisation, his dissertation work aims to develop an empirical understanding of the factors of success.



Priscilla Longwe and Chimwemwe Salima

"We are living in a poor country, there has been a missing link between research and the use of that research by local communities," he says. "If we encourage people to conduct community action research, it will bring local communities who are implementors of these innovations closer to the university. It will bring community action research into the university curriculum."

He continues:

"The major challenge is that the government does not have resources, so we need a community that can be innovative. But when we introduce innovations in rural communities to raise the economic status of the country, it's not sustainable. They are working through poverty, and never think about sustainability — they must just earn for today... In this study, by using community action research, we bring people to terms with their own livelihoods. They learn to stand on their own two feet."

Dalo Njera



Dalo Njera

Most of the members of the Khumbirani Club in Dowa, for example, have relied heavily on subsistence agriculture in the past, growing maize predominately – their ability to diversify to other crops often limited by the cost of seeds and inputs. Without options for transporting their produce to markets, they are also at the mercy of mobile traders who will snap up their entire harvest for a song, due to the lack of competition locally.

Although most have only recently begun farming fish, several have already begun to see the benefits of extra income trickle in. Those who have begun making sales have been able to use the money to pay school fees, purchase fertilizer and inputs for farming; as well as livestock.

Given that the club needs to create volume in order to attract buyers, there is every incentive for club members to work together, and to expand their membership. The name Khumbirani, for example, means "admire us." "We want all the other farmers not engaged in fish farming to admire us, and to want to come and join us," explains Matchaya Simbi, the local headman, who is also part of the group.

In order to join, one must have enough land to construct a 1000 meter pond, pay a membership fee of 500 kwacha, and also be hard-working, explains Bester Mwase, the Mwase's adult son who has his own fish ponds and is in charge of pond construction for the group. New members are subjected to a trial period, after which the farmers all help each other, and will for example look after the ponds of any neighbour who is ill.

"Our eyes have been opened because of this research," says Bester Mwase.



As CARP is already situated within the RFN, the programme, if successful, will be well-positioned to be taken up as a model for the entire region.

RUFORUM has always lobbied governments to step up their support of higher education. *"We have to show governments that if they support us, we can deliver,"* says Prof. Emmanuel Kaunda. *"So if CARP works, it will be providing a platform, a test case, a showcase."*

Fish sales through bidding by CARP PhD student (Dalo Njera)



AUTHOR/RESEARCHER: Megan Lindow
DESIGN AND LAYOUT: Natalie van der Walt
PHOTOGRAPHS: Megan Lindow



This work is published under the Creative Commons Attribution 3.0 Licence.
Copyright © 2012

Regional Universities Forum for
Capacity Building in Agriculture
(RUFORUM)



University of Malawi
Bunda College of Agriculture

