

AQUACULTURE

Buna boon: online platform to boost aquaculture

Wags will tell you that if you teach a man to fish, he'll sit in a boat all day and drink beer. Maybe so, but when it comes to fish farming, improved technical know-how leads to bigger harvests. A new Water Research Commission (WRC)-backed digital initiative does just that, while developing data collection. Matthew Hattingh reports.



Here's something fishy to chew on: more people worldwide now eat farmed fish than beef. The trend is expected to continue, and while Africans lurk at the tail end, trailing every continent in consumption, and all but Oceania in production, that's changing. Aquaculture production on the continent, although less than 3% of the global total, is evolving from subsistence to commercial, cashing in on a growing demand and a favourable environment, including water.

Trouble is, aquaculture takes considerable technical know-how to do well. Give your fish too little feed and they won't grow big in good time; give them too much and you're throwing money down the drain (or at any rate, into the pond). The weight of a fish at a particular age has a direct bearing on profitability. Then

there's everything from water temperature and oxygen content that the poor fish farmer must manage.

Authorities in Africa know this, which is why there's increasing interest in helping our fish farmers become more productive and profitable. Fourteen years ago, a Rhodes University team and the WRC developed a manual (**WRC Report No. TT 463/P/10**) to provide small-scale fish farmers with technical knowledge and support. Seven years later the project was revisited. Printing the manual proved costly and it was cumbersome to update. Meanwhile, the growth of the internet allowed a move away from paper.

The WRC supported an initiative to take the manual online in

the form of a platform called Buna Africa (www.bunafrica.org). Buna is Sepedi for harvest. Developed by the Rural Fisheries Programme, within Rhodes' Department of Ichthyology and Fisheries Sciences, it worked relatively well, and has been widely used in Southern African Development Community countries by farmers and agricultural extension officers. However, it remained beyond the reach of many potential users who lacked access to computers.

The soaraway growth of smartphone ownership suggested a solution. What if Buna was retooled so anyone with a fairly basic device and some data might access it? A proposal to do just that was accepted by the WRC in 2021 and the project that followed has been detailed in *Addressing accessibility of online platforms for low-literacy users in small-scale aquaculture (WRC Report No. 3136/1/24)*. The report, published in May, tells how the look, feel and functionality of Buna have been transformed and why the project far exceeded the more modest digital makeover originally envisaged.

It explained how team Buna set about making the manual more user-friendly. This was crucial because the literacy of rural fish farmers was often lacking and typically, they were still finding their feet in the digital world. The project involved repackaging the manual's content, including switching to simpler, more direct written language, bolstered by voiceovers in English and

vernaculars, and video material, all carefully sorted, cleaned and gutted as far as possible of 'dense, jargon-heavy text'.

But it didn't stop there. "We realised we could do much more than provide the manual online," said Qurban Rouhani, Director of the Rural Fisheries Programme. He told the *Water Wheel* that a central aim of the project had been data gathering, especially production figures. "We realised that in many countries on the continent and beyond, governments don't have regular and reliable production data."

This dearth of data made it difficult to set policy, plan, assign resources and manage the sector, including supporting agricultural extension officers. "In this age, worldwide, data is the new currency," said Rouhani. He told how Buna learned from the likes of Google and Facebook. The tech titans discovered if you give people incentives, useful, free services, they wouldn't be too fussed if you used their data.

In the case of Buna, the services and tools included access to Rhodes-WRC and other aquaculture manuals; a fish production calculator for Nile tilapia (with plans to expand to other species); a WhatsApp-like messaging function that puts farmers in touch with their peers; and a service that links farmers with service providers, such as netmakers, feed producers and pump suppliers.



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For most freshwater fish farmers in South Africa, aquaculture is still a secondary activity. New technologies, such as Buna, make it possible that aquaculture will become more commercially orientated.



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Also included were links to YouTube videos on aquaculture; a weather service with farm-level forecasts and current conditions; and government documents such as funding calls and notifications. Plans for a fish health service that facilitates diagnostics and connects farmers with state vets and laboratories was still in the pipeline.

Rouhani reckoned the tools and resources represented 95% of Buna's content. The balance was about submitting data, with facilities that let fish farmers enter production figures, which would be visible to government officials on Google Maps. He said because farmers benefited from using their own data on Buna, "they can see the truth" so were less likely to fudge facts. Data would be more accurate and timely than if sourced conventionally, which involved extension offices going into the field with clipboards and later transcribing their findings. "The problem with that is you may not go out to the farm for three or four months," said Rouhani, mentioning logistical difficulties facing officials in some countries like a lack of petrol or broken motorbikes. Worse, some farmers "tell the extension officer what they want to hear, or the extension officer tells his bosses what they want to hear".

From the outset, the project sought to rope in fish farmers as co-creators and contributors in Buna's redevelopment. The research-study's authors are Adrie Haese of Pretoria University, Rouhani

and Nyiko Mabasa of Rhodes, Buna Africa's Paul Chisenga, and Bethanie Trollope and Christa van Zyl of the University of Johannesburg. The involvement of Haese, an information design fundi, and Trollope and Van Zyl, an Honours student and head, respectively, of their university's Department of Graphic (Communication) Design, reflected the priority the project placed on design and software development.

To quote the report: "The challenge within the South African aquaculture sector (and across the developing world) is not so much the limitations of the development of digital platforms that fish farmers can use, but rather with limitations on the part of farmers. Fish farmers, based in rural areas, may lack access to internet infrastructure and also have low literacy and/or digital literacy skills. As such, the development of digital technologies should not only look to innovate, but also consider how to do so in a way that is inclusive of populations with diverse literacy levels and digital skills."

To develop the platform the team worked with a group of small-scale fish farmers in Thohoyandou, Limpopo, who had assisted with earlier versions of Buna. Also involved was an extension officer from the area. A "participatory design" process was pursued to hatch and trial ideas, figure out what would work in practice, and understand what suited users best. The thinking was to discover, refine and press into service knowledge

individual farmers intuitively possessed, drawing on their experiences, insights and expertise.

The team knew the platform had to look good and be easy to navigate if it was to attract and keep users. Pains were taken to present information, tools and design elements in a clearer and consistent way. At the same time, it was necessary to strike a balance between the needs of low-literacy users and not alienating more tech-savvy and literate users.

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The report explained the phases and series of focus groups the design process involved. In July 2022 the team met the Limpopo farmers to reacquaint them with the platform. New team members were introduced and there was discussion on Buna’s layout, content and accessibility. Farmers were given a chance to talk about their experiences and the difficulties they faced. Site visits to five farms followed. “The goal, or design brief, that developed from our interaction with the farmers was to update the design of Buna to be mobile-friendly and accessible to users with varying levels of literacy, both in a traditional and digital sense, to improve their businesses and foster a sense of community,” the authors said.

The literature reviewed and with consensus on the desired outcome shaping up, preliminary changes were made to Buna, bringing on board suggestions from the extension officer. Some months later, the team met the farmers again and showed them a “low fidelity”, paper version of the redesigned Buna. The farmers were encouraged to suggest changes. They were also invited to enter their information into the system, navigate the platform and say what they thought of it.

The farmers’ views were sought on “icons, article formats, video links, and other aspects”, with the goal of “envisioning a solution tailored to meet their specific needs”. Next, high-fidelity prototypes were developed and presented to the farmers for their views, with an emphasis “on the platform’s visual appearance, colour schemes, iconography, information presentation, and responsiveness across different devices”.

A further focus group was held in May last year when printouts were shared, and computers made available for farmers to try out the platform. At a final focus group and testing session in September last year farmers tried out a high-fidelity prototype. Field notes, recordings and other data from the focus groups were collected and analysed and the report presented a host of conclusions and recommendations.

For the most part, farmers felt their voices had been heard and their suggestions applied. “Buna platform is very helpful. I can teach us managing and lead

us to better,” said one. Another farmer said it would teach “us to harvest good and health(y) fish” and “how many fish can fit into a certain space”.

Thanks to the farmers’ participation, a need for instructional support was identified. Although the calculator tool was well received, the farmers’ interactions with it led to the development of a video library of frequently asked questions and demo videos on each page of the platform. Community building was not initially a primary focus of the project, but farmers were keen to use the platform to connect.

“The farmers were particularly enthusiastic about the potential of the platform to build a community. They expressed the view that it could help foster the growth of a fish farming community in Thohoyandou, as well as nationally and internationally.” The farmers also hoped the platform would improve communication with officials and extension officers, reducing frustrations and improving government support.

What was the state of fish farming in South Africa? the *Water Wheel* asked Rouhani. He said aquaculture started in the country in the 1890s with the introduction of trout, but the sector remained small, with production of 8000-tons a year. By comparison, it was growing vigorously elsewhere in Africa. Zambia, for example, produced over 100 000-tons a year, while Egypt topped one-million-tons. The focus on the continent had shifted too, from subsistence and providing cheap protein to commercial production.

Rouhani mentioned Buna had partnered with the agency WorldFish in Zambia and Malawi, and was working with the UN’s Food and Agriculture Organisation (FAO) in Uganda and Rwanda. At the time of the interview, he was preparing to travel to Ghana to meet the FAO to explore how Buna could be expanded to other African countries.

He hoped Buna data would spur and support the South African government to develop policy and grow the sector. Rouhani said the new WRC report was part of a work-in-progress and he was excited about what the next version of Buna might look like. “This kind of research is not something that ends. We have not reached perfection; there is no end point. Farmers improve. Literacy improves. New technology comes into play,” he said, mentioning the internet-of-things (where objects equipped with sensors are networked) and artificial intelligence (AI).

“We used it in a very small way (in the study, to simplify complex language), but we have our eye on it. We really see AI becoming the engine of digitalisation. Can you imagine if we unleash AI, it can help fish farmers manage water quality, price of feed and stocking and to predict demand and fish prices. You can hold your fish back a bit or squeeze a few more out. The power of digitisation is there to be harnessed. It’s exciting.”

To view the report, *Addressing accessibility of online platforms for low-literacy users in small-scale agriculture (WRC report no. 3136/1/24)*, visit: <https://wrcwebsite.azurewebsites.net/wp-content/uploads/mdocs/3136%20final.pdf>