CAPACITY BUILDING

Multi-award winning Tafadzwa pays it forward

This article forms part of a series of profiles on high achieving water researchers supported by the Water Research Commission as part of the Commission's 50-year celebrations.

Tony Carnie

Professor Tafadzwa Mabhaudhi

Prof Tafadzwanashe Mabhaudhi is gaining global recognition for his research into the critical linkages between water, food and energy. He spoke to Tony Carnie about his personal research journey and the importance of helping upcoming scientists to achieve their goals.

At the age of 37, Tafadzwa Mabhaudhi has chalked up a string of achievements. He is already a professor. He has been cited over 1 000 times by fellow scientists, written over 130 journal articles, book chapters, technical reports, policy briefing notes and popular articles. And he has received several awards for prolific academic output and helping to translate science into policy.

But, recognising the wisdom of the old African proverb that "it takes a village to raise a child", Mabhaudhi is the first to acknowledge that this success would not be possible without the support and wisdom of many 'village elders' who helped him along the path.

The experience has also encouraged him to 'pay if forward' while building and nurturing a new grouping of water and food researchers, initially nick-named "the green team".

Mabhaudi, a Research Associate Professor at the University of KwaZulu-Natal (UKZN) and Co-Director for the Centre for Transformative Agricultural and Food Systems, stumbled

gradually into the emerging research arena known as the Water-Food-Energy (WEF) nexus, along with research into crop-water usage and undervalued traditional African food crops.

The son of a reverend, Mabaudhi grew up in Zimbabwe, and shared his father's mission to be of service to people. But it was only after he completed his Master's degree that he began to see the possibilities of how to achieve this, when he started to supervise and mentor fellow young scientists.

After graduating with a BSc Honours degree in crop science from the University of Zimbabwe, he spent nearly two years farming a 20-hectare plot on the outskirts of Harare in partnership with three friends. It was not an ideal time. Zimbabwe's economy was experiencing hyper-inflation, creating major economic challenges for the new business venture. Two of his boreholes also broke down and he watched his harvest of rhubarb and patty-pans wither in the field.

While he "burned his fingers a bit" he also learned some valuable lessons about the difficulties facing fellow farmers.

In 2008 he moved to the UKZN's Pietermaritzburg campus where he completed his Master's, PhD and post-doctoral studies, with funding from the Water Research Commission. He continued to run the farm remotely until 2009, when he decided to unplug himself completely to focus on his studies.

After finishing his Master's (which compared traditional landrace varieties of maize with hybrid maize), his supervisor Prof Alfred Modi urged him to "stick around" and do a PhD, focusing on the drought tolerance and water-use of amadumbes (taro) and Bambara groundnuts.

In his final thesis he noted that of the world's roughly 30 000 known edible plants, only about 7 000 had been cultivated or collected as food. Even more shocking was the fact that about 20 species now provided for 90% of the world's food requirements – leaving tens of thousands of edible species largely underutilised.

Many of these plants were specially adapted to range of ecological niches and also tolerant of both heat and water stress.

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Matthew Erasmus (left) and Prof Tafadzwa Mabhaudhi (right) laying out a field trial for bambara groundnuts at Ukulinga Research Farm in Pietermaritzburg.

WRC archives

Tafadzwa Mabhaudhi was honoured in 2019 with the WRC's Research Knowledge Tree award for helping to inform policy and decision-making.

Prof Modi was impressed by Mabhaudhi's work ethic, his attitude towards team work and willingness to help other researchers and said he had dreamed of building a new team of researchers who would work towards transforming subsistence agriculture.

Later, as Mabhaudhi pushed deeper out his comfort zone into his post-Doctoral studies, he received support and encouragement from several people, including Prof Sylvester Mpandeli, Dr Gerhard Backeberg and Andrew Sanewe at the WRC; Prof Mike Savage (UKZN); Prof Sue Walker (University of the Free State); Prof Yakob Beletse from the Agricultural Research Council and Dr Abraham Singels from the South African Sugarcane Research Institute.

"Prof Beletse helped me work through a lot of complex equations – and for some time he was not my favourite person! Prof Modi was also a pillar. We spent a lot of time together and he showed me how to retrace my steps, and also how to lead."

By 2013, Modi and Mabhaudhi's "team of two" began to expand.

"Prof Modi said: 'Now we are ready now to build that team we spoke about earlier'. We had 10 Master's students and three PhDs and the WRC also gave us a follow-up project and things started to go big."

"We did not have lax requirements, but our emphasis was on giving everyone a chance to help them become their best. So it

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Tafadzwa Mbhaudhi gives farming tips to learners at the Swayimane High School near Pietermaritzburg.

was not about having everyone at (equal) high level, but rather each one operating at their high level," he says, noting that it was time-consuming to invest in every person at an individual level, taking into account their strengths and weaknesses.

However, Mabhaudhi did not see his role as a supervisor as simply directing students towards getting a degree.

"For me, it was also about paying it forward because I had been given so much support and was able to do things I did not think I could do when I began. Often, people think they can't do something because they have never had that experience, and we tend to treat unknowns as impossibilities. I take mentoring as a very key part of my work and I'm also trying to get my students to support each other, so that I am there to guide and also find resources."

In 2019, the fledgeling green team was formally rebranded as the Centre for Transformative Agricultural and Food Systems, a title chosen to reflect its work in supporting smallholder farmers, boosting undervalued traditional food crops and finding solutions to the challenges of climate change.

"It is not transformation simply from the perspective of white to black. It is more about a paradigm shift – a shift in focus and mindsets. Despite all the talk about enabling the potential of under-utilised crops, there is still very little support for such crops. You can't go and buy amadumbe seeds in a shop, even if you wanted them . . .There is potential, but still not the kind of support that is needed to produce these crops or to establish commercial markets.

"We also need to rebrand some of them, so that they are not seen as 'poor people's crops'. Before maize arrived here on a ship, we had a system going on and no one was starving. It was working, and we need to get it working again."

Mabhaudhi notes that there has been some good progress in marketing amadumbe crops produced by around 400 members of the Ezemvelo Farmers Association in Umbumbulu to outlets such as Pick 'n Pay and Woolworths. "But that is just one crop and one group of farmers. The challenge is how to replicate it at a time when the global market is waking up to the health benefits of foods which are packed with as many natural nutrients as multi-vitamin tablets."

But it was crucial to draw lessons from similar initiatives on other continents - as with quinoa, an edible South American seed rich in protein, dietary fibre, vitamin B and dietary minerals.

"Quinoa became a global sensation, but the people growing it did not benefit as they should have."

This is partly why Mabhaudhi has immersed himself in initiatives to translate science into policy: "It is not enough just to do science, if it's not informing how decisions are made. We need to ask ourselves: 'What have we done to make our information available?' ... We might think that the solutions we propose are obvious – much like wearing a mask to curb the transmission of Covid-19 yet that does not always happen.

"This can be a difficult and non-traditional role for many scientists, but the world is changing rapidly . . . You need to be sitting in the same room as the practitioners, policy-makers and decision-makers, so that you can co-design, co-learn and co-implement."

Mabhaudhi has also begun to participate in advisory forums with government structures.

"I have gained greater insights and understanding into planning processes at a national level - including politics and people's political shelf lives . . . You can stand next to a minister, for example, to explain how fantastic some traditional food crops might be, but sometimes decision-makers are looking at things from a global or national strategic level rather than from a local perspective."

He thinks scientists should be cautious about being "too water-centric".

"It is not always helpful where you make yourself superior by declaring 'Do as we say' ... there has to be a balanced approach. Policy normally stems from good intentions, but decisions are only as good as the information people have at their disposal – and very often, hard numbers and scientific data are hard to ignore."

He also thinks South Africa can draw lessons from the Covid crisis, noting that it is unlikely that the country can go back to "the happy days".

"The future is complex. We have learned that climate change is complex because it affects everything. People lose their homes. This is often followed by disease and food price increases – so it's not just about climate models and weather."

Quite apart from emerging climate change threats, it was likely that further pandemics would emerge, making it essential to initiate new conversations with new voices to tackle new challenges. Mabhaudhi raises the example of how the peer-review system shaped his PhD thesis, which went through as many as 14 iterations following the first draft.

"Often there is a world of difference between what I wrote in version one compared to version 14 – and that is the benefit of multiple minds examining an issue."

A similar approach had emerged during the Covid crisis, with a group of experts led by Prof Salim Adbool Karim to advise the government on how to respond to the crisis. "Imagine what might have happened if they had not had some of these guys providing expert advice?" he asks, suggesting that the Ministerial Advisory Council (MAC) structure could be replicated to advise other government ministries on a range of issues such as poverty, food, water and energy.

"For me, every minister should have one. It is a very good template for creating spaces for evidence-based science to support decision-makers. But we should also be careful about making them exclusive gatekeepers. There has to be transparency and space for civil society to participate."

Noting that nearly 62% of the country's available freshwater is used for irrigation, Mabhaudhi thinks there is much scope to use scarce water more effectively – especially through recycling and reuse. But a cautious approach was needed to ensure that the savings achieved through such innovation was used for sustainable growth.

"Often, if a farmer manages to save water he just uses the saving to irrigate something else – so there have to be more incentives to guard against this situation."

WRC Executive Manager: Water Utilisation in Agriculture, Prof Sylvester Mpandeli, says Mabhaudhi's research on the Water-Energy-Food Nexus has been widely recognized globally. "Tafadzwa is a very bright young man. His work is important for several reasons, because while he is an agricultural scientist, he combines his understanding with socio-economic issues and translates that into the science-policy interface.

"He stands out ... he drives research and innovation and also engages communities, asking them whether they agree or disagree with proposals."

Recalling that the WRC funded Mabhaudh's studies from Master's to post-doctoral level, Mpandeli says he had continued to achieve success. This included being recognised among UKZN's Top Ten most published postdoctoral fellows (2016); Top 10 most published researchers under 40 years (2020), a Fellow of the Zimbabwe Young Academy of Sciences; a Y-rated researcher by the National Research Foundation and an award from the WRC for helping to inform policy and decision -making.

And just as we were concluding this interview, an email message came through on Mabhaudhi's phone that he has been awarded the 2020 UKZN Vice-Chancellor's Research Award.

Mabhaudhi, who comes across as a deep, strategic thinker, says he is grateful for these awards and the support he has received, but his biggest personal reward is seeing his students doing things they once thought were not possible. "That gives me huge satisfaction – better than any award," he says, sharing an anecdote about one of his former students who contacted him recently to report that she was now teaching in the Middle East. Thanking him for helping her to navigate life, she apologised that she was no longer involved in agriculture. However, she had now found her confidence and her true purpose.

Mabhaudhi wrote back to say that he never wanted her to grow mealies for the rest of her life and it was more important for people to be passionate in their career choices. "If you don't focus on what you really care about you will likely only be average. But you excel when you find your passion. Your work becomes more rewarding and ideas start to come to you in your sleep."

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Tafadzwa discusses irrigation problems with local farmers, the late Mr Gasa (right) and Mr Ncube (left) outside Pietermaritzburg.