

SEEING THE BIG PICTURE: MODELING FISH PRODUCTION IN LAKE KARIBA

Year after year, fishermen caught fewer fish from Lake Kariba, on the border between Zambia and Zimbabwe. Year after year, the fishermen speculated and the researchers tested hypotheses, but without success. No one knew why fisheries were declining, and no single answer seemed to fit.

This was the situation encountered by ACCFP Doctoral Fellow, Mzime Ndebele-Murisa. She took a different approach, looking at the lake as a system with all the factors as contributors to its function and health. Her holistic research method established the varied causes behind the fish declines. She considered climatic and limnological factors as well as the actual Kapenta fish catches/production and fishermen statistics of vessels, trips and effort.

Her research established both the major and minor factors influencing the fish stocks. She determined the relationships among all the factors and the synergies as well as the feed-back mechanisms in the lake which eventually affect the fish. Ndebele-Murisa concluded that the changes in fish catches were attributed to climate change—in particular, global warming. Temperature changes in the Middle Zambezi, where Lake Kariba is, are occurring at a faster rate than model predictions have projected. The waters of Lake Kariba have warmed up in response to the warming of the air temperatures, leading to an altered phytoplankton community and subsequently, decreasing fish production. In order to mitigate these climate changes, she warned that the fishery management strategy needs to be changed.



Mzime Ndebele Murisa conducting field research

The results from her work include four important ‘demand-driven’ adaptation strategies, which translate her work from the science realm of understanding what’s happening, to the policy and practice realms of what to do next to address the problem.

1. Develop a policy framework for effective fisheries management to be adopted in Zambia and Zimbabwe
2. Develop a bio-economic model for Kapenta fisheries in the lake considering the current climate changes.
3. Test the efficiency of projected, downscaled climate data produced by regional climate models to find the best models that capture the climate phenomena and oscillations in the southern African region around Lake Kariba.
4. Promote small-scale fish farming (aquaculture) in rural Zimbabwe in order to boost fish production and as an adaptation strategy against climate change and the resultant declining fish stocks in Lake Kariba. This fish production will also be a diversification strategy for farmers living in the arid to semi-arid areas who depend on rain-fed crop and livestock production as such forms of agriculture are currently being adversely affected by climate change.

Ndebele-Murisa has teamed up with local and international governments and NGOs to move forward on these initiatives, thereby building on her ACCFP research and expanding its influence. Her research is an apt example of how ACCFP brings together science and policy. Her research not only answered scientific questions about how climate change is affecting an ecosystem, but also offered solutions for the stakeholders involved.