

Seawater-farmed tilapia: Part 1

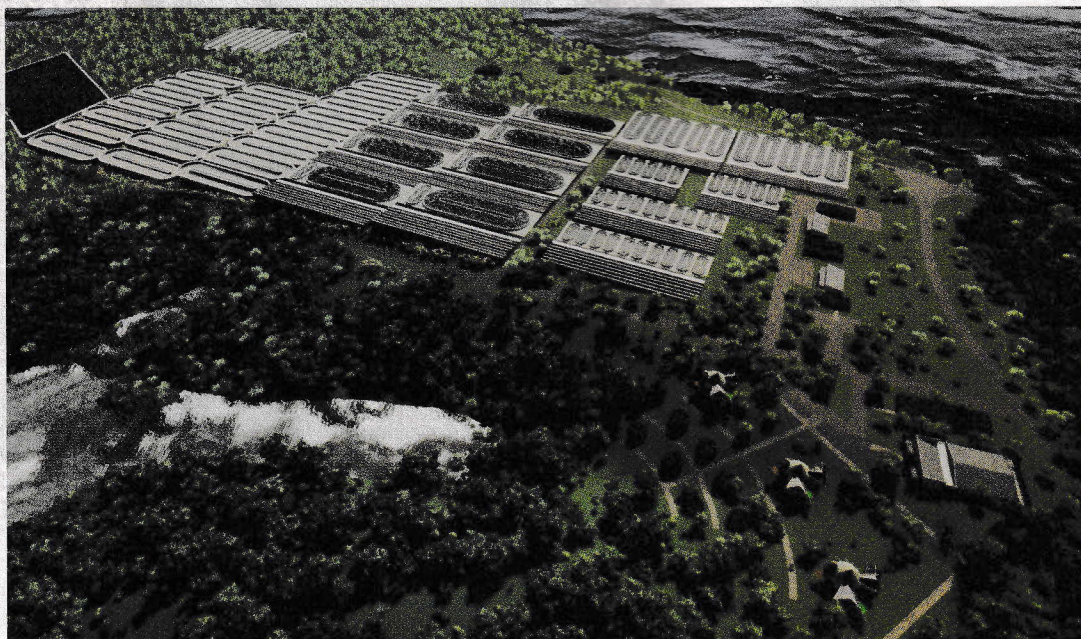
FAST FACTS

Cape hake fillets are becoming increasingly expensive in South Africa, and are largely unaffordable for many households.

The Eastern Cape Rural Development Agency has embarked on a project to domesticate the Mozambique tilapia for domestic production.

The project aims to establish and develop a value chain for an industry that aims to grow to 100 000t of marine-cultivated tilapia by the year 2035.

Fish is a healthy source of protein, but is becoming increasingly unaffordable for South Africans. **Ramon Kourie** and **Vuyani Somyo** of Thapi AquaKulcha look at why marine tilapia may be the perfect alternative to other white fish.



Despite a significant annual Cape hake quota, which fluctuates from 100 000t/year to 140 000t/year in South Africa, fish has become increasingly unaffordable for most food-insecure households.

Wholesale prices of South Africa's most favoured fish-and-chips choice, Cape hake, have climbed in recent years to above R45/kg on a whole-weight basis. Similarly, retail prices of tinned pilchards, a national favourite food basket item, have climbed above R60/kg on a drained-weight basis, putting food-insecure households increasingly at risk of not acquiring adequate omega-3 fatty acids in their diets.

In addition to being a response to the affordability problem of hake and the threat of diminishing ocean stocks, the project aims to take advantage of the natural bounty of Mozambique tilapia along the coastline of the Eastern Cape and KwaZulu-Natal.

The ambition is to establish and develop a value chain for an industry that aims to grow to 100 000t of marine-cultivated tilapia by the year 2035. The growth trajectory maps the course of an industry that will start with the establishment of an MTI incubator in Mbhashe, Eastern Cape,

ABOVE RIGHT:

A 3D-generated architectural impression of the Mbhashe Marine Tilapia Industry Incubator earmarked to produce 2 000t of seawater-farmed Mozambique tilapia annually.

RIGHT:

Mozambique tilapia (*Oreochromis mossambicus*) harvested from a large-scale biofloc technology farming system in Malawi.

PRIVATE INNOVATORS

Building on a concept sourced from private innovators Thapi AquaKulcha, identified through an open call for expressions of interest in 2019, the Eastern Cape Rural Development Agency has taken the lead to address this undesirable fish-supply situation by focusing on an ambitious project to domesticate the local Mozambique tilapia (*Oreochromis mossambicus*) species for seawater culture. The project is called the Marine Tilapia Industry (MTI).



as the base for growing a range of commercial clusters along the coastline of the Eastern Cape and KwaZulu-Natal over the years.

MTI is encapsulated in the Provincial Oceans Economy Master Plan of the Eastern Cape and chosen as a priority project from a host of submissions considered through a rigorous filter by a combined committee of government departments, public entities and institutions in the compilation of the Oceans Economy Master Plan.

MOZAMBIQUE TILAPIA GROW UP TO TWICE AS FAST IN SEAWATER AS THEY DO IN FRESH WATER

On 24 July 2020, the MTI was gazetted (No. 812) by the minister of Public Works and Infrastructure as a strategic integrated project and assigned the sub-project number SIP 23.

The incubator will be situated at the Mbhashe Local Municipality coastline with a clear set of seeding and catalytic output objectives, including



LEFT:

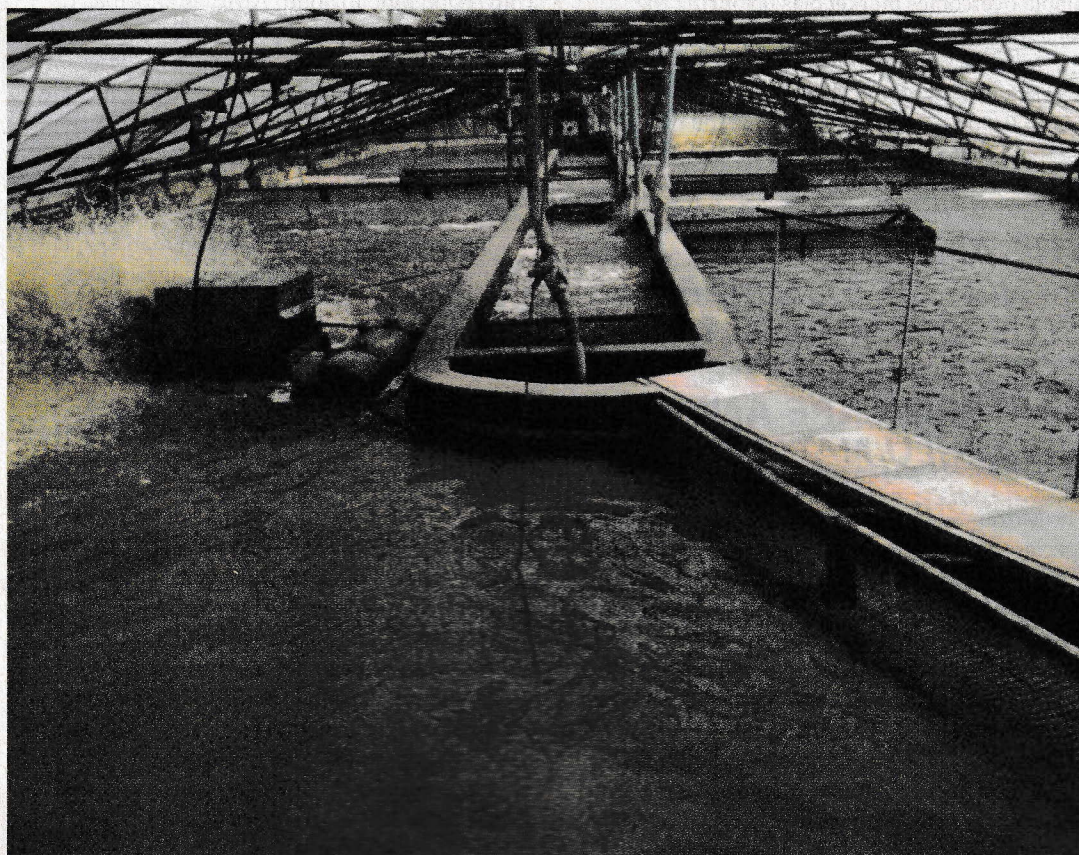
A top-quality seawater-reared red tilapia fillet packed in Taiwan for the Japanese sushi, sashimi or nigiri markets. This brings premium rewards to Taiwanese fish farmers, earning US\$12/kg (about R190/kg).

producing improved gene lines of pure breeds of Mozambique tilapia and an ongoing human resource development programme to feed into the commercial growth phases to follow.

COMMERCIALISATION

The Mozambique tilapia is indigenous to the east-coast territory of the Eastern Cape and KwaZulu-Natal, and the commercialisation of marine tilapia aquaculture poses no biodiversity risks to endemic fish fauna.

The species grows up to twice as fast in seawater as it does in fresh water. It also has greater palatability when grown in seawater, on par with the best line-fish, offering improved meat texture and flavour properties,



LEFT:

This large-scale freshwater biofloc technology fish farm in Malawi was developed by Thapi AquaKulcha. Both Mozambique tilapia and Shiranus tilapia (*O. shiranus*) are reared here, achieving a food conversion ratio of around 1:1 on 20% protein plant-based feeds.



ABOVE:
The Mozambique tilapia
is a low-cost fish that
produces healthy,
good-quality protein.
WIKIMEDIA COMMONS

and therefore higher marketability. Sold as a marine fish, seawater-farmed Mozambique tilapia overcomes market bias favouring the consumption of marine fish in South Africa.

In terms of quality, Taiwanese marine-farmed tilapia fetches a premium price of US\$12/kg (about R190/kg) for fillets in Japan, and is used for the making of sushi. This is about 80% higher than the retail price of Cape hake fillets.

THE AIM IS TO HAVE A RANGE OF COMMERCIAL CLUSTERS ALONG THE COASTLINE OF THE EASTERN CAPE AND KWAZULU-NATAL

The Mozambique tilapia is a low-trophic-level species (plankton feeders, under wild conditions) with a highly efficient digestive system capable of good growth on animal-free, plant-based feeds. This reduces the cost of production, contributing to the alleviation of food insecurity.

Based on a number of studies, the Mozambique tilapia uses feed more efficiently, and is capable of achieving a lower feed conversion ratio in seawater than it is in freshwater farming systems. These advantages are further amplified by the use of biofloc technology (BFT), which is the

use of seawater and plant-based feeds that carry a lower protein content of just 20%. The feed conversion ratio in South Africa is anticipated to be lower than the approximately 1:1 achieved in freshwater BFT systems in Malawi. Other benefits of farming Mozambique tilapia include:

- Upstream and downstream scale and scope economies and the beneficial effects of specialisation, including a reduced gestation period from investment to first income;
- More efficient use of labour and management, an effect of farm size and the manageability of fewer larger-scale grow-out production units (20 tanks each producing 250t annually give 5 000t per grow-out farm per annum).

The value proposition in the development of a scalable and competitive marine tilapia farming industry in South Africa hinges on the use of reduced input, plant-based, low-protein feeds and BFT aquaculture tanks placed under greenhouse enclosures. This capitalises on solar heat gains to enhance productivity and hence capital employed in farm infrastructure under reduced land requirements.

Production costs for large-scale BFT Mozambique tilapia aquaculture in seawater systems are anticipated to be around US\$1/kg (R15,50/kg), before the fish are sold to a processing plant serving four 5 000t/year grow-out farms.

Email Ramon Kourie at
ramonk@thapiaquakulcha.co.za. **FW**