

Seeds of Gold



Special Focus On

Transforming Commercial Aquaculture in Kenya



In Partnership with

Aquaculture growth

Kenya has great potential to scale its annual aquaculture production

JAMES MWANGI

Populations in Africa are growing rapidly, with Kenya's alone expected to double by 2065.

With this growth will come an increased demand for food, and crucially, the protein necessary to feed the growing population.

Kenya is home to Africa's largest freshwater lake – Victoria – which is the natural habitat of the tilapia species.

With an abundance of the necessary natural farming conditions for tilapia, Kenya has the potential to greatly benefit from the growth of freshwater aquaculture.

The growth of the sector has the potential to generate up to 702 million low-carbon, protein rich meals and create employment.

However, the industry has been

Development of a new spatial plan for the Kenyan side of Lake Victoria - the first of its kind - will be an essential governance tool

James Mwangi



unable to live up to its full potential.

Wild fish stocks have plummeted by more than 50 per cent over the past two decades, and access to quality feed and other inputs has proved to be challenging for farmers.

Today, the supply-demand gap for tilapia alone stands at 100,000 metric tonnes per year, leaving Kenya reliant on imports.

However, the tide has slowly begun to turn. Aquaculture in Kenya has been growing steadily, and continues to make significant strides.

Over the past decade, pioneer businesses in the sector have driven transformation across the value chain.

The region is now home to dynamic, profitable firms able to generate millions of shillings for local economies while simultaneously supporting regional food security.

Feed sub-sector

These pioneer farms have blazed the trail for cage farming on Lake Victoria and have grown rapidly, demonstrating viable, scalable and replicable business models for medium and large-scale cage farming.

This success has catalysed investments into other areas of the sector such as feed mills as well as increasingly specialised hatcheries.

Investments in the feed sub-sector have improved accessibility of locally produced high-quality feed with annual milling capacity nearing 50,000 metric tonnes.

The increase in local feed production could see the prices of aquafeed production come down by as much as 25 per cent in the near future.

Building on this, the government is also directing its attention towards realising the full potential of aquaculture under the Blue Economy.



Lakeview fish cages in Lake Victoria. Pioneer farms have blazed the trail for cage farming, having demonstrated viable and replicable business models for medium and large-scale cage farming.

Meeting the ever growing demand for tilapia in Kenya

The development of a new spatial plan for the Kenyan side of Lake Victoria – the first of its kind in the region – will be an essential governance tool in planning for aquaculture siting and development, to mitigate conflicts between lake users and encourage investment in suitable areas.

The projects' carrying capacity

assessment lays the foundations for a more data-led approach to regulating the industry, by stipulating thresholds for biomass, hence encouraging investment while helping to mitigate environmental and biosecurity risks.

The sector is going from strength to strength, thanks to the ingenuity and innovation of

farms, and government enthusiasm to realising this opportunity.

We estimate that in the last five years, tilapia production in Lake Victoria has risen six-fold to 13,000 metric tonnes in 2023, and is expected to rise a further four times in the coming five years, holding the potential to generate over 50,000 jobs and increased

incomes.

For farmers, entrepreneurs and investors, there is a window of opportunity. Firms are operating profitably, the government making strides in bolstering the enabling environment while demand continues to rise.

So how do we transform this opportunity into a reality?

New entrants

Aquaculture in Kenya continues to show real signs of momentum and growth, with a cohort of strong pioneers demonstrating the commercial potential of fish farming at SME and large-scale levels.

As the industry begins to take off, it is primed for new entrants, operators, entrepreneurs and investments.

Indeed, Kenya has great potential to scale its annual aquaculture production beyond 100,000 metric tonnes and to be competitive regionally and internationally.

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James Mwangi is an Intervention Manager at Gatsby Africa, a foundation set up by Lord David Sainsbury, with a long history of engaging in East Africa across government, business and society. We are committed to helping build stronger and more inclusive economies in East Africa through the transformation of sectors that have the potential for inclusive, resilient, and competitive growth over the long-term. We currently work in diverse high-potential sectors: Aquaculture, Commercial Forestry, Livestock, Textiles and Apparel, Water and Tea. We believe that, if successfully transformed, these sectors are capable of inspiring a step change in the region's growth, generating of jobs and additional incomes.

Jewlet Farm: A key player in Kenya's aquaculture

Enos Were is an aquaculture player, known for his hatchery in Homa Bay. Supplying 800,000 to 1.2 million fingerlings a month, his venture – Jewlet Fish Farm – mirrors the country's rising demand for fingerlings, driven by expanding opportunities.

His hatchery is a hub for enthusiasts, scholars, researchers and entrepreneurs. Established in 2010, Jewlet Fish Farm, began modestly but has expanded in response to growing demand, including the establishment of a fry sex reversal nursery, a hatchery with incubation tanks and a third farm focused on selective breeding.

"Selective breeding ensures high performance of the broodstock. We supply high-quality stock to farmers," he says.

The hatchery begins with broodstock, using about 17,000 predominantly female fish on eight acres.

Maintaining a one-to-four male-to-female ratio, eggs are collected weekly and moved to the hatchery.

Inside, four incubation tanks with McDonald jars mimic natural brooding conditions.

"Optimal tank conditions are vital for high hatch rates and healthy fry," he says.

After a seven-day incubation, hatchlings spend two days in dedicated tanks before being moved

to the nursery. Here, a 28-day sex-reversal using testosterone achieves a 98 per cent efficiency in all-male production, exceeding the global average by three per cent.

Following sex reversal, fish undergo grading, with some sold immediately, while others are nurtured for 15 to 45 days before distribution nationwide.

Mr Were's hatchery has seen remarkable growth, starting from 150,000 fingerlings annually to 1.2 million a month. He attributes the growth to the high demand for quality fingerlings. Assistance by FAO in acquiring four incubation tanks in 2016 and 2017 facilitated this



Tilapia eggs and fingerlings. PHOTO | GATSBY AFRICA

expansion.

"We are striving to expand production to 2.5 million fingerlings a month," he says.

He, however, adds that even this expanded capacity will not fully satisfy the needs of the market, saying there are barriers to realising the full potential of aquaculture.

Mr Were highlights

challenges in the business.

"Ensuring hatching process reliability is a concern. We have to be wary of equipment failure. Clogged pipes in our McDonald jars poses a risk to eggs," he says.

"Power outages prompted investment in generators, but fuel costs affect production. Natural disasters like the corona

in 2020 can result in huge daily losses."

Importing hormones and pure alcohol pose difficulties due to regulations and taxes. A litre of extra neutral alcohol goes for Sh95, but excise duty can inflate the price to Sh400.

Despite the challenges, Mr Were remains optimistic. He believes cage farming, particularly in lakes, will significantly influence demand, and appeals to a broader demographic of farmers, including those with limited land, such as youth and women to venture into aquaculture.

Initiatives like IFAD and World Bank's ABDP, aimed at supporting small-scale fish farmers, along with climate-smart projects, are expected to boost demand.

Tunga Nutrition leads way in the manufacture of fish feed

With an annual processing capacity of 25,000 tonnes, the company is well-equipped to contribute to the growing demand for feeds in Kenya and East Africa in general



In East Africa's dynamic aquaculture landscape, several companies have made impressive contributions to the growth and development of this industry.

One such company is Tunga Nutrition (K) Ltd, a joint venture between Unga Farm Care (EA) Ltd and Nutreco International BV, which has quickly become a key player in the region's fish feeds industry, signalling a new era of opportunity and prosperity for aquaculture enthusiasts and investors.

Established against the backdrop of a growing demand for high-quality feeds, the journey of Tunga Nutrition Ltd is a testament to the power of innovation and collaboration in driving industry-wide transformation.

"Several entities joined forces to accelerate aquaculture development in Kenya and the region in 2010. According to a study, East Africa lacked cost-effective, good-quality fish feed," says Harrison Juma, the Tunga Nutrition General Manager.

This collaborative effort culminated in the formation of Tunga Nutrition. Leveraging its partnership with Skretting – Nutreco's Fish Feeds entity – Tunga Nutrition has made great strides since its formation.

It has expanded production capacity from 8,000 to 25,000

tonnes per annum.

"Our production capacity at Unga was around 8,000 tonnes annually. Through collaboration with Skretting, we have invested in more efficient and sophisticated automated machinery, resulting in a three-fold increase in production," Juma adds.

The expansion of Tunga Nutrition's operations has had far-reaching implications for aquaculture in East Africa.

With an annual processing capacity of 25,000 tonnes, the company is well-equipped to contribute to the growing demand for fish feeds.

This increased production capacity not only addresses the pressing need for high-quality feeds but also presents a compelling investment opportunity for stakeholders keen to tap into the region's burgeoning aquaculture market.

Quality assurance is a cornerstone of Tunga Nutrition's success story.

With certification from the SGS Kenya Ltd and the International Organisation for Standardisation (ISO), the company is committed to delivering feeds that meet the highest standards of nutrition, quality and safety.

"Producing top-notch fish feed for tilapia is a technical process, including extrusion under high pressure to create uniform pellets that float on water," the gen-

eral manager says.

The commitment of Tunga Nutrition to quality has earned the trust and loyalty of farmers across the region, positioning the company as one of the most preferred suppliers in the market.

Its adherence to stringent quality standards ensures the health and wellbeing of aquatic ani-

Our production capacity at Unga was around 8,000 tonnes annually. Through collaboration with Skretting, we have invested in more efficient and sophisticated automated machinery

Harrison Juma, Tunga Nutrition General Manager



mals and instils confidence in customers and investors alike.

For investors eyeing opportunities in East Africa's aquaculture industry, the success story of Tunga Nutrition serves as a compelling case study.

As production continues to ramp up to meet growing demand, investors can expect significant returns and opportunities for portfolio diversification.

Moreover, Tunga Nutrition's expansion into new markets underscores the untapped potential of aquaculture in Kenya and the region.

This presents investors with a unique opportunity to capitalise on emerging markets and drive sustainable growth. As Tunga Nutrition continues to lead the charge in East Africa's aquaculture revolution, the future looks promising. With increasing demand for fish feeds and supportive initiatives from governments and other organisations, the stage is set for continued growth and innovation.

For investors willing to seize the opportunity, Tunga Nutrition's success shows that now is the time to dive into East Africa's thriving aquaculture industry.

As of June, Tunga Nutrition had already run out of production capacity but the company has approval for extra investment. Watch this space, a new line is coming up.

A farmer giving his tilapia Tunga's Optiline feed. PHOTO I TUNGA NUTRITION

Also director urges young Kenyans to get into fish farming

BY MILLICENT MWOLOLO

Young vibrant farmers have taken into aquaculture with energy. Shalton Omwolo Owino, a director at Elso Farms Ltd in Kisumu West sub-county, says aquaculture is profitable.

"There is a ready market and prices are promising if you do the right timing when harvesting," Owino, aka The Flamboyant Farmer as he is known on social media, says.

"We stagger our production in order to make money throughout the year."

Elso practises cage fish farming. The farm has nine cages in L. Victoria. He sources fingerlings from authorised and certified hatcheries.

"My annual stocking density per cage is 5,500 fingerlings," he says.

"I have to ensure the fingerlings are at different stages of development so that cages produce mature fish at different times."

When other farmers harvest fish for eight months, Elso Farms does so in 12.

Elso Farms Ltd has been a source of livelihood to fish vendors. The other customers include event organisers, caterers, hotels and supermarkets. The other beneficiaries in the value chain are boda boda riders who do deliveries.

Elso Farms has two employees who attend to the fish in the cages daily.

During the opening of Homa Bay Municipal Market in January last year, President William Ruto said fish farming in Nyanza would be funded and expanded. He added that the government would help farmers earn more from fish by adding value to their produce.

"The government will allocate Sh600 million to help process fish in Homa Bay. Fishing has a potential that must be exploited. When we add value, we will earn more and generate more jobs," the President said.

In May 2023, the government came up with a Sh21 billion programme comprising 12 projects in an effort to boost small-scale businesses in aquaculture.

"The initiative is expected to create more opportunities for fisherfolk and impact their livelihoods and the local economy," said then-Mining, Blue Economy and Maritime Affairs Cabinet Secretary Salim Mvurya.

The minister added that the projects would be a welcome relief to farmers as most continue to harvest immature cage fish for sale at throwaway prices.

According to Mr Owino, cage fish farming is risky because the lake is a natural resource.

"You never know what happens there at night," he says.

The greatest challenge is that aquaculture is capital intensive. Feeds are expensive and the fingerlings may take a year or less to mature, depending on the feeding regime.

At the fingerlings stage, farmers use the mash powder which retails at Sh6,100 per 25-kilo bag – with each caging unit making use of six bags, an expensive undertaking.

Commercial success of Victory Farms: East Africa's largest tilapia producer

Founded in 2015 by **Joe Rehmann**, the Chief Executive Officer, and **Steve Moran**, Chief Aquaculture Officer, Victory Farms works to build an end-to-end solution for quality, sustainable, affordable and accessible protein while creating lasting social and economic empowerment opportunities for communities. **Proscovia Alando** talks to **Caesar Asiyu**, the Victory Farms Chief Development Officer, who gives insights about the farm going from just a few cages to a vertically integrated successful enterprise which recently

raised \$35 million of new investments into business.

From Victory Farms' perspective, what is the East African aquaculture opportunity?

Africa is experiencing the world's fastest population growth, and fish – especially tilapia – is a favoured source of protein due to its efficiency in converting plant-based feed. It's also notably affordable.

However, despite the popularity of fish in the region, consumption levels are restricted by supply limitations.

Traditional wild catch fisheries have seen a drastic decline since the 1970s, with figures dropping by up to 90 per cent.

This decline, particularly in tilapia, has left a substantial supply gap estimated at more than 1,000,000 tonnes annually in East Africa.

Currently, aquaculture meets just three percent of the deficit.

However, we have witnessed firsthand the impact of addressing the supply demand gap, and after establishing a Victory Farms outlet in a Western Kenyan town tilapia consumption more than doubled.

Demand is clear, demonstrating the untapped potential within the market once supply constraints are addressed.

Victory Farms aims to scale up significantly to respond to this opportunity and bolster East Africa's food and nutrition security.



President William Ruto and Homa Bay Governor Gladys Wanga at Victory Farms. The farm manages the entire fish life-cycle, from producing eggs to transferring fingerlings to nurseries. PHOTO | GATSBY

What challenges did Victory Farms encounter along the journey to where it is now?

Being a young industry, we have faced challenges with regulations and taxes as policymakers catch up with developments in the sector.

However, this is changing. President Ruto's visit to Victory Farms is a clear sign that the aquaculture industry is now recognized for its importance to society and the economy.

We're grateful for the President's focus on aquaculture and hope this recognition will lead to improvements in the business environment, regula-

tions, and taxes for aquaculture.

Describe Victory Farms at present

Victory Farms is fully vertically integrated. We've expanded into fish breeding and local commercial fish feed production. Our infrastructure includes hundreds of cages, ranging from 6x6 square metres to 30 metres in diameter.

Our goal is to increase annual production capacity in Kenya to over 50,000 tonnes. We manage the entire fish life-cycle, from producing eggs to transferring fingerlings to nurseries, then to production cages in Lake Victoria for up to nine months. Our fish,

Oreochromis Niloticus, grow naturally in cages without growth hormones or antibiotics.

Harvested fish are processed immediately into ice slurry, reducing spoilage to just one per cent.

We deliver fresh chilled fish to 88 branches across Kenya within 48 hours via an off-grid cold chain.

We distribute primarily through 15,000 market women, 'Mama Samaki,' recognized as micro-entrepreneurs.

They receive reliable supplies at affordable prices, along with micro-credit and entrepreneurship training. We also serve bulk buyers such as institutions, supermarkets, hotels, and restaurants.

Victory Farms adopts global aquaculture best practices, prioritising continuous improvement and research while tailoring technology to local conditions.

Our culture fosters open, flexible, and nimble innovation, enhancing efficiency through locally developed, low-cost solutions.

To ensure we have a reliable supply of quality, affordable feeds, we've established Samakgro feeds—a joint venture with Maxim Agri and partners.

Samakgro, the largest fish feed mill in Naivasha, produces locally sourced, high-performance feed powered by geothermal and solar energy.

What lies ahead for Victory Farms?

Our vision is to become the largest tilapia platform globally, driving job

Victory Farms adopts global aquaculture best practices, prioritising continuous improvement and research while tailoring technology to local conditions

Caesar Asiyu



creation, commercial activity, economic growth, environmental conservation, and community development.

We firmly believe that responsible aquaculture can have a profoundly positive impact on millions of people's livelihoods, health, and nutrition, contributing to a better Africa.

Through continuous innovation, enhanced efficiencies, and strategic partnerships with both public and private sectors, we are confident in realising this ambitious goal.

Samakgro Ltd – New venture cashes in on fish feed opportunity in East Africa

BY PAULINE ONGAJI

Aquaculture has witnessed progress over the last decade. Freshwater aquaculture is particularly registering notable improvement.

However, one of the main challenges the industry faces is constrained access to quality, affordable feeds. It should be noted that feed is the main input that drives productivity in aquaculture. It typically accounts for up to 70 per cent of direct costs in fish farming.

Indeed, marginal improvements in the quality and price of feed can translate to significant gains in profits.

The recent launch of Samakgro Limited Kenya, a fish feed production company in Naivasha, was inspired by this reality.

The company is a joint venture between Maxim Agri Holding – a global animal feed manufacturing firm – and Victory Farms – the largest tilapia farm in Kenya.

"We saw this opportunity after realising that a significant quantity of fish feed was being imported from Zambia, Egypt and other countries. Because of that, farmers were getting expensive products," Samakgro General Manager Obaidur Rehman says.

As such, the company set out to produce high quality feed to meet the fast-growing demand from fish farms in the region.

According to Rehman, the company has an annual production capacity of 30,000 metric tonnes, expanding to 60,000 metric tonnes per annum in the near future, setting it on course to become a leading player in the production of high-quality and affordable fish feed in Kenya and East Africa as a whole.

Most of the ingredients for the manufacture of Samakgro's fish feed are regionally sourced.

"The only inputs we import from Europe are premix, vitamins and minerals," Rehman says.

This is the company's strategy towards ensuring it delivers the



Samakgro Limited processor in Naivasha. PHOTO | GATSBY AFRICA

best quality of fish feed to farmers, and at fair prices. Rehman says the programme has helped Samakgro to reduce input costs.

"With this, we are able to translate the cost reduction into our selling price," he says.

The company hopes the fair pricing of its products will dissuade farmers from opting to make their own fish feed, which in most instances, presents quality issues.

According to Rehman, producing

high quality fish feed is technical, requiring complex extrusion to ensure feed pellets can float on water and do not dissolve.

"What we produce floats. This means the fish can swim up and feed on it. There is minimal wastage. Secondly, every pellet of our feed is uniformly produced, meaning it has the same nutritional profile, thus translating to efficient feeding," he says.

The company plans to maximise

local sourcing of raw materials though this presents challenges. Specifically, sourcing of soybeans and maize can be difficult.

"Farmers in Kenya don't grow much soybean, and so it has to come from neighbouring countries. On the other hand, maize is the staple food in Kenya. That means there is massive pressure to produce the crop for human consumption rather than for the purpose of animal feed," he says.

These two ingredients, Rehman says, are the key contributors to the cost of fish feed manufacturing. Consequently, fluctuation in price of these products can affect the cost of feed.

This notwithstanding, the entry of Samakgro into the local industry is expected to improve access to high-quality and affordable feed for fish farmers.

Ultimately, improvements in the cost of fish feed will result in healthier profit margins for the farmers.

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IN BRIEF

A day in the life of Millicent Awuor, the Lakeview manager

Millicent Awuor plays a significant role at Lake View Fisheries by managing the collection of data.

Awuor uses this information for important tasks like developing feeding plans, tracking stock, recording production, growth performance, sales and even budgeting.

According to the farm manager, one key data point is the stocking profile, which shows the total number of fish and their sizes.

This profile uses Lakeview Fisheries stocking plan, harvests data, mortalities and average body weight (ABW) samples to visualise the fish inventory at any given time of the production period.

This information enables the farm owner, manager and the workers to ensure frequent harvesting.

“Every day, starting at the hatchery, I oversee various activities alongside the Head of Department, including the collection and transfer of juvenile fish (fry and fingerlings), feeding, dyke maintenance and pond cleaning,” the manager says.

“Subsequently, I move to lake operations to supervise harvesting, feeding, sampling and cage/net maintenance.”

She stresses the need for careful record-keeping in order to make data-driven decisions and stay profitable in aquaculture.

“Detailed records help us understand profits and make informed choices. Feed represents 70 per cent of the direct costs in fish farming, so managing it well is really important,” Awuor says.

“We track feed purchases and usage every day to plan our feeding and budgeting. We also measure the average weight of our fish to track their growth and feeding efficiency every month.”

Additionally, Awuor and her team at Lakeview Fisheries regularly check water quality factors like temperature, oxygen levels and pH to ensure our fish thrive in the best conditions.



Michelle Mbeo, the co-director of Lakeview Fisheries, feeds cage fish.
PHOTO | PROSCOVIA ALANDO

Data-led management

Lakeview: Venture with a vision

Located on Mfangano island, Lakeview Fisheries has leveraged data to improve productivity and profits. Owned by a woman and managed by another, Lakeview showcases opportunities that aquaculture creates. In an interview with **Michelle Mbeo**, the farm owner, **Proscovia Alando** takes a close look at the origins of the business, its daily operations and why she is excited about fish production.

Could you share the origins of Lakeview Fish Farm?

Lakeview Fisheries dates back to 2013 when we noticed dimin-

ishing wild stocks threatening the livelihoods of the Mfangano community. Recognising the increasing gap between fish supply and demand nationwide, my father seized the chance to venture into commercial fish farming.

Did you encounter technical challenges when getting into aquaculture? If so, how did you overcome them?

There was a significant knowledge gap at the outset. To address this, we visited top fish farms across Africa to study cage farming practices and gain first-hand insights into operations.

Additionally, we sought guidance from environment experts to ensure the suitability of site selection for hatchery and cage installations.

Could you walk us through farm operations at Lakeview?

Our vertically integrated tilapia fish farm specialises in Nile tilapia. With an annual capacity of 300 tonnes, our infrastructure includes land-based breeding and juvenile ponds for tilapia hatchery operations and floating cages for grow-out operations in Lake Victoria.

Our hatchery produces 250,000 tilapia fingerlings per cycle, and we are exploring the implementation of an automated recirculating aquaculture (RAS) system with a capacity of one million fingerlings.

Juvenile tilapia from the nursery are transferred to the cages in the lake, where they grow to market size.

Our floating cages, located a kilometre offshore, are strategically positioned to ensure the growth of fish in the cleanest waters, away from industrial pollution and water hyacinth.

This allows us to cultivate high-quality tilapia in their natural habitat. Achieving our current capacity involved a phased approach. Our target is to produce 5,000 tonnes of fresh tilapia a year, and we are in the process of expanding our cage sites from one to five.

Tell us about Lakeview staff?

Lakeview has 32 permanent

staff members, with additional hires during peak farming periods.

We prioritise training and skill development for local community members, including women and young people, for various roles on the farm.

Who are your key customers?

We sell tilapia through our branded outlets and have initiated limited processing, including freezing and gutting.

Our clientele includes households, hotels, restaurants and supermarkets across Homa Bay, Kisumu, Migori, Nakuru, Nairobi and other towns. Additionally, the farm works with approximately 370 fishmongers in low-income neighbourhoods.

What other challenges has Lakeview faced?

Since inception, Lakeview has encountered several obstacles, including the high cost of quality feed, farm flooding and the persistent water hyacinth issue.

Additionally, we contend with elevated energy expenses, particularly in operating the RAS system for our hatchery and ice machine.

While we utilise diesel-powered generators and solar panels, they fall short of meeting our energy demands.

Nevertheless, the Lakeview team is experienced at adapting to these challenges and remains

HIGHLIGHTS

1 The target of Lakeview Fisheries is to produce 5,000 tonnes of fresh tilapia a year.

2 Lakeview faces challenges like high feed costs and hyacinth issues, but the company's adaptable and experienced team keeps it hopeful.

3 The company has trained more than 1,200 local smallholder farmers on effective cage management.

hopeful for the future.

Could you share some of accomplishments of Lakeview Fisheries?

One of our most significant accomplishments lies in training more than 1,200 local smallholder farmers on effective cage management.

This initiative has not only enhanced their yields but also contributed to their long-term sustainability.

Furthermore, we have facilitated the organisation of farmer groups by establishing aggregation centres, enabling them to maintain fish quality and reduce post-harvest losses.

With an annual capacity of 300 tonnes, our infrastructure includes land-based breeding and juvenile ponds

Michelle Mbeo





An advanced hatchery at African Blue, a fish farm in Uyawi beach, Bondo sub-county in Siaya. As the industry begins to take off, it is primed for new entrants. PHOTO | AFRICAN BLUE FISH FARM

Innovation

African Blue banks on solar heating to produce fish hatchlings

While utilising solar power to run its hatchery, the company introduced an innovative technique: employing solar heating to purify lake water for incubation

BY PROSCOVIA ALANDO

Located on Uyawi Beach, Bondo sub-county, African Blue is a testament to the untapped potential for innovation in aquaculture. The fish farm was founded by Albert Altena in 2014.

While utilising solar power to run its hatchery, the company introduced an innovative technique: employing solar heating to purify lake water for incubation.

“Our solar heating for water purification is exceptional. It is a method unlike any other,” Altena says.

The process starts in breeding ponds next to the lake. The natural breeding environment is maintained.

“Our broodstocks, producing eggs, originate from a certified hatchery - Jewlet Enterprises - in Kendu Bay,” he says.

The breeding is natural. We introduce 12 male fish and 36 females in a single hapa, allowing them to mate naturally.”

Being mouth breeders, tilapia fish have the female carry fertilised eggs in their mouths.

“We collect the eggs by moving the fish to a corner of a hapa. The fertilised eggs are taken to the in-

cupation unit where they will develop to swim-up fry,” he adds.

When incubating eggs, many hatcheries utilise recirculation (RAS) systems, incorporating bio-filters, mechanical filtration and UV light.

“We chose a simpler purification method. Water from the lake first passes through charcoal and fine mesh material to eliminate impurities,” Altena says.

It is then stored in dark underground tanks. From there, the water is pumped to an overhead conical tank, where remaining impurities settle at the bottom.

The water then flows through a solar system, where it is heated to neutralise biological contaminants. The heated water then enters a second tank, where remaining debris settles at the bottom.

Finally, the clear water from the top of the second tank is used for incubation.

In the incubation unit, purified water is pumped into tanks and then distributed into hatching jars, including some made from locally available chicken drinkers, highlighting the use of simple and accessible materials.

The eggs in the jars experience continuous gentle water flow, mimicking the natural environment for tilapia.

The entire process, from egg collection to harvesting, takes six to eight months, resulting in fish typically weighing around 500g at harvest.

Approximately 250,000 out of 500,000 swim-up fry produced every fortnight reach maturity.

“Our method offers numerous advantages over newly promoted RAS systems. It eliminates costly and complicated components like biofilters and UV light, reducing

“We chose a simpler purification method. Water from the lake first passes through charcoal and fine mesh material to eliminate impurities”

Albert Altena



expenses,” he says.

Relying on natural sunlight for heating and producing electricity, our system, is more resilient in areas with unreliable power sources and much more cost efficient. We produce 500 tonnes of tilapia annually, expected to increase to 700 tonnes next year and to at least 1,000 tonnes in the next three or four years.”

Every production increase has received positive feedback from consumers. African Blue provides its premium tilapia to upscale hotels in Kisumu. This thriving small and medium-sized fish farm has enhanced operations by creatively utilising locally sourced materials, resulting in promising outcomes.

This underscores the expanding prospects within aquaculture and highlights the potential for innovation and cost-effective practices using readily available materials.

POLY CULTURE

Cavarino Farms in Narok County explores polyculture

Cavarino Farms in Narok County is an exciting enterprise specialising in tilapia and catfish.

As the sole hatchery in the South Rift region, it plays a significant role in meeting the surging demand for fish by supplying catfish and allocating a portion of its production to other farms.

The increasing interest in catfish farming stems from their remarkable ability to grow quickly, spawn easily and tolerate lower water quality compared to other freshwater species.

Many farmers buy catfish fingerlings to stock dams, indicating the growing popularity of the species in aquaculture.

While tilapia remains a staple among Kenyans, catfish is gaining traction, particularly in restaurant orders, reflecting a shifting culinary landscape.

Additionally, the local community in Narok now relishes fish as a delicacy during dry seasons, further driving up the demand for catfish.

Cavarino Farms’ journey began in 2012 when Mr Steven Njoroge observed that fish farming was primarily concentrated in Kenya’s lake regions.

Mr Njoroge recognised the untapped potential of inland areas and set himself on a mission to make a significant impact.

His extensive travels and visits to institutions worldwide, including the University of Tennessee in the United States and the University of Nairobi, equipped him with the knowledge and skills necessary for success.

“I have visited farms all over the world to learn the dos and don’ts in aquaculture” Mr Njoroge says, highlighting his commitment to continuous improvement and innovation.

Cavarino Farms operates an intensive system, comprising 29 liner ponds and 118 concrete tanks housed in greenhouses and supported by a borehole.

Every unit can hold up to 1,000 fish, but stock varies for now.

Of the 118 concrete tanks, twenty-two are for breeding.

Ornamental fish

The remaining 96 tanks are divided equally for catfish and tilapia production.

“We practise polyculture, rearing tilapia and catfish separately,” says Cavarino Farm Manager Alvine Ochiel.

“Every grow-out liner pond typically holds around 1,000 tilapia. Of the 96 raised tanks,

forty-eight are designated for catfish, while the rest are nursery tanks for post-fingerling and fry for both species from the hatchery, ensuring segregation.”

“In addition to tilapia and catfish, Cavarino breeds ornamental fish,” Ochiel says.

“These include red comet, yellow comet, shubunkin, and koi carp, housed separately in tanks rather than ponds. Of the 22 breeding tanks, one is exclusively dedicated to ornamental fish breeding,” Mr Ochiel says.

The company sells about 20 tonnes of fish every year, with 65 per cent being tilapia and most of the remaining stock being catfish.

Catfish are typically sold in kilogrammes or whole fish, occasionally offered as filets.

From the hatchery to the grow-out, there’s a big difference between the two species, starting from propagation.

Breeding tilapia involves pairing males and females in a ratio of one to three, with eggs collected through “robbing”.

Catfish breeding requires human intervention, with females injected with hormones before egg collection, Ochiel says. Mr Njoroge highlights the differences in nurturing.

Tilapia undergo sex reversal, while catfish do not.

Catfish are more sensitive during the juvenile stage, making nursing challenging due to their fragility and requiring careful attention to prevent high mortality rates. However, they are harder in the grow-out stage.

Complexity of monitoring

Cavarino Farm adjusted its breeding ratios to meet demand, now producing 200,000 tilapia fingerlings and 50,000 catfish.

This increased production reflects the growing opportunities in aquaculture, showcasing its potential for further expansion and development.

Mr Njoroge underscores the importance of proper management and record-keeping in fish farming, given the complexity of monitoring growth underwater.

He also stresses the appeal of pond farming, particularly for those without access to suitable lakes for cage farming, utilising land unsuitable for crop cultivation.

Additionally, Cavarino Farms engages the local community, supporting development projects and offering lessons to aspiring fish farmers and other interested parties in aquaculture.



Cavarino general manager and the aquaculture manager on their 118 tanks, 22 are for breeding. RICHARD MAOSI | NATION



Angela Odera, the founder and Chief Executive Officer of Rio Fish, a processing firm in Homa Bay County. She abandoned banking and ventured into aquaculture.

PHOTO | GATSBY

Empowering women, small-scale farmers for Kenya's aquaculture

PROSCOVIA ALANDO

The narrative of Angela Odera's journey into aquaculture from 2014 is one of purpose and determination. Witnessing the dwindling fish supply in her village and the exploitation of women in the trade, Ms Odera saw an opportunity for meaningful change.

Determined, Ms Odera pooled her savings and persuaded her spouse to join her in establishing Rio Fish Ltd.

"I put together all my savings and sold the idea to my spouse, who has been my greatest support system professionally and financially," she says.

Transitioning from a banking career to the helm Rio Fish marked a significant moment for Ms Odera. Her decision not only represented a shift in career but also a firm commitment to driving positive change in her community. Their venture, in Suba South, Homa Bay County, has flourished, boasting an annual ti-

lapia production capacity of 300 tonnes. As Rio Fish expanded, Ms Odera and her team launched the Rio Fish Hub – a platform that consolidates fish from Rio Fish Farm and smallholder farmers organised into groups.

Through this aggregation model, Rio Fish ensures market access and minimises post-harvest losses as smallholder farmers gain from the company's cold chain facility. At the hub, Rio Fish ensures a diverse range of products, offering everything

from round whole fish to cleaned and gutted options, as well as sundried and smoked delicacies. Rio's new high-quality offerings will soon grace supermarket shelves, Ms Odera says.

"We sell fish at depots in Homa Bay, Migori, Kisii, Nyamira and Bomet, with outlets in Nairobi and Mombasa. We plan to expand to other counties," she says.

Rio Fish Ltd extends its offerings beyond the market hub with a dedicated restaurant near the premises. Here, patrons take a culinary odyssey, savouring a variety of fish dishes. The restaurant is particularly celebrated for its signature "fish choma", a culinary delight that has earned popularity among fish enthusiasts in Homa Bay and other regions.

As part of its dedication to empowering women in fish production, Rio Fish invests in their training, fostering economic growth and sustainability.

The company also provides women traders with an alternative source of fish and mobilises them into groups, effectively combating the exploitative practice of "sex-for-fish".

"Our objective is to ensure Kenyan women access fish without getting exploited. We achieve this by linking fish value chain stakeholders and organising markets to provide a convenient and affordable supply," Ms Odera emphasises.

Rio Fish demonstrates its commitment to gender inclusivity through workforce composition, boasting 36 full-time employees, predominantly comprising youth and women.

"We have 40 full time staff, 24 of whom are women. We engage 10 casuals regularly. We have opened new outlets in Nairobi and expanded our product offering. We have also partnered with MEDA, providing training, cool boxes and sensors to farmers in our network," she says.

"We have partnered with KEPISA to upgrade our biodigester, which we use to manage fish waste to generate biogas. The biogas is used to dry fish efficiently and reduce reliance on expensive and unreliable grid power."

With a vast network of more than 700 smallholder fish farmers and 400 traders, the firm positions itself as a gender-smart organisation in the fish value chain.

Rio Fish Ltd is championing and spearheading a project aimed at recruiting 600 women in cage fish farming and providing training for 2,000 small enterprises in

Our objective is to ensure Kenyan women access fish without getting exploited. We achieve this by linking fish value chain stakeholders and organising markets to provide a convenient and affordable supply

Angela Odera, Rio Fish CEO



Suba South, supported by the Africa Enterprise Challenge Fund. This project mobilises women into groups, provides catalytic capital for inputs and offers training in aquaculture best practices.

Ms Odera expresses gratitude for the support of different people and institutions, including Gatsby Africa, Africa Enterprise Challenge Fund (AECF), The Miller Centre, Aquaculture Management Consulting (ACMS), Kenya Marine Fisheries Research Institute (KMFRI), the Kenya Fisheries Research Institute (KEFS) as well as the devolved and national governments.

Her decision to abandon a career in banking and lead Rio Fish Ltd underscores the economic opportunities in aquaculture and highlights its profound social impact. Rio Fish exemplifies how the industry can drive positive change in communities by empowering women economically and combating exploitative practices.

"We are going green and will be launching our first solar powered cold room to enhance cold storage efficiency and access," she says.

Beyond financial gains, aquaculture offers individuals the chance to make a tangible difference in society, fostering inclusivity, gender equality and sustainable development. Ms Odera's journey demonstrates that aquaculture presents a unique blend of economic potential and social responsibility, making it a compelling choice for those seeking profit and purpose.

Environmental and biosecurity protocols for aquaculture growth in Kenya: Spotlight on KMFRI



Dr Jonathan Munguti, KMFRI Head of Aquaculture Directorate. POOL | NATION

In Kenya's thriving aquaculture landscape, a growing appetite for fish intersects with a steadfast dedication to environmental preservation and economic advancement.

As demand soars and opportunities expand, striking a balance between industry growth and ecological integrity becomes paramount.

Guided by the principles of environmental responsibility and strict safety measures, the industry sets its sights on sustainable growth, inviting investors and enthusiasts to explore new opportunities and innovations.

Biosecurity practices in aquaculture play a critical role in preventing the spread of infectious diseases among

aquatic populations. These measures not only uphold industry stability but also minimise stress on aquatic organisms, improve disease resistance and ensure sustainable production.

Recognising this opportunity, the Kenya Marine and Fisheries Research Institute (KMFRI) is playing a significant role in advancing genetic research and selective breeding to supply high-quality broodstock and seed to the industry, particularly in tilapia aquaculture.

Dr Jonathan Munguti, the Head of the Aquaculture Directorate at KMFRI, underscores the importance of selective breeding.

"Selective breeding

enhances disease resistance, thereby reducing outbreaks and lessening reliance on antibiotics," Dr Munguti says.

KMFRI's selective breeding programme for Nile Tilapia, located at the National Aquaculture Research and Training Centre in Sagana, Kirinyaga County, has made huge strides, reaching the F8 generation.

The institution ensures comprehensive biosecurity protocols, including quarantine areas, regular health assessments and physical barriers within breeding facilities aimed at preventing the introduction and spread of pathogens.

"The selectively bred Nile tilapia brings clear benefits to

farmers, boosting productivity and profits with minimal investments. This tilapia stands out for its resilience, fast growth and high-quality flesh," Dr Munguti says.

"Seed and brood fish of this selectively bred Nile tilapia from Sagana have been distributed to farms and hatcheries across the country."

Dr Munguti emphasises the necessity of prioritising preventive measures in biosecurity.

"If biosecurity measures are not followed properly, managing the fallout of a disease outbreak can be much more complex and expensive," he says.

In response, KMFRI conducts training sessions on biosecurity.

CONTINUED ON PAGE 8

Regulation

The government is promoting fish farming, particularly through initiatives like the IFAD and state-funded Aquaculture Business Development Programme (ABDP).

This initiative aims to financially empower smallholder fish farmers in 15 counties by promoting best management practices.

It includes comprehensive training for extension officers and providing vital inputs.

Another important effort is the Go Blue programme, which works on making coastal development sustainable, focusing on creating jobs and ensuring effective maritime governance.

Given the technical nature of aquaculture, investing in skills and training for sound farming management practices is crucial, alongside addressing market access challenges.

Recognising this, the government established the Kenya Fishing School at the National Aquaculture Research Development and Training Centre in Sagana.

Aquaponics units

This institution develops and implements Technical Vocational Education Training (TVET) curriculum for fisheries and aquaculture, providing guidance for new staff and fish value chain stakeholders.

Additionally, the government is exploring initiatives to enhance the sector's role in Kenya's economy and food security.

One key focus is educational institutions, aiming to impart knowledge on aquaculture technology and innovations to students.

Several learning institutions have introduced aquaponics units, integrating fish farming with vegetable growth by recirculating water from ponds and tanks.

The government also promotes scalable aquaculture models, no-



Government backs the transformation of fish farming

tably cage farming in Lake Victoria.

To ensure environmental sustainability amidst increased aquaculture activities, clear regulatory frameworks and a comprehensive Lake Victoria spatial plan are being developed.

These measures, including as-

sessing the carrying capacity of the lake, aim to prevent environmental strain. Mr Daniel Mungai, the Director General of the Kenya Fisheries Service (KeFS), stresses the collaborative efforts between KeFS and the Kenya Marine and Fisheries Research Institute (KMFRI).

While KeFS focuses on policy development and regulation enforcement, KMFRI spearheads the spatial planning.

KeFS is responsible for licensing to enforce suitable siting and environmental impact assessments as per National Environment Management Authority require-

ments, ensuring minimal lake pollution.

"To foster growth, a key step involves conducting carrying capacity assessments by KMFRI. These assessments enable strict control of aquaculture output, with KeFS developing enforcement mechanisms to implement regulations," Mr Mungai says.

Recent reports show a 35 per cent decline in Lake Victoria fish stocks.

Additionally, aquaculture presents a viable solution to overfishing, but farmers face challenges such as high feed costs.

To address this burden, the Fisheries Service is working with the National Treasury to secure tax waivers for aquaculture items and ingredients.

Research is focused on developing affordable, high-value feeds to reduce expenses and enhance profits in aquaculture.

The government recently established the Kabonyo Fisheries Aquaculture Service and Training Centre of Excellence.

Though the launch has taken place, ground-breaking is yet to be done.

Once operational, this centre aims to produce at least 10 million fingerlings annually and provide training, research and selective breeding of different fish species.

The goal is to enhance cultured breeds, making them more resilient to climate change, promoting faster growth and increasing resistance to common diseases, thereby ensuring the availability of quality and affordable inputs.

To ensure the quality and safety of locally-farmed fish, the government has set standards for inputs on commercial farms and conducts monitoring for contaminants.

Training programmes educate producers, processors and transporters on the proper handling of fish.

This commitment to quality control and safety aligns with the national strategy for aquaculture,

To foster growth, a key step involves conducting carrying capacity assessments by KMFRI. These assessments enable strict control of aquaculture output, with KeFS developing enforcement mechanisms to implement regulations.

Mr Daniel Mungai



prioritising investment, productivity and fair competition while conserving aquatic resources and promoting competitiveness for SMEs and large investments.

Reflecting on success stories in aquaculture, Mr Mungai gives the example of Victory Farms.

He underscores the company's achievement in demonstrating the commercial viability of large-scale tilapia farming in Lake Victoria, which has created jobs and significantly impacted the rural socio-economic landscape.

President William Ruto recently launched the Riwa Special Economic Zone, admitting Victory Farms as its anchor investor to set up a fish processor.

This solidifies Victory Farms' role as a pioneering force in aquaculture.

The role of aquaculture in reducing fish imports has reshaped the economic scenario.

KMFRI's contribution to environmental and biosecurity protocols in the growth of fish farming

CONTINUED FROM PAGE 7

and disease control at fish farms and hatcheries.

This proactive approach is crucial for maintaining fish health, farm productivity and overall profitability.

The involvement of KMFRI in shaping national aquaculture and Blue Economy policies demonstrates the government's dedication to supporting the sector.

KMFRI ensures policies balance economic growth with environmental sustainability and community welfare by providing science-based evidence.

This commitment offers an exciting opportunity for individuals getting into the industry, as it signifies a conducive regulatory

environment supported by comprehensive research and expertise.

Through collaboration with KeFS, KMFRI conducts carrying capacity assessments, informing policymakers and other stakeholders about environmental limits for aquaculture expansion.

These assessments mitigate the risk of environmental harm while maximising economic potential.

Additionally, they play a crucial role in biosecurity by preventing disease outbreaks and water pollution, ensuring the health and sustainability of farmed fish.

Overall, the collaborative efforts of KMFRI and KeFS promote sustainable economic growth and environmental stewardship in Kenya's

aquaculture. This approach creates an exciting environment for people looking to contribute to the development of the sector.

Beyond research, KMFRI engages in advocacy and knowledge dissemination, working with policymakers, stakeholders and the public to convey scientific findings and raise awareness about aquaculture issues.

"We're dedicated to training, sharing research findings and forming partnerships to boost aquaculture," Dr Munguti says.

He highlights the potential of aquaculture to meet the growing demand for fish, stressing the importance of seed and feed quality, technology and best management practices to position Kenya as a key player in global aquaculture.



A farmer during the inspection tour by KMFRI officials at Kavunzoni Bamba Fish Farming Project in Kilifi County. KEVIN ODITI/NATION