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Kenya Marine and Fisheries Research Institute

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By: Dr Jacob Abwao, Dr Mary A. Opiyo, Dr Domitila Kyule, Dr Paul Orina, Dr Kevin Obiero, Dr Isaac Wamalwa, Ms Ruth Lewo, Ms Alice Hamisi, Mr Sammy Macaria & Dr Jonathan Munguti *Edits: Jane Kiguta*

Breakthrough in aquaculture as KMFRI unveils genetically improved Sagana Tilapia

Kenya Marine and Fisheries Research Institute (KMFRI) has marked a significant milestone in Kenya's aquaculture development with the successful development and release of the Genetically Improved Sagana Tilapia (F-9), a superior strain of Nile tilapia that promises to transform fish farming across the country.

The newly launched F-9 strain, developed through advanced selective breeding techniques, exhibits enhanced growth rates, improved feed conversion efficiency, high survival, and reproductive control**,** setting new standards in sustainable aquaculture.

The F-9 strain is the product of a rigorous breeding programme under KMFRI's national fish breeding nucleus at Sagana, supported by the Aquaculture Business Development Programme (ABDP), a joint initiative between the Government of Kenya and the International Fund for Agricultural Development (IFAD). This collaborative project is designed to boost aquaculture productivity, improve livelihoods, and strengthen fish seed systems in Kenya.

"This is a game-changer for Kenya's blue economy. The F-9 Sagana strain not only delivers better yields for farmers but also supports food security and job creation," said KMFRI Ag Director General Dr James Mwaluma.

A farmer inspects freshly delivered fish seed

Boosting Genetic Diversity for Sustainability

In an effort to enhance genetic diversity and ensure long-term sustainability of the breeding programme, KMFRI scientists introduced novel genetic material by crossbreeding the F-8 Sagana strain with wild Nile tilapia broodstock from Lakes Albert and Turkana. This reciprocal crossing resulted in a robust F-9 generation with exceptional performance traits.

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KMFRI technical team undertaking broodstock pairing in preparation for mass breeding. The bigger males are fin clipped to mitigate aggression and killing smaller females

Scaling Impact through Certified Hatcheries

To scale up the distribution of the improved fingerlings, KMFRI rolled out its Seed Improvement and Multiplication Model (2021), under which 30 certified hatcheries across the country have been entrusted with multiplying the F-9 strain. This decentralized model ensures that smallholder farmers have consistent access to high-quality fish seed.

Feeding for Success

Recognizing the importance of nutrition in unlocking the genetic potential of the F-9 strain, KMFRI and ABDP partnered with leading commercial feed manufacturers to supply nutritionally balanced, high-protein feeds tailored to the needs of the improved tilapia. This step is critical to realizing faster growth rates and greater farm productivity.

High Quality tilapia feeds used in KMFRI Sagana to support the selective breeding program.

Hatchery managers from selected hatcheries receiving the improved Nile Tilapia strain for multiplication

The development and deployment of the F-9 Sagana Tilapia aligns with Kenya's broader vision of a vibrant, sustainable, and inclusive aquaculture sector. Through continued innovation and strategic partnerships, KMFRI remains committed to advancing science-based solutions that empower fish farmers and safeguard the country's aquatic resources.

"With the F-9 strain, we are ushering in a new era of aquaculture in Kenya; one that is anchored in science, sustainability, and service to the people," added KMFRI Ag Director General.

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By: Dr Gladys Okemwa *Edits: Jane Kiguta*

KMFRI collaborates in landmark marine research mission aboard R/V Dr. Fridtjof Nansen

Kenya Marine and Fisheries Research Institute (KMFRI) scientists, in partnership with experts from across Africa and Europe in May 2025 concluded a landmark marine research expedition aboard the R/V Dr. Fridtjof Nansen, a globally renowned Norwegian research vessel.

“KMFRI as a national institution mandated to carry out research in freshwater and marine ecosystems prides itself in being part of this initiative which also aligns with the 5-year strategic plan,” said KMFRI Ag CEO Dr James Mwaluma.

He said that by involving Kenyan researchers and fostering collaboration with international experts, the cruise strengthens regional expertise and lays a strong foundation for future oceanographic surveys by KMFRI and its partners.

The R/V Dr. Fridtjof Nansen, operated by the Norwegian Institute of Marine Research (IMR), is the third research vessel to carry the name of the esteemed Norwegian scientist, explorer, and Nobel Peace Prize laureate. Serving as a floating hub of marine science, the vessel has contributed significantly to the global understanding of ocean ecosystems.

KMFRI Ag CEO Dr James Mwaluma

The Fridtjof Nansen is equipped with state-of-the-art instruments for conducting marine ecosystem research and supporting capacity development in partner countries. “Therefore, Kenya stands to benefit greatly through enhanced collaboration with Norway and the broader scientific community,” said KMFRI CEO Dr Mwaluma.

Blue Economy stakeholders

The 10-day scientific survey began on April 24, 2025, departing from Mombasa and covering Kenya’s coastal and marine zones, including the Exclusive Economic Zone (EEZ). This was the first such survey

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of its kind in Kenyan waters in 42 years, a milestone moment that offered significant learning opportunities and capacity building for the dynamic and enthusiastic research teams involved.

It was also the first time the IMR scientific team and the vessel's crew operated in Kenyan waters, providing a mutual learning experience about the region's unique marine environment. "This expedition was an invaluable opportunity for KMFRI researchers to explore the vessel's capabilities and limitations in conducting marine research," said Dr. Gladys Okemwa, Principal Research Scientist at KMFRI.

Key Findings: Rich Biodiversity and Dynamic Fish Populations

One of the expedition's notable findings was the high abundance of small pelagic fish, particularly anchovies and sardines, predominantly in the northern waters near Malindi. This distribution pattern is likely influenced by strong ocean currents flowing northward and aligns with areas of high tuna catch.

KMFRI Board Chairman Amb. Dr Wenwa Akinyi Oranga with Ag Ocean and Coastal Systems & Blue Economy Director Dr Uku at the function.

In just 12 days, the researchers identified 431 taxa, highlighting Kenya's rich marine biodiversity. Several species potentially represent new records for Kenyan waters, especially in deep-sea areas that remain largely unexplored. "This survey enhances the visibility of Kenya's marine biodiversity and suggests the possibility of previously unrecorded species, pending validation," noted Dr. Okemwa.

Oceanographic data collected, including current speeds, temperature, salinity, and dissolved oxygen profiles will significantly advance understanding of ocean circulation and support better forecasting for maritime traffic, fishing, and climate change impacts.

One key observation was the limited extent of the oxygen minimum zone, a critical area to monitor as climate change may cause it to expand or shift into shallower waters, with implications for marine life and fisheries.

KMFRI's Ag Director Oceans and Coastal Systems & BE Dr Jacqueline Uku and Principal Research Scientist Dr Gladys Okemwa during a panel discussion at the event

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Mapping the ocean floor

Among the expedition's highlights was the high-resolution bathymetric mapping of several ocean regions, particularly along the edge of the North Kenya Bank. These maps are crucial for understanding underwater topography and its role in marine ecosystems.

While the survey generated valuable insights, researchers noted limitations; the vessel could not access shallow coastal waters, where most of Kenya's artisanal fisheries are located, and is not equipped to conduct assessments of large pelagic species like tuna. Consequently, biomass estimates do not represent the full EEZ.

Celebrating 50 Years of the EAF-Nansen programme and the vessel's historic return to Kenya

Heads of organizations under State Department for Blue Economy and Fisheries and FAO on a tour of the fisheries research vessel

The R/V Dr. Fridtjof Nansen's arrival in April 2025 also marked the 50th anniversary of the EAF-Nansen Programme, the longest-running fisheries development initiative by the Food and Agriculture Organization (FAO) of the United Nations and the Norwegian government.

During the Port Call event held on May 6, 2025, FAO Representative in Kenya, Dr. Nyabenyi Tipo, emphasized the programme's importance: "This work is especially critical for Kenya and the wider Western Indian Ocean region, where fisheries are a vital source of nutrition, employment, and income for coastal communities."

Jointly organized by the Ministry of Mining, Blue Economy and Maritime Affairs, the Kenya Marine and Fisheries Research Institute (KMFRI), the Royal Norwegian Embassy and FAO, the event brought together diplomatic missions, heads of government institutions, international and local NGOs, among others, to celebrate achievements and confront emerging challenges in sustainable ocean management.

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Kenya's fisheries sector supports over 300,000 people directly and millions more indirectly. The country was among the first visited by the original Nansen vessel five decades ago. Its return in 2025 is both a moment of reflection and a renewed call to action amid growing environmental challenges.

Attendees at the port call event

Advancing the ecosystem approach to fisheries (EAF)

Now in its current phase, the EAF-Nansen Programme promotes the Ecosystem Approach to Fisheries, an integrated model that incorporates ecological, economic, and social dimensions into fisheries governance.

In Kenya, the programme has supported a comprehensive review of national policies aligned with 82 core EAF legal requirements, identifying key gaps and offering tailored recommendations. It has also conducted training for government agencies to strengthen their ability to design and implement sustainable fisheries management plans.

Fisheries Principal Secretary Ms Betsy Njagi delivers her remarks at the Port Call event

With over 400 scientific surveys conducted globally aboard the vessel, the EAF-Nansen Programme continues to build a vast repository of data on fish stocks, ocean health, and climate change. These insights are helping countries like Kenya make informed decisions to manage marine resources sustainably and equitably.

Take-home message

The recent expedition aboard the R/V Dr. Fridtjof Nansen underscores the growing significance of collaborative marine science in addressing environmental challenges and optimizing resource use. For Kenya, it marks a turning point in offshore research, marine policy development, and biodiversity conservation, laying a strong foundation for sustainable ocean stewardship.

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By: Jane Fonda & Dr Chrispine Nyamweya ***Edits: Jane Kiguta***

Migori county welcomes strategic partnership for Lake Victoria small fish project

Representatives from the Kenya Marine and Fisheries Research Institute (KMFRI) and the Lake Victoria Fisheries Organization (LVFO) were hosted by Migori County Governor, H.E. Dr. Ochilo Ayacko, for a high-level meeting to deliberate on the implementation of the Lake Victoria Small Fish Project (LVSFP).

The project is set to revolutionize the small fish value chain in the Lake Victoria region, with a particular focus on the sustainable management and processing of species such as omena.

Migori County Governor Dr Ochilo Ayacko

Team group photo

Central to the LVSFP is the establishment of a solar-powered fish drying plant at Sori Beach in Nyatike Sub-county. With a daily processing capacity of 3 tonnes, the plant is poised to significantly reduce post-harvest losses, through the deployment of efficient solar drying technologies. The project aims to enhance fish preservation, reduce spoilage, and increase the profitability of small fish enterprises along the lakeshore.

County Official

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Funded by the International Fund for Agricultural Development (IFAD), the initiative also includes the distribution of 170 solar-powered lanterns to local fishermen. These lanterns are expected to improve night-time fishing operations, enhance safety, and reduce reliance on kerosene-based lighting, thereby contributing to environmental conservation and operational efficiency.

KMFRI research scientist Ms Jane Fondo

Capacity building is another core component of the LVSFP. The project plans to train over 2,000 small fish vendors, predominantly women and youth, on value addition, marketing, and digital tools such as the e-fisher app. These trainings will empower local traders with modern business skills, strengthen market access, and promote women and youth's economic inclusion in the fisheries sector.

KMFRI Limnology Assistant Director Dr Chrispine Nyamweya

The collaborative visit between KMFRI, LVFO, and the County Government of Migori underscores a shared commitment to promoting sustainable fisheries and improving the livelihoods of fishers in the region. The LVSFP not only advances blue economy goals but also contributes to food security, gender equity and social inclusion, and community resilience around Lake Victoria.

Boardroom meeting