

A DECADE OF STRUCTURAL EVOLUTION OF THE AQUACULTURE VALUE CHAIN IN KENYA¹

JANUARY 2026

Lilian Kirimi, Joseph Opiyo, John Olwande, Kevin Obiro, Tom Reardon, Lenis S.O. Liverpool-Tasie



EXECUTIVE SUMMARY

The Kenyan aquaculture sector has undergone a profound structural transformation over the last decade, evolving from a subsistence-based activity into a sophisticated commercial ecosystem. This growth is most evident in the cage-based segment of Lake Victoria, which saw an explosive 1,300-fold increase in production volume between 2014 and 2024. While the sector has successfully "democratized participation" by attracting thousands of small-scale farmers, the "industrialization of volume" has led to a concentration where few large-scale, vertically integrated firms now control most of the production. Pond-based aquaculture has also experienced significant expansion over the decade with the number of farmers more than doubling and small-scale operators continuing to dominate, representing over 89% of all producers. While total production volume surged nearly five-fold to 1,789.7 metric tons, the industry is witnessing a gradual structural shift toward commercial diversification as medium and large-scale operations increase their collective share of total output.

This transformation has been mirrored by the rapid maturation of the "hidden middle," characterized by a professionalized workforce of cage fabricators, specialized managers, and a transport network increasingly dominated by micro-enterprises. To sustain this momentum and ensure inclusive agricultural transformation, future policy must bridge the productivity gap for smallholders through Public-Private-Producer Partnerships (4P), strengthen environmental governance to prevent mass fish kills, and provide targeted credit and infrastructure for the micro, small, and medium enterprises (MSMEs) that provide critical logistics and inputs.

¹ This Research Brief is part of the INCATA Project, funded by the Gates Foundation.

INTRODUCTION

This study was developed under the INCATA project (Linked Farms and Enterprises for Inclusive Agricultural Transformation in Africa and Asia), which explores the relationship between commercial small-scale producers (cSSPs) and the micro, small, and medium enterprises (MSMEs) that constitute the "hidden middle" of the agrifood value chain. The primary objective of this specific study was to conduct a meso-level inventory of the spatial and size distribution of actors in key segments of Kenya's aquaculture value chain. By assessing the structural changes over a 10-year period, the report examines how the value chain and its various segments have grown across different production areas and identifies the primary drivers behind these observed shifts.

OVERVIEW OF THE AQUACULTURE VALUE CHAIN

Kenya is the seventh most populous country in Africa, yet its per capita fish consumption of 4.5 kilograms per year remains significantly lower than the African average of 10 kilograms. To bridge this gap and meet rising demand, the country would need to increase fish production by 113%. Historically, the sector was revitalized by the 2009 Economic Stimulus Program (ESP), which promoted pond aquaculture as an alternative livelihood. Since 2018, growth has accelerated due to supportive policies like the Blue Economy Strategy and Government of Kenya/donor-funded interventions such as the Aquaculture Business Development Program (ABDP) and the Kenya Climate Smart Agriculture Project (KCSAP). Aquaculture now contributes approximately 20% of the national fish production, serving as a vital and resilient alternative to unpredictable capture fisheries.

METHODOLOGY

The study employed a multistage inventory approach to map the concentration and distribution of value chain actors. Initially, a rapid reconnaissance survey and official statistics were used to identify key production counties for cage farming (such as Busia, Homa Bay, Kisumu, and Siaya) and pond farming (including Kisii, Kakamega, and Kiambu). For cage-based aquaculture, the research team used a systematic snowballing technique, starting with key informants at main beaches to identify all relevant landing sites and actors, including feeders, security providers, and fabricators. This iterative process involved field visits to validate actor numbers and historical data. For pond-based aquaculture, data was gathered through focus group discussions with farmers and local fisheries officers, with final validation provided by County Directors of Fisheries.



RESULTS

Cage-Based Aquaculture: Rapid Industrialization and Participation



Between 2014 and 2024, Kenya's cage-based aquaculture sector underwent a massive structural transformation, evolving from a nearly non-existent activity into a sophisticated commercial ecosystem. It was characterized by exponential expansion in both participation and production. The total volume of fish produced via cages skyrocketed from just 24 metric tons (MT) in 2014 to 30,565 MT in 2024, representing an extraordinary 1,300-fold increase in production. This growth was accompanied by a significant expansion in participation, as the number of cage operators rose from a mere 39 to 2,737 over the same decade. While cage aquaculture was negligible in three of the four surveyed counties ten years ago, it has since become a widespread and rapid phenomenon across Lake Victoria.

Cage farming has been defined by a dual structural trend comprising small and larger operations. A defining trend of the last decade is the "democratization of participation," where small-scale farmers have consistently represented the largest segment of new entrants. By 2024, small-scale operations comprised 95.2% of all cage farmers, a dominance attributed to the relatively minimal capital required to set up small clusters. This trend exists alongside a parallel "industrialization of production volume". While smallholders are the most numerous, a few large-scale operators—representing only 0.8% of total farmers in 2024—control 68.1% of the total production volume. These large-scale firms achieve a disproportionate share of output through significant capital investment and vertical integration, allowing them to realize lower unit costs via scale, better survival rates, and mechanized feeding.



The structural transformation is marked by distinct regional models of development. Homa Bay County exemplifies the industrial model, where large-scale, vertically integrated firms control a staggering 95.7% of the county's production volume, despite representing only 1.0% of its operators. In contrast, Siaya County maintains a decentralized, smallholder-led model. In Siaya, 96.9% of operators are small-scale, and they contribute a substantial 85.9% of the county's total volume. Meanwhile, counties like Busia and Kisumu demonstrate an emerging diversification in production scale, with growth distributed more broadly across small, medium, and large operations by 2024.

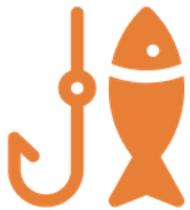
Drivers of this transformation comprise a combination of high-level political backing and strategic economic incentives. The national government's "Big Four Agenda" (2017–2022) explicitly prioritized aquaculture under its food security and manufacturing pillars, providing the sector with high-level political support. Furthermore, the formal launch of the Blue Economy Department in 2016 signaled that aquatic resources were a national priority, creating a more favorable regulatory environment for investors.

Economic drivers included significant investment from government/donor-funded programs such as the Aquaculture Business Development Programme (ABDP) and the Kenya Climate Smart Agriculture Project (KCSAP). These initiatives provided critical subsidies, credit guarantees, and grants for inputs like cages and fingerlings, dramatically lowering entry barriers for thousands of farmers. Market protection was also a key factor; the introduction of a 10% government excise duty on imported fish from China incentivized domestic production and attracted new private-sector capital.

Environmental and market conditions further accelerated this shift. High consumer demand for farmed fish, coupled with the decline and unpredictability of wild fish catches from capture fisheries, pulled investment toward cage aquaculture as a sustainable alternative. Geographically, Lake Victoria offered natural advantages, including deep (>30m), clear, and hyacinth-free waters that provided ideal environmental conditions for large-scale cage siting and reduced operational risks. Despite this success, the sector faces recurring challenges, including inadequate regulatory compliance and poor environmental management, which have led to frequent mass fish kills that threaten the long-term sustainability of the industry.



Pond Aquaculture: Small-Scale Dominance with Gradual Diversification



Pond-based aquaculture in Kenya has also experienced substantial growth in both participation and production volume over the last decade. Between 2014 and 2024, the total number of pond-based farmers more than doubled, increasing from 9,005 to 18,957 operators. Despite this rapid expansion, the sector is characterized by the persistent dominance of small-scale farmers, who have consistently represented over 89% of all producers throughout the ten-year period. This demographic provides the backbone of the industry, although there has been a modest emergence of medium-scale farming and a small but growing presence of large-scale operations, indicating a nascent development towards larger commercial enterprises. Regional shifts further illustrate this trend; for example, Kisumu County transitioned from having exclusively small farmers in 2014 to a structure where medium-sized operations comprised nearly 19% of its producers by 2024. Other counties like Siaya and Busia also saw the late emergence of large-scale farmers by 2024, where none had existed in previous years.

The growth in the number of participants has been matched by a significant increase in total output, with pond-based production rising from 365.7 metric tons in 2014 to 1,789.7 metric tons in 2024. While small-scale farmers contribute the largest share of this volume, their relative dominance is on a declining trend, falling from 90.7% of the total volume in 2014 to 84.9% in 2024. This shift is primarily driven by the increasing contribution of medium-sized farms, whose share of production volume rose from 8.4% to 13.4% over the same period. Large-scale farming also saw growth in volume contribution, increasing from a low base of 0.9% to 1.7% by the end of the decade. These trends suggest a clear process of diversification in production scale, particularly in counties such as Kisumu, Kisii, and Bungoma, where medium-sized farmers now contribute significantly to local production.

The transformation of the pond-based segment has been propelled by several specific drivers. A foundational factor was the government's ESP, which created a solid base for aquaculture growth, particularly in counties like Kakamega. In such regions, proactive county government initiatives—including the construction and rehabilitation of ponds, the supply of high-quality fingerlings, and marketing campaigns like "Fresh Fish Fridays"—have successfully boosted local consumption and production. Furthermore, the expansion of medium-scale enterprises has been facilitated by improved access to credit, better market linkages, and the increased availability of commercial seeds and feeds. Urban demand from growing centers like Kakamega Town and Mumias has also created reliable markets for higher-volume producers, enabling some medium-scale farmers to transition into larger enterprises.

While pond production has grown, its industrialization has been slower than that of cage-based aquaculture. Large pond farms face higher entry barriers, including complex land acquisition processes, water access rights, and significantly higher capital requirements. In contrast, cage systems can more easily utilize existing lake space, which has led to a more rapid concentration of large-scale volume in the cage segment. Nevertheless, the persistent presence of large producers in Kakamega—where their share of production volume reached 7.2% by 2024—demonstrates that with strong extension services, high pond densities, and reliable access to quality inputs, pond-based systems can achieve significant commercial scale. Overall, the pond-based sector remains a vital, smallholder-driven component of Kenya's aquaculture value chain that is gradually evolving toward a more diverse and commercially oriented structure.

The Maturation of the "Hidden Middle"



The support services sector has registered massive growth and maturation over the last decade, mirroring the expansion of fish production. The most immediate service roles—including feeders, security guards, cage managers, and cage fabricators—experienced an overall rapid and accelerating expansion, with numbers in all four categories surging between 2014 and 2024. Specifically, the number of feeders grew from 35 to 952, security personnel increased more than twentyfold to 245, and the number of cage managers rose from 20 to 302. Most notably, cage fabricators saw a fiftyfold proportional growth, increasing from just two individuals to 107, which signals an escalating demand for specialized construction and maintenance services. This explosion in support services is a direct response to the sector's expansion and indicates a fundamental transition from a subsistence-based model to a market-oriented economy where businesses now specialize in providing essential inputs. This transition has been driven by increased investor interest, high-level political backing through the "Big Four Agenda," and programs like KCSAP and ABDP, which provided subsidies and grants for infrastructure and inputs.

The input supplier segment similarly underwent an exponential transformation, with the overall supplier base increasing nearly tenfold over the decade. Fish feed distribution emerged as a critical structural component, with feed stockists accounting for nearly half of all input suppliers by 2024. Hatcheries also experienced strong growth, increasing from 14 to 62 to meet the rising demand for commercially supplied fingerlings. Beyond simple retail, there has been a shift toward localized manufacturing; feed millers, which were non-existent in 2014, grew to nine by 2024, while providers of specialized equipment like nets, dam liners, and floaters increased twentyfold. These services exhibit clear regional concentration, with Siaya County acting as the primary hub for input supply and fabrication, while Kakamega serves as a major center for feed distribution.

The mid-stream and downstream segments of the value chain have also professionalized to handle the increased output. The total number of fish wholesalers grew 1.6 times, with a notable structural shift toward larger, more professional enterprises in urban centers. While small wholesalers still dominate numerically, there is a gradual

process of commercial consolidation, particularly in Nairobi, which hosts the highest share of large wholesalers (12.0%) to supply hotels and high-consumption areas. Supporting this wholesale growth, the number of market-based loaders nearly tripled to 229, with major concentrations in Nairobi and Migori, reflecting their roles as key consumption and transit hubs.

The transport network and specialized labor services have expanded sixfold to support the logistics of the maturing value chain. A significant trend is the structural shift toward micro-enterprises; motorbikes and tuk-tuks now represent the largest share of transporters, growing from 34% in 2014 to 56% in 2024. This shift is most dramatic in Nairobi, which moved from a system dominated by large lorries to a 71.4% micro-transporter structure, facilitating localized and high-frequency delivery networks. Complementing these logistics, the number of specialized fish cutters tripled, with the majority concentrated in urban hubs like Nairobi and Mombasa, suggesting that final fish preparation for consumers occurs primarily at the point of sale away from primary production areas. Collectively, these results demonstrate that Kenya's aquaculture value chain has evolved from a rudimentary system into a developed commercial ecosystem supported by specialized technical labor, localized manufacturing, and an efficient, multi-tiered logistics network.

RECOMMENDATIONS FOR POLICY AND INCLUSIVE TRANSFORMATION

To ensure the transformation of the aquaculture value chain remains inclusive and sustainable, the following actions are recommended: bridge the productivity gap by expanding Public-Private-Producer Partnership (4P) arrangements to link small-scale producers with large industrial firms, facilitating access to high-quality fingerlings, authenticated feeds, and modern technical training; strengthen environmental governance by addressing recurring mass fish kills and environmental risks through stricter regulatory compliance for cage siting and implementation of water quality monitoring protocols in Lake Victoria; support MSME maturation by providing targeted credit facilities, grants, and subsidies to help the "hidden middle"—such as cage fabricators and micro-transporters—upgrade their technologies and cold-chain capabilities; enhance market infrastructure by investing in regional aggregation and transshipment hubs, modeled after the Busia Fish Market, to streamline both domestic and cross-border trade for small-scale actors; and promote localized manufacturing by incentivizing the local production of feeds and specialized aquaculture equipment to reduce operational costs and dependency on imports.

REFERENCES

- Aura, C. M., et al. (2025). Unbundling Fish Kills Associated Losses and Compliance Aspects. *Aquaculture, Fish and Fisheries*.
- Aura, C. M., et al. (2020). Status of Cage Aquaculture in Lake Victoria (Kenya). KMFRI Technical Report.
- Kenya Fisheries Services (KeFS). (2023). *Fish Statistical Bulletin*.
- Kenya National Bureau of Statistics (KNBS). (2024, 2025). *Economic Surveys*.
- Obiero, K. O., et al. (2019). Predicting uptake of aquaculture technologies among smallholder fish farmers. *Aquaculture International*.
- Munguti et al. (2021). Sustainable alternatives for local demand.