Revolutionary Collaborations in Fish Farming: The Case of Nyeri County

County:	**Nyeri**		
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Target Audience:	**Counties, Fish farmers, Youths, development partners**		
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Introduction:

Nyeri County, perched in the lush Central Highlands of Kenya, is renowned for its temperate climate, fertile soils, and abundant freshwater resources sourced from rivers and springs cascading off the Aberdare Range. For decades, its' economy has thrived on coffee, tea, and dairy farming—sectors that shaped its identity and sustained its rural communities.

However, the landscape is shifting. Climate variability has disrupted traditional farming cycles, rainfall patterns have become erratic, and arable land is increasingly fragmented due to population pressure and urban expansion. At the same time, youth unemployment continues to rise, and smallholder farmers face diminishing returns from conventional agriculture. These converging challenges have prompted a strategic pivot—toward aquaculture.

Fish farming is emerging as a viable and transformative alternative. It requires less land, adapts well to changing weather conditions, and offers high nutritional value and market potential. Recognizing this, the County Government of Nyeri, in collaboration with development partners such as the Aquaculture Business Development Programme (ABDP), has rolled out a multi-pronged strategy to promote aquaculture as a tool for economic empowerment and food security.

This success story highlights how Nyeri County through a collaborative approach is harnessing fish farming to empower smallholders, diversify livelihoods, and build a more food-secure future by spotlighting the story of 2 farmers; Peter Mwangi and Christopher Mureithi whose exemplary stories are transforming aquaculture in Nyeri County.

Implementation of the practice (*Solution Path*):

1. **Peter Mwangi: Youth practising climate-smart Recirculatory Aquaculture System (RAS)**

Figure 1water hyacinth that is used for biofiltration in RAS

Peter is among the 398 small-scale fish farmers who have benefitted from the Aquaculture Business Development Program being implemented collaboratively with Nyeri County Government Department of Fisheries Development, receiving about 400,000 fingerlings. He started with a small pond during the economic stimulus program in 2013 and encountered a myriad of challenges including poor water quality, poor quality feeds and low quality of fingerlings. In 2019, the County Government through the department of fisheries and aquaculture development in partnership with the Dutch Embassy, Wageningen University, and FOSPA-Africa, identified Peter as among the passionate youth and women farmers who were taken for a training on fish farming in Netherlands where he acquired the skills to use the modern technologies for fish farming.

To address the problem of fish mortality caused by poor water quality in traditional ponds, Peter, converted his traditional pond into a Recirculatory Aquaculture System (RAS) which continuously purifies and reuses the water. The RAS has water recycling features whereby water from the fishpond is filtered and cleaned and recycled back to the ponds. It is comparable to a closed circuit, where waste products like solid waste, ammonium, and CO_2 are either removed or converted into non-toxic substances. The clean water is then replenished with oxygen and sent back to the fish tanks. The system used biofilters such as water hyacinth to remove harmful waste products like ammonia, ensuring healthy water conditions for the fish. The farmer has also embraced clean energy solutions where he uses a solar-powered pump to pump the cleaned water back into the fishponds.

As compared to the open pond system, RAS offers the following benefits as compared to the traditional fish farming system:

- ✓ **Better water quality** since the purification through addition of oxygen and removal of ammonia gives the water better quality and therefore faster growth of the fish and healthy water conditions for the fish

- **Lower water quantity:** The system significantly reduces the amount of water used as compared to the traditional pond system therefore ensuring water conservation
- **Climate smart and has reduced environmental impac**t as it re-uses water usage and minimizes pollution making the system more environmentally sustainable
- RAS allows for the farmer to **produce fish throughout** the year since the system is done in green houses, enabling all year-round fish farming. The system also ensures faster maturity of fish where fish get to maturity in 5-6 months compared to 8 months in the traditional ponds
- The system also ensures **increased production** since the climate/temperature in the greenhouse is controlled and the raised ponds with one circular raised pond holding 1000 fingerlings
- The challenge of **fish predation** by birds such as kingfishers is reduced. **Escapees are also limited** as well as external transmission of diseases and parasites.

Figure 1:Circular raised ponds that hold more than 1,000 fish

This innovative aquaculture farmer has mastered the art of sustainable farming by integrating a Recirculating Aquaculture System (RAS) with crop cultivation. After harvesting the fish, ammonia nutrient-rich pond waste is channelled to irrigate the maize fields. The water transforms farmland into a thriving oasis.

2. **Christopher Mureithi: Pioneering Hatchery-Based Fish Farming in Nyeri County**

In Nyeri County, one of the persistent challenges facing fish farmers has been access to high-quality fingerlings. Recognizing this gap, the Nyeri County Government, through its Department of Agriculture and Fisheries, in partnership with the Aquaculture Business Development Program (ABDP)—launched a targeted initiative in 2022 to build farmer capacity. Beneficiaries received training in aquaculture practices, pond liners, and improved tilapia F9 fingerlings, a cold-tolerant breed well-suited to Nyeri's climate.

Among the standout beneficiaries is Christopher Mureithi, a visionary farmer who has established a hatchery with the capacity to host up to 18,000 fingerlings. His model ensures a consistent supply of healthy stock for his own ponds and for other farmers in the region. Mature fish are housed in separate breeding ponds, providing eggs for the hatchery and sustaining the production cycle.

To boost survival rates and optimize water use, Christopher has adopted the Recirculating Aquaculture System (RAS), a modern, water-efficient technology that filters and reuses water,

maintaining ideal conditions for fingerling growth. In a bid to diversify income and sustain operations, he has also ventured into ornamental fish farming, selling each at KES 200 to help cover feed costs. Christopher sells fingerlings that are between 1.5 months to 2 months old at between 15 to 25 Kshs.

Picture: 4 Christopher Mureithi attending to his hatchery

The County Government continues to support farmers like Christopher by providing quality feeds, technical training, pond liners, and extension services, ensuring that aquaculture remains a viable, scalable, and climate-resilient livelihood option across Nyeri.

Through such climate-sustainable ventures by Christopher, farmers have formed farmer cooperative groups which offer financial solutions as well as provide a platform for peer learning amongst farmers. For example, Christopher is the chairperson of Muthe-Gathehu fish farmers co-operative through which the members have been able to benchmark on fish farming from other counties such as Kirinyaga, Machakos and Tharaka Nithi Counties.

Results of the practice (*outputs and outcomes*)

Individual-Level Impact

Peter:

By Adopted Recirculating Aquaculture System (RAS) with controlled temperatures (26–28°C) Peter houses over 4,500 fingerlings and produces 1,800 kg of table fish per cycle, each retailing at between 350 – 600 Kshs. He is also able to achieves year-round harvests, effectively doubling his income while eliminating wastewater discharge through rainwater harvesting and solar-powered recirculation

Christopher:

He has established a hatchery that produces high-quality, fast-maturing tilapia F9 fingerlings that grow from 40g to 400g in 4 months which has ensured a steady supply of quality and affordable fingerlings improving access for other farmers. The diversification into ornamental fish farming, generating additional income for feed sustainability.

Community & Systemic Outcomes

- On community and systematic outcomes, over 3,000 farmers in Nyeri County have benefitted from aquaculture interventions with most of the transitioning from subsistence to semi-commercial fish farming, which has improved productivity and income.
- With the formation of farmer cooperatives (e.g., Muthe-Gathehu), financial inclusion has been fostered as well as providing a platform for peer learning
- Enhanced food security, nutrition, and poverty reduction in rural communities
- Strong alignment with SDGs: Clean Water (SDG 6), Decent Work (SDG 8), and Climate Action (SDG 13)

- Nyeri County now serves as a benchmark for aquaculture governance, with the model being scaled to other counties including Kirinyaga, Machakos, and Tharaka Nithi

Lessons learnt:

Some of the key learnings form these 2 initiatives include:

- Productivity gains are real: Farmers like Peter Mwangi achieved 4x higher yields and reduced fish maturation time from 9 months to 4–6 months. Controlled environments lead to better fish quality and more predictable harvest cycles.
- Adopting water and resource efficiency such as A-RAS recycles water, reducing consumption by up to 90%. These and other climate-smart practices such as the use of solar-powered systems and rainwater harvesting promote environmental sustainability and attract development partners while also minimising operational costs and environmental impact.
- There is need to be innovative and embrace modern fish farming technologies in hatcheries such as adoption of RAS to ensure efficient use of water, embracing raised fishponds in greenhouses as this helps with temperature control and ensure proper utilization of space while also controlling predators.
- Adopting cooperative models fosters knowledge exchange, financial access, and collective growth among farmer groups. Formation of Muthe-Gathehu Fish Farmers Cooperative, chaired by Christopher, facilitating peer learning and benchmarking with counties like Kirinyaga, Machakos, and Tharaka Nithi Counties

Recommendations:

1. Investing in training and extension services by partnering with technical institutions and NGOs to train farmers on system design, maintenance, and fish health is an important component in ensuring skills development and support to young farmers
2. Leveraging on public-private partnerships through collaborating with development partners (e.g., Netherlands Embassy, FOSPA-Africa) to co-finance infrastructure and scale adoption is highly recommended.
3. Incentivizing youth participation for example through provision grants or subsidized kits to youth groups to build and manage A-RAS units is necessary in motivating them to engage in fish farming.
4. It is important for fish farmers to form groups and cooperatives to help them learn from each other and share ideas, pool resources and be able to secure loans as well as earn support from the County Governments and partners
5. Considering the fish cost of commercial fish feeds (a 50 kg bag goes for 4500 shillings) fish farmers need to find alternative feeds on rear other species of fish such as the ornamental fish that fetch better prices and farmers are therefore able to buy fish feed.

Further Reading:

1. Nyeri county government website – www.nyeri.go.ke
2. Aquaculture Business Development Program (ABDP) - https://www.abdpcu.org/
3. Agroberichten buitenland https://www.agroberichtenbuitenland.nl/actueel/nieuws/2025/01/13/kenya-affordable-aquaculture-recirculatory-system-a-ras-technology-is-paving-the-way-for-sustainable-aquaculture

4. Fospa Africa - https://fospa-africa.org/
5. Climate Lens - https://climate.co.ke/a-ras-technology-is-paving-the-way-for-sustainable-aquaculture/

PICTORIAL

ornamental fish reared by Christopher Mureithi in Nyeri County

1 week old tilapia F9 fingerlings in Chistopher Mureithis' hatchery in Nyeri County