Driving Sustainable Fish Farming in Uasin Gishu County: A Model for Resilient Blue Economy

County:	**Uasin Gishu**		
Sector/s:	**Blue Economy**	**Sub-sector/Theme:**	**Aquaculture**
Keywords: (for search in the online platform)	**Fish farming, aquaponics, raised ponds, liner ponds, fish value addition, sustainable aquaculture, youth in aquaculture, climate-smart farming, Maarifa Centre**		
Target Audience:	**County Governments, youth, aquaculture investors, extension officers, policymakers, Maarifa Centre**		
Authors (contacts and their institutions can be included as well)	**Mercy Gatabi – CoG, Maarifa Centre**		
Resource Persons (include their designations)	**Edina Kemei - Uasin Gishu County Fisheries Sector**		

Introduction:

Uasin Gishu County, best known as Kenya's breadbasket for its dominant maize and wheat production, is increasingly emerging as a promising frontier for aquaculture development. Characterized by loamy and clay soils, abundant water resources, and high rainfall, the County offers a naturally conducive environment for fish farming. These agro ecological conditions present an opportunity to diversify agricultural livelihoods, especially in the face of fluctuating grain markets and growing food security concerns.

In alignment with national priorities such as the *Sustainable Development Goals (SDGs)* and *Kenya Vision 2030*, as well as localized policy frameworks like the *Bottom-Up Economic Transformation Agenda (BETA)* and the *Nguzo Kumi* blueprint spearheaded by Governor Jonathan Bii, the County has placed agriculture, particularly agribusiness, livestock, and fisheries, at the center of its economic transformation agenda. The fisheries sector contributes to multiple development goals by enhancing access to affordable protein-rich food, creating jobs along the aquaculture value

chain, improving household nutrition through omega-3-rich fish consumption, and generating sustainable income for rural households.

Fish farming in Uasin Gishu is primarily conducted through pond systems and dam-based aquaculture, with over 2,000 farmers currently engaged in the practice, an impressive growth from fewer than 870 just two years ago. This increase is a result of deliberate County-led campaigns aimed at encouraging farmers to diversify beyond grain farming, a shift that is particularly timely given the rising need for climate-resilient and nutritionally balanced food systems.

To support this transition, the County Government has rolled out a number of aquaculture initiatives. These include restocking public dams with fingerlings, providing pond liners, starter and finisher fish feeds, training programs, and encouraging the formation of farmer cooperatives. Strategic partnerships, such as with the University of Eldoret, have further boosted these efforts through technical support and the establishment of hatcheries to ensure availability of quality fingerlings.

Despite the positive momentum, several constraints continue to impede the sector's full potential. These include the high cost of fish feed, accounting for up to 65% of production costs, limited access to certified fingerlings, water scarcity and pollution, insufficient extension services, lack of structured markets, minimal value addition, financial barriers, and increasing vulnerability to climate change. Unpredictable rainfall patterns, floods, and droughts frequently disrupt pond water levels, affecting fish survival and productivity.

Implementation of the practice (solution path):

Faced with worsening climate variability, water stress, soil degradation, and a dependency on rain-fed agriculture, Uasin Gishu County identified aquaculture as a viable solution to diversify food systems and strengthen household resilience. However, barriers such as unsuitable soils, high input costs, and poor extension support, post-harvest losses, and limited market access hindered rapid uptake of fish farming.

To address these challenges, the County Government, through its Department of Livestock and Fisheries, developed and implemented a multi-pronged solution pathway grounded in climate-smart technologies, farmer-led innovations, public-private partnerships, and targeted capacity building. This approach was designed to not only expand fish production but to make the sector more climate-resilient, accessible, and profitable, particularly for youth and women.

1. **Promotion of raised pond systems**

Many parts of Uasin Gishu have soils that are either too rocky, poorly drained, or susceptible to flooding, making traditional in-ground fish ponds risky or unviable. Raised ponds constructed using treated timber and lined with UV-resistant plastic liners were introduced to make fish farming possible in such environments.

These systems protect pond water from contamination, prevent flood damage, and are easy to maintain.

Sites for raised ponds are selected based on accessibility, topography, and proximity to reliable water sources. Once identified, farmers, guided by extension officers, construct wooden or block frames, which are then lined with a soft base layer such as sand or geotextile fabric to prevent damage to the pond liner. UV-resistant liners are fitted securely into the frame, and inlet and outlet pipes are installed to manage water flow efficiently. In some setups, solar-powered aerators are introduced to maintain optimal oxygen levels for fish health. Throughout the process, extension officers provide technical support on pond setup, stocking, water quality monitoring, and disease management.

Figure 1: An above-ground raised pond at Dr. Nyale's farm in Kapsoya Ward, Ainabkoi Sub-County

Benefits:

- Raised ponds are protected from flood runoff and soil contamination.
- They are easy to clean and maintain, encouraging youth and women participation.
- These systems are ideal for homesteads or peri-urban settings where space is limited.
- Fish farming is made possible even in rocky, poorly drained, or densely populated areas.

2. Adoption of liner pond systems

Increased drought spells and sandy soils were causing high water losses through seepage, leading to poor fish growth and farm abandonment. The County promoted the use of lined ponds to retain water and stabilize pond conditions throughout production cycles. This technology is now widely adopted in the County, especially in areas with loose soils.

Figure 2: A lined earthen pond at Sila Bore's farm in Sergoit Ward, Moiben Sub-County, designed to retain water and enhance fish production in drought-prone areas.

Farmers receive training on selecting suitable sites with well-drained soils and on accurately marking pond dimensions, typically around 10m by 5m by 1.5m should be at most 1,2 m deep deep. Excavation follows, with the removal of sharp objects and leveling of the pond floor to ensure liner protection.

A cushioning layer is laid at the base before installing a UV-resistant pond liner, which is carefully secured using soil and stones around the edges. Once the pond is gradually filled with clean water, water quality is tested and allowed to stabilize. Fish are only introduced once the water conditions are confirmed to be safe for aquaculture.

3. Introduction of Aquaponics

Frequent water shortages, shrinking land sizes, and high input costs have made it increasingly difficult for many households to sustain both fish farming and crop production independently. Traditional methods also expose farms to risks such as runoff pollution, inefficient nutrient use, and weather-related disruptions.

To overcome these constraints, the County introduced aquaponics, an innovative, closed-loop system that integrates aquaculture (fish farming) with hydroponics (soilless crop production). In this model, fish waste provides natural nutrients for vegetables, while the plants filter and purify the water, which is recirculated back to the fish tanks.

This innovation not only maximizes resource efficiency, but also transforms fish and crop production into a single, symbiotic system that thrives in small spaces, uses minimal water, and eliminates the need for synthetic fertilizers.

Aquaponics systems were piloted in institutions such as Chebisaas High School and Lelmolok High School among youth groups, with technical support from partners such as the Sagana Aquaculture Research Centre. System components, including fish tanks, pumps, gravel-filled grow beds, and filtration units, were installed based on site-specific needs. The systems were stocked with tilapia or catfish, and beneficial bacteria were introduced to establish a functional nitrogen cycle. The system works by crops benefiting from nutrients from fish wastes and no bacteria is introduced.

Figure 3: Chebisaas High School's integrated aquaponics system in Moiben Sub-County, Kimumu Ward

Farmers and students received training on system balance, crop selection, and routine maintenance. Extension officers provided continuous mentorship to ensure optimal performance and longevity. In schools like Chebisaas, aquaponics has evolved into both a productive farming unit and a practical agricultural education platform.

4. Launch of the "Fish for Health and Wealth" Campaign

Even with improved production, farmers were struggling to find reliable markets and suffered post-harvest losses due to lack of value addition and consumer awareness. The *"Fish for Health and*

Wealth" campaign was developed in 2015 as a County-led market activation initiative. It linked farmers to buyers, taught value addition skills, and boosted local fish consumption.

Figure 4 Local farmer during the "Fish for Health and Wealth" campaign, promoting on-site fish harvesting

Every Friday, the County's Department of Fisheries, in collaboration with local farmers, organizes live exhibitions at designated farms and the County fisheries office. These sessions include hands-on demonstrations on fish harvesting, cleaning, degutting, dip frying, and packaging. Farmers contribute fish, oil, and cooking equipment, fostering a cooperative, participatory environment.

The events draw in local buyers, including households, schools, and institutions, who purchase the freshly prepared fish on-site. In addition to marketing skills, the campaign integrates nutrition education, raising awareness on the health benefits of fish consumption and promoting dietary diversification in local communities.

Cross-cutting climate resilience outcomes across all interventions:

- Water conservation through liner ponds and aquaponics
- Year-round food and income supply despite droughts or floods
- Reduced input costs through integrated systems and value addition
- Improved biodiversity through ecosystem-friendly farming practices

Results of the Practice:

- The adoption of modern pond technologies, especially raised ponds with reinforced liners, has led to better water retention and year-round fish production, even in areas previously unsuitable for aquaculture.
- The "Fish for Health and Wealth Campaign" has created new marketing channels through community-based fish processing and direct sales. Farmers now earn higher incomes due to value addition and reduced post-harvest losses.
- Aquaponics systems have generated interest among youth and educational institutions. Several schools have incorporated these systems into their agricultural programs, with Chebisaas High School emerging as an eminent demonstration and training site. This integration has stimulated greater student participation in agricultural studies while providing practical income-generating opportunities.
- Household consumption patterns show clear positive shifts, with many families incorporating fish into their diets more frequently. The increased availability and affordability of fish protein has contributed to improved dietary diversity in participating communities.
- The climate-smart approaches demonstrate measurable ecological advantages, particularly in water conservation and sustainable integration with crop production. These systems show potential for reducing agricultural runoff while maintaining productivity.

Lessons learnt:

- Selecting appropriate fish farming methods tailored to local conditions and farmer needs significantly enhances productivity and sustainability.
- Regular capacity building, on-site demonstrations, and extension support are essential in promoting uptake of aquaculture innovations.
- In aquaponics systems, vegetables perform better under shade nets than when grown inside the same greenhouse as fish tanks, highlighting the importance of optimizing growing conditions.
- Fish farming can be both economically rewarding and environmentally sustainable when best practices are applied.
- Involving schools and integrating fish farming into learning programs boosts youth participation and builds long-term interest in agriculture.

Recommendations/*Conclusion:*

1. Aquaponics system optimization: Greenhouse vegetable components should be transitioned to shade net structures, as this modification offers superior temperature regulation and reduces crop wilting while maintaining productivity levels.
2. Targeted youth programs and school-based aquaculture training should be established to maintain young farmers' interest and active participation in the sector.

Photo Gallery

Figure 5Fish tanks of an aquaponic system where integrated fish and vegetable farming supports nutrition, learning, and sustainable agriculture practices.

Figure 6Aquaponics tanks used to rear fish while supporting vegetable growth through nutrient recycling

Figure 7Vegetables thriving in a greenhouse integrated with an aquaponics system