



Aquaculture for smallholder farmers

A UK Parliamentary briefing on behalf of the All-Party Parliamentary Group on Agriculture and Food for Development.

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About the APPG

The APPG on Agriculture and Food for Development (APPG AgDev) brings together Parliamentarians concerned with agriculture, nutrition and food security in the developing world. It uses its cross-party membership to facilitate informed debate on the needs, opportunities and challenges of the 500 million smallholder farmers who feed 2 billion people worldwide.

The APPG was established in October 2008 in response to growing concerns over heightened food prices and a chronic underfunding of agricultural development by bilateral and multilateral organisations and national governments. Chaired by Jeremy Lefroy MP and co-chaired by Lord Cameron of Dillington, the APPG is a cross-party initiative drawing members from both Houses of the UK Parliament.

Aquaculture: an underdeveloped tool for poverty reduction

Aquaculture refers to the breeding, rearing and harvesting of fish in ponds, lakes and the ocean. Twenty years ago, only 10% of fish eaten globally was farmed. Today, the figure is 50%¹. Wild fish stocks cannot sustainably meet growing global demand, and the aquaculture industry has grown rapidly to fill the gap in many parts of the world.

Africa is a notable exception. The potential market there is certainly growing: between 2017 and 2050, the populations of 26 African countries are projected to expand to at least double their current size². But at present, Africa accounts for just 2.3%³ of global farmed fish production. Asia is responsible for 89.3% of it, and Europe 3.9%. Vietnam alone produces around double the amount of farmed fish that comes out of the whole of Africa each year.

Per capita fish consumption in Africa is only about 9kg per year – compared to a world average of 21kg – and this will likely drop further unless local and regional aquaculture value chains can be developed. Such development is already underway in certain parts of sub-Saharan Africa, such as Nigeria, Kenya and Zambia, but more could be done.

With appropriate support, aquaculture could expand much more rapidly as a tool for rural development, creating employment and increasing the incomes of millions of

people. The economic impact can extend far beyond fish farmers themselves, to include “upstream” industries such as hatcheries, feed manufacturers, equipment manufacturers and veterinary services and “downstream” industries such as processors, retailers, transportation and food services.

The other major impact could be on health, as micronutrient deficiency remains a serious problem in many developing countries. Stunting in children is irreversible, and limits their potential as adults. This, in turn, slows down a country’s overall long-term economic development. Accelerating the development of aquaculture could help address this problem, as even a small increase in access to protein each week can make a crucial difference to child development.

Giving evidence to this APPG inquiry, John Linton, Commercial Director of the Natural Resources Institute, said Africa should be a world leader in aquaculture, but isn’t, despite 40 years of research and development, and hundreds of millions of dollars spent. This briefing gives an overview of the current state of aquaculture in Africa, with examples of success stories, and presents some recommendations for policymakers.

How aquaculture can accelerate progress on the SDGs

SDG1: No poverty

Aquaculture could help poor, rural households improve their incomes. Fish is a high value product, but Africa as a whole only produces 2.3% of global aquaculture output, meaning millions more people could potentially participate in the sector to earn a better living.

SDG2: Zero hunger

If smallholders produce fish successfully on a commercial basis, their access to it can improve household food security and the income can enable them to buy a more diversified diet.

SDG3: Good health and wellbeing

Fish is rich in micronutrients such as vitamin A, iron, calcium, zinc and essential fatty acids.

Widening access to this form of protein could significantly reduce rates of malnutrition.

SDG5: Gender equality

Rural women already produce the majority of food in sub-Saharan Africa, but could be far more productive if they had equal access to resources and services. As an underdeveloped sector, aquaculture has the potential to unlock the economic potential of many more women farmers.

SDG14: Life below water

The harvest of wild fish stocks has already reached unsustainable levels in Africa and other parts of the world. Aquaculture can help meet demand and ensure that wild fish stocks remain available for future generations.

The global picture: dominance by China

China is an aquaculture powerhouse, accounting for 45.4 million tonnes annually, or 60% of global farmed fish production.

How has China become so successful? Part of it is cultural: China has been cultivating fish (traditionally the common carp) at the household level for thousands of years.

But the modern, market-driven expansion of aquaculture started from the late 1970s with governmental support for technological and scientific development. This produced a remarkable shift from capture fisheries to aquaculture. In 1978, capture fisheries represented nearly 74% of the country's total production, with aquaculture at 26%. By 2013, this was reversed, with aquaculture accounting for nearly 74% of the country's total production⁴.

One of the key factors in China's success is its well organised national extension system for aquaculture. There are more than 18,000 fisheries extension stations throughout the country, providing farmers with access to training and technical information.

The majority (70%) of aquaculture is pond-based, and most farms are privately or collectively owned, with high participation of women on the small-scale and family-based fish farms. Good infrastructure is in place

for the movement of fish, and high domestic demand coupled with good access to inputs makes aquaculture economically attractive to small-scale producers. China has five million people engaged full-time in fish farming, equivalent to 27% of the world total⁵.

In second place by some distance, India produced 4.8 million tonnes of fish from aquaculture in 2014. This was about a third of its total domestic fish output, and accounts for 6.6% of global aquaculture production. Indonesia produced 4.2 million tonnes (5.7% of global production).



Photo: Daniel Jamu

Aquaculture in Africa

Within Africa, fish farming is led by Egypt. The continent as a whole farms about 1.7 million tonnes of fish a year, and Egypt alone accounts for 1.1 million tonnes of that, mainly tilapia. Nigeria is a distant second with 313,000 tonnes, mainly catfish. Ghana, Uganda, Zambia and Kenya are some of the other sub-Saharan countries with significant aquaculture industries.

In global terms, Africa's 2.3% share (bolstered significantly by Egypt) means African aquaculture is still relatively undeveloped, but it is on an upward trajectory. Between 2005 and 2014 aquaculture output for the continent as a whole almost tripled, albeit from a low base.

About 43% of continental Africa has the potential to farm tilapia, catfish and carp⁶. Growing populations, increased urbanisation, improved market integration and reduced capture fisheries are likely to continue stimulating domestic demand. So what is holding it back?

Millions have been spent by donors and governments over the past few decades on aquaculture programmes in various countries, often helping small-scale rural producers to establish one or several small ponds. Typically, once project funds were exhausted, the aquaculture operations became economically unviable for farmers and the ponds dried up.

Giving evidence to the APPG for this inquiry, Dave Little, Professor of Aquatic Resources and Development at the University of Stirling, said: "Malawi, for example, has had many foreign aid aquaculture projects and it has very little to show for it. If we pitch projects at the household entrepreneurial level, and get better seed and feed networks, there is some emerging promise. But it won't happen overnight, and it's not just about the farmers but about the whole value chain."

In the past, many of the projects in sub-Saharan African countries weren't underpinned with the necessary policies or wider economic ecosystem that would enable smallholders to sustain a business on their own. Problems have included high interest rates, insecure land tenure, inadequate research and extension services and training, insufficient market information, and a lack of legal and regulatory frameworks specifically designed for aquaculture.

These shortcomings discourage potential upstream and downstream actors too, making it even more difficult for fish farmers to succeed. Without a supplier of good quality fingerlings and feed, and the promise of buyers or processors to sell the final product to, the risk to any

aspiring fish farmer will be too high. They are likely to stick to producing a more reliable but probably less valuable product.

While these barriers have not disappeared, there are pockets of success in certain sub-Saharan countries. Many are formally recognising a place for commercially oriented aquaculture within their overall economic development strategies, and acknowledging that good governance underpins it. This was reflected in the keynote address given by NEPAD's Chief Executive Officer, Dr. Ibrahim Assane Mayaki, at the World Aquaculture Society meeting in Cape Town in June 2017 – the first time the meeting was held in Africa.



Photo: Farm Africa / Mwangi Kirubi

In his address, Dr. Mayaki spoke of a new "Blue Revolution" in Africa placing fisheries and aquaculture at the top of the development agenda, and noted that in 2014 the African Heads of State and Government had adopted the Pan-African Fisheries Policy Framework and Reform Strategy for Fisheries and Aquaculture. One of the objectives of this framework is to support market-based sustainable aquaculture by integrating aquaculture strategies and plans into national development plans, and creating a Centre of Excellence to provide training and promote good practice.

Knowledge and technology are being transferred from Asia, and in countries such as Ghana and Zambia the market is seeing improved availability of locally produced inputs (seed and feed), which is driving growth.

There is still a long way to go for Africa to fulfill its potential in fish production, but as the case studies in this briefing show, the rewards can be transformative. With the right policies and approaches, many more countries could use aquaculture as a driver of economic development and accelerate progress towards the Sustainable Development Goals.

Case Study 1: Eriwe Fish Farm Village

Eriwe Fish Farm Village is located an hour's drive from Lagos in Nigeria. It was established in 2001 by the Ijebu Development Initiative on Poverty Reduction (IDIPR) – a microcredit scheme – and it sits on around 150 hectares of customary land allocated by the local King.



The Village is structured into cooperative groups, which tend to be large family units. In 2014 there were 57 such groups, and a total of around 1,000 members. Each of the groups has two ponds where they grow catfish for sale, with financial and managerial support provided through IDIPR.

“The complex is fully integrated and has its own feed mill and hatchery,” says John Linton, Commercial Director at the Natural Resources Institute. “The mill and hatchery are run as independent economic entities, but their proximity to the ponds means there is a close link between the fish farmers and their inputs.”

When members join a group, they are given training by IDIPR. Ponds are dug by hand. The major upfront cost is feed, which is met through the credit scheme run by IDIPR.

The downstream element of the chain is provided through a network of middlemen and traders, with

whom the farmers have built good relationships over the years. Harvesting is scheduled to avoid gluts, and the innovative use of buckets with a small amount of water in them means fish can be marketed live up to 900km away, avoiding the need for expensive cold chains.

Fish are sold to the middlemen at around US\$2.25 per kg, and the cost of production is approximately US\$1.40. With average annual production from the two ponds per operational unit being 16 tonnes, each group is earning between \$10,000 and \$15,000.

“To me the most astounding feature is the contribution to the livelihoods of the member farmers,” says Linton.

“Under this model, smallholder aquaculture is not simply profitable, it is transformational. The model works because it has a demonstrably viable business model, the people working in the value chain are very competent, and there is a good enabling environment.”

The complex is fully integrated and has its own feed mill and hatchery

Case Study 2:

Kenya Market-Led Aquaculture Programme

Fish consumption in Kenya has always relied on the wild fish caught from Lake Victoria. But stocks have dwindled, and the industry is struggling to meet consumer demand for its most popular fish, the tilapia.



Between 2009 and 2012, the Government of Kenya built around 48,000 fish ponds across the country in an attempt to kick-start an aquaculture industry. But having a pond isn't enough, and many farmers found themselves unable to thrive without access to good inputs, training, market information and buyers.

The NGO Farm Africa stepped in from 2011 by establishing a network of Aqua Shops, giving farmers access to fish feed, technical advice, and training on marketing and selling their fish. Between 2011 and 2015, 56 shops helped 7,500 farmers increase their incomes by 63%.

This has led on to Farm Africa's current project, the Kenya Market-led Aquaculture Programme (KMAP), which works along the entire fish farming value chain.

Upstream, KMAP is continuing its work with input suppliers so that farmers can buy high-quality and affordable fingerlings and feeds. Demonstration farms provide farmers with technical training, including

record-keeping so that farmers can monitor yields and measure the value added by using good inputs.

Downstream, KMAP is training farmers to identify and access markets beyond their immediate local area. It is also working with traders to link them to fish farmers (including cooperatives) and enable them to buy greater volumes from the farmers.

KMAP is running from 2016 to 2019, and so far (between April 2016 and September 2017) it has provided direct training and marketing support to 1,072 fish farmers, and increased the productivity of tilapia farms by an average of 43%.

Farm Africa's Arnoud Meijberg, who gave evidence on the project to the APPG, said a market orientation and business skills were key to making fish farms economically viable.

"Good inputs are essential but not enough," he said. "There needs to be identified demand, access to that market, and farmers need to keep records and have business skills so they can sustain the operation."

Key recommendations from this inquiry

- **Develop an enabling regulatory environment.** For example, a well-developed system of quality management for locally produced fingerlings and feed gives farmers confidence that they can grow quality fish at an affordable cost of production. Other good enabling policies include security of land tenure, support for producer associations and transparent environmental regulations.
- **Focus on locations with high potential.** Not every farmer in every area is a potential fish farmer. In Nigeria, Ghana and China, successful aquaculture enterprises are clustered in areas of high population and demand, with established links to markets. Supporting clusters, cooperatives and producer associations gives aquaculture a voice and attracts professionalisation along the value chain.
- **Deliver targeted support along the whole value chain.** Fish farmers, input suppliers and buyers all depend on each other to make the chain viable. If potential fish farmers are primarily being held back by a lack of access to quality inputs, then development support could be directed there to unlock the industry.
- **Identify successful models to replicate – such as the Eriwe Fish Farm Village.** “If smallholders can’t see it, they won’t replicate it,” according to NRI’s John Linton. “It needs to be not just profitable but transformational, and people need to believe that others in the value chain are competent too.”
- **Invest in research and knowledge transfer.** National, regional and international research initiatives, such as WorldFish and the new CGIAR Research Program on Fish Agri-Food Systems (FISH), can fill data gaps. This is relevant to identifying successful fish strains suited to local conditions, for example.
- **Target support at women farmers.** Women are already involved in aquaculture in many developing countries, but their contribution is often unrecognized. Aquaculture policies and strategies need to consider the specific constraints encountered by women (for example, access to resources) to enable them to develop successful enterprises.
- **Adopt an ecosystem approach.** Environmental impact assessments are necessary to avoid any negative impacts from large-scale aquaculture development. The introduction of improved strains of tilapia can be disruptive to native strains, while inputs and waste from fish farming can affect surrounding water resources. At the same time, aquaculture can deliver environmental services: pond-based systems can increase access to water for irrigating crops, for example.

1. FAO (2016). *The State of World Fisheries and Aquaculture 2016: Contributing to food security and nutrition for all*.
2. United Nations, Department of Economic and Social Affairs, Population Division (2017). *World Population Prospects: The 2017 Revision, Key Findings and Advance Tables*. Working Paper No. ESA/P/WP/248.
3. Xiaowei Zhou (2017). *An Overview of Recently Published Global Aquaculture Statistics*. FAO Aquaculture Newsletter 56.
4. Zhang Hongzhou (2015). *China’s Fishing Industry: Current Status, Government Policies, and Future Prospects*. Conference paper. Available at: https://www.cna.org/cna_files/pdf/China-Fishing-Industry.pdf
5. FAO (2016). *The State of World Fisheries and Aquaculture 2016: Contributing to food security and nutrition for all*.
6. Hishamunda, N., Ridler, N., 2006. *Farming fish for profits: a small step towards food security in sub-Saharan Africa*. *Food Policy* 31 (5), 401–414.

Further information

Sustainable Aquaculture Research Networks in Sub Saharan Africa

www.sarnissa.org

WorldFish

www.worldfishcenter.org

FISH: the CGIAR research programme on fish

www.fish.cgiar.org

Global Aquaculture Alliance

www.aquaculturealliance.org

Institute of Aquaculture

www.aqua.stir.ac.uk

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