



More Meat, Milk and Fish by and for the Poor

CGIAR Research Program 3.7

FISH

MAIN POINTS

- Milk, meat, eggs and fish are key components of a balanced and nutritious diet for most people. Inadequate supplies often result in malnutrition, especially among women and children.
- The world is seeing an explosive growth in demand for these animal source foods. This is especially true of developing countries.
- Increasing the availability and affordability of animal source foods to meet the needs of poor consumers will be essential to ensure food and nutrition security for all.
- Increasing the supply of affordable fish to meet demand requires continued growth of small and medium enterprise aquaculture, serving national and regional markets.
- This is especially true for Africa, where aquaculture production lags behind the rest of the world and is in urgent need of support to develop at scale.

FISH FOR FOOD AND NUTRITION SECURITY

Consumption of milk, meat, eggs and fish (the animal source foods) contributes significantly to preventing undernutrition and achieving nutrition security. For many developing country communities, especially those living close to coastal and inland waters, fish are the dominant animal source food. Accounting for more than 50% of the animal protein in the diet for 400 million poor people in Africa and South Asia, fish provide both quality animal protein and critical micronutrients. This nutrition is especially important for vulnerable groups, such as infants, children, pregnant and nursing women and those living with HIV/AIDS.

Driven by rising population, urbanization and increasing expectations of a diversified diet, demand among poor consumers will increase dramatically for many countries where fish are an important part of the diet. Meeting this demand will be especially challenging for Africa where per capita fish supply has remained low and relatively static for the last three decades.

Globally, about 47% of fish for human consumption is now supplied by aquaculture. With most wild capture fisheries either fully or over-exploited, achieving large scale, environmentally sustainable increases in supply of fish to poor consumers will require further aquaculture growth. This is especially true for Africa where aquaculture currently



Growth in aquaculture is essential if Africa is to produce enough fish to feed its people.

makes a much lower contribution to fish supply than the rest of the world. African aquaculture currently produces less than 2% of global aquaculture production, representing less than 5% of Africa's fish (FAOStat, 2010).

CGIAR RESEARCH ON ANIMAL SOURCE FOODS

As a member of the Consultative Group for International Agricultural Research (CGIAR), The WorldFish Center will partner with several other CGIAR Centers in the CGIAR Research Program 3.7 "More Meat Milk and Fish by and for the Poor" (CRP 3.7). Under this program we will work to help achieve large scale, environmentally sustainable increases in supply of fish to poor consumers in developing countries. We will do this by focusing our research to develop new seed and feed technologies, understand how to improve the institutional environment, and by testing an integrated value-chain approach to these issues in a limited number of countries. In doing so, we also recognize the importance of aquaculture as an engine for rural development and will seek to achieve these increases by strengthening aquaculture-based value chains in which the poor are able to capture a significant share of the benefits.

The program takes a themed approach that combines foundational technological research (Theme 1) with focussed programmatic engagement to support integrated value chain development in a few selected countries (Theme 2). A final underpinning theme on Targetting Gender and Impact

(Theme 3) is designed to support the program by:

- Ensuring that gender and equity are mainstreamed into the program in a transformative way.
- Ensuring that the program is well focussed and working to deliver its intended impact on target beneficiaries.
- Measuring whether the intended impact on target beneficiaries are delivered.
- Identifying and documenting the mechanisms and processes that brought success.

With a budget of \$25m over the first three years, the program aims to deliver annual production growth rates of over 10% in priority countries, leading to gender equitable increases in per capita consumption of over 20% for 20m poor consumers by 2018, thereby contributing to reduced micronutrient deficiencies among these populations.

The focus of research for the fish components of the Program are on technology platform and integrated value chain research.

TECHNOLOGY PLATFORM RESEARCH

Research on aquaculture breed and feed technologies forms the platform for growth in the aquaculture sector. With a view to generating widely applicable international and regional public goods, we will work on these issues in a limited number of countries where there is emerging national demand for these technologies, and where institutional capacity exists to develop and apply them. The research agenda will focus on three broad themes:

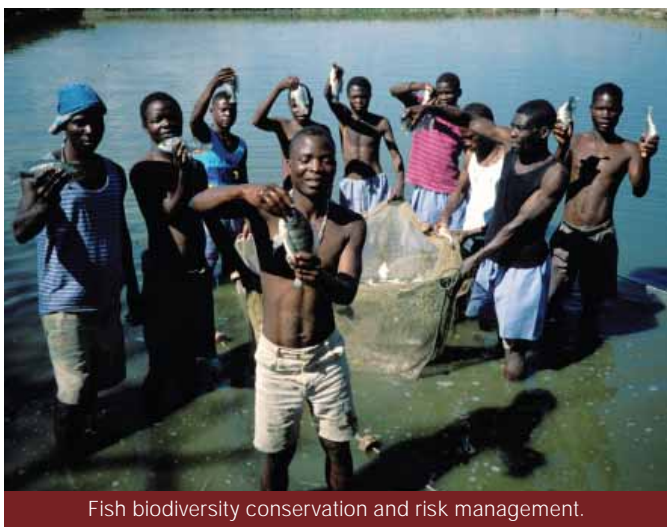


Development and dissemination of quality seed for key aquaculture species.



Development and dissemination of quality feeds for aquaculture.

i. Selective breeding of key species continues to deliver significant productivity gains for aquaculture. The Program will therefore continue this work to provide improved strains suitable for developing country farmers. It will also provide technical backstopping to partner countries in Africa and Asia where there is potential for large scale increase in fish supply. This support will help develop and evaluate national breeding programs for species that are suited to the prevailing environmental, production and marketing conditions.



Fish biodiversity conservation and risk management.

ii. The risks associated with developing and disseminating genetically improved strains need to be managed. The Program will therefore work with partner countries to develop guidelines and tools that help do this and help implement them.

iii. Improving feeds remains key to ensuring that enterprises remain profitable and sustainable. The program will work to identify approaches and share lessons on producing nutritritionally sound and environmentally sustainable feeds. We will give particular emphasis to identify on-farm and local sources for these inputs and potential synergies between the fish and livestock sector.

INTEGRATED VALUE CHAIN RESEARCH

CRP 3.7 is based on the premise that a systematic and integrated approach to overcoming barriers to production is the best way to increase fish supplies and therefore improve food security and nutrition in poorer countries. To do this the program takes a whole value chain approach to overcoming the full range of technological, market and institutional barriers to substantial growth in production. Most importantly, the approach places significant emphasis on the stakeholders as valuable participants in the research process. In the case of aquaculture, value chains include all the input suppliers, farm production through to transporting, processing and marketing of outputs to creation of added value products through to consumption.

Research and supporting action will fall under three broad themes that will support outcomes and innovations along the value chains.

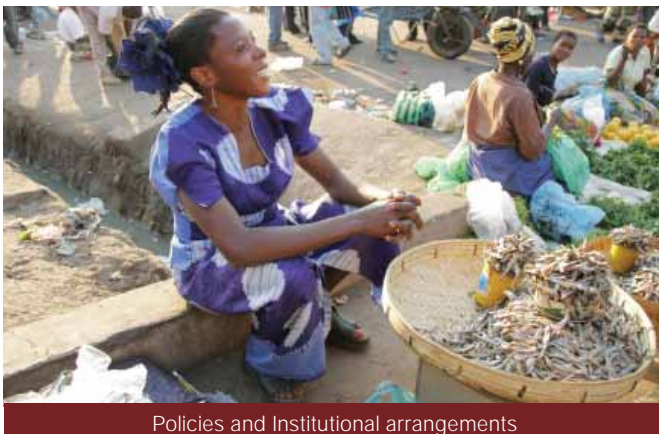


Diagnosis, dialogue and knowledge sharing.



Technological research and support.

- i. Using participatory market chain analysis we will work with stakeholders along the seed, feed and fish production value chains to understand their structure and dynamics and where value is captured. This diagnosis will also allow us to identify the constraints to be overcome and opportunities for improvement. It will also allow us to identify gender disparities that might be addressed. As part of this work we will facilitate the dialogues and learning networks among stakeholders that are needed to help aquaculture to develop in the country and support capacity development efforts through training and technical support.



Policies and Institutional arrangements

- ii. We will work with government and the private sector to identify how the national policy and institutional environment might better support the aquaculture sector and the investments that would be needed. This will include work to develop and improve markets for seed, feed and fish and to ensure equitable access to these markets, especially for women. It will also include research on how best to provide extension services and other support to value chain participants.

- iii. Drawing on our Theme 1 research and the diagnoses outlined above we will work to help farmers and other actors along the feed, seed and fish value chain adopt improved production practices and improve profitability. In doing so we will also work to ensure that approaches are environmentally sustainable and make best use of available resources.

GEOGRAPHIC FOCUS

Our value chain research will focus on Uganda and Egypt, two countries with important fish consumption but significant undernourishment, and an aquaculture sector that has potential for effective intervention (Table 1). Because their aquaculture sectors are at different stages of development the needs of each country are different and they provide different opportunities for learning (Figure 1).

Egypt leads African aquaculture production with 700,000 tons per year, but the sector needs to grow substantially if it is to sustain per capita consumption. The goal will be to move from the current large number of small-scale enterprises with limited support and scattered technology innovations, to a consolidated sector with a mix of emerging medium scale enterprises and sustainable small scale farms supported by significantly improved technology and services.

Fish farming has increased fish supply for consumers and maintained affordable prices. This has contributed to a doubling between 1994 and 2008 for the contribution that fish protein makes to total protein in the Egyptian

In Egypt we believe a combination of upgrading farmers to produce at the level of the current best producers, expanding areas under production and technical innovation could increase annual average production growth rates to 10%, yielding an additional 615,000 tonnes by 2017. At current population growth rates, and assuming all other sources of fish supply remain static, this increase in tilapia alone would bring per capita fish supply from 15.37% in 2008 to 18.56% in 2017.

Table 1. Aquaculture production, the importance of fish in the diet and the level of undernourishment in the population for the top eight aquaculture producers in sub-Saharan Africa.

| Country | Child Stunting ¹ (% of Children < 5) | Fish Consumption ² (% of total Animal food consumption) | Aquaculture Production ³ (Tonnes in 2008) |
|------------------------|--|---|---|
| Egypt | 31 | 38 | 693,815 |
| Nigeria | 41 | 45 | 143,207 |
| Uganda | 39 | 63 | 52,250 |
| United Rep of Tanzania | 44 | 65 | 11,308 |
| Madagascar | 53 | 33 | 11,081 |
| Zambia | 46 | 56 | 5,640 |
| Ghana | 29 | 74 | 5,594 |
| Kenya | 36 | 38 | 4,452 |

¹ Source: World Health Statistics (2010);

² Source: Speedy (2003). Global Production and Consumption of Animal Source Foods. Journal of Nutrition. 133: 4048S-4053S;

³ Source: FAOStat (Online query).

diet (Box 1). But, despite this impressive growth and current value, aquaculture production will need to rise further to meet growing demand for fish. Even more will be required for fish to continue to be available to people with lower incomes. To meet projected national need for the next 10-15 years, a further 1.0-1.6 million tonnes of fish will be required. Analysis of the sector indicates that this growth will need to be based primarily on the expansion of tilapia aquaculture in semi-intensive to intensive ponds.

Annual average production growth rates for tilapia between 2003 and 2008 were approximately 16%. In the absence of further investment in innovation, this growth is unlikely to be maintained. Growth of 5% annually until 2017 would yield an additional 213,000 tonnes over 2008 levels.



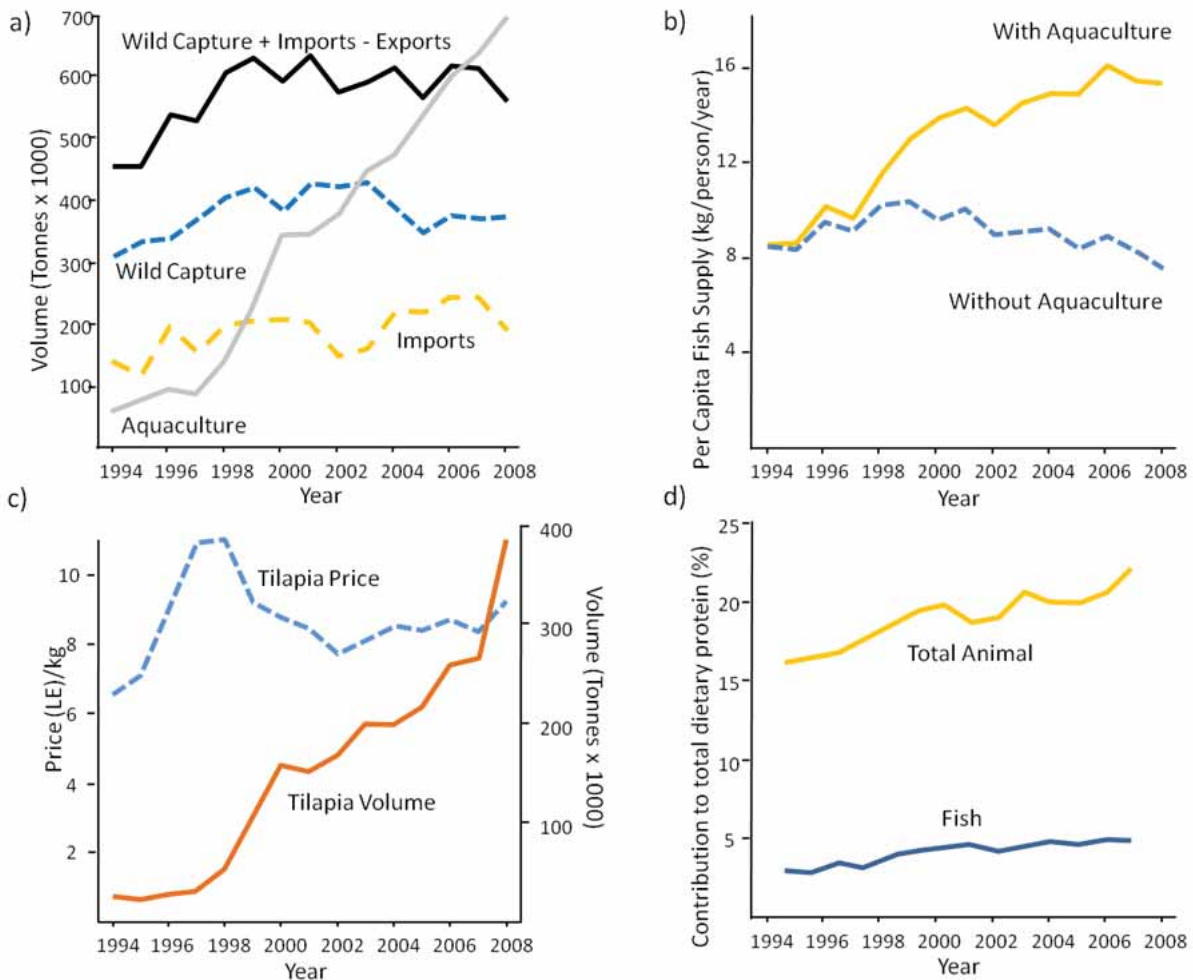
| Characteristic | <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> Uganda  </div> <div style="text-align: center;"> Egypt  </div> </div> | | | |
|-------------------------------------|---|---|---|---|
| | Stage 1 | Stage 2 | Stage 3 | Stage 4 |
| Primary focus | Household food security | Supply to immediate local markets. Rudimentary value chains | Supply to local and regional markets. Value chains increasingly well developed. | Supply to local and regional markets and retail chains. Maturing value chains. |
| Scale of production | On farm | Small scale enterprises | Mainly small scale enterprise, but some MEs emerging. | Medium scale enterprises becoming dominant, some consolidation occurring. |
| Feed and seed supply | Rudimentary, with supply and quality problems. | Rudimentary, with supply and quality problems. | Functioning, but considerable scope for improvements in quality | Systems well developed and operating at a high standard. |
| Production Practices | Rudimentary, few adopted norms. | Rudimentary, few adopted norms. | Broadly sound, but considerable scope for improvements. | High standard. Focus on innovation to drive down production costs. |
| Support services | Poor to basic, farmer to farmer learning networks emerging. | Poor to basic, industry associations emerging. | Basic services available. | Well developed. |
| Primary Development Benefits | Household food and nutrition security | Household food security Income generation for farmers. | Stable and affordable fish supplies for poor consumers. Employment and income through value chain participation. | Stable and affordable fish supplies for poor consumers. Employment and income through value chain participation. |

Figure 1. Stages of Aquaculture Development and the status of Uganda and Egypt.

Box 1. Aquaculture in Egypt increases access and affordability of fish.



Growth in aquaculture production has affected the affordability of fish for consumers. For the last decade wild capture supplies have been stable or declining, fish imports have remained relatively stable and exports have been minimal (Fig a). Yet, despite a population increase of 20m people, aquaculture increased per capita fish supply from 8.5 kg to 15.4 kg/person/yr from 1994 – 2008 (Fig b). During this time tilapia, which constitutes over 50% of all farmed fish by weight, saw a trend of increasing price from 1994 to

1998 that was reversed over the next four years. Since then prices have risen slowly, but remain well short of the peak in 1997 (Fig c). Thus, aquaculture has increased fish supply for consumers and maintained affordable prices. This has contributed to a doubling between 1994 and 2008 of the contribution that fish protein makes to total protein in the Egyptian diet (Fig d). Prices for tilapia remain well below those for chicken meat; in urban markets they were 35% lower in 2007 and 42% lower in rural markets.

Uganda has a looming food security crisis, with a predicted 14 million Ugandans becoming food insecure in the next 10 years (USDA Global Food Security Assessment 2010 – 2020). The government of Uganda has identified increased aquaculture production as a priority for helping to achieve this by meeting the local and regional fish supply gap.

Ugandan aquaculture is growing rapidly, but from a low base of 2,400 tons in 2002 rising to 52,000 tons in 2008/9. With a strong culture of fish consumption, increasing income and population growth in urban areas, and an increasing and food insecure rural population demand for fish is projected to rise. (Jagger and Pender 2002). The goal in Uganda will be to move from a few small-scale enterprises with rudimentary value chains, technologies, production practices, and support services to a large number of small-scale enterprises and support services ready to rise to the next level of development.

Two areas in Uganda have been chosen as the focus of the fish value chain research – a northern area that has a high unmet demand for fish and potential for cross border trade with southern Sudan and another area in south eastern Uganda where the demand for fish comes from urban markets and cross border trade from Kenya (Figure 2). The Government of Uganda has identified both as priority regions for aquaculture development. WorldFish and partners believe that these regions not only provide the greatest potential for impact but also the contrasts between them offer excellent opportunities for learning.

In Uganda approximately 3,000 households participate in fish production in each of the priority regions and we believe this program can increase this total by 50% by 2017. Improving the livelihoods of both current farmers and these 3,000 new entrants would reach 9,000 households. A further 3,000 would benefit from participating in the upstream and downstream linkages in the target value chains.

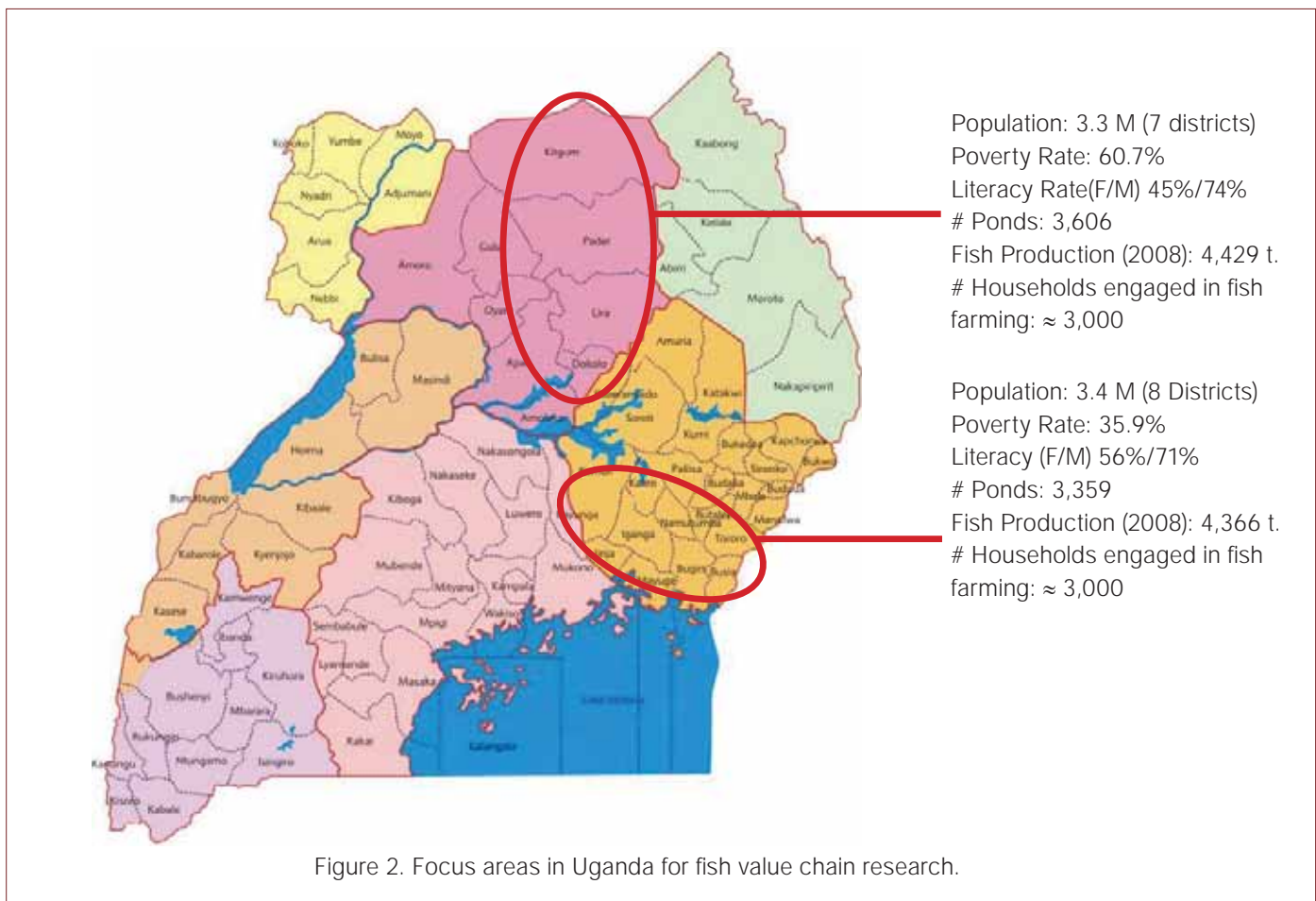


Figure 2. Focus areas in Uganda for fish value chain research.



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