Growing Fish to Make Money in Africa

Rural development projects target food security and poverty alleviation. In Central Cameroon, a project providing extension of integrated farming technology to rural/subsistence farmers and to periurban/small-scale commercial farmers achieved increases in fish pond productivity, number of fish farmers, and net returns from aquaculture. However, gains for commercial farmers were larger and more sustainable, and at less cost, than for subsistence farmers. This SmartLesson describes the project and some of the lessons it provided.

Background

The principal objectives for rural development in Africa are to increase food supplies and to create economic opportunities while protecting the environment. Since the 1950s, a number of organizations have tested a variety of approaches to achieve these objectives.

In 2000, the WorldFish Center, a member of the Consultative Group on International Agricultural Research (CGIAR), undertook a five-year study to better understand what type of farmer and farming system should be prioritized for research, extension, and policy support in the periurban and rural zones surrounding the large urban market of Yaoundé, the capital of Cameroon. DFID (the U.K. Department for International Development) supported the work under its “development of integrated aquaculture-agriculture systems for small-scale farmers in the forest margins of Cameroon project” (DFID 2005).

The project used participatory action research (PAR) methods to establish the basic technology for aquaculture on these small-scale farms (see Figure 1) and a research-extension team (RET), in which a locally recruited senior research scientist was employed at 25 percent of full time to guide joint learning exercises (participatory research projects) undertaken by farmers’ groups and extension agents working together. To estimate the cost-benefit of providing services, the project recorded the RET operation costs.
Three years after the end of the project, we conducted a Rapid Rural Appraisal to determine to what extent improved production and marketing proved sustainable over the medium term in the project’s four target areas:

1. **Average standing stock at fish-pond harvest** rose from 498 kilograms per hectare (range: 113–905) to 1,609 kilograms per hectare (range: 1,062–4,710).

2. **Cash returns from aquaculture** increased from $0.05 to $0.25 per square meter of pond.

3. **The number of active fish farmers** increased from 15 to 192 small-scale farmers.

4. **Some 600 production ponds** produced about 80 tons of fish per year (worth approximately $230,000 farm gate)\(^1\) for the Yaoundé market.

Profits and production in periurban areas rose significantly more than in rural areas from the adoption of improved aquaculture (see Table 1). Average net aquaculture profits per farm among periurban producers rose from $150 to $1,500 over the project period, compared with an increase from $34 to $213 for farmers in rural areas. Likewise, standing stock at harvest on periurban farms increased from 490 to 2,060 kilograms per hectare, compared with an increase from 560 to 1,200 kilograms per hectare on rural farms.

Group dynamics were problematic. At the end of the project, farmers listed “conflict with neighbors” as one of the top three constraints to expansion. The groups disintegrated because of personal feuds among members, exacerbated by the different levels of interest and commitment among the membership. Some of the farmers ended up working alone, with others going off to form their own groups. Incentives for group action were clearly lacking.

\(^1\)Farm gate is the net value of a cultivated product when it leaves the farm, after marketing costs have been subtracted.

Five years of RET field work cost $306,000 in salaries, equipment, and vehicle operation and depreciation. Calculated on a per active farmer basis, provision of RET services over five years cost $2,850 per rural farmer and $1,240 per periurban farmer. The main reasons it was so much cheaper to provide services to periurban farmers were lower costs for transportation, better communication, and less need for training and support (number of visits). Overall, nearly 80 percent of costs were incurred in providing services to rural farmers. Although net returns to cash and fish production were positive overall, RET services to rural farmers produced only a 23 percent increase in net profit on an 11 percent increase in productivity, compared with a 442 percent increase in net profit on a 253 percent increase in productivity among periurban farmers.

Three years after the end of the project, the difference between small-scale rural and periurban farmers remained clear. Most fish farmers were continuing to produce fish, but rural farmers had more or less returned to pre-project production levels, generating crops with an average value of $57, while small-scale periurban farmers reported average pond harvest values of $760, somewhat lower than those observed during the project but still profitable, and this despite a general lack of extension support.

Regular extension supervision is easier in areas closer to town.
Lessons Learned

Lesson 1: Farmers who are making money will keep producing.

Increased productivity and number of fish farmers were typical of small-scale aquaculture projects carried out in Africa over the last five decades. Also typical was that, within three years of project closure, many of these farms had returned to their original low productivity, making marginal contributions to both food security and income (Moehl et al. 2006). In the absence of technical assistance, communications, marketing, and logistics, only those farmers in areas of higher market access generated earnings of sufficient magnitude to keep them interested in aquaculture.

The rural poor can be given opportunities to improve their livelihoods and food security, albeit at significantly higher costs to the extension service than those farmers with greater resources and access to markets. With such support, however, rural farmers can benefit from new technology. For example, impact assessment of a 15-year participatory research intervention, similar to that reported here and aimed at very low-income farmers in Malawi, increased production efficiency and durability in times of drought and showed a benefit/cost ratio of 1.4 and an internal rate of return of 15 percent (Dey et al. 2010), with 60 percent of the benefits accruing to consumers through higher fish availability at lower prices.

Lesson 2: Breaking the cycle of poverty requires economic growth, which requires markets.

Sustainably putting more cash in the hands of the rural poor so they can break out of the cycle of poverty requires economic growth, the second major objective of aquaculture. Despite having at least temporarily increased local crop production, the many years of projects aimed at improving the efficiency of African artisanal farming systems have largely failed to produce significant economic growth. They have improved productivity and efficiency. But without markets that can turn these changes into cash that can be reinvested in hired labor, purchased inputs, and expansion, significant increases in rural wealth are unlikely (Winkelmann 1998).

Most projects have relied on local (village) markets to consume excess production. Many of these markets are cash-poor and rely heavily on barter, increasing social capital (of particular importance in African societies with little or no social security system) but doing little toward alleviating poverty. With no significant cash-flow being generated by the farm, there is no money to reinvest, bank, or spend to create economic activity.

The limited on-farm resource base keeps rural aquaculture productivity low.
Lesson 3: Constraints to the creation of businesses in rural Africa are more easily overcome by larger-scale investments.

Generally speaking, economic growth depends on the establishment of viable businesses (Delgado et al. 1998). However, the proximate constraints to business in rural Africa are substantial: poor infrastructure, unskilled labor, high transport and input costs, and low access to technical expertise. Calculating the minimum investment size at which a business can be profitable should be considered common practice, so as to avoid investing in production systems that cannot make enough money to justify the necessary management (Kuyvenhoven and Ruben 2002).

Lesson 4: Genuine poverty reduction depends not only on generation of wealth but also on distribution of wealth.

The current African political and economic climate may be more easily surmountable by larger-scale fish farms. Large farms generate large incomes, but the distribution of wealth is crucial to the rate at which income growth by investors is translated into national poverty reduction. A 1 percent increase in gross national income (GNI) in economies with high inequality (Gini coefficients of about 0.6) reduces poverty by only 1.5 percent per year. With more equitable distribution of wealth (Gini coefficients of about 0.2), the same increase can reduce poverty by twice as much (Lustig et al. 2002).

By inference, if investing in the economy is dominated by the upper 20 percent of the population, at least twice as much income growth is needed to significantly reduce poverty than if investment is driven by investments made by the lowest 20 percent of the population. In other words, very large-scale (industrial) systems have relatively less economic impact and tend to concentrate wealth more than would a larger number of smaller-scale investments. Furthermore, such investments in agriculture (which includes aquaculture), particularly when made by the lowest income groups, produce larger and more equitable gains to the gross domestic product (GDP) than in other sectors (World Bank 2008).

Conclusion

Either of the major objectives for aquaculture—food security and economic growth—can be achieved. However, different target populations require different approaches.

In much of Africa, where up to 80 percent of the population is composed of low-income, small-scale farmers, achieving food security will require a concentrated effort on the rural poor, possibly by supporting extension, especially marketing. This may appear expensive and has to be viewed as a long-term investment, but it can be worthwhile, if affordable.

If we want to target economic expansion and job creation, we need to support the growth of rural businesses of a sufficient scale to produce adequate profits to achieve sustainability in the absence of long-term subsidies.

By targeting assistance at farmers and value-chain stakeholders with the capacity to achieve sustainable scale, governments can maximize the returns on their aquaculture development investments. Options for creative, positive, and pro-poor interventions include:

- Access to credit so investors can afford a meaningfully profitable production system;
- Appropriate technical assistance at small and medium enterprise (SME) production scales;
- Reduction of arbitrary tariffs and simplification of permitting;
- Assistance with market access and information.

Among these, the cheapest and quickest way to help rural farming communities out of poverty may be to provide direct technical assistance to SME investors who want to build commercially viable farms (Brummett et al. 2004). Research should focus on profitable farming systems, and extension agents should be trained in technologies that can be adapted to the calculated minimum profitable investment and then scaled up as the business grows.

Groups have often been promoted as a means to overcome the lack of individual capital assets among the rural poor, but to be sustainable, groups need clear objectives and transparent management, neither of which is easy to achieve. If these and other social constraints to development can be dealt with in the shorter term, continuing to provide support to those farmers with at least enough assets to enter aquaculture at a minimally profitable scale may, in the shorter term, succeed in capitalizing and intensifying these small ventures, creating employment opportunities, lowering the cost of fish, and extending the benefits of aquaculture to the larger community.

![Farmers sharing experiences.](image-url)

2The Gini coefficient measures inequality in a population. It ranges from a minimum value of zero, when all individuals are equal, to a theoretical maximum of one in an infinite population in which every individual except one has an income of zero.
References


