

Potentials and Challenges of Smallholder Fish Farming in Ethiopia: The Case of South West and West Showa Zones, Oromiya, Ethiopia

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Abstract

The purpose of this study was to identify the potentials and challenges of promotion of smallholder fish farming based on the experiences of south west and West Shewa zones of Oromia region. Therefore, primary data were generated using both rapid appraisal methods mainly based on focus group discussion (FGDs) and Key Informant Interviews (KII) in addition to formal survey using pre-tested questionnaire from randomly selected 34 Smallholder fish farming households. The data was summarized using mainly descriptive and approaches. Cost of fish feed, lack of awareness, extension and advisory services, lack of relevant expertise and private investment had been identified as challenges for the development of small scale fish farming in the study areas. Therefore, further gender disaggregated trainings based on their responsibility should be given to create awareness. Research centers should take full package technologies and try to do on farm evaluation before releasing to individual users. To involve private sectors in this sub-sector and also to encourage farmers the government should develop aquaculture stimulus package which will create various actors along the value chain.

Keywords: Smallholder fish farmers, potential and challenges, south-west and west shewa Oromiya

Introduction

Globally, 58.3 million people were engaged in the primary sector of capture fisheries and aquaculture in 2012. Of these, 37 percent were engaged full time, 23 percent part time, and 40 percent either occasional fishers or of unspecified status. In 2012, 84 percent of all people employed in the fisheries and aquaculture sector were in Asia, followed by Africa which is more than 10 percent (FAO, 2014). According to FAO (2011), Ethiopian current annual per capita fish production is less than 240 g. at the annual fish demand estimates of the country before 2010

was 65,344 tones, equivalent to 1 kg/person. Future demand at the current population growth rate would reach 83 483 tone in 2010, 94,526 tone in 2015 and 117, 586 tone in 2025.

In several Asian countries aquaculture constitutes an important part of rural development, serving as source of food supply and income for farm households. It is also the fastest growing form of food production and plays vital role in helping to meet the increasing demand for aquatic products worldwide there by contributing to food security and the growth of national GDP (FAO, 2011). Due to the general perception of

aquaculture as low productivity and backward sector in Africa, there are huge potential of aquaculture as a pathway toward economic growth, food security, environmental sustainability, and poverty reduction (Atdhe *et al.*, 2009). Besides those success stories and contributions to the economy, there are lots of challenges in aquaculture especially in developing countries. A major challenge to sustainable aquaculture development is to allocate productive resources, such as land and water, among competing users with minimum conflict (FAO, 2014). According to Rothius *et al.*, (2012) in Ethiopia an estimated 15,158 km² of land are highly and 871,731 km² moderately suitable for aquaculture which is a huge potential to develop small scale back yard aquaculture in earthen ponds.

Despite the existence of enormous potential for aquaculture development in Ethiopia, aquaculture as an agricultural sector could not significantly contribute to the country's economy. Since fish is good source of protein for the family, it can alleviate protein deficiency and enables healthy growth in children and fosters better health and less disease in the family (FAO, 2009). The basic rationale of introducing aquaculture in developing countries like Ethiopia is to improve smallholders' livelihood and nutrition status of the farming community. Therefore, Smallholder farmers in the study area have both land and water throughout the year which is very

basic and common in fish farming enterprise. However, it suffers some constraints such as less experience to the commodity, lack of fish feed suppliers, limited and/or no pond management and hence pond water quality deterioration and generally less /absence of using aquaculture technologies.

Thus the focus of this study was to generate information on the status of the small holder fish farming in the area and to investigate constraints and opportunities. The information will be used to promote market oriented fish farming system, enable smallholder farmers to adopt more productive and sustainable fish farming practices and/or aquaculture technologies. Therefore the specific objective was to assess the potential and challenges of promotion of smallholder fish farming in West and Southwest Shoa zones of Oromia region.

Materials and Methods

Description of the study area

The study was undertaken in West and South-West Shoa Zones of Oromiya Region between September to December 2013. Wonchi (Senkole Kebele), Bantu, Tole and Ilu woredas of South-West Shoa and Ilu Gelan (Ijaji) and bako Tibbe from West Shoa were selected randomly. Basically the areas are characterized by a mixed type of farming, integrating both crops and livestock as a major source of income.

Data collection tools, design and analysis

The required primary data was generated using both rapid appraisal methods mainly based on focus group discussion (FGDs) and Key Informant Interviews (KII) with beneficiary smallholder farmers. A formal survey was undertaken using pre-tested questionnaire, out of 60 Smallholder fish farming households, 34 households were randomly selected in the study area. The collected data was summarized using mainly descriptive and narration approaches.

Results

Status of smallholder fish farmers in the study area

Aquaculture technologies currently adapted and disseminated by National fisheries and other aquatic life research center in the study area includes formulated fish feed, improved fishing gear and fish culture techniques such as cage culture, poly culture and integrated aquaculture agriculture. Technologies like fish feed and fishing gear are not fully accessible to all fish farmers' due to lack of aquaculture input suppliers in general and the relative high cost. Basically farmers in the study area are crop and livestock producers, with crop production being the major household income source. The selection of farmers to engage in fish farming in the study area was based on the availability of water and land. While the introduction of fish species

was based on conducive environment; temperature and other parameters. The most common specie in the area being *Oreochromis niloticus*.

Due to some constraints as mentioned above, all farmers were not commercializing their product rather use for household consumptions. Future intervention mechanisms such as create sustainable market linkage between fish farmers and consumers, encourage access to use microfinance services and organize farmers' saving and lending group (*iqube*) can sustain their farming business as well as benefit from the sector.

Consequently, starting from 2008 GC National fishery and other aquatic life research center is doing in collaboration with South West and West shewa zones of Oromiya, Districts experts, development agents and selected fish farmers to further develop the small scale aquaculture in the districts. On top of providing some aquaculture technologies mentioned earlier, technical supports has been given and will be given to the experts and users. Among the given topics of trainings; pond management and pond water quality monitoring, harvesting and post harvest handling, feeding of fish, gear making and maintenance and different fish cooking method were the major ones.

The first challenge in promoting of fish farming in the study area was the extension system. Lack of consecutive research, development and extension system among research institution,

ministry of agriculture and nongovernmental organization already working with the community were among the challenges identified which hinders the development of small scale aquaculture in the area. There were only three divisions assigned to work on crop production, livestock and natural resources. Fortunately the experts who were assigned to work on livestock were from fishery background and it was good opportunity for fish farmers but still the extension system was not equally supporting fishery as a priority commodity like crop and livestock which we expect will be improved in the future following the restructuring of the previous Ministry of Agriculture where Livestock and Fishery being as a new ministry.

Socio economic characteristics of smallholder fish farming households

Household heads composition was 94.3% male and 5.7% female who

were either widowed or divorced. Average age in the area was 29.5 years and average household family size 6.46. Out of the total number fish farmers, 76.5% had at least one pond and 23.5% own two to five ponds with mean pond size of 121 space m² which is usually located at their backyard. According to FAO (2012), most small scale farmers own small ponds of an average size of 150 m². Ponds were stocked with *O. niloticus* in 2008/9, where fingerling was obtained from NFALRC as this was the institute who introduced backyard small scale aquaculture in these areas. Some farmers who started fish farming lately reported that their fingerling sources were the early engaged farmers at affordable price. Up to 50% of the farmers depended on diverted river water and other 50% use subsurface spring water which is accessible throughout the year.

Table 1: Characteristics of pond fish farming in the study area

Variable	Factor	n	Percentage/average
Species cultured	Tilapia/ <i>O. niloticus</i>	34	100
Water sources	River	18	52.9
	Stream	16	47.1
Water availability	All year round	28	82.4
	Seasonal	6	17.6
Use of fish	Sold Fingerling	7	20.6
	Household consumption	27	79.4
Sources of feed	Mill dust & Food left-over	28	82.4
	Wheat bran	6	17.6
Type of pond	Earthen	34	100
Pond size (m ²)		34	121
Number of harvest		34	1.14
Distance to the nearest extension service/km		34	4.97

Small holder fish farming practices adopted by farmers

It is obvious that fish farming is not a popular farming practice in Ethiopia rather it is at its infant stage. Many reasons can be mentioned as a constraint such as lack of awareness by the majority about the commodity, fish is well known around major lakes and rivers culture and food habit of the people preferring other animal meat like beef and mutton than fish are among the major issues always raised. Despite its importance, fish is not fully demanded by the people around the study area. This is because of lack of awareness and advocacy services that should be done by fishery extension service group. Very few farmers who are exposed to the modern knowledge and education were willing to accept the technology and adopt the pond culture system for household consumption.

However, those farmers who took consecutive training and aware of the benefits from consuming fish are easily able to adopt and practice the pond farming system successfully. On the other hand other farming practices such integrated aquaculture agriculture, formulated fish feed and mono sex tilapia are also introduced to the fish farmers.

Potential of smallholder fish farming

The basic rationale of introducing aquaculture in developing countries like Ethiopia is to improve smallholders' livelihood and nutrition

status of the farming community. Despite the existence of enormous potential for aquaculture development in the Ethiopia, aquaculture as one sub-sector of agricultural could not significantly contribute to the country's economy. Since fish is good source of protein for the family, it can alleviate protein deficiency and enables healthy growth in children and fosters better health and less disease. Smallholder farmers in the study areas have both land and water that flow throughout the year which is very basic and common in fish farming enterprise. However, lack of basic aquaculture input suppliers like formulated feed, quality fish seed and fishing nets around the area forced the small scale farmers to look into research centers which have limited capacity in delivering those inputs.

Challenges for expansion of smallholder fish farming

It is difficult to conclude that a single challenge is very important and responsible in hindering the development of the sector as the challenges in the area have multi-dimensional nature. It is observed that technical, socio-economical and cultural challenges are among the major ones hindering the development of small scale aquaculture in the study area.

Technical challenges

Respondents in the study area thought that fish farming cannot be a profitable business so that it will no longer be sources of income for the

household. More than half of the respondents' believed that government and other nongovernmental organizations would provide support to reduce the risk in cases of any failure in fish farming business. However, some farmers have tried their bests to sustain the business. Regardless of how they benefit from the fish farming practices either for household consumption or as a means of income, about 74.3% of the respondents reported that their life has improved since they adopted fish farming practices as compared to the past three years.

Table 2: Major constraints in fish farming

Constraints	(%)
Net for harvest	33.3
Feed cost	23.3
Shortage of water during dry season	20.0
Lack of follow up & expertise support	11.0
Lack of awareness on production and marketing	6.7
Predators	6.7

The above summarized constraints were reported by the respondents as to have hindered the development of the sector. Although a few farmers can afford equipment and inputs for fish farming business, there are apparently no dedicated suppliers to the sector. As indicated in Table 1, most of the respondents use mill dust (82.4%) due to availability and low cost. In contrast, protein rich formulated feeds from various agro industrial by products such as fish meal, oil cakes, soybean, wheat bran and brewery west were not used as these are not accessible and farmers cannot afford.

This resulted in stunted fish growth and early breeding in Tilapia which was evidenced during our survey which is again a major challenge in up scaling the technology around the study area.

According to (Bahnasawy *et al.*, 2003) the amount of feed recommended is usually 5 - 10% of the body weight of the cultured fish. However, fish farmers do not know the total number of fish and the average stocked fish weight. As a result the fish were not fed as per the recommended optimum quantity for semi intensive farming system which depends on the body weight of the fish. Rather farmers provide feeds based on rough estimates of the feed required. The rest 17.6% of the respondents had used wheat bran to feed the fish where the cost of wheat bran was not affordable by all farmers as reported by the respondents.

According to Yemi and Deji (2012), growth of the fish farming sector continues to be limited by weak input and output markets and limited access to technologies and knowledge. In the present study, in addition to the cost of feed, lack of awareness has been encountered as a problem. The gap of extension service by community development agents is a challenging problem in developing small scale aquaculture in the study area. Lack of relevant expertise and private investment in the sector add up to the constraints to the development of the aquaculture sector in Ethiopia.

Table 3: Respondents' perception on fish farming business

Variable	Factor	Percentage
In case of failure, expectation of support from Government and NGOs	Yes	42.9
	No	57.1
Rely on other relatives in case for help	Yes	54.3
	No	45.7
Traders that respondent trust more	Wholesalers	2.9
	Retailers	25.7
	None	71.4
Living conditions as compared to the past three years	Much less	8.6
	Less	2.8
	Better	74.3
	Much better	14.3

Gender and aquaculture

It is known that family members' participation is valuable and brings tremendous change in any agricultural farming especially in aquaculture where all family members can perform easily. In particular, women's participation in aquaculture has significant positive impacts on productivity of the business itself and improvement of households' nutrition and overall living standards. Atdhe *et al.*, (2009) stats that regardless of who coordinates information preparation and delivery, ensuring that the information provided to women increases their ability to engage in all aspects of aquaculture systems is essential.

Women and youth in the study area were actively involved and their contribution was valuable to the existing development of the sector. Since all fish ponds were located at the farmers' backyard, women and youth took the burden of the pond management as well as feeding the fish. However, their effort has not

been well recognized and the contribution was not clearly quantified. The result revealed that 94.3% of the male respondents participate in aquaculture and related trainings and workshops alone.

Regardless of their participation women took the responsibility to feed the fish as well as managing the ponds, women have to given special trainings besides to other managerial issues for instance, feeding fish, pond management and cooking are among the key which is very important to the women this is because of the tradition that in a rural area women took the responsibility in cooking and feeding of the whole family.

Conclusion

Farmers in the study area have good opportunity with regard to resources such as land and water either diverted from the rivers or directly from sub-surface springs. Therefore, future interventions should focus on alternative farming businesses techniques like fish farming which should be strengthened through allocation of adequate resources and expertise. Nationwide stimulus package for small holder aquaculture in Kenya and Nigeria has led expansion of aquaculture which eventually turned out to be one of the fastest growing agribusiness. This will also hold true for the Ethiopian case where the majority of farmers have less and/or no awareness about fish in general and small scale aquaculture

in particular. Therefore, we recommended that such stimulus package should be designed to develop small scale aquaculture in Ethiopia where there is vast area and ample water resources vital for the development of the sector.

Market linkage between small holder farmers group and local cooperative unions should be established as the latter can be a potential processor and supplier of fish feed, which is a critical input in fish farming. Farmers in this area do have access to financial credit in which solely relies on government and relatives support. One alternative can be that these small holder fish farmers become a member of farmers union where they can have access to credit saving facilities there by develop confidence in taking risks in case of failure on new business such as aquaculture.

To encourage the aquaculture, the programs were initiated to upgrade the technology, and encourage involvement of private sector for activities such as quality seed, feed and other inputs and creation of suitable infrastructure for storage, transport, marketing and credit. Eventually according to their household work share and participation women and men in the households should equally participate in all aquaculture related trainings together. This can help to increase production and productivity as well as the household fish consumption and faster the household benefit from the sector.

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