Preliminary study on the spread of aquaculture technologies between farmers in Southern Malawi

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Abstract

Fisheries extension workers empower fish farmers by training them to become innovative and successful small-scale fish farmers. In turn, fish farmers attract, and have the knowledge to train others to farm fish. Between November 2002 and February 2003, 55 fish farmers were interviewed to determine the extent to which small-scale fish farming spreads through farmer-to-farmer transmission. In addition technologies passed between fish farmers were examined to determine the main types of technologies that are spread, as well as, to determine if the quality of information transmitted remains stable or if it is distorted as it passes from one farmer to the other.

The study showed that information on small-scale fish farming spreads substantially beyond extension-farmer transmission. Twenty-nine percent (29 %) of fish farmers were taught by extension workers and were thus considered a primary class. Sixty percent (60 %) of fish farmers were classified as secondary because they had been taught by primary fish farmers and 11 % were classified tertiary because they had been taught by secondary fish farmers. The results therefore indicate that small-scale fish farming technologies are passed along more through farmer-to-farmer than extension-to-farmer transmission. Pond management, integrated agriculture with aquaculture, fingerling and fish selection, and pond construction are the main technologies that are passed through farmer-to-farmer transmission. Finally, results suggest that the quality of information that is transferred through farmer-to farmer is comparable to information transmitted through extension worker -to-fish farmer transmission, but this needs further investigations.

Introduction

Over the past few years of Malawi has experienced a shortage of food due to various reasons including drought, excessive rains, and poor macro-economic policy procedures. Integrated agriculture and aquaculture (IAA) is said to improve farm resilience to drought and farm diversification resulting in increased whole-farm productivity, household income, household food security and nutritional status of under-five children (Jamu *et al.,* 2002). Hence, the Malawi Department of Fisheries in collaboration with the Japanese International Cooperation Agency (JICA), and the World Fish Center, is encouraging farmers adopt fish farming through IAA participatory research and extension program.

While the benefits of IAA are manifold, Tshiunza *et al.* (2002) notes that "one way of determining the success of an innovation is to assess the level and rate of its adoption as well as the rate at which such an innovation spreads among the target population/ area". It should be noted however, that in the early stages of the spread of an innovation, extension workers play a crucial role. On the other hand, extension services may be more expensive than transmission of a technology through farmer-to-farmer model. This study was conducted to measure the extent to which fish farming technologies do spread beyond the fisheries extension workers, the type of technologies that are being passed along and to assess the quality of information that is being transferred from one farmer to the other.

Methodology

The study was conducted between November 2002 and February 2003 in villages of three districts in Southern Malawi; Mulanje, Zomba and Machinga. Fifty-five (55) fish farmers were randomly selected from NAC's database; 11 fish farmers came from Mulanje, 23 from Zomba, and 21 from Machinga districts. The sample consisted of 44 male and 11 female fish farmers.

Extended conversations were undertaken with the farmers while simultaneously completing a series of questions on a semi-structured questionnaire. To thoroughly obtain all information on participating farmers, background information that had been missed during conversations was gathered from the available information that was collected for RESTORE software program (Lightfoot *et al.*, 1999) during the NAC extension program.

The first part of the questionnaire had questions that intended to gather personal data including age, gender, education level, marital status, and home location. In addition, data were collected on number of ponds, time when the farmers started fish farming and income of the farmers. To measure the quality of information that was being transferred, the level of success was compared between farmers. Success was indicated by the level of income generated from fish farming. A multiple regression analysis was run to determine if level of fish farming, number of ponds, number of year's fish farming, and farmers age and education correlated with income of the fish farmer.

The second part of the questionnaire was meant to obtain information on the second fish farmer (herein referred to as secondary fish farmer) who had been taught by a fish farmer (primary fish farmer, that is, the one who was taught by an extension worker) in question. The information about the type of the aquaculture technology that was passed along was also collected.

Results and Discussion

Reasons for fish farming

Seventy five percent (75%) of the fish farmers said that they grew fish for both food security and income generation, while 11% and 9 % said that they grew fish for home consumption and solely for income generation, respectively. The rest (5%) gave "water for irrigation" as reasons for fish farming (Figure 1).

Adoption of fish farming and income generation

On average, the respondents had adopted fish farming about 8 years before this study. Out of the 55 farmers, 37 made a profit from fish farming, whereas 17 did not make any profit while two of them could not tell whether they made profit or not. The average income generated from fish farming was MK 11 118.97 (approximately 125.00 USD) per annum, with more cash income from farmers in Zomba (MK 17 950.29, approximately $199 USD) seconded by farmers in Mulanje (MK 8317.78, approximately $92 USD), and finally Machinga (MK 5283.33, approximately $59 USD) districts (Figure 2).

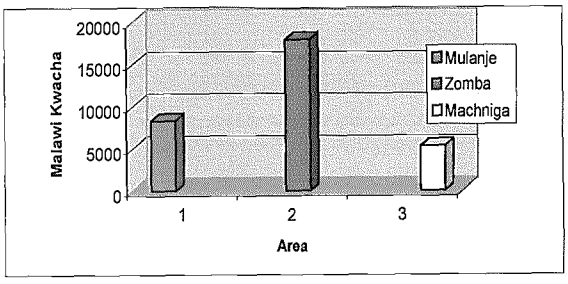

Figure 2: Annual income generated from small scale fish farming in Mulanje, Zomba and Machinga districts

On average, fisheries extension workers made 19 visits (range 0-72) to farmers per year , but visits to males were on lower (17) than to females (25) per year. Fifteen percent (15%) of the farmers were not visited by extension workers for the whole year (Table 1).

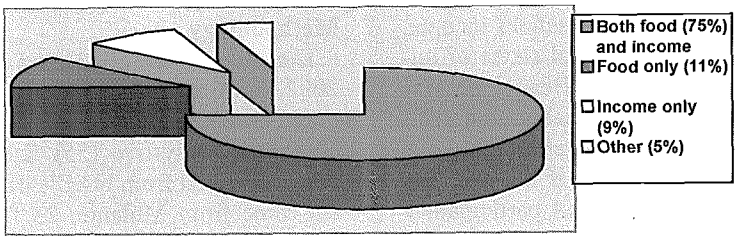

Figure 1: Main reasons for fish farming

Table 1. Number of visits (per year) among extension workers and fish farmers

	No. of visits to farmers by extension workers	No. of farmers to visit the field station	No. of visits to farmers by other fish farmers	No. of farmers to visit other fish farmers
Male	17	3.2	12.9	17.2
Female	25	1.6	10.4	12.3
Total	19	2.8	12.4	16.2

On the other hand, on average, farmers made about 3 visits (range 0-24) to their field station per year and on average, males made more visits (3) than females (2) during the same period. This gender difference may be occurring due to socio-cultural influences where men are more mobile and often work away from the home than women. Forty six (46%) percent of the farmers had never visited the fisheries field station to seek assistance on fish farming activities (Table 1).

On average, farmers received 12 visits (range, 0-48) from other fish farmers for assistance while 36 % of the farmers reported no visits from other fish farmers. Similarly, fish farmers made 16 visits (range, 0-48) annually to other farmers to seek for assistance. In total, 77 % of the farmers interviewed visited other fish farmers to receive assistance. While 82 % of the male fish farmers visited other fish farmers, only 57% of female fish farmers visited other fish farmers for assistance (Table 1).

While farmers got information on fish farming through visits by, or to other fish farmers as well as by extension workers, the majority (69%) of the fish farmers preferred receiving assistance from fisheries extension workers over fellow farmers. The rest (37%) preferred receiving assistance from fellow farmers to fisheries extension workers. Most farmers felt that they would gain more accurate information from extension workers than from other farmers.

Spread of aquaculture awareness and dissemination

Twenty-nine percent (29%) of the respondents were categorized as primary fish farmers, meaning that they received information on how farm fish from extension workers, 60% were categorized as secondary fish farmers meaning that they received information from primary and the remaining 11% were tertiary fish farmers (those that were taught fish farming by secondary fish farmers) (Figure 3).

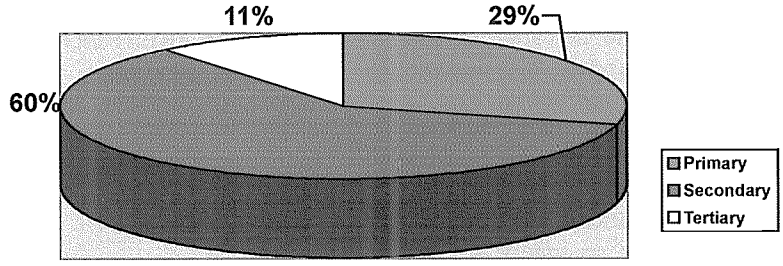

Figure 3: Levels of aquaculture for fifty-five small sc farmers interviewed from Mulanje, Zomba, and M

Table 2: Technologies most commonly transmitted between fish farmers in Southern Malawi

Pond management	IAA technologies	Fingerling and fish selection	Pond construction	Other
Fingerling management in hapas and breeding ponds	Use of organic manure and inorganic fertilizers	Fingerling selection for pond rearing	Fish pond pegging, construction and design	Transportation of fingerlings on long distance for stocking fishponds
Fry and fingerling reproduction	Use of mud pond for fertilizing vegetable gardens	Suitable fish selection for pond culture		*Tilapia rendalli* seed multiplication for pond culture
Polyculture of fish in ponds	Use of fertilizers, water and manure in IAA with crops, livestock and poultry			Problems faced by fish farmers
Monosex of all male culture in ponds	Fish integration with rice culture			Farming records and book keeping
Methods of harvesting fish	Fish integration with vegetable culture			Fishponds and family health
Fish production cycles and feeds				

Since the data indicates that the majority of fish farmers are secondary, it may be suggested that fish farming is spreading more through farmer-to-farmer than through extension worker-to-farmer transmission. This view should be cautiously taken as the sample size of the study was relatively small.

Out of the sample 58% had taught others although only 22 out of the 55 could produce names of those that they had taught. The 22 fish farmers taught 134 other people (on average 6 people) on how to fish farm. From this we can say that each farmer is teaching fish farming to an average of 6 people.

The technologies that were most commonly transmitted between fish farmers are presented in Table 2 and were categorized into five main areas (1) pond management (2) integration of agriculture and aquaculture (3) fingerling and fish selection (4) pond construction and (5) other, which included technologies that do not fit in the previous categories.

Quality of information that is transmitted from farmer-to-farmer

Multiple regression analysis showed that the five dependant variables (number of year's fish farming, number of ponds owned, age, and education of fish farmer) did not significantly correlate with income (R^2=0.261), implying that income did not increase or decrease at various levels of fish farming; as the level of fish farming increases (from primary to secondary to tertiary...) the level of income is stable. This may suggest that the quality of information being transmitted may be consistent for primary, secondary and tertiary farmers.

In summary therefore, although preliminary, results of this study suggest that there may be variation in income from fish farming due to location; that farmer-to-farmer technology transfer play a big role in dissemination of aquaculture technologies and should therefore be encouraged and enhanced; that female fish farmers are less mobile than male fish farmers in sourcing fish farming information and should therefore be targets for extension workers; that the quality of information disseminated between farmer-to-farmers may be comparable to information disseminated between extension worker to farmer. The latter, however requires further investigations using other dependent and independent variables.

References

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