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Research Application Summary

Economic analysis of small-scale fish farming in Bunda, Lilongwe, Malawi

Mussa, H.,[1] Kaunda, E.[1] & Banda, L.[1]
Lilongwe University of Agriculture and Natural Resources, Bunda Campus, Department of Aquaculture and Fisheries Science, P.O. Box 219, Lilongwe, Malawi
Corresponding author: mussahappy@gmail.com

Abstract

This study to determine economic returns of small-scale fish farming in Malawi was carried out in Bunda area, Lilongwe. Thirty two small-scale fish farmers were purposively sampled and interviewed using a structured questionnaire. Cost and returns analysis per harvest gave a margin of MK 7,378.12 (US$ 17.2). Regression analysis showed that costs of fingerlings, costs of labour, respondent's total area of land, and costs of manure and fertilizer were significant factors affecting respondent's total revenue. The major problems faced by fish farmers were high cost of input, predators, inadequate extension visits and drying of ponds. The study concluded that small-scale fish farming is a profitable enterprise, especially where there is access to high quality inputs, proper management, absence of predators, and when farmers have access to extension services.

Key words: Costs and returns, economic analysis, extension services, fish farming, Malawi, regression analysis

Résumé

Cette étude visant à déterminer les retombées économiques de la pisciculture à petite échelle au Malawi a été réalisée dans la région de Bunda, à Lilongwe. Trente-deux exploitants piscicole à petit échelle ont été échantillonnés et interviewés à l'aide d'un questionnaire structuré. L'analyse des coûts et de la rentabilité par récolte a donné une marge de 7378,12 MK. L'analyse de régression a montré que les coûts des alevins, les coûts de la main-d'œuvre, la superficie totale de terre de l'enquêté et les coûts du fumier et de l'engrais étaient des facteurs qui ont influencé de façon significative le revenu total de l'enquêté. Les principaux problèmes rencontrés par les pisciculteurs étaient le coût élevé des intrants, les prédateurs, les visites de vulgarisation inadéquates et le dessèchement des étangs. L'étude a conclu que la pisciculture à petite échelle est une entreprise rentable, surtout là où l'on a accès à des intrants de grande qualité, une gestion adéquate, à l'absence de prédateurs et lorsque les agriculteurs ont accès aux services de vulgarisation.

Mots clés: Analyse économique, analyse de régression, coûts et rendements, pisciculture, Malawi, services de vulgarisation

Background

Most of Malawi's capture fisheries have reached their maximum sustainable yields yet demand for fish remains high. Since increasing fish supply from capture fisheries is unlikely, aquaculture provides a viable alternative for increasing fish production (Schmidt, 1977; Balarin, 1984). Much as aquaculture is viewed as a viable

alternative for increasing fish supply to inland areas, most fish farmers lack information on how to assess profitability of their farms. This has partly hampered aquaculture development in the country and discouraged potential farmers from investing in fish farming. Others have become inactive because the potiential profitability of aquaculture has not been demonstrated to them. Studies to determine the economic returns as well as factors that affect profitability of fish farming in Malawi are scanty. This study was carried out to examine economic returns and factors influencing profitability of fish farming in Bunda, Lilongwe, Malawi with a view to determine its viability.

Literature summary

Aquaculture in Malawi contributes to food and nutritional security in terms of increased access to food, increased food production, improved household capacity to acquire nutritious food and improved utilization of farmland for food production (Jamu and Chimatiro, 2004). Aquaculture supplies fish to most upland areas which have limited access to fish from lakes and rivers. Fisheries resources contribute four percent to Malawi's GDP and Aquaculture accounts for about two percent of the nation's fish production. It also contributes between approximately one and 17 percent of overall household income, depending on the fish farming activities involved (SSC, 2005). In southern Malawi, where most aquaculture is concentrated, farmers are able to generate US$ 199 from 1 to 3 ponds averaging 151m^2 (Andrew *et al.,* 2003). Malawian agriculture is dependent on rainfall from November to April, leaving the remaining months dry and idle in terms of agricultural production. Aquaculture enables farmers to continue producing food in those idle dry months. Fish farming also plays a crucial role in turning marginal wetlands into productive land for crop production such as vegetables. In other areas, aquaculture is carried out in communal ponds and irrigated dams, thereby diversifying income through the sale of fish and provision of nutrition to poor households.

In Malawi a typical small-holder fish farmer has one or two small ponds of about 200 m^2 or less usually located in close proximity to a seasonal wetland or "dambo" (GoM, 2014). Fish production from small holder farmers has steadily increased from 1,600 tonnes in 2008 to 2,500 tonnes in 2010 (GoM, 2011).

In a detailed survey carried out in Malawi, it was reported that the majority of fish farmers recognize that aquaculture provides an opportunity for farm diversification and improved income (ADiM, 2005). However, most were dissatisfied with their performance. The main reasons for dissatisfaction for all groups currently engaged in fish farming were the slow growth rate of fish. However farmers were satisfied with the market and the price of fish. There is overall inadequate understanding of the critical requirements for successful fish farming. Studies from Nigeria (Olaoye *et al.*, 2013) indicate that there is a considerable level of profitability in fish farming and reveal that fish output is determined by pond size, labour used, cost of feeds, cost of lime and cost of fingerlings. Thus, the aim of this study was to establish the economic returns to small scale fish farming in Malawi.

Study Description

The study was conducted in Bunda area, Lilongwe district, central Malawi. The area is located within the coordinates, 14.10^{0}S, 33.47^{0}E, and at an average altitude of 1200 m above sea level. Data were collected through a household survey which purposively targeted a total of 32 fish farmers that were supported by a local Non-Governmental Organization (NGO), Kawjo Foundation with funding from Global Environment Facility Small Grants. The Global Environment Facility Small Grants programs aimed at "scaling up adaptive capacity of rural communities to climate change through innovative integrated agriculture aquaculture for improved rural livelihoods".

Research Application

Costs and returns analysis per cropping operation revealed that on average farmers make a gross margin of MK7378.12 from a pond size of 180m^2, stocked with 961 fingerlings, for a period of six months (January-June, 2014). Table 1 shows the gross margins of fish farming in the study area.

Table 1. Gross margin for fish farming in Bunda, Lilongwe, Malawi

				Unit	Amount (MK)
1.	**Gross Income (GI)**				
	Average yield			Kg	18.56
	Price/kg			MK	1,600 .00
	Gross Income (GI)			MK	29,692.50
2.	**Variable costs (VC):**				
	Fingerlings			MK	9609.38
	Feed			MK	7362.50
	Labour			MK	2118.75
	Fertilizer and manure			MK	3223.75
	Total variable costs (TVC)			MK	22314.38
3.	**Fixed costs:**	Quantity	Unit price	(MK)	
	Hoes	4	1300	MK	5200.00
	Shovels	2	1800	MK	3600.00
	Buckets	3	600	MK	1800.00
	Slashers	1	1300	MK	1300.00
	Land			MK	7000.00
	Pond construction (Labour)			MK	36600.00
	Total fixed costs (TFC)			MK	**55500.00**
4.	**Total costs (TC) (2+3)**			MK	**77814.38**
5.	**Gross Margin (GM) (1-2)**			MK	**7378.12**
6.	**Net Farm Income (NFI) (5-3) or (1-4)**			MK	**-70436.26**

At the time of the study 1 US$ = MK 430

Results of a multiple linear regression model that was run to establish the factors that influences the gross margin (profitability) of fish farming in the study area showed that age of respondent, costs of fingerlings, costs of labour, costs of feed, and costs of manure and fertilizer significantly affected gross margin. Costs of fingerlings, costs of labour, costs of feed, and costs of manure and fertilizer were significant at P<0.05 while age of respondent was significant at P<0.1. Costs of fingerlings, and costs of manure and fertilizer were positively related to gross margin. This suggests that these are the key factors influencing gross margin in the study area. Age of respondent, costs of labour, and costs of feed were negatively related to gross margin. The negativity indicated that the variables and revenue move in opposite directions (Table 2).

Table 2: The regression results of the determinants of fish output in the study area

Variable	Coefficients	B	T	Sig.
Constant	12405.081	-	.908	.374
Age of respondent	-2403.669	-.343	-2.025	.056**
Education level	2285.014	.126	.784	.442
Household size of respondent	1825.629	.118	.798	.434
Respondent's total area of land	902.865	.338	1.977	.610
Land allocated to fish farming	6441.244	.335	1.687	.106
Costs of fingerlings	2.311	.430	2.163	.042*
Costs of labour	-1.131	-.374	-2.423	.025*
Costs of feed	-.424	-.238	-1.465	.015*
Costs of manure and fertilizer	1.815	.495	2.822	.010*
Costs of pond construction	-.014	-.021	-.115	.910

R^2=0.578 F Stat = 3.563

**significant at P<0.05, **significant at p<0.1, None = Not significant*

The study results revealed the constraints associated with fish farming in Malawi were high input costs, predators, inadequate extension services, drying of ponds, and theft (Table 3).

Table 3: Problems faced by fish farmers at Bunda

Problem	Frequency	Percentage
High input costs	32	100
Predators	32	100
Inadequate extension services	24	75
Drying of ponds	17	53.1
Theft	11	34.4

* Percentage greater than 100 due to multiple responses

In summary, based on the findings of this study it was observed that, on average, a gross margin of about MK7,378.12 (US $ 17.2) and a net farm income of MK 70,436.26 (US $187) were realized from fish farming in the study area. The major problems and constrains to fish farming in the study area were high cost of input, predators, inadequate extension visit and fluctuation in pond water. Factors that significantly affected revenue in the study area were age of respondent, costs of fingerlings, costs of labour, costs of feed, and costs of manure and fertilizer. This study concluded that small-scale fish farming in the area is not economically rewarding, but it can be economically viable when there is access to high quality inputs (feed), proper management, absence of predators, and when farmers have access to extension services.

The study recommends that farmers make use of associatios and clubs to purchase inputs in bulk so as to increase their bargaining power and reduce unit prices. Government should consider allocating specialist extension workers since the majority of the farmers have inadequate knowledge of fish farm management. There is also need to establish a formulated fish feed depot in the study area as most farmers feed their fish on maize bran.

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