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Challenges Facing Fish Farming Development in Western Kenya

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Research Article

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ABSTRACT

This paper examines the challenges facing fish farming development in western kenya. Sample survey of 192 farmers representing the fish farming community in the area was used. The study result revealed that the high prices of fish feed, declining fish prices and lack of finance were found to be the top ranking serious challenges facing fish farmers in that area. A Cross-sectional and longitudinal Survey research design was adopted for the study. Stratified sampling was used to select fish farming households. Key informants were selected through purposive sampling method. Data gathering was through multiple methods; where primary and secondary data were collected. Data analysis made use of descriptive statistics, where numerical and non-numerical summary of data were used. Chi-Square was used to test the independence between variables. Spearman rank order correlation coefficient was used to test relationship between fish farmers ranking of various variables affecting them. Findings were, fish farmers faced several management problems which included high cost, unavailability and low quality of feeds, drying up of ponds during drought, lack of fingerlings, flooding, siltation of ponds, pond maintenance and poor security. Benefits of the study are; the government through Kebs should frequently carry out spot checks on feeds supplied to Agrovets to ascertain its quality. Fish farmers will adopt Best Management Practices in fish farming in order to improve their household food security and livelihoods through increased income. The study therefore suggests that the government through Kebs should frequently carry out spot checks on feeds supplied to Agrovets to ascertain its quality. There is need for the fish farmers to carry out a proximate analysis for crude protein content to ascertain the quality of the feeds to be used. Fish farmers should also be trained on feed formulation and fish breeding to maintain a constant supply, quality and save on costs for both feeds and fingerlings.

Keywords: Fish farming, Food security, Livelihoods, Challenges.

INTRODUCTION

There are a host of problems facing the growth of Kenya's fish farming industry. These challenges include; uncoordinated promotion of fish farming through many institutions, Government, research institution, Universities, NGOs and Regional authorities among others (Mwangi, 2008; Osure, 2011). The demand for fingerlings to stock the fast-growing number of fishponds has skyrocketed from 1 million to 28 million in less than a year, forcing the government to lean heavily on private industry. Because of this scenario there is no significant growth in fish farming industry and the farmer is left confused by many extension officers who visit and give varying information. Furthermore, there are no comprehensive policies on fish farming and legislation are inadequate (Mwangi, 2008; Osure, 2011). Because of this, policy makers have accorded low priority to fish farming as an economic activity. Subsequently the sector has operated without a comprehensive policy and legislation. This has reduced management and research effectiveness, discouraged investment in fish farming and constrained production and growth (Mwangi, 2008). Furthermore, lack of certified quality seed (Fingerlings) and commercially produced feeds are also among problems facing the fish farming sector. Most farmers have not yet embraced the technology for producing high quality seed. Commercially produced feeds are hard to come by and when available they are expensive for most farmers to afford. Inadequate training programmers' for farmers and extension workers have retarded the growth of the fisheries sector. The inadequacy in provision of extension services has been a major challenge to development of fish farming in Kenya. This situation results from lack of resources and technical staff (MOFD, 2011). Inadequate outreach programmes and inefficiency in dissemination of technology transfer to farmers

also play a key role in the backwardness in developing the sector. Many farmers with good land that can be put into fish farming are not even aware of this potential.

Poor record keeping by farmers and inefficient statistical data collection has impeded information dissemination on fish farming. Coupled with this, low funding of the sub- sector activities by the Government and low investment by the private sector are a major constraint to this sector. In addition these challenges are compounded by inadequate entrepreneurship skills by the farmers and lack of credit. Nonetheless, although it has not been scientifically quantified, Kenya has enormous potential for fish farming in the agricultural rural zones. In fact, extensive water bodies provide great potential for food and incomes for rural population. Munialo (2011) stressed that the potential for growth and expansion is high given the many favourable physical endowments of the region. These include; adequate rainfall, a well distributed network of rivers, streams, dams, satellite lakes and wetlands as well as suitable climate characterize the region. The Kenya Integrated Household Survey of 2005/06 indicated that 46% of the rural population living near perennial and seasonal water bodies fall below the poverty line. This is despite the potential these water bodies hold. In reaffirming the potential of the region Munialo (2011) explains; other advantages include favourable physical features such as the vast gently sloping land, fertile soil with high water retention capacity, and regional and international markets. This potential can be tapped to increase fish production through fish farming. Lake Victoria can be used for cage and pen culture (Mwangi, 2008; FAO, 2007; Munialo, 2011).

METHODS AND MATERIALS

The data reported here were collected to identify the opportunities and challenges faced by fish farming household in Siaya County. This study was conducted in the six districts of Siaya County Kenya for a period of ten months. Cross-sectional and longitudinal survey design that focused on the individual fish farmers as the unit of analysis was employed. This method is capable of describing the existing perception, attitude, behaviour or values of individuals within a household (Mugenda and Mugenda, 1999). The sampled population in the study area was that specifically involved in fish farming. From each district, a Stratified random sampling approach was used to select the respondents. This sampling technique was used to avoid conscious or unconscious bias in the selection of sampled households and ensured that the selected sample was representative of the population. In total 192 fish farmers were selected for the study. A large sample was required to produce salient characteristics of the population to an acceptable degree and also reduce sampling errors (Mugenda and Mugenda, 1999). The instruments used for data collection were questionnaire, Key informants interview guides, observations checklist and secondary information sources. A structured questionnaire was prepared and given to fishery's experts and research supervisor to check content and validity. After incorporating experts' comments, it was pre-tested, and then a final version incorporating the pre-test results was produced. All questionnaires were administered through face-to-face interviews by the researcher and researcher assistants. In three districts Focused Group Discussions (FGDs) were conducted covering various topics such as ranking of different opportunities and challenges experienced by fish farmers.

The statistical package for social sciences (SPSS-Version 17) computer programme was used to analyze the data. Two analyses were made: descriptive analyses (by use of means, modes, standard deviations, variance, percentages, and frequencies) and the inferential analyses (by use of chi-square, correlation analyses). The former provided the descriptive and documentation of the state of affairs as they were, while the latter indicated statistically significant relationships between the variables and in the testing of the specific objectives. Means, standard deviation and Chi square test were used to test differences that existed. All this were tested at the probability level of $p=0.05$ or $p=0.01$ level of significance.

RESULTS AND DISCUSSIONS

A number of challenges have contributed to slow pace of fish farming in Siaya County in Western Kenya. Key among these are high cost of feed, shortage of quality fingerlings and feeds, flooding, poor security and poor management practices among others. Some of these challenges include:

Water Source for Fish Farming

Most farmers depended on natural sources of water where the main sources of water for fish farmers were springs (Figure 1). Majority (82.8%) used springs as their source of water, 16.7% used streams only 0.5% used the borehole as their water source.

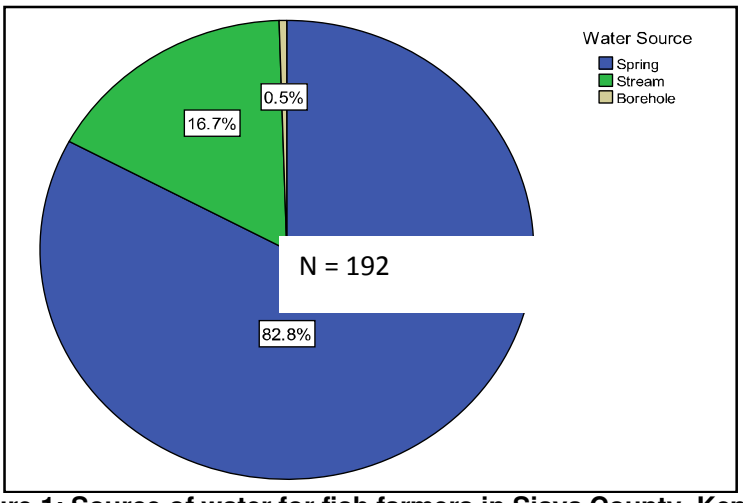

Figure 1: Source of water for fish farmers in Siaya County, Kenya.

Chi Square test carried out on farmers' source of water showed significant differences. The natural sources are not reliable as they dry up or water volume reduces during droughts. The scenario was quite different in Rarieda, as was observed neither streams nor springs existed; the source of water was mainly from the lake though drenches. This is due to the fact that Rarieda is on the leeward side of the lake receiving decimal rainfall throughout the year. FGD findings were that some fish farmers used piped chlorinated water which tended to affect fish farming in Rarieda.

Majority (87.2%) of fish farmers said their water was of good quality, 5.7% said their water quality was not good while 7.0% were not sure whether the water quality was good or bad(Figure 2).

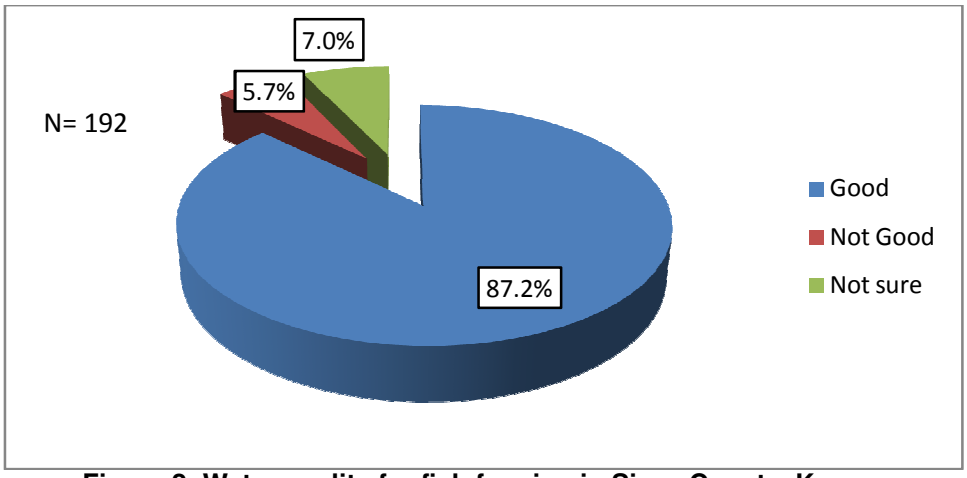

Figure 2: Water quality for fish farming in Siaya County, Kenya.

Chi Square test carried out on water quality showed significant variations ($X^2_{2,0.01}$ = 130.89;($p<0.01$) by fish farmers.

From observations, it was established that in some regions, the water was not of good quality as indicated by activities such as bathing and washing that were taking place in streams on the upstream side. It also emerged from FGDs that fish death due to water poisoning by unknown people was being experienced in some areas of Sauri in Yala and Bondo. Similarly siltation and floods affected the water quality especially during rainy seasons. FGD findings also indicated that siltation was a major threat to water quality in the region. Such poor quality water negatively affects the growth of fish and some even died due to lack of adequate oxygen to enable them continue thriving. FGD findings were that siltation was a major cause of poor water quality during rain season. From the FGD it was also establish that pesticides and other harmful toxicants from agricultural practices affected water quality for

fish farming. From observation, in Rarieda some farmers used piped water for fish farming which had high levels of chlorine.

Effect of Predators

Majority (88.3%) of fish farmers were affected by preditors while those whose ponds were not affected by predators were 11.7%. These results indicate that predation was a serious threat to fish farming. A Chi Square test carried out to established that there was a highly significant (P<0.01) variation in the responses$\chi^2_{1,0.01} = 225.094$). FGDs also confirmed that predation was a serious threat to fish farming. Asked to name the predators that were a threat to fish farming, responses were as given in Figure 3.

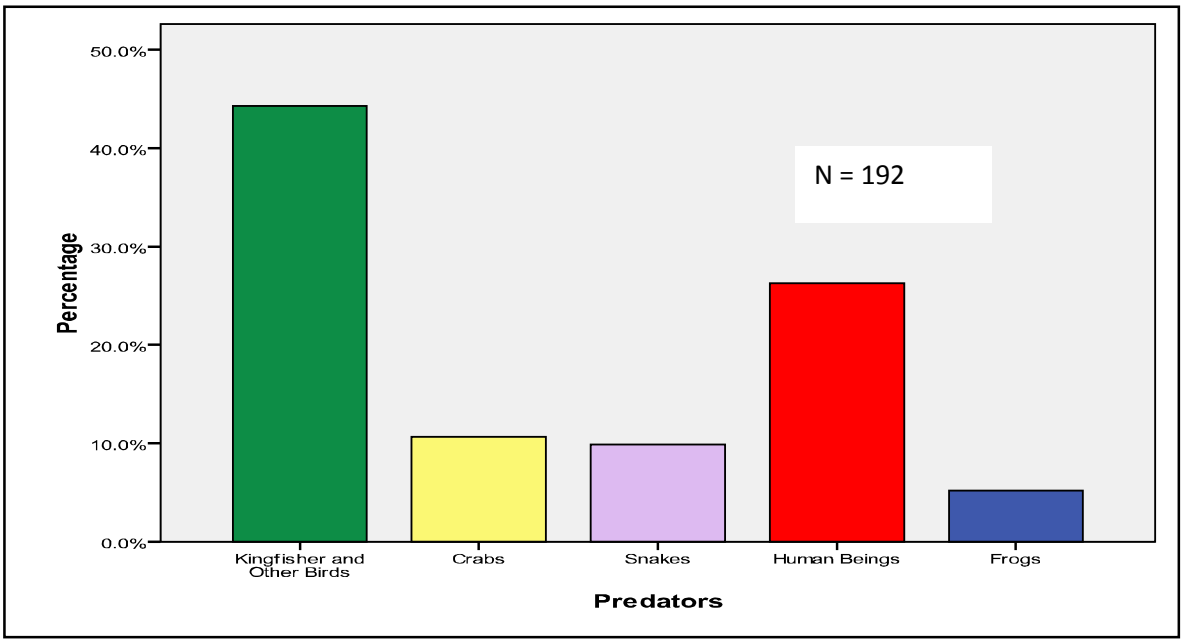

Figure 3: Predators affecting fish farming in Siaya County, Kenya.

A Chi Square test carried out on the responses indicated that there was a highly significant (P<0.01) variation in the responses$\chi^2_{5,0.01} = 285.094$). The results from questionnaires indicated that the predators included kingfisher and other birds (44.3%), human beings (thieves) (26.3%), crabs (10.7%), snakes (9.9%) and frogs (5.2%). Stakeholders during FGDs were also asked to rank the predators based on their seriousness (Figure 3). A Spearman Rank Order Correlation (r) was calculated to ascertain if there was any difference in terms of the rankings from questionnaires and those of FGDs. The probable error ($P.E._r$) of the correlation obtained was: r = 0.94±0.05; $P.E._r$ = 0.03, indicating highly significant (p<0.01). This implies that there is a significant similarity in the two rankings. Although frogs rank low as predators as the Key informants were of the opinion, most farmers were not aware the severity of frogs as predators especially on fish eggs, fries and fingerlings.

Diseases

Incidences of diseases in fish ponds were not common in the study area as indicated in Table 1 and none of the respondents could name the disease(s) affecting their fish ponds. This was an indication that farmers did not know the diseases affecting fish and it was, therefore, difficult for them to establish whether diseases were impacting negatively on their fishing endeavours.

Table 1: Incidence of diseases in fish farming in Siaya County, Kenya.

Response	Frequency	Percentage
Yes	17	8.8
No	166	86.5
No response	9	4.7
Total	**192**	**100.0**

A Chi Square test carried out to establish if there were differences between the 'yes' and 'no' responses indicated that there was a highly significant (P<0.01) variations in the responses ($\chi^2_{1,001} = 241.668$). Results in Table 1 showed that respondents whose ponds had been affected by diseases were 8.8% while those whose ponds had never been affected by diseases were 86.5%. Healthy farm-reared fish, guarantee free of diseases, pesticides, and other harmful toxicants, they are a more desirable substitute for wild fish from potentially polluted waters (Helfrich, 2009).

Management of Ponds

Pond management was a serious problem facing fish farmers, majority (95%) of the respondents faced various difficulties in managing their ponds while few (4.2%) faced no problems (Figure 4).

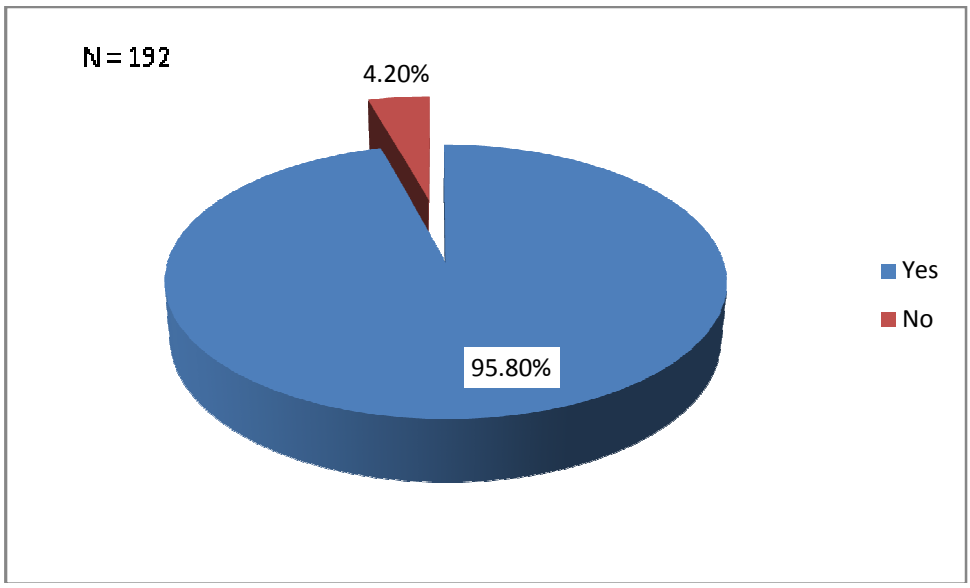

Figure 4: Difficulties in managing ponds by fish farmers in Siaya County, Kenya.

A Chi Square test carried out established that there were highly significant (p<0.01) differences in the responses ($\chi^2_{1,001} = 322.667$). These results are in agreement with those of Munialo (2011) who notes that fish farming remains underdeveloped in Western Kenya with small- scale fish farming being characterized by low investment, poor management and low yields.

Asked to name the problems they faced in pond management the leading difficulties were: high cost of feeds (33.6%), drying up of ponds during drought (18.5%), lack of fingerlings (13.8%), flooding (10.9%), siltation of ponds (8.9%), pond maintenance (8.6%) and poor security (5.7%) as recorded in Figure 5.

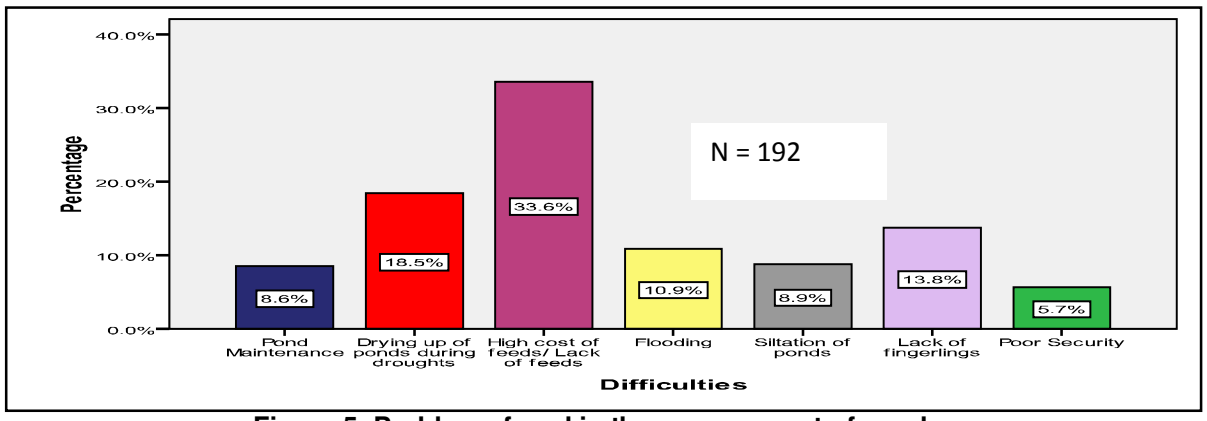

Figure 5: Problems faced in the management of ponds.

A Chi Square test carried out established that there were highly significant (P<0.01) differences in the response ($\chi^2_{6,0.05} = 144.35$). From observation, it was also noted and confirmed that some ponds had actually been adversely affected by floods. FGDs indicated that the high cost/ lack of feeds was due to the fact that most of the farmers depended mainly on commercial feeds which were quite expensive. OECD (2010) noted, in the top ten fish farming Countries, that Small-Medium Enterprise fish farming success is due to strong markets, access to seed, feed, credit and transport and a focus on profits. Mwangi (2008) concurs with these findings; polyculture of tilapia with African catfish, mixed sex culture system of farming, has resulted in low pond productivity.

Lack and cost of commercially produced feeds and employment of low pond management practices, has resulted in stagnation of fish farming leading to household food insecurity and low contribution to livelihoods in Kenya. Bangladesh has had similar challenges, where heavy floods have hit the country affecting fish farming Project seriously by sweeping away most pond dikes (Practical Action, 2010). From the household survey and FGDs, most fish farmers complained of under size fish despite regular feeding, by feeds provided by the government under the Economic Stimulus programme. Arising from these complains a proximate crude protein content analysis for various feeds from government parastatals (Lake Basin Development Authority) and private manufactures was carried out. Eight feed samples for fingerlings, growers and table size tilapia were taken and a proximate analysis of their crude protein content carried out at the Kenya Agricultural Research Institute (KARI) laboratories in Kitale, which specializes in animal nutrition as seen in Table 2.

Table 2: Results on Crude Protein Content for sampled fish feeds Analysed in KARI laboratories at Kitale, Kenya.

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No.	**Source**	**Crude Protein content (%)**
1.	LBDA Feeds (MASH)	20.62**
2.	GOWINO Feed industry (MASH)	18.13**
3.	MELL-WIT-61 Mineral Enterprise Ltd	18.1**
Feed for post fingerlings		
4.	Tilapia pond growers (Pellets)	21.69**
5.	GOWINO Feed industry (Pellets)	21.25**
6.	UGA FISH (PELLETS)	30.00
7.	PAC-KISUMU (MASH)	22.50**
8.	FLOATING PELLETS - SIGMA FEEDS	31.88

The asterisk ** represent below optimum crude protein content for the sampled feeds

Out of the eight sampled feeds, only two (UGA FISH-Pallets and SIGMA FEEDS- FLOATING PELLETS) for post fingerlings stage were above the optimal requirements in terms of crude protein content. Interestingly the government feeds (LBDA) did not meet the standards. A circular by the Ministry of Fisheries Development; DAA/8 Vol.1/27 (2012) on procurement of fish feed for the fisheries ESP has recommeded crude protein content of at least 26% or more.
Lack of quality fingerlings was a major problem since most farmers relied on the fisheries' department and other external sources such as Dominion fish farms for fingerlings. This was due to the fact that most fish farmers lack adequate knowledge in fish breeding as result of inadequate extension services, a lack of quality fingerlings, and insufficient training for extension workers (Ngugi et al., 2007).

Similarly, lack of commercially produced feeds and employment of low pond management practices, has resulted in stagnation of fish farming leading to food insecurity in the study area (GOK, 2010). In addition, the demand for fingerlings to stock the fast-growing number of fishponds has skyrocketed from 1 million to 28 million in less than a year, forcing the government to lean heavily on private industry (Francis, 2011). Lack of quality fingerlings, poor management practices and lack of quality feeds are among the challenges to future aquaculture expansion. Pollution, environmental degradation, shortage of land, fresh water and suitable baby wild fish to build brood stocks of farmed fish are also associated with constraints (Ricdardson, 2010).

CONCLUSION AND RECOMMENDATIONS

It was also established that majority of fish farmers faced several management problems which included high cost, unavailability and low quality of feeds, drying up of ponds during drought, lack of fingerlings, flooding, siltation of ponds, pond maintenance and poor security. An assessment of eight sampled feed types established that only two samples were meeting the required standards as per Ministry of Fisheries Development requirements of at least 26% or more crude protein content.

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