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Study of obstacles of fish culture in Khartoum State (Omdurman, Khartoum and Khartoum north, case study)

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Abstract

The present study aimed to provide baseline information of fish culture status (obstacles) of Omdurman, Khartoum and Khartoum north in the Khartoum state in Sudan due to there is little or lack of information in this field. 30 owners of farm were questioned from Omdurman, Khartoum and Khartoum north, 10 farms for each location; Descriptive analysis was done for analyzing the raw data of the study by using Excel Microsoft Software 2007. Social data showed that male farm owners group was dominant in third sites 100%. Age groups of fishermen ranged between 20 to 60 years; where age group 31- 40 Khartoum north, age group 41- 50 was dominant in O mdurman and age group 51-60 year was dominant in Khartoum. Six educational categories were recorded where University education was dominant in the three locations 50%, 50% and 70% respectively; whereas, postgraduate was the second in the tow location: O mdurman and Khartoum 20% and the secondary education were the third in Khartoum 30%. all farm owners were married 100% in three sites; As regards to the farm owners other activities results showed that most of them were practicing other activities (farmers, business owner, officers and workers). Category of farmer was dominant 90% secondly business owner and officer 70% and 50% respectively. Data showed that the problems (Varanus niloticus, birds, marketing, fees and thefts) was dominant in three locations had the highest percentage 90%, 80%, 60%, 30% and 10% respectively. and according to production cost in three locations arranged: (feeds, workers, fingerlings, water and technical supervision) 50, and 70% and 40%, 50% and 70% and 30%, 40% and 50% and 10, 20 and 40% and 10, 20 and 30% respectively. Category of feeds dominant followed by workers and fingerlings, the best Method to obtain of information, the results showed that Bulletins was dominant in three sites 80%, 30% and 90%; whereas, field visits in three location was the second 60%, 90% and 0%, Radio programs in three location was the third 60%, 10% and 60% and the lowest percentage; Seminars and television 40%, 50% and 40%, and 30%, 0% and 0%. For the best location to obtain information results revealed that the General Director of Fisheries Ministry of Agriculture, Animal Resources and Irrigation - Khartoum State was dominant in the three locations 90%, 80% and 90%, whereas, Universities in three location was the second 40%,

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20% and 0%, and the lowest percentage Central Research of fisheries 40%, 0% and 0%, and Internet 10%, 20% and30%. Also result showed most of the farm owners in three sites all them need to training courses in deferent programmers (Fish extinction, Fish feeding, Fish production and Fish marketing) according to this percentages 60%, 30% and 50%, and 30%, 10% and 50%, and 10%, 10% and 30%, and 10%, 0% and 20% respectively.

Introduction

Aquaculture is capable of increasing the total production and fulfilling the high de mand for fish protein (6). Fisheries and aquaculture is a source not just of health but also of wealth. Employment in the sector has grown faster than the world's population. The sector provides jobs to tens of millions and supports the livelihoods of hundreds of millions. Fish continues to be one of the most-traded food commodities worldwide. It is especially important for developing countries, sometimes worth half the total value of their traded commodities. (6) Global fish production continues to outpace world population growth, and aquaculture remains one of the fastest-growing food producing sectors. In 2012, aquaculture set another all-time production high and now provides almost half of all fish for human food. (6) World aquaculture production attained another all-time high of 90.4 million tons (live weight equivalent) in 2012 (6). World aquaculture production of fish accounted for 44.1 percent of total production (including for non-food uses) from capture fisheries and aquaculture in 2014, up from 42.1 percent in 2012 and 31.1 percent in 2004. All continents have shown a general trend of an increasing share of aquaculture production in total fish production, although in Oceania this share has declined in the last three years (4). Global aquaculture production (including aquatic plants) in 2016 was 110.2 million tonnes, with the first -sale value estimated at USD 243.5 billion. The first-sale value, re-estimated with newly available information for some major producing countries, is considerably higher than previous estimates. In general, FAO's data for aquaculture production volume are more accurate and reliable than those for value. The total production included 80.0 million tonnes of food fish (USD 231.6 billion (5). Farmed food fish production included 54.1 million tonnes of finfish (USD 138.5 billion), 17.1 million tonnes of molluscs (USD 29.2 billion), 7.9 million tonnes of crustaceans (USD 57.1 billion) and 938 500 tonnes of other aquatic animals (USD 6.8 billion) such as turtles, sea cucumbers, sea urchins, frogs and edible jellyfish (5). Since 2000, world aquaculture no longer enjoys the high annual growth rates of the 1980s and 1990s (10.8 and 9.5 percent, respectively). Nevertheless, aquaculture continues to grow faster than other major food production sectors (5). Consumption of farm raised seafood is expected to increase further due to an increase in demand as well as static, or in some cases declining, capture fishery landings. Sudan's capture fisheries production was estimated to be about 34000 tonnes in 2012, 29000 tonnes from inland water catches and 5000 from marine catches (7). Aquaculture in the Sudan dates back to the early 1990s with respect to Marin culture and to 1953 for freshwater culture (10). The aquaculture sector is still incipient and the annual production was estimated at 2000 tonnes in 2012. Capture fisheries activities are centred around the River Nile and its tributaries, seasonal flood plains and four major reservoirs as well as the territorial waters of Sudan on the Red Sea. Freshwater fish culture is primarily based on the pond culture of the Nile tilapia Oreochromis niloticus (10). Fish farming is development in Sudan; compared to the available cultivable inland water. This is due to lack of trained personnel and consequently insufficient knowledge of the basic technical aspects of the field and inadequate planning for its development. Fish was not much used in Sudan. However at present there is a great demand for it and the government should make concerted efforts to develop fish culture on large scale as a source of

animal protein. The value of growing fish in pond is obvious since this will serve as a direct contribution to the food of rural population without involving problems attendant on large-scale production. The main objective of this study is to identify the problems of fish farming in O mdurman, Khartoum and Khartoum north at Khartoum State is a (case study), and to contribute to solutions until the field of fish farming in Sudan rises.

Materials and Method

Area study: Khartoum State

Is one of the eighteen states of Sudan. Although it is the smallest state by area (22,142 km2), it is the most populous (5,274,321 in 2008 census). https://web.archive.org/; http://southsudaninfo.net/wpcontent/ It contains the country's second largest city by population, O mdurman, and the city of Khartoum, which is the capital of the state as well as the national capital of Sudan. The capital city contains offices of the state, governmental and non-governmental organizations, cultural institutions. The state lies between longitudes 31.5 to 34 °E and latitudes 15 to 16 °N. It is surrounded by River Nile State in the north-east, in the north-west by the Northern State, in the east and southeast by the states of Kassala, Qadarif, Gezira and White Nile State, and in the west by North Cordovan, location of Khartoum state on map of Sudan

Figure 1. The location of Khartoum state on the map in Sudan [Source: adapted from Google, ORION-ME (2019) and Government of Khartoum state (2016).

Data collection

Raw data of this study were gathered through a questionnaire during Augusts to November 2018. The questionnaire was designed to provide essential fish culture (farm owners) information related to: sex, age, education levels, social status, also to essential technical problems information related to: feeding, fish fingerlings, water supply and Predators (reptiles, birds ... etc), thefts, Financial financing, marketing, fees, other job beside fishing, fish culture activity, experience in fish culture, training programs need, 30 owners of farm were questioned from Khartoum state (Omdurman, Khartoum and Khartoum north), 10

farms for each location.

Statistical analysis

Descriptive analysis was done for analyzing the raw data of the study by using Excel Microsoft Software 2007.

Table 1. Distribution of owners of farm according to their personal characteristics

	Variables	**Omdurman**		**Khartoum**		**Khartoum north**	
		No	%	No	%	No	%
Sex	Male	10	100	10	100	10	100
	Female	0	0	0	0	0	0
Age	Less than20	0	0	0	0	0	0
	21 – 30	0	0	0	0	0	0
	31 – 40	2	20	1	10	4	40
	41 – 50	8	80	4	40	3	30
	More than 51	0	0	5	50	3	30
Educational level	Illiterate	0	0	0	0	0	0
	Khalwa	1	10	0	0	0	0
	Primary	0	0	0	0	1	10
	Secondary	2	20	2	20	1	10
	University	5	50	5	50	7	70
	Postgraduate	2	20	3	30	1	10
social status	Marred	10	100	10	100	10	100
	Unmarred	0	0	0	0	0	0

Result and Discussion

The study showed that 80% of the farm owners, aged 41-50 years from Omdurman, secondly 50% aged more than 50 years from Khartoum area and lastly 40% aged 41-50 years from Khartoum north. This result is in agreement with results of Hamza (9). In contrary, age group 60 -70 years may represent the rate of the professional farmers who practice culturing, harvesting and fishing during whole year. This result is into similar with results of FDKS (8). also study showed that 70% and 50% of the research community hold university degrees Khartoum north, Khartoum and Omdurman equally respectively, 30%, 20% and 10% have postgraduate studies, Khartoum, Omdurman and Khartoum north respectively. The results showed the farm owners has a high level of education, to helps of apply modern technologies for developing the field of fish farming in Sudan. this result is not agreement with result of Mohammed (14) who reported that most farmers and fishers of the state have basic education of 47%; whereas, the illiterate fishers constituted 31.7%. Also study showed all research community male

Table 2. Distribution of owners of farm according to their other activity

Variables	Omdurman		Khartoum		Khartoum north	
	No	%	No	%	No	%
	1	10	1	10	9	90
Other Job Farmer	2	20	5	50	1	10
Officer Worker	0	0	1	10	0	0
Business men	7	70	3	30	0	0
Other	0	0	0	0	0	0
Social activity						
Member of Fish culture society	1	10	3	30	0	0
Member of Sudanese Fishers society	2	20	0	0	1	10
Member of a cooperative society	0	0	0	0	4	40
Member of Sudanese unit council	2	20	3	30	2	20
Member of Fishers society	1	10	1	10	3	30
Other	0	0	0	0	0	0

and married 100%, this result harmonizes with results of Mohammed, M. O. (13).

Other Job of farm owners and other activities data in Table 2 showed that 90% and 10% of owners: farmers in Khartoum North, Khartoum and Omdurman equal respectively, and 50%, 20% and 10% of owners: employees from Khartoum, Omdurman and Khartoum North respectively, and 70%, 30% and 0% of owners: business owner from Omdurman, Khartoum and Khartoum North respectively. Also result showed that four categories of other activity of farm owners (cooperative agriculture society, Sudanese council, Fishers society and Sudanese Fish culture society) were presented with different percentages such as: (0%, 0% and 40%, and 20%, 30% and 20%, and 10%, 10% and 30%, and 10%, 30% and 0% respectively. Category of cooperative agriculture society was dominant followed by Sudanese council, Fishers society and the last other activity group Sudanese Fish culture society. The result obtained by this sample community showed a weak association of farm owner with the various societies. This result also harmonizes with results of Mohammed, (13); FDKS (8).The result also agreed with that reported of Ministry of Agriculture, Animal Resources and Irrigation - Khartoum State, that farm owners and fishers have very limited participation in the activities of the various associations (12)

The result in table 3: showed that four categories of problems of the threats of production (Birds, Marketing, fees or taxes, thefts, Diseases, ice, mismanagement, Display and handling) were presented with different percentages such as: 80%, 30%, 20%, 10% and 0% respectively: the Birds was dominant problem in Omdurman location, followed by Marketing, fees or taxes, thefts and other problems lowest percentage (0 %), while in Khartoum the main problems: Predators, Birds and Marketing 90%, 80% and 40% respectively, and in Khartoum north percentages such as: 70%, 60 and 50% of Birds, Marketing and Predators respectively. Generally results of present study showed that the dominant problem Birds and Predators (Varanus niloticus) Results agreement with (Ministry of Agriculture, 2016) reported that the reason is that some producers don't follow a complete cycle system. That mean cycle is not completed in a specified time due to short of feed, water supply and some Predators in some areas. Feed is one of the important operational elements for the success of aquaculture investment projects,

Table 3. Desecration and distribution of the problems facing owners of farm according to area

Variables	Omdurman		Khartoum		Khartoum north	
	No	%	No	%	No	%
Problems						
Mismanagement	0	0	0	0	0	0
Thefts	1	10	1	10	0	0
Diseases	0	0	0	0	0	0
Varanus niloticus	0	0	9	90	5	50
Birds	8	80	8	80	7	70
Marketing	3	30	4	40	6	60
Handling	0	0	0	0	0	0
Ice	0	0	0	0	0	0
Display	0	0	0	0	0	0
Fees	2	20	3	30	3	30
Other	0	0	0	0	0	0

semi- intensive, intensive and high- intensive e.g. (cages culture, tanks and concrete ponds) to need high skill workers, good fingerlings and high quality of feed. This results is consistent with what (1) reported that the marketing problem is represented in the low prices of fish marketing during the abundance period, There are no alternatives to preserve and manufacture the surplus, the large number of intermediaries in the markets, the lack of markets near the fish farms, and the lack of marketing outlets, In addition to the lack of tools and tasks for the fish farms.

Table 4. The ordinal of important production cost in farmed culture

Variables	Omdurman		Khartoum		Khartoum north	
	No	%	No	%	No	%
Problems						
Water supply	4	40	2	20	1	10
Feeds	7	70	5	50	5	50
Fingerlings	5	50	4	40	3	30
Workers	7	70	5	50	2	40
Supervisor	3	30	2	20	1	10
Other	0	0	0	0	0	0

Result of present study showed that the ordinal of production costs in three location: Omdurman, Khartoum and Khartoum north, according to the prices: (feeds, workers, fingerlings, water and technical supervision) where presented with different percentages such as: (50 and 70%, and 40%, 50% and 70%, and 30%, 40% and 50%, and 10, 20 and 40%, and 10, 20 and 30% respectively. Category of feeds dominant followed by workers, fingerlings respectively Results with agreement (2 , 3) Feeding of fish is the main role in aquaculture production systems and therefore, it accounts for 40-50% of the total production costs in semi- intensive culture systems. To develop aquaculture, search for cheaper and locally available feed stuffs is necessary. Industrial and agricultural by-products have been used as sources of suitable and cheap feed sources (3, 15, 11).

Table 5. Distribution of owners of fish farms according to their best Method, Efficiency leveland training programmer's owner in fish culture

Variables	Omdurman		Khartoum		Khartoum	
	No	%	N	%	N	%
The best Method of information						
Bulletins	8	80	3	30	9	90
Seminars	4	40	5	50	4	40
Radio programs	6	60	1	10	6	60
Television	3	30	0	0	0	0
Field visits	6	60	9	90	0	0
Other	0	0	0	0	0	0
The best location of information						
General director of fisheries,	9	90	8	80	9	90
Universities	4	40	2	20	0	0
Central Research of fisheries	4	40	0	0	0	0
Internet	1	10	2	20	4	40
Other	0	0	0	0	0	0
Training programmers needs						
Fish feeding	3	30	1	10	5	50
Fish production	1	10	1	10	3	30
Fish extinction	6	60	3	30	5	50
Fish marketing	1	10	0	0	2	20
Other	0	0	0	0	0	0

Data in table 5: showed five methods to obtain of information (Bulletins, Seminars, Radio programs, Television and Field visits) and four locations (General Director of Fisheries, Universities, Central Research of fisheries, and Internet). Percentages showed such as 80%, 30% and 90%, and 40%, 50% and 40%, and 60%, 10% and 60%, and 30%, 0% and 0%, and 60%, 90% and 0% respectively, results showed the best Method to obtain of information Bulletins followed by Field visits, radio programs and Television, and 90%, 80% and 90%, and 30%, 20% and 0%, and 40%, 0% and 0%, and 10%, 20% and 50% respectively, also results showed the best location to obtain information General Director of Fisheries Ministry of Agriculture, Animal Resources and Irrigation - Khartoum State followed by Universities, Central Research of fisheries, and Internet together respectively. Also Data showed four

Training programmers (Fish extinction, Fish feeding, Fish production and Fish marketing) were presented percentages such as 60%, 30% and 50%, and 30%, 10 % and 50%, and 10%, 10% and 30%, and 10%, 0% and 20% respectively. Result showed that the farm owners are need training in fish extension, followed in fish feeding and lowest in fish production and fish marketing.

Conclusion

Sudan`s fisheries resources depend mainly on the White Nile, the Blue Nile, the main River Nile and their tributaries and huge number of small water bodies of fresh water including reservoirs, lakes, small ponds, canals, irrigation canals. results of present study showed the farm owners, aged between forty to fifty years from Omdurman, secondly aged more than fifty years from Khartoum and less than forty years from Khartoum, community has a high level of education and Other Job of farm owners (business owners, farmers, officers), Generally results showed the dominant problem Birds and Predators (Varanus niloticus) in three locations: O mdurman, Khartoum and Khartoum north, and the highest production cost: feeds, workers, fingerlings, water and technical supervision respectively, also farm owners are need some training courses in fish extension, fish feeding and fish production.

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