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Full Length Research Paper

Perception of the fish farming in an urban metropolis: Case of Yaounde in the Central African Sub-Region

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Perception of fish practice in Yaoundé (Cameroon) (Figure 1) led to a survey conducted between January 2011 and June 2011. The latter, through the so-called accelerated participatory rural appraisal, we identified from households surveyed, grouped into three blocks, the most consumed fish, divided into nine orders, belonging to 14 families and 17 species (Table 1). Indeed, the first block consisting of 293 households expressed regarding fish consumption 52% of Scomber scombus, the second block containing 261 households, found 43% of S. Scombus. The last block represents 208 households brought out 48% of S. scombus. However, from these different rates of consumption, there emerge stronger finding of significant consumption of Scomber scombus (P <0.01). This very significant difference would indicate a greater availability of frozen fish which has also led to the problem of shortage of freshwater fish. In a second step, it was indeed asked about the issue of unavailability of freshwater fish in the market, whiles the hydrography of the city of Yaoundé is very rich. To better understand the availability, interviews for this purpose were conducted with 17 farmers settled in villages such as Awai, Ekoumdoum, Essomba, Mendong, Nkoabang, Nkomo, Nkozoa, and Odza (Figure 2). At the end of these interviews, the difficulties associated with the needs of fish production were expressed respectively by the lack of nursery facilities, the problem of funding, monitoring, and training requirements are in line with the investment on nursery structure. The course of solving various practical difficulties associated with fish in the city of Yaoundé remains difficult, especially with the problem of mass production. Prospects for research and development planned at the end of this study suggest a real chance to overcome the other disability through public power. We therefore remain optimistic about the sustainable and profitable farming of fish on the economy of our country.

Keywords: Fish farms, hatchery, fish, household.

INTRODUCTION

Fish is a natural source of animal protein (FAO, 1999). Nevertheless, fish farming remains a marginal activity in sub-Saharan Africa (Dabbadie, 1996). In the 1950s, the results of tilapia production in fish farming made it appear as a miracle fish, which could solve the problem of malnutrition in developing countries. In the general enthusiasm, many poorly identified species are introduced in many African lakes. The idea was not bad, for lakes with less ecological niches for this type of species. Unfortunately, insufficient knowledge of the taxonomy of tilapia, the absence of faunistic inventory of the various lakes and ignorance of the mechanisms of speciation have resulted in a disruption of the biogeography of this African genus and many cases of hybridization between native and introduced species. All regions of Cameroon have fish farming potentials whose interests vary from one region to another (Delincé, 1992). It was in 1948 that the first earthen ponds were installed in Cameroon. From then, the urban and rural populations were enthusiastic in this practice and the result is the stagnation of this activity. Until today, this practice remains a philosophical exercise that can only be solved through training, funding and

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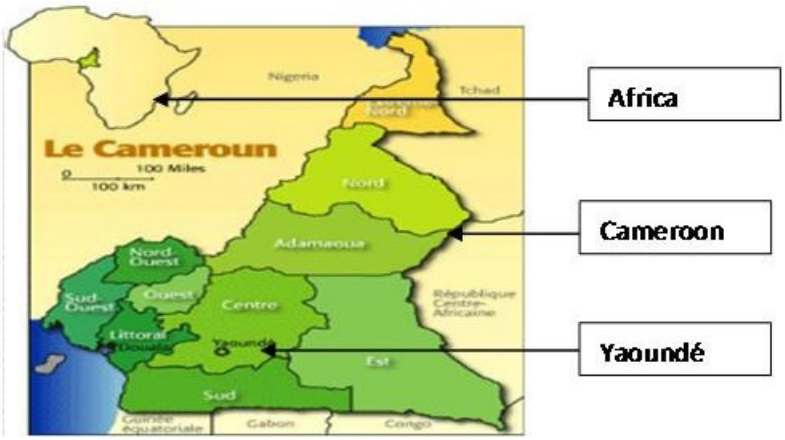

Figure 1. Map of Cameroon, indicating the study site

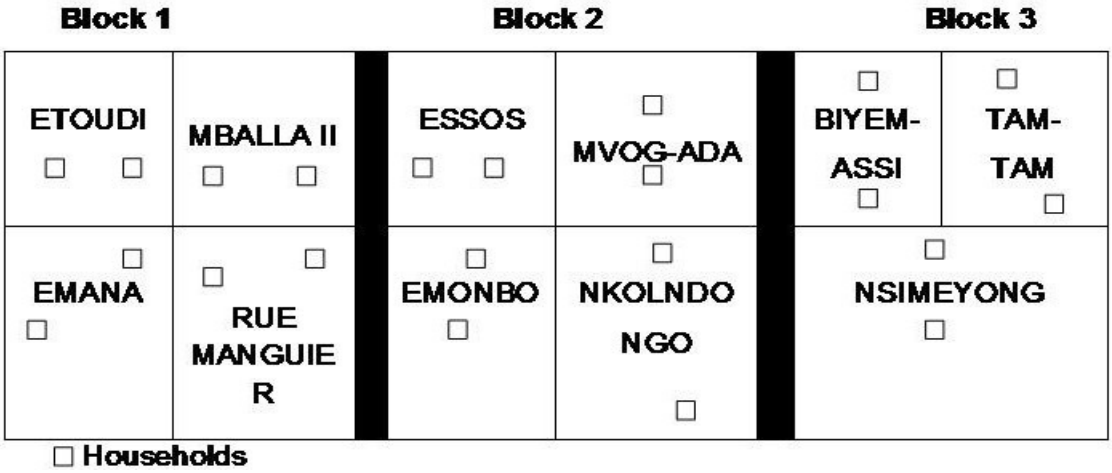

Figure 2. Different blocks and Households in Yaounde.

monitoring of various fish farmers. This study is a first step to understanding what fish consumers think and then identify some problems associated with the practice faced by fish farmers in the city of Yaoundé, in spite of its dense network of rivers. In Cameroon, particularly in the Great Southern Cameroon region, lack of vitality and viability of fish yields would be due to the scarcity of nursery structures. In the Centre region, the sector is slow to get its bearings and eventually loses the achievements because of amateurism and the scarcity of fry which leads to unproductiveness, to demotivation of the players who then abandon a large number of ponds (Delincé, 1992).

MATERIAL AND METHOD

Site of study selection

The choice of blocks and neighborhoods took place on the basis of three criteria.

The geographical requirement for good spatial representation of the city with the presence of a maximum of subdivision and urban fabric.

The socio-economic criteria which is based on the necessary participation of respondents who have at least an income.

The standard technique of focusing on the main purpose of our study, namely the presence of a fish ponds of Obili and other devices.

The city of Yaoundé (3°51'36.62''N ; 11°29'53. 42''E ; élév. 732m), which is the political capital of Cameroon (Central Africa), is located on the western edge of the south Cameroon plateau to 3 °52 'N latitude and 11 ° 32' E longitude with an average altitude of about 750m. The terrain is hilly and the city sprawls over several hills from 25 to 50m high (The Biology and culture of tilapias. ICLARM Conf.(434p);Bowen, 1982).

The face of the medium is degraded by urbanization. The forests with large areas of savannas interspersed with forest gallery. The climate is equatorial, and characterized with two dry seasons (a long dry season

Table 1. The most consummed fish species in Yaounde city and their common names

Order	Family	Genus	Species	Common name
Suriformes	Sciaenidae	*Pseudotolithus*	*P. typus*	B
	Siluridae	*Chrysichthys*	*C.nigrodigitatus*	Machoiron
		Clarias	*C.gariepinus*	Silurid
Cypriniformes	Cyprinidae	*Cyprinus*	*C.carpio*	Carpe
Pleuronectiformes	Soleidae	*Solea*	*S. solea*	Sol
Perciformes	Scombridae	*Scomber*	*S.scombrus*	Mackerel
		Thunnus	*T. thynnus*	Tunny
	Centropomidae	*Lates*	*L. niloticus*	Captain
	Cichlidae	*Symphysodon*	*S. discus*	Dis
		Oreochromis	*O. niloticus*	Tilapia
	Sparidae	*Sparus*	*S. aurata*	Seabream
	Pomacanthidae	*Pomacanthus*	*P. arcuatus*	Demoiselle
Clupeiformes	Clupeidae	*Sardina*	*S. pilchardus*	Sardine
Gadiformes	Gadidae	*Gadus*	*G. morhua*	Co
Salmoniformes	Salmonidae	*Oncorhynchus*	*O. tschawytscha*	Salmon
Isospondyles	Osteoglossidae	*Heterotis*	*H. niloticus*	Kanga
Esociformes	Esocidae	*Esox*	*E. lucius*	Pike

Table 2. Presentation of the difficulties, feeding and the species cultivated by Farmers of Yaounde

	Mendong	Odza	Ekoudoum	Awai	Nkomo	Nkouabang	Essomba	Nkozoa
Presence of incubator	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent
Level of education in fish farming	None	None	Advanced level	None	None	None	None	None
Aim of the practice	Commerce	Commerce	Commerce	Commerce	Commerce	Commerce	Commerce	Commerce
Training	Unskilled	Unskilled	Unskilled	unskilled	Unskilled	Unskilled	Unskilled	unskilled
Food	Droppings + Granules	Droppings + Granules	Droppings + kitchendirt	Droppings	Droppings	Droppings + kitchendirt	Droppings	Droppings
Species Farmed	Tilapia +Hemichromis+ Silurid	Tilapia + Silurid	Tilapia + Silurid	viperfish+ tilapia	tilapia + Mudfish+Heterotis	Kanga + Tilapia	Tilapia + Silurid	Tilapia + Silurid

from January to March and a short dry season from July to August) alternating with two rainy seasons (small rainy season from September to mid November , and a long rainy season from mid March to June), with relatively variable duration from one year to another (Hickley et al., 1987; Suchel, 1987). Soils are Ferro- lateritic type with pH varying from 4.5 to 5.8 (Lauzanne, 1988;Sanchoir, 1995;Yongué, 1986). The city of Yaoundé is crossed by the river Mfoundi, consisting of 14 tributaries flowing mostly in the north-south direction.

SAMPLING

This research work took place from January to June 2011. It covered some of the most popular neighborhoods in Yaoundé in other to integrate all segments of the population.

To carry out this study, the Participative Accelerated Appraisal method based on traditional knowledge of indigenous and which was developed between 1970 and 1980 by various specialists in natural resources management, is suitable for such study. This method proposes that the collection of information from local communities, the evaluations of social impact, especially in developing countries, is done primarily by small discussion groups. Thus, this method of investigation by the focus group is appropriate for this research is not intended to provide a statistically representative picture of the characteristics of a population, but a qualitative analysis of the importance and practice of fish farming.

The first phase of land has been in a total distribution of neighborhoods in three blocks. Information gathering was done on 293 households in Block one, then 261

Table 3. Problems associated to fish farming in Yaounde city

System	Principal problems	Breeders' needs
Ponds	System poor in nutrients, non-structured, low water quality	Required knowledge (training), perpetuation of the system, Funding
Fish breeding/ Nursery	Very low or almost null production, consequence on the genetic plan with respect to the management of begetters	Installation of seed supply systems, best genetic knowledge in male seed production

households were interviewed, and finally 208 households followed the same treatment. It should be remarked underscored that during this study, the parameters are sought such as the identification of different species of fish consumed in households (Table 1), consumer perceptions of frozen fish and freshwater ones, and finally the preferred choice between these two types of fish.

The second step is to turn to those involved in fish practice. This section is to enumerate the different species grown in Yaoundé (Table 2), identify problems associated with that practice and their various needs (Table 3).

For the comparison of the average consumption of the different blocks and households, we used the analysis of average. Differences were considered significant at 5%. Statistical analyzes were performed using the program STATISTICA 5.1 (Statsoft, Inc.)

RESULTS

Perception of Consumers

Consumption (Table 1)

The population of Yaoundé, through this study was subjected to a questionnaire consisting of thirty two questions. The informations collected during this exercise are listed according to the objective of secularization of food and meet under the Law No. 91/023 of 16 December 1991 on statistical surveys. In a block (B1), 293 households surveyed on the issue of fish consumed, it appears that the most consumed fish are presented in the relative abundances as follows: 52% of Scomber scombus 7.1% of Chrysichthys nigordigitatus, 6.8% of Cyprinus carpio, 5% of Clarias gariepinus, 4% of Oreochromis niloticus, 3.8% of Thunnus thynnus, 1.9% of Sardina pilchardus, 1.9% Lates niloticus, 0.9% of Oncorhynchus tschawytscha, 0.7% of Gadus morhua, O.7% of Solea soleea, 0.7% of Heterotis niloticus, 0.5% of Sparus aurata, O.5% of Pomacanthus arcuatus and 0.2% of Esox lucius.

Then, in block two (B2), 261 households are surveyed and the species most consumed are 43% of 43% of S. scombus, 9.2% of C. nigrodigitatus, 8.7% of C. carpio, 7.9% of P. tupus, 7.9% of T. thynnus, 3.2% of S. pilchardus, 3.2% of O. niloticus, 2.9% of L. niloticus, 2.6% of C. gariepinus, 2.6 of G. morhua, 1.8% of H. niloticus, 1.8% of S. solea, 1.3% of S. aurata, 1.1% of P. arcuatus and 0.5% of O. tschawytscha.

Finally, the third block (B3) shows 208 households with 48% of S. scombus, 14% of P. typus, 8.2% of C. carpio, 5.2% of C. nigrodigitatus, 4% of S. pilchardus, 3.7 of C. gariepinus, 3.5% of T. thynnus, 3% of L. niloticus, 2.2% of P. arcuatus, 2% of S. solea, 2% of S. discus, 1.7% of O. niloticus and 1% of S. aurata.

Perception of fish farmers

The breeding of fish

In the second stage of this work, the actors are fish farmers. We hold interviews with them and the result is that the most cultivated species in the area of Yaoundé are multiple and the main problems associated with the practice are the lack of fish rearing structures (hatchery), the level of education of farmers is relatively low, the system is very poor on nutrients, lack of funding, the study of water quality and training of farmers (Table 2). The needs expressed by them are classified in order to have the best structures of production as far as possible a good quality in other to allow better seed production to 100% males and sustainability of pond systems. Fish farmers have commented on the species most preferred in breeding. Among the cultivated species, tilapia has a prominent place, according to them Oreochromis niloticus is typically ranked among the micro phytophagous fish which can ingest and digest large amounts of phytoplankton algae and cyanobacteria (Fish, 1955; Trewavas, 1983; Hickley et al., 1987; Lauzanne, 1988; Palomares, 1991; Mukankomeje, 1992). For some authors such as Dempster et al., (1995); Tilapias are the only herbivorous fish through adaptation of their digestive system. Nevertheless, the degree of opportunism of the species is very broad and its diet is often closer to that omnivorous fish (Bowen, 1982). In addition, diet is also one of the major problems in fish farming. Diet in this case is based on two components, namely artificial feeding and natural food. It should be noted that artificial feeding is not at the level of farmers, because it provides the expenditure of our local currency (CFA). According to natural food, it requires knowledge in other to have per-

formance and survival of cultivated species. Thus, benthophages species such as carp or tilapia re-suspend the sediment and facilitate a greater argillaceous turbidity which affects primary production (Boyd, 1981; Delincé 1992;Dabbadie, 1996).

However, the contribution of natural food in the fish yield is great (Dabbadie, 1996). It seems certain that the production of species in lower price as carp or tilapia could never be practiced profitably without the contribution of natural food (Boyd, 1981;Delincé 1992). quoted by Dabbadie, (1996).

DISCUSSION

In general, the distribution of different species of fish consumed in the city of Yaounde (Table1) in different blocks, shows a predominance of scomber fish from the comparison of different average consumption and their standard deviations (1366±719.91). This result corroborates the 2011 report on aquaculture activities in Cameroon. It also classifies scomber at the top of imported fish with 98 881.20 tons per year followed by 14 050.70 tons of Bars /captains (Minepia, 2011). This high consumption of frozen fish reveal that the production of fresh water fish still remains low despite the fact that the central region has a rate of 31% of national production.This percentage should be improved by providing some solutions to the needs expressed by breeders: building nursery structures, financing developmental projects and the training of technical staff.

The low consumption of fresh water fish (0reochromis niloticus) in the various households (62.66 ± 16.16) is only a reflection of what is expressed by the fish farmers. Knowing that tilapia has many positive attributes (Fish, 1955)., the question arises as to what really retains it's exploitation in most developing countries. As part of this work, the optimum is significant on fresh water fish ($F=10.30$, ddl=16, $P<0.01$). To address the concerns of the population, we can introduce the Nile tilapia 0reochromis niloticus is more adaptable to tropical climat (Davlin, 1991). To solve the discontinuity in the presence of fresh water fish in the study region, it is imperative to address the needs expressed by farmers which include: establishment of nursery structures, funding of fishery sectors, training of farmers (Table 3).The solutions for fish culture will come from a closer collaboration between farmers and scientists. In addition, because of the possible interactions between genotype and environment, research to improve production systems and breeds must be interactive. It is probably cheaper, more profit- able and acceptable ecologically to raise tropical fish in Less intensive systems in developing countries; for example, for value-added products such as nets and fish foods (Getabu, 1992; Boyd, 1981).

CONCLUSION

The results and orientations described here mainly concern two groups of fish: the first formed by frozen fish and the second, consisting of freshwater fish. The scope of research conducted demonstrates the diversity of species of fish consumed, the significance of high consumption of scomber (1366 ± 719.91), the optima of freshwater fish on frozen fish ($P<0.01$). These observations simply demonstrate the need to promote fish farming industry, and reinforce the monitoring of fish culture in yaounde.

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REFERENCE

Boyd CE, Musig Y(1981). Orthophosphate uptake by phytoplankton and sediment. Aquaculture 22: 165-173

Bowen SH(1982). Feeding digestion and growth – Qualitative considerations. In: Pullin R.S.V. et Lowe McComell R.H. (eds).

The Biology and culture of tilapias. ICLARM Conf. Proc. 7, Manila, Philippines (434p): 141-156.

Dabbadie M(1996). Etude de la viabilité d'une pisciculture rurale à faible niveau d'intrant dans le centre-ouest de la côte d'ivoire: approche du réseau trophique. Thèse de Doctorat de l'Université de Paris VI. 207 p.

Davlin A (1991). The nineties: a booming decade for the aquaculture industry! The aquaculture industry. Aquaculture Analyst's Report 111(1):1-6

Dempster PW, Beveridge MCM,Baird DJ(1993). Herbivory in the tilapia Oreochromis niloticus: a comparaison of feeding rates on phytoplankton and periphyton. J. Fish Biol. 43 : 385-394p

Ekodeck GE (1984). L'altération des roches métamorphiques du Sud-Cameroun et ses aspects géotechniques. Thèse de doctorat d'Etat, Université de Grenoble I, 368p.

Delincé G(1992). The ecology of the fish pond ecosystem with special reference to Africa. Kluwer Academic (Publ.), Dordrecht, Netherlands: 230p.

Eno Belinga SM,Kabeyene Beyala(1982). Géologie dynamique des paysages de fer de la ville de Yaoundé, secteur Nord. Ann. Fac. Sci., 51-56p.

FAO (2006). La situation des pêches mondiales et de l'aquaculture Rome. 162 pages.

FAO (1999). Directives pour la collecte régulière de données sur les pêches de capture Document technique sur les pêches. FAO/DANIDA Bangkok, Thaïlande, 123p.

Fish GR(1955). The food of tilapia in East Africa. Uganda J. 19: 85-89.

Getabu A(1992). Growth parameters and total mortality in Oreochromis niloticus (Linnaeus) from Nyanza Gulf, Lake victoria. Hydrobiologia, 232: pp. 91-97.

Gueye B, Freudenberger KS(1991). Introduction à la méthode accélérée de recherché participative (MARP). Rapid rural Appraisal. Quelques notes pour appuyer une formation pratique Deuxième édition.

Hickley P, Bailey RG(1987). Food and feeding relationships of fish in the Sudd swamps (River Nil southern Sudan). J. Fish. Biol. 30 : 147-159.

Lauzanne L(1988). Feeding habits of african freshwater fishes. In :C. Leveque, Brunon M.N. et Ssentongo G.W. (eds), Biologie et écologie des poissons d'eau douce africain. Coll. Travx et documents n°216, ORSTOM (Publ.), Paris, France : 221-242.

Micha J-c(1974). La pisciculture africaine. Espèces actuelles et espèces nouvelles, 163- 195. In J.-C. Ruwet (éd.) Zoologie et Assistance Technique, Ed. Fulreac, Liège. 38 p.

Minepia (2011). Rapport d'activités sur l'aquaculture.114-117p.

Mukankomeje R(1992). Production algale et consommation par le tilapia Oreochromis niloticus L., au lac Muhazi (Rwanda). These doct., Fac. Univ. ND de la paix, Namur, Belgique: 254p.

Powles H(1987). Research priorities for African aquaculture. Report of a Workshop held in Dakar, Sénégal, 13- 16 Octobre 1986. IDRCMR 149e, 172 p.

Palomares ML(1991). La consommation de nourriture chez les poissons : étude comparative, mise au point d'un modèle prédictif et application à l'étude des réseaux trophiques. Thèse doct., INP, Toulouse, France : 211p.

Pruginin ,Y et BA Arad(1977). Fish farming in Malawi. A report prepared for the promotion of integred fishery developmentproject.F1:DP/MLW/71/516/10.22p.FAO,Rome.

Pullin RSV(1984). Tilapia -potentially an international food commodity. INFO fISH Marketing Digest 3(84):35-36.

Pullin RSV(1985). Tilapia: 'everyman's fish'. Biologist 32(2):84-88.

Pullin RSV, et JL Maclean(1992). Analysis of research for the development of tilapia farming-an interdisciplinary approach ls lacking. Neth. J. Zool. 42(213):512-522.

Sanchoir C(1995). La pédologie In : Sanchoir C et Bopda A, (coord.), Atlas régional, Sud Cameroun. ORSTOM et MINREST, 55p.

Suchel B(1987). Les climats du Cameroun. Thèse de Doctorat d'Etat. Université de Bordeaux III.1186P.

Trewavas E(1983). Tilapiine Fishes of the Genera Sarotherodon Oreochromis and Danakilia. British Museum Nat. Hist., 583p.

Yongué Fouateu R(1986). Contribution à l'étude pétrographique de l'altération et des faciès de cuirassement ferrugineux des gneiss migmatiques
de la région de Yaoundé. Thèse de Doctorat de 3e cycle. Université de Yaoundé, 214p.