

AN OVERVIEW OF THE CHALLENGES AND PROSPECTS IN DEVELOPING AN AQUACULTURE INDUSTRY IN LAGOS STATE, NIGERIA

FAKOYA K. A.; OWODEINDE, F. G.; JIMOH, A. A.; AKINTOLA, S. L.

Department of Fisheries, Faculty of science, Lagos State University, P.M.B. 1087, Lagos State, Nigeria.

ABSTRACT

Macroeconomic growth and the development of sustainable business activities are interrelated. In Lagos State, aquaculture is a marginal economic activity thriving mainly on a semi-intensive level. Notwithstanding the available potentials for the development of successful commercial aquaculture enterprises in the state, the transformation to a full-fledged industry continues to be undermined by certain critical factors. Feasible development strategies may be sought in increasing all stakeholders' capacity in the formulation of policies, plans and regulations, a complete separation of aquaculture from the capture fisheries in administrative structure and policy; the adoption of precautionary approach; provision of economic incentives to enhance private investments and increase output, respectively.

INTRODUCTION

The ultimate goal of subsistence and commercial aquaculture is to provide cheap, readily available animal protein in the form of fish, thereby contributing to food security and alleviating poverty. Globally, commercial aquaculture possesses the greater potentials to enhance per caput consumption of animal protein by increasing domestic fish production and contributing substantially to Gross Domestic Product.

In sub-Saharan Africa, the objective of utilizing aquaculture as a rational supplement to the capture fisheries, which has declined in production since the 1990s, seems to have failed. The setback in the performance of aquaculture as a viable economic activity in the region is associated with certain critical factors. The most prevalent of these factors are institutional vis-à-vis credit or finance; marketing and policies or legal framework to create an enabling environment for successful aquaculture development despite the available potentials.

Nigeria is adjudged to be the largest inland aquaculture producer in sub-Saharan Africa (Aguilar-Manjarez and Nath, 1998). In Lagos State, perception of profitability in commercial fish farming is enough to stimulate increased private investments in the business. Furthermore, high educational profile of potential investors is bound to raise the status of the fishery sub-sector compatible to other sectors of the Nigerian economy (Ogunlaru, 2000).

In view of this situation coupled with the available aquaculture potentials, Lagos State is well positioned to play a leading role in the supply of fish to satisfy local protein needs, serve as a source of foreign exchange earnings, a source of indirect and direct employment and income generation.

Therefore, this paper review the antecedence of aquaculture in Lagos State, highlights on the challenges and prospects for a viable commercial aquaculture industry and proposes a combination of strategies to create an enabling environment.

APPRAISAL OF AQUACULTURE DEVELOPMENT IN AFRICA

About 2500B.C. in Ancient Egypt, archaeological stone carving show the Nile Tilapia kept in man-made ponds for ornamental use (Balarin, 1985). Prein and Ofori (1996) classified fish culture systems indigenous to Africa as enhancement methods that manipulate existing fish

populations and/or optimize the aquaculture environment for fish production. Relics of these systems are the 'Drain-in-Pond' or ancient Howash farms on the Nile Delta; lagoon farming or Barachois unique to Mauritania, brush parks or Acadja in Benin and Ghana; flood plain management characteristic of fish holes or whedos in Benin and pearl farming in the coast of Sudan (West, 1996).

Towards the end of the 19th century, stocking of natural waters with the exotic fish species such as trouts, blackbass, carps for sport fisheries marked the beginning of modern fish farming in Africa. Later emphasis changed to the production of food fish with pond culture of Tilapia. Initially in Kenya before it spread to other areas on the continent (Balarin, 1985). Despite the apparent importance of fish contribution to total animal protein, contributions of aquaculture to per capita supply and per capita food fish supply are lowest, respectively in Africa (FAO, 2000). This implies that aquaculture has grown relatively slower than in other regions of the world. Certain prevalent factors are known to hinder sustainable aquaculture development in Africa. Specifically, the dearth of a commercial aquaculture/fish farming industry is attributed to a lack of essential inputs such as a realistic and stable foreign exchange; investment capital; wholesaling and retailing mechanism, qualified farm managers, legal framework; roads; vehicles and other components of transportation; ready availability of feeds; equipments; chemicals; reliable electrical supplies rather than appropriate production technologies (Brunmet, 1994). Furthermore, based on the report of Pedini and Shehadeh (1997), consideration of the relatively short timeframe for the adoption of modern aquaculture also indicates that transition to a viable economic activity in Africa is bound to take a much longer period to accomplish.

REVIEW OF AQUACULTURE DEVELOPMENT IN NIGERIA

Modern Aquaculture came into Nigeria with the construction of the 160 hectares Panyarn farm in 1951. (Tobor 1994). This sub-sector contributes to less than 10 percent to total domestic fish production in the country (Table 1). Compared to the industrial and artisanal capture sub-sectors, the aquaculture sub-sector may be regarded as poorly developed or unexploited.

Domestic Fish Production and Percentage Share of Total By Sectors in Nigeria 1991-2000(tons)

SECTORS	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
ARTISANA L	291,2 86	283,9 43	201,1 76	234,6 01	320,9 55	309,2 00	360,2 20	433,0 70	426,7 86	418,0 69
SUB- TOTAL										
Percentage contribution	84.84	82.76	78.73	82.84	86.50	86.87	87.18	89.57	88.98	89.50
Coastal & Brackish Water	168,2 11	184,4 07	106,2 76	124,1 17	159,2 01	138,2 74	175,1 26	219,0 73	239,2 28	236,8 01
Inland: Rivers & Lakes	123,0 75	99,53 6	94,90 0	110,4 84	161,7 54	170,9 26	185,0 94	213,9 96	187,5 58	181,2 68
AQUACUL TURE (FISH FARM)	15,84 0	19,77 0	18,70 3	18,10 4	16,61 9	19,49 0	25,26 5	20,45 8	21,73 8	25,72 0
Percentage contribution	4.61	5.76	7.32	6.39	4.48	5.48	6.11	4.23	4.53	5.51

INDUSTRIAL (COMMERCIAL TRAWLERS)	36,226	39,365	35,644	30,488	33,479	27,244	27,703	29,955	31,139	23,308
Percentage contribution	10.55	11.47	13.95	10.77	9.02	7.65	6.59	6.20	6.49	4.99
Fish (Inshore)		25,592	22,464	21,885	21,191	15,425	15,326	17,947	14,181	13,877
Shrimp (Inshore)	6,200	9,373	8,956	7,884	12,252	9,551	10,807	10,716	15,249	8,056
EEZ (OFFSHORE)	1,258	4,400	4,224	718	36	2,268	1,570	1,291	1,710	1,375
Percentage contribution	0.37	1.28	1.65	0.25	0.009	0.64	0.38	1.07	0.36	0.29
GRAND TOTAL	343,352	343,078	255,523	283,193	371,053	355,934	413,188	483,482	479,663	467,098

Source: Adapted from Federal Department of Fisheries (2000)

Aquaculture is acknowledged as the fastest growing food production sector (FAO 2002). In Nigeria, between 1994 and 1998, the sub-sector achieved impressive annual growth rate of 24.9 per cent. This surpassed the growth rates for the other fishery sub-sectors and livestock production sector, respectively (CBN, 1998). However, attaining higher growth rates and increasing total output of farmed fish from 25,000 – 30,000 metric tons are feasible if the abundant aquatic resources are harnessed. Okoye et al, (1991) projected a potential yield of 1million metric tones under an intensive production rate of 3t/ha/yr. More recently, Anetekhai (2002) projected a total annual production of 7,985,085.65 tons of fish under extensive management practice if only 5 percent of the country's resources are used. (Table 2). A minimal level of intensification is capable of increasing this annual production by over a 100 percent.

Table 2: Potential Yield from Aquaculture at 5 percent of assumed resource use

Resource Types	Area Land Mass (Ha)	Proportion of assumed land mass or water surface put to use @ 5%	Potential yearly yield (T/ha/yr)	Expected yearly production (tons)
Perennial fresh water swamps	1,010,000	50,500	2	101,000
Fresh water	12,500,000	625,000	3	1,875,000
Land locked	79,1000,000	3,955,000	1.5	5,932,500
Marine	48,695	2434.75	1	2,434.75
Total				7,985,085.65

Source: Anetekhai (2002); Anetekhai et al., (2004)

AQUACULTURE DEVELOPMENT IN LAGOS STATE: A RETROSPECTIVE VIEW

Modern fish culture practices came into Lagos State with the construction of a tidal pond at Onikan in 1958. Efforts to develop aquaculture during the Third and Fourth National Development Eras (1970-1974) and (1975 – 1980), respectively resulted in the establishment of demonstration fish farms nationwide. In Lagos State, the first demonstration fish farm was constructed at Iju Agege in 1973. Other Government-controlled fish farm were also established in Badore, Alakotomeji, Baiyeku and Epe in 1974. The objective was to afford the private investors the opportunity to view at first hand the socio-economic merit of operating fish farms. However, operations of these projects were not successful. High establishment costs of model fish farms relative to their lower output discouraged widespread adoption of fish farming by private investors (Oyatoyi, 1982). Inadequate physical infrastructures and support services most probably contributed to the high initial investment costs incurred by Nigerian commercial fish farmers compared to their counterparts in developed countries such as the United States (Olaniyi, 1986). From another perspective, the unsuccessful take-off of aquaculture in the first phase may also be attributed to the adoption of Government instead of the private investor as key elements in aquaculture development efforts by bilateral and international agencies (Van dem Berg, 1996).

As at 1988, there were 36 fish farms in the state occupying a total area of less than 26 hectares with actual production heetarage of 14 hectares. Few were described as truly commercial and most were one-man, one-miniature pond projects; the size of which varied from 0.1- 11 hectares. Farming practice was predominantly integrated with polyculture on a semi-intensive level (NIOMR, 1989).

Key problems identified to fish farming in Lagos state were reported as follows:

- a) Inappropriate pond construction techniques;
- b) Substandard dams in Badagry and Epe due to the predominantly sandy and loamy soil; containing less than 30% clay content;
- c) Prohibitive costs of earth moving equipment and the high ground water table which makes the use of the machinery difficult;
- d) The relatively more expensive land in other areas of the state with the exception of Badagry which has the highest concentration of fish farms;
- e) Little or no pre-stocking preparation of ponds;
- f) Lack of hatchery-reared fish seeds and the consequent sourcing of untested cultivars or fish seed from the wild;
- g) Staggered stocking and incompatible species mix in polyculture which exarcebated cannibalistic tendencies of *Clarias gariepinus*;
- h) Poor nutritional balanced feeds obtained from agro-industrial by-product;
- i) A lengthy grow-out period of an average of 12 months and
- j) Missing link between fish farmers and researchers and the lack of aquaculture expertise among extension agents.

CURRENT STATUS OF COMMERCIAL AQUACULTURE IN LAGOS STATE: CHALLENGES AND PROSPECTS

At the turn of the 21st century, fish farming practices had advanced. Ogunlaru (2000) described commercial fish farming in Lagos State as a nascent economic activity. There are more commercial fish farms. Sizes of farms varied from 0.0108 - 46.6 hectares. Fish farming practice is predominantly semi-intensive system in seepage ponds integrated with livestock or

crop production. There are also few instances of intensively managed system comprising of flow through and internal water circulating systems earlier reported by Obi (1999). Spectrum of cultured fish species includes the catfishes (*Clarias*, *Heterobranchus* and their hybrids), *Cyprinids*, *Megalops*, *Channa obscura*, *Gymnarchus niloticus* and *Heterotis niloticus*.

There is an increasing trend towards vertical integration in aquaculture enterprises; vast improvements in the survival and stocking rates of *Tilapia spp.*, *Clarias spp.* and *Heterotis spp.*; a significant decrease in grow-out period to 5-10 months and a commensurate increase in number of cropping to 2-3 in a year have been observed.

CHALLENGES TO COMMERCIAL AQUACULTURE

Below are major constraints to commercial fish farming in Lagos State:

Lack of access to capital

Capital is an essential tool for investment and is necessary for the commercialisation and intensification of aquaculture (Brummet, 1995). Particularly, capital expenses in aquaculture tend to be relatively high and may require long term financing arrangement. In Lagos State, personal funds which are limited in quantity constitute the major source of capital for establishment, hence the limitations on farm size and operations. Consequential to the poor state of aquaculture financing is a high interest rate, presence of collateral, lack of participation by financial institutions. Even when loans were granted, the amounts were grossly inadequate.

Lack of Effective Legal Framework for Aquaculture

Ezenwa (1994); Ogunlaru (2000) highlighted the absence of a legal framework for the aquaculture sub-sector in the country. Balarin (1985) opined that in African countries where aquaculture is not protected by law, legislations governing other activities which impact one way or the other on aquaculture tend to hinder its development.

Strategies to promote aquaculture are in the National Agricultural Policy and are also to be articulated in the New Agricultural Policy (Dada, 2003). Likewise, aquaculture plans exist at the state and national levels. However, inconsistencies in policies and in implementations of plans coupled with a lack of will to follow through in a determined manner (Kwanashie et al. 1998), has impacted negatively on the aquaculture sub-sector. Lack of legal framework is exacerbated by overlapping administrative jurisdiction between the Fisheries Department of the Lagos State Ministry of Agriculture and Cooperatives and the Lagos State Agricultural Development Authority (LASADA) and constitutes economic waste also responsible for the slow pace of aquaculture. In addition, the integration of aquaculture administrative structure under the inland fisheries subdivision, and the poor state of budgetary allocations have further relegated the aquaculture sub-sector as an offshoot of the inland capture fisheries sub-sectors (Ogunlaru, 2000).

Lack of Assured Access to Land

Due to the metropolitan nature of the state, land is relatively expensive with the possible exception of Badagry and other peri urban areas where there is a relatively lower level of commercial activities and less human population. The process of securing land for land based aquaculture, the predominant form of aquaculture in Lagos State is time wasting and corrupt ridden. (Ezenwa, 1994). Sadly, the establishment of the Lagos State Agricultural Land Holding Development Authority has obviously not improved the situation.

Lack of Inexpensive Quality Feed

Coppens and Artemia are popular brands of fry feed. However, they are imported and relatively expensive for most small-scale commercial fish farmers. On the contrary, the local supply of Daphnia, a zooplankton of veritable high protein quality is limited by season and hence is not available all year round.

Insufficient Supply of Fingerlings

Existing private fish hatcheries are few. Output of fingerlings is low as a result of lack of good broodstock, live food for fries, good water, electricity, skilled manpower and difficulty in obtaining hormones (Anetekhai et al., 2004)

Lack of Trained Workers

Availability of hand-on experienced workers in the aquaculture business is a limiting factor. More often failure of various commercial aquaculture projects have been blamed on incompetent fish farm managers and self-acclaimed aquaculture consultants.

Poaching

A major hazard in the business as it affects viability of aquaculture and may deter further investment

PROSPECTS FOR DEVELOPING SUSTAINABLE COMMERCIAL AQUACULTURE

Lagos State, the economic nerve-centre of the nation perhaps is the most advantaged to develop sustainable commercial aquaculture given the array of information on natural resource potentials and socio-economic status:

Availability of suitable sites:

It is no mistake that Lagos State is often called the land of aquatic splendor. A network of abundant natural water resources vis-à-vis rivers, lagoons, backwaters, creeks, streams, flood plains, and coastal water, constitute approximately 25 percent of the landmass. These resources, in addition to 47,877 hectares of swamps are potential biomes for fish farming (NIOMR, 1989)

Favourable Climatic Condition

Lagos State is located within the Southern rainforest zone of the humid tropics. The ecological climate of this region is devoid of the annual ice-cold season in temperate regions where low ambient temperature depresses growth rate and development of fishes. The state experiences maximum temperature ranges between 26°-36°C which persists throughout the year and permits all-year round production of cultured and wild fishes (Aguilar-Manjarez and Nath, 1998; LASADA, 1999).

Existence of Indigineous Species

The cat fishes (*Clarias spp.*, *Heterobranchus spp.*, and *hybrids*) and Nile Tilapia (*Oreochromis niloticus*) are the most important indigenous culturable species in the state and in the nation. Both fishes have good growth potentials, high demand, acceptability and are practically cultivated in all systems possible (earthen, Concrete, flow through and recycling).

In the last decade, Nigeria has been the main catfish producing country in sub-Saharan Africa. In the year 2000, she accounted for 90 percent of the catfish supply. While in the case of Tilapia, the country maintains a second position to Zambia, accounting 22 percent of total Tilapia aquaculture production of the region (FAO Fishbase 2001).

Existence of an ever-expanding Domestic Market

There is a prevailing food fish deficit which began in the 1960s. Future trends suggest that domestic fish demand will continue to increase particularly in the Lagos metropolis, due to rising population pressure and urbanization. Nigeria is the largest importer of frozen fish in Africa. Between 1992 and 2002, the quantity of fish imports tripled, rising from 225,590.00 metric tons valued at US\$267,211,201 to 681,151.80 metric tons at a cost of US\$375,027,917.90 (Dada, 2003). This measure to augment local fish supply is at a prohibitive cost to the country depriving investment in domestic fisheries and still leaves a wide gap between total fish supply and demand with the consequences of higher rates of increase in fish prices.

Macro economic and industrial growth

Compared to other states in the country, the high level of commercial and industrial activities, the seaport and international airport, road network, telecommunication. Other infrastructures and support services in the metropolis should be substantial to attract increased private investment in fish farming.

Export potentials of farmed fish to the European Union (EU)

Currently, Nigeria earns appreciable foreign exchange from exportation of shrimps, live ornamental fishes and other fishery products to many European countries. In the EU, the imports of aquaculture products particularly catfish and Tilapia will continue to rise relatively more rapidly than that of capture fisheries. Consumers demand for aquaculture products over fisheries products is more influenced by retailers, caterers, restaurant chefs, processing industry and middle persons. They tend to prefer aquaculture products for the following reasons: year round availability, trace ability, less fishy taste and odour, homogeneity in meat/flesh and in size, less expensive price.

Fourteen sub-Saharan African countries including Nigeria are listed as completely harmonized countries or the so called "list countries. Import conditions for fishery and aquaculture products into the EU are defined for each country. In addition, trade agreements signed between the EU and African, Caribbean and Pacific countries (ACP) permits zero tariff duty for fishery and aquaculture product valued till December 2007. Furthermore, there are no import quotas for fishery and aquaculture products. Tariff contingents which are applicable during part of the year are not imposed on cat fish or tilapia. Reference price system used by the EU to protect domestic fish products have not been extended to farmed products and there is no indication of that this might happen in the near future.

DEVELOPMENT STRATEGIES FOR LONG TERM SUSTAINABILITY OF COMMERCIAL AQUACULTURE.

Considering the poor performance of government-owned model fish farms in the country which affected the success of the private fish farms, the best avenue to promote sustainable commercial aquaculture in the three tiers of government would be limitation in government's role to a catalyst or facilitator in private sector initiative. Cue should be taken from industrial fisheries sub-sector, and applied to the aquaculture sub-sector where Federal Government collaborative and interventional efforts have enhanced the capacity of the fisheries sub-sector as a substantial non-oil foreign exchange earner (Dada, 2003).

To accomplish this task, the following strategies should be adopted.

- a) Demonstration of Government's commitment to prioritise the aquaculture sub-sector and place on a par with other fishery sub-sectors should start with a complete separation of aquaculture from the inland fisheries subdivision in administrative structure and function. Anetekhai et al., (2004) advocated for the creation of a ministry of fisheries with directorates for industrial fisheries, artisanal fisheries and aquaculture/fish farming sectors, respectively.
- b) Creation of a consultation and participatory forum to include all stakeholders vis-à-vis government authorities (directorate of aquaculture), private investors in fish farming, manufacturers and suppliers of aquaculture inputs, financing institutions, researchers, traders of farmed fish, non-governmental agencies, professional associations, special interest groups, to identify and deliberate on constraints factors to commercial aquaculture development in the past and present. This forum should also be involved in the formulation, and implementation of legal framework for aquaculture. Increasing stakeholders' capacity is proposed to minimize mistakes and enhance consistencies in the implementation of plans, policies regulations and guidelines for aquaculture development.
- c) If it is envisaged that the emergence of aquaculture laws is likely to take a relatively long time, then regulation for aquaculture can be incorporated as codes of practice under the existing Inland Fisheries Act or Bye Laws. Regulations should be put in place in order to obviate possible negative impacts or problems associated with commercial fish farming. There should be regulations which provide enforcement (i) for the Environmental Impact Assessment (EIA) of proposed aquaculture projects; (ii) on quarantine measures to include medium to long term assessment of exotic or genetically modified organisms (GMOs) under prevailing farming systems on a pilot scale before introduction; (iii) on fish farm designs, siting, system management, zoning, etc. The precautionary approach should be adopted by incorporating flexibility in policies and project planning to accommodate changes if or when the needs arises.
- d) In line with the country's position on privatization and deregulation, direct foreign investment by large multinational firms in aquaculture should be stimulated by providing certain economic incentives akin to what has been done in the telecommunications industry. These incentives should include tax free holidays for a period of 3 years and reduced import duties on essential inputs such as feed. As the industry matures, there should be a gradual withdrawal of the subsidy on fish feed imports to allow for the emergence of indigenous feed production technology. However, appropriate guidelines should also be directed at the foreign investors specifically to prevent the formation of a cartel or monopoly which could hurt the growth of indigenous small-scale commercial fish farmers and prevent social conflicts with the local communities and competition for shared resources with other economic sub-sectors. Therefore, they should be enforced to locate to peri-urban or rural areas and serve as employment multipliers, provide certain infrastructural facilities and social amenities from which both the local communities and small scale commercial fish farmers could benefit. Foreign investors should be enforced to produce primarily for export, partially fund research and form contractual agreement with small-scale fish farmers in production.
- e) Research should be directed and initially funded by the government. Priority areas of research should focus on : (i) improving productivity and yield of existing sites;

- (ii) summarizing the existing production technology of each culturable species for its adaptation and stipulate where further investigations are needed; (iii) maintenance of broodstock quality, development of viable superbreed broodstock and hybrids, development of live food for fries. Existing model fish farm could be rehabilitated and upgraded to centers of research and training.
- f) The unified extension service currently practised in the state has decreased the quality of aquaculture technical competence. Therefore there should be a professionalisation of the extension system, the cost of which is to be borne substantially by the private sector.
- g) Government should undertake the development of fish farm estates in each local government of the state leased to prospective small-scale fish farmers. This could be the solution to obliterating the bureaucratic bottlenecks and other problems often associated with the acquisition of land for commercial fish farming. A good starting point could be to promote the culture of Nile Tilapia (*Oreochromis niloticus*) for new entrants into the fish farming business because of its ease of reproduction and as it obviates the need to feed fish meal. Sequel to this could be gradual introduction to poly culture of *Tilapia spp* and *Clarias spp*. Furthermore, to reduce production cost and increase income, integration with poultry, vegetables and other viable agricultural sectors should be recommended.
- h) Enhancing flow of credit to aquaculture could be accomplished by improving on the number of financial institutions participating in aquaculture funding. The objectives are to: (i) demonstrate profit ability by subjecting key inputs and outputs which are vital to financial health, to sensitively analyses; (ii) set up consultancy units in aquaculture or engage aquaculture specialists involved in management and planning of prospective fish farms. Another avenue would be to channel a significant portion of the Small and Medium Scale Enterprises (SME) fund to the aquaculture sub-sector. However, there should be lower interest rates and concessions on loan terms. Anetekhai et al., (2004) advocated for reduced emphasis on physical collateral, a moratorium period of 12 months on the loan repayable within 5 years at an interest rate of 5 per cent. The release of these funds, he proposed should coincide with periods of construction and stocking to avoid gross misuse of the funds. The state should expedite action to provide aquaculture insurance scheme so that the criterion of collateral is partially resolved.
- i) The formation of a producers' association among the indigenous small-scale commercial fish farmers is very important. Merits or functions of this group includes: (i) mobilization of farmers' savings and lending based on negotiation with financial institutions in order to reduce cost of loan administration; (ii) stabilisation of prices and maintenance of high product quality standards all-year round. (iii) diffusion of technological information and processing technology via the network of demonstration fish farmers within the group and the extension agents; (iv) formation of marketing boards jointly controlled by the state and the farmers, aquaculture products could be targeted at international markets once domestic demand has been satisfied; (v) self policing or self regulating role to monitor and enforce adherence or compliance to regulations and guidelines; (vi) partially refund research and privatized extension service.

- j). Finally, the establishment of an aquaculture information network centre is equally important. This could link the Nigerian Institute of Oceanography and Marine Research (NIOMR), Federal College of Fisheries and Marine Technology (FCFMT), Lagos State University (LASU), University of Lagos (UNILAG), State-owned and Federal Polytechnics and Colleges of Education, for the purpose of information exchange, research and also provide easy access to private investors. The role of the press is particularly vital in the area of information collection, storage and dissemination. The press could help attract potential investors, finance houses and corporate bodies to the sector.

CONCLUSION

Despite these pragmatic strategies recommended to promote sustainable commercial aquaculture, it should be noted that political stability and macro economic policies which affect the sub-sector, directly or indirectly, shall remain important criteria for making investment decisions in commercial fish farming.

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