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COMMITTEE FOR INLAND FISHERIES OF AFRICA

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PROSPECTS FOR SUSTAINABLE COMMERCIAL AQUACULTURE DEVELOPMENT IN AFRICA

SUMMARY

This paper discusses the concept of **sustainable commercial aquaculture** as the rearing of aquatic organisms with the goal of **maximising profit**, and mainly **by the private sector without direct financial assistance**, whether by donor or government. By generating its own funds commercial aquaculture offers the prospect of financial self-sufficiency. Sustainable commercial aquaculture can, in the medium and long term, contribute to increasing food security, hunger and poverty alleviation, economic growth and employment generation. Development of sustainable commercial aquaculture requires suitable physical, technical, economic, and market conditions, and legal and policy environment. In sub-Saharan Africa, it is still infant in some countries; elsewhere, it has not taken off. Information on the physical potential is limited. Stabilisation or decline of the capture fisheries, growing shortage of fish for domestic consumption, opportunities for exports and suitable land and water combined with cheap labour show prospects for commercial aquaculture development in the Region. The sector is essentially hampered by difficult access to credit, high bank interest rates, availability and high cost of feed, availability of good quality seed, and a low flow of domestic and foreign capital investment. The committee is invited to advise on the action to take in order to quantify the potential of commercial aquaculture in each country and on the means of overcoming identified constraints to sustainable commercial aquaculture in the Region.

SETTING

1. About 90% of aquaculture production occur in developing countries, where output from aquaculture grew at a rate of approximately 11% a year during the 1985-1998 period. In Africa, though growth of aquaculture output over the same period was about 39%, Africa still lags behind the rest of the world in this sector. The 1998 output was around 0.34% of world output. This is little considering that about 12% of the world population lives in Africa.
2. Almost two-thirds of Africa's output comes from Egypt. The residual supply from sub-Saharan Africa in 1997 just exceeded 40,000t or 0.12% of the world total. Of this regional output, 40% comes from Nigeria, 40% is produced by Madagascar, South Africa, and Zambia, and 20% comes from the rest of the Region.
3. Much of the farmed fish produced in sub-Saharan Africa comes from rural pond aquaculture. This illustrates the important role of rural aquaculture¹ in securing food, in the form of fish, in the Region, especially for rural communities with low purchasing power. FAO recognises this role and regards rural aquaculture as an important means of contributing to alleviating hunger, malnutrition and poverty. Its policy is to lend continued support to this system of aquaculture, through different programmes such as the SPFS (Special Programme for Food Security), while exploring additional ways of sustainably and efficiently increasing aquaculture fish supply. One of the ways of increasing fish production is through commercial aquaculture. The rationale is that commercial aquaculture can be sustainable because it depends on private, rather than public funds, that are usually scarce or lacking.
4. It is difficult to define commercial aquaculture and many definitions are possible. For the purpose of this paper, commercial aquaculture is defined as those farming operations whose goal is to **maximise** profits and that are primarily conducted by the private sector without direct financial assistance, whether donor or government. Such aquaculture is not an alternative to rural aquaculture but rather a complement. If we view aquaculture system as a continuum of economic activities from exclusively oriented towards self-consumption to exclusively oriented towards sale, commercial aquaculture would be those operations which are exclusively oriented towards sale while the other extreme would be rural aquaculture. Those farms which fall within the two extremes would be either rural or commercial depending on, inter-alia, the proportion of output sold (consumed).
5. For commercial aquaculture to be sustainable,
 - farms must offer the prospect of competitive profits. Unless there are other sources of money to fund the farm, if no profits are generated, the farm will close. If positive returns are generated but not competitive with those from other activities, farmers will have an incentive to leave the industry for better opportunities;
 - the level of returns must also be stable. That is, mortality rates and prices of inputs and outputs cannot be too volatile. This is due to risk aversion by fish farmers and potential creditors;

¹Like commercial aquaculture, there is no universally accepted definition of rural aquaculture. Broadly speaking, rural aquaculture refers to the "poorest of the poor" aquaculture (very low cost/very low output) whereby most, if not, all of the output is consumed by the producer, and to the "less poor" aquaculture (low/medium cost, low/medium output) whereby most of the output is sold for economic profit (Martinez, Espinosa, Manuel in FAO Aquaculture NewsLetter, November 1992, No. 2, pp. 6-10).

- the fish farmed and the farming process must be acceptable and meet general cultural, gender and social norms, especially when the output is intended for domestic consumption. This suggests that the sector's benefits should accrue to a wide socio-economic spectrum and not be retained exclusively by a small elite. When the output is intended for export, these norms may be irrelevant while others, such as quality standards may apply;
- aquaculture operations must also be environmentally friendly, in part because sustainable development requires intergenerational equity. Therefore, aquaculture's contribution to the potential well-being of future generations should be expected to be at least as high as the present, which implies that both natural and man-made assets be at least maintained over time.

6. Commercial aquaculture generates many advantages:

- commercial aquaculture can contribute to food security; directly by producing fish for food, especially in urban areas, and indirectly by generating employment income for the purchase of food.
- commercial farms generally have collateral; thus, they can access institutional credit; other farms may have to rely on own equity, or credit from informal moneylenders;
- commercial aquaculture will pay taxes, thereby contributing to government revenues; it can also be a source of hard currency through exports; even if consumed domestically, the output from commercial aquaculture may replace imported fish and thus save foreign exchange;
- when located in isolated rural areas, commercial aquaculture can generate positive externalities by pressuring for improved infrastructure, promoting the development of small communities and discouraging youth from migrating to cities;
- commercial farms will tend to hire labour (although employment of hired labour does not preclude the use of family labour) at wages which generally exceed those on non-commercial farms;
- labour productivity will tend to be higher on commercial farms as they will have the incentive to conserve and only employ labour if it is justified by the extra output. This is important because it is the labour productivity that drives living standards up and ultimately alleviates poverty;
- commercial aquaculture can generate jobs in secondary (processing, marketing, transportation, ..) industries;
- commercial aquaculture can stimulate research and technological development, some of it funded by the industry itself;
- commercial and rural aquaculture can co-exist and be complementary. Rural aquaculture farms can be guaranteed an income by providing seed inputs to a "nucleus" commercial farm. The diffusion of knowledge from commercial farms to rural aquaculture farmers through on-site training, technology transfer meetings and formal training sessions is possible. Commercial farms can also provide the later with feed and seed loans and offer them market guaranties;

7. There may also be pitfalls associated with commercial aquaculture:

- commercial aquaculture can lead to inequitable income distribution, and social conflicts. Conflicts arise because traditional farmers feel threatened or jealous at the success of commercial aquaculture, or are concerned about detrimental environmental side-effects.

- commercial aquaculture can adversely affect the environment through externalities which range from pollution to mangrove destruction and soil salinisation, to name a few. Environmental damage can be a major cost to society;
- one can argue that policies focussing on commercial farmers with sufficient funds and initiative to manage fish farming successfully might raise incomes of certain fish farmers without alleviating poverty;
- concern exists that most commercial farmers will be male, better educated and richer, which would exacerbate social differentiation.

STATUS AND POTENTIAL OF COMMERCIAL AQUACULTURE IN SUB-SAHARAN AFRICA

8. The predominant systems of aquaculture in sub-Saharan Africa are extensive (with low capital investments and few operating costs), and semi-intensive (with organic fertilisation and cheap feed). The typical fish farmer is a smallholder. Integrated with other crops and livestock, fish is raised as a source of food but also (if not primarily) for cash income. There are some commercial farms in Côte d'Ivoire, Madagascar, Malawi, Mozambique, Nigeria, Senegal, Zambia and Zimbabwe. Elsewhere, they have not proven economic because of, inter-alia, excessively high operating costs.

9. While aquaculture activity occurs in freshwater, brackish and marine environments, approximately three-quarters of sub-Saharan output is of freshwater fish².

10. The most important species raised are the tilapia, which account for 31% of the volume produced and 16% of the total value; carps represent 24% of the volume and 10% of the value, mullets 13% of the volume and 36% of the value, and catfish which account for 12% of the volume and 6% of the value. Shrimp production represents 2% of the volume and 3% of the value. This distribution refers to all forms of aquaculture. There is no information to assess the importance of these fish species in commercial aquaculture.

11. In 1997 the total value of all aquaculture output from sub-Saharan African barely exceeded US\$100 million. The contribution of commercial aquaculture as defined above is not known.

12. In spite of the sector's small output and uneven development, there are reasons for cautious development of commercial aquaculture in the Region.

13. On the demand side, there is a sizeable and growing shortage of fish for domestic consumption. Sub-Saharan Africa imports one million tons of fish a year; production from the capture fisheries, which is stagnant or even declining, is unlikely to satisfy the gap.

14. There is potential for export to Europe and North America. Existing European tilapia production, estimated at 360 mt in 1996, does not cover current demand. Some tilapia from

²Crustacean and mollusc aquaculture exist in Madagascar, Namibia, Senegal, South Africa, Swaziland, Zambia and Zimbabwe. Marine aquaculture in Nigeria and South Africa, and Tanzania produced 3,000mt of aquatic plants in 1997, but the principal focus of aquaculture in the region is that of fresh water fish.

Zimbabwe and shrimp from Madagascar and Mozambique are already exported to Europe, but Europe continues to import from elsewhere.

15. On the supply side, there are the resources for aquaculture expansion. The Region possesses vast inland waterways, with the larger bodies alone covering 520,000 km²³. Most countries in the Region also have relatively cheap labour and under-utilised land.

16. With existing water availability and climatic conditions, approximately 23% of the land area in southern Africa is suitable for commercial tilapia (*O.niloticus*) and African catfish (*Clarias gariepinus*) farming, with less than 5% being used. Seven of the ten Southern African Development Community (SADC) countries studied have considerable land suitable for the two species. The proportion of the total area potentially suitable for commercial aquaculture ranges from 21% in Tanzania to 34% in Malawi³.

17. About 43% of continental Africa has the potential for farming tilapia, African catfish and carp commercially. About 15% of that area is the "most suitable", with possible yields of up to 2.0 crops/year for Nile tilapia and 1.7 crops/year for African catfish. Overall, 16 countries are very suitable in half or more of their national area for commercial farming of the three species³.

18. The profile of potential commercial aquaculture farmers in Africa is diverse, incorporating businessmen and women, academics and bureaucrats who run a business part-time, and expatriate managers. Retirees, especially from the civil society, are likely to be an important part of the commercial fish farmer pool.

III. PRE-REQUISITES FOR AND MAJOR CONSTRAINTS TO COMMERCIAL AQUACULTURE IN SUB-SAHARAN AFRICA

19. Conditions for commercial aquaculture to take off and develop include:

- appropriate culture species. That is, ease of reproduction and grow-out, low mortality and high feed conversion rates;
- demonstrated economic viability. Demand for the product and the potential for increasing it must exist, and with the promise that farm-gate price will exceed the per-unit production cost;
- average long-run potential profits, which are estimated by taking account of expected acceptable risks, must be positive. Risks occur because of biological (disease), meteorological (hurricanes), economic (macroeconomic instability) or political (public interference with business operations, uncertainty over property rights, weakening of social institutions) shocks;
- positive response to market preferences. An example of the importance of market preferences occurred in Jamaica and Costa Rica when early attempts to develop aquaculture in these countries failed because there was market resistance to *O. mossambica* due to its dark flesh and because it was fed pig manure. The industry expanded when a new tilapia species (*Oreochromis niloticus*) was introduced and fed dry pellets;

³Kapetsky, J.M. (1994). A Strategic Assessment of Warm Water Fish Farming Potential in Africa. FAO CIFA Technical Paper No.27, pp67.

Nath, S. S. and J. Aguilar-Manjarrez (1998). A strategic re-assessment of fish farming potential in Africa. FAO CIFA Technical Paper No. 32, pp170.

- necessary infrastructure in place. Availability of infrastructure is critical because of the need to transport inputs to the farm and output to market. This is particularly important if the output is fresh fish and consumers lack refrigeration;
- farmer access to financial resources. Commercial farms rely on hired (and family) labour and machinery for pond construction. They also have high operating costs that can cause imbalances in cash flow. Access to credit for initial investment and during cash flow shortages can therefore be critical;
- good entrepreneurial motivation and managerial expertise. Entrepreneurship, which is manifested by vision, dedication and drive, is critical because aquaculture requires perseverance and an ability to accept risks. Commercial aquaculture can also be handicapped by a separation of ownership and management; when absentee owners have tried to replace entrepreneurs with salaried managers, operations often collapsed;
- above all, sound government policies are critical. Whether by providing the legal, political and fiscal framework for entrepreneurs to feel secure with their investments, or by actively intervening to promote the sector, policy-makers have a critical role in successful commercial aquaculture; they can encourage or discourage private investment. Governments are also necessary to ensure long-term sustainability, by enacting environmental regulations, and encouraging environmental assessments.

20. Major impediments to commercial aquaculture in the Region consist of:

- absence or inaccessibility of capital. Of the factors of production capital is the most scarce in sub-Saharan Africa. The need is for fixed and operating capital to cover cash-flow shortages. Unfortunately, financial institutions are reluctant to provide credit to aquaculture in many sub-Saharan African countries because commercial aquaculture in most countries is new and unknown with risks unquantified. Lending is also often politicised;
- high cost of money. When financial institutions are not reluctant to lend, they charge high interest rates on loans. In many countries, interest rates on loans can be as high as 50%. With this high cost of capital, the industry may lack absolute and comparative advantage and may never be sustainable;
- limited direct domestic and foreign investment in commercial aquaculture. This can be attributed to high risks of investing in the Region. Foreign investors are particularly concerned about political stability, governance and repatriation of profits. Domestic businesses place more weight on taxes and access to financing. Historically, these conditions have not been favourable in the Region. Africa attracts only 1.3% of the world total direct foreign investment, with 75% of this going to oil-exporting countries. Non-oil exporters in sub-Saharan countries have, therefore, a share of the world direct foreign investment that approaches zero. The ratio of total investment to GDP is about 17%, which is far below that of other developing countries;
- lack of access to good quality feed. Feed accounts for more than half the operating costs in intensive cultivation. In most African countries, the limited demand for fish feed and the high cost of agricultural by-products have handicapped the development of a fish feed industry although there are exceptions. Feed can be imported but at the cost of foreign exchange, and imported feed is often beyond farmers' reach;
- fingerling production faces issues of quantity and quality;
- inadequate training and extension services. In most countries, training and extension services are publicly funded and often limited to non-commercial farmers;
- land availability or unclear user rights in some countries;

- most countries in sub-Saharan Africa lack legislation specifically for aquaculture. Yet the absence of legislation can be a deterrent to investors because it creates uncertainty. The problem is compounded when obtaining regulatory permission is administratively cumbersome.

IV. CONCLUDING COMMENTS

21. In addition to contributing to food security, commercial aquaculture can alleviate poverty by generating economic growth. Economic growth and poverty reduction are positively related, circular and mutually reinforcing. By stimulating private investment and employment, economic growth can contribute to poverty reduction, which in turn induces further investment. Private investment in commercial aquaculture can contribute to government revenues, foreign exchange earning and direct and secondary job creation. On the other hand, commercial aquaculture (especially shrimp farming) has demonstrated equity and environmental costs.

22. Though it is yet to be quantified, potential for commercial aquaculture in sub-Saharan Africa exists. Not only does the Region suffer from an existing shortage of fish as reflected by imports, but also, over time, growing demand could increase the shortage. Furthermore, suitable conditions exist for fish to be grown and sold profitably. In addition, while the principal market for farmed finfish in sub-Saharan Africa is the urban domestic market, there is potential for exports to Europe or North America.

23. Low flow of private investment, difficult access to credit, good quality feed and seed are the major obstacles to aquaculture development in sub-Saharan Africa.

24. Existence of commercial aquaculture need not threaten rural small-scale aquaculture because the two can co-exist, and be complementary and mutually supporting.

V. SUGGESTED ACTION BY THE COMMITTEE

25. The Committee is invited to:

- identify actions which could be taken to re-quantify the potential of commercial aquaculture in each country in the Region;
- formulate recommendations on how to overcome identified impediments to the development of commercial aquaculture in the Region, especially the problem of low private investment in the sector, credit, feed and seed.
- identify action required to consolidate and promote commercial aquaculture in the countries where it exists, and,
- determine action at the regional level which, under CIFA framework, could contribute to a better assessment of potentials, transfer of technology and promotion of commercial aquaculture.