INTENSIVE SMALL SCALE CAGE, PEN AND ENCLOSURE FISH PRODUCTION SYSTEMS: TOWARDS 2010

S.O. OTUBUSIN

Department of Aquaculture and Fisheries Management, University of Agriculture, P.M.B. 2240, Abeokuta, Nigeria

ABSTRACT

A brief review of most of the publications by the author and other relevant workers on the three water-based fish culture systems was made. The present status of the culture systems in the National Food/Fish Programmes was highlighted. Strategies were advanced towards a successful implementation of the intensive water-based culture systems project as a contribution towards alleviating poverty, hunger and malnutrition under the concept of VISION 2010.

1. INTRODUCTION

Capture fisheries - where fishermen go out to the natural or man-made unstocked bodies of water to "hunt for fish" - is the main source of fish supply. FAO (1995) reported that it appears that most of the major inland fisheries are now being exploited at close to, or above, their sustainable levels. FAO (op. cit) noted that inland capture fisheries yields increased steadily from 1984 to peak in 1990 at a global total of some 6.5 million tons. Since 1990 catches appeared to have stabilized or even declined slightly. Considering both inland and marine capture fisheries, in 1989 world fish production reached 100.3 million tons. Production declined in 1990 and 1991 to 97 million tons, but increased to 98.7 million tons in 1992, and to 101.3 million tons in 1993 (FAO, 1995). The increase in total production between 1992 and 1993 came almost entirely from aquaculture. The projections provided in FAO's Agriculture: towards 2010 indicated that to maintain present per caput fish consumption levels of 13.0 kg per year 2010 (forecasted population, 7032 million), 91 million tons of food fish would be required (FAO, 1993). Such an increase in the production of food fish was considered feasible if aquaculture production could be doubled in the next 15 years among other conservation and management measures. At the local scene, NISER (1995) reported the projected fish supply and demand calls for a pragmatic option of intensive fish farming, a manageable production system, using especially at small-scale the water-based fish culture systems: cage, pen and enclosure. Smallscale not only because "small is beautiful" but also because for example, in capture fishery, the small scale (artisanal) is however, still the most important sub-sector, consistently accounting for well over 90% of the total domestic production in Nigeria (West, 1986). An intensive water-based fish culture system designed to incorporate these rural folks will immensely contribute to the fish demand in Nigeria.

An attempt will therefore be made in this paper to briefly review some relevant publications of this author and some other appropriate workers on the subject matter in order to advance strategies towards a successful utilization of these intensive water-based fish culture systems as a contribution to the concept of VISION 2010.

2. BACKGROUND INFORMATION

Since 1983, a systematic approach had been initiated towards evolving a fish production technology using locally available materials as fish enclosures erected within the abundant water bodies (about 12.5 million ha, Ita *et al*, 1985) that Nigeria is endowed with (Otubusin, 1983). This was soon followed by the reports of the results from preliminary studies on bamboo floating cage and net enclosure fish culture in Lake Kainji Basin (Otubusin and Opeloye, 1985).

The investment prospects of these water-based fish culture systems were further reported for commercial entrepreneurship for fingerlings, table-size fish and integrated system (Otubusin, 1986; 1987; 1989; 1990; 1992; Otubusin *et al.*, 1991; Otubusin and Olatunde, 1992). The versatility of these fish culture systems was also reported at a Fisheries Society of Nigeria (FISON) Conference at Akure in 1990 (Otubusin, 1990) and a Community Based Implementation Strategy (**CBIS**) was re-iterated as appropriate for effective grass-root participation in the fish culture.

Aside from the few training programmes organized at the Institute (**NIFFR**) in cage farming, it is noteworthy that a pilot-scale commercial cage fish culture project was initiated at Shagunu Bay - the continuity of which is now history! (Otubusin, 1993). This background information will not be complete without making mention of the inability of Nigerian/German (GTZ) Kainji Lake Fisheries Promotion Project to promote small-scale cage fish farming, as a possible approach for fisheries development in Kainji Lake - for the fact that, according to GTZ, "the viability of the project could not be seen from the economic figures" (Mdaihli and Du Feu, 1994).

3. PRESENT STATUS OF THE CULTURE SYSTEMS IN NATIONAL FOOD/FISH PROGRAMMES

It is encouraging to note that in spite of the "apathy" sometimes suffered by these innovative culture systems in Nigeria, recent interests from both local and international bodies (e.g. **IFAD**) have been geared up towards generous funding of this project. These water-based fish culture systems are also accorded high priority under the tasks of most of the zones participating in the National Agricultural Research Project (**NARP**) - National Coordinated Research project (**NCRP/MTRP, Freshwater and Marine Fisheries**)

Private organizations and individuals have also began to show interest in operating water-based fish culture systems especially under the situation of exorbitant cost of hiring earth-moving equipments for pond construction, inland-based fish culture system. The gradual proliferation of "bush-parks" or "**acadjas**" on the waters of the coastal states of Nigeria, especially Lagos State is a good indicator of the desire of the artisanal fisherfolks to practice the cheaper water-based fish culture system. In spite of these renewed interests in these culture systems, there is urgent need to formulate workable strategies towards a practical utilization of these systems in profitable and sustainable fish production.

4. THE STRATEGIES

(a)Considering all the factors of production in culture fisheries, there is urgent need for a well planned and implemented human resources development especially for the middle and high level manpower needs of the national intensive small scale cage, pen and enclosure fish culture project. At least ten of such subject matter specialists (with bias in cage, pen and enclosure systems) should be trained per state by early 2000 AD. This situation assumes that all fisheries related Institutions (Fisheries Colleges and Departments of Fisheries in Universities) will without delay include courses in water-based fish culture systems in their syllabuses.

(b) The government at the three tiers should accord water- based culture systems the highest priority and generously back up same financially. It should be noted that the largest expanse of water bodies Nigeria is endowed with is the propelling third major factor of production.

Israel's water bodies total surface area is less than 0.1% of those of Nigeria and yet Israel's records in water-based Agriculture is

resounding. A committed implementation of strategies 1 and 2 will therefore be a synergistic approach to making a good success of the project.

(c) The well-trained subject matter specialist (SMS) in each State will then be used as trainers of village Extension Agents (VEAs) who will in turn be used as facilitators of the demonstration of the water-based fish culture systems at the Local Government Areas (LGA). At least two VEAs must be so trained to serve each Local Government Area for grassroots participation.

(d) With well trained manpower at the State and LGA levels, fishermen and interested farmers/individuals should be organized into community Development Associations (CDAs) for a **Community Based Implementation Strategy (CBIS)** of the national water-based fish culture project. At least two demonstration sites of the location-specific, water-based culture system (either cage, pen or enclosure) should be established for thorough on - the - spot training of fishermen/fish farmers at the grassroots level. A **subsequent target by the year 2010 of 100 units** of CDA - owned water-based culture systems per LGA capable of annual production of **10 tons of fish per unit** will annually supply **1,000 tons** of fish. The annual total fish production by all the LGAs say 772 (but should be more by 2010 AD) will be **772,000 tons** which is about 82% of the deficit between projected supply and demand of NISER (1995).

(e) Finally, the **University of Agriculture, Abeokuta (specifically its Department of Aquaculture and Fisheries Management)** is strongly recommended to co-ordinate this proposed **National Intensive Small Scale Cage, Pen and Enclosure (NISCAPEN) Fish Culture Project.** This co-ordination center will then call a National workshop on the Project and map out practical, effective, result-oriented strategies for meeting the set target under the concept of **VISION 2010.**

5. CONCLUSION

Without any iota of doubt, Nigeria is very much endowed with abundant natural resources (including aquatic resources) which if well utilized should help alleviate hunger, starvation, malnutrition, poverty and unemployment. However, this author had been sounding the "bell" for immediate attention and action pertaining to the immense potentials of these water-based fish culture systems with little or no positive response from the government and even non-governmental organizations e.g. Nigerian/German (GTZ) Kainji Lake Fisheries Promotion Project (Mdaihli and Du Feu, 1994).

The latest government's economic policy focus-vision 2010 which is in line with global clarion call - **TOWARDS 2010,** literally 'discarding' the outdated **FOOD** or **HEALTH** or **SHELTER - FOR ALL BY THE YEAR 2000,** should seriously and faithfully address the food security issues of the country. A prominent part should be played by Nigeria's abundant aquatic resources. A public debate on the policy focus - **VISION 2010,** should without delay be set in motion and immense contributions from all facets of Nigeria's economy including the culture water-based fisheries sub-sector should be well digested and assimilated to lead to the emergence of a fruitful national plan that will be faithfully implemented for the good of all. **The Malaysian example, VISION 2010, should be enough food for thought.**

6. REFERENCES

Ita, E.O.; Sado, E.K.; Balogun, J.K.; Pandogari, A; & Ibitoye. B. (1985) Inventory survey of Nigerian inland waters and their fishery resources I A preliminary checklist of inland water bodies in Nigeria with special reference to ponds, lakes, reservoirs and major rivers. *Kainji Lake Research Institute Technical Report Series. No. 14,* KLRI, New Bussa 51p.

Mdaihli, M and Du Feu, T. (1994) Small scale commercial cage fish farming in Lake Kainji Area Nigeria - a possible approach to Fisheries Development in Lake Kainji? A GTZ Publication.

Otubusin, S.O. (1983). Modern aquaculture practices for increased fish production in Nigeria. *Proceedings of the 3rd Annual Conf. of the Fisheries Society of Nigeria (FISON), Maiduguri. 22nd - 25th Feb, 1993* pp. 89-104.

Otubusin, S.O. (1987) The effect of different levels of blood meal in pelleted feeds on tilapia (Oreochromis niloticus) production in floating bamboo net-cages. *Aquaculture 65*:263-266.

Otubusin, S.O. (1989) Fish culture in cages, pens and enclosures: A possibility of meeting the fish demand in Nigeria. In: (1989) FISON Conference Proceedings. A.D. Onyia and G.N. Asala (eds.) pp. 9-15.

Otubusin, S.O. (1990) The versatility of Fish Cage, Pen and Enclosure for use by rural communities: **A CALL FOR ACTION!** Proced. of the 8th Annual Conf. of FISON - Akure, Ondo State. 5th-9th Nov. 1990.

Otubusin, S.O. (1992) Fish Culture Studies in floating cages in Lake Kainji, Niger State, Nigeria. Ph.D. Dissertation, Ahmadu Bello University, Zaria. 411p.

Otubusin, S.O. (1993[a]) Commercial cage fish farming in Nigeria: **THE WAY FORWARD.** Presented at the Internal Seminar of NIFFR, New-Bussa. 27 October,(1993) 9p.

Otubusin, S.O. (1993[b]) A proposal on small-scale commercial fish farming in Lake Kainji Area Nigeria submitted to the Nigerian German (GZ) Kainji Lake Fisheries Promotion Project, New Bussa, Nigeria.

Otubusin, S.O. and Olatunde, A.A. (1992) Utilization of wastewaters in fish production: Preliminary results from fish culture studies in floating cages in a sewage pond, New-Bussa Nigeria. Proceed. of the 10th Ann. Conf. of FISON, Abeokuta, Ogun State. 16th-20th Nov., 1992. p. 39-46.

Otubusin, S.O; Ayanda, J.O.; Opeloye, G.O. and Asekome, I.G. (1991) Economic feasibility of cage fish farming. In: Proceed. of the 4th Annual Seminar of the Committee of Directors of Research Institutes (CODRI). J.G. Tobor and B.I.O. Ezenwa (eds) Nigerian Institute for Ocean. and Marine Research, Lagos 10th December, (1991) pp. 71-84.