

Egyptian Aquaculture: Expanding Development Plans



*Richard A. Neal*¹

About the Author

Richard Neal is presently an Aquaculture Advisor for the U.S. Agency for International Development on loan from the National Oceanographic and Atmospheric Administration. His experience includes work with freshwater lake fisheries in Iowa, limnological work in a salmon nursery lake in Alaska, research on paralytic shellfish poisoning in Washington and Alaska, population dynamics research on penaeid shrimp in the Gulf of Mexico and leadership of the shrimp culture program at the Galveston Laboratory of the U.S. National Marine Fisheries Service. For the last 2 years he has worked with AID in Washington with that agency's Fisheries Division.

The unusual potential for aquacultural development in Egypt has sparked interest from several international and bilateral groups including UNDP, FAO, World Bank, USAID, the German Agency for Technical Cooperation, the Canadian Government, and some private investors. The Government of Egypt is also planning large investments through the Ministry of Agriculture which is serving as a coordinating body for the various development efforts. These groups have all become aware of the potential for aquacultural development in Egypt during the last few years. Much credit for recognizing and exploring this potential must be given to the Inland Fisheries and Fish Culture Division of the National Academy of Science's Institute of Oceanography and Fisheries which has pioneered in development of mullet-tilapia-carp polyculture systems in Egypt and has assisted private farmers who have entered the field.

Cumulatively this development effort will probably be one of the largest ever launched in the field of aquaculture. For this reason and others, Egypt's new aquaculture activities are creating considerable interest in fisheries circles. All efforts

are being organized to encourage additional private investment, so total aquacultural development in Egypt during the next 10 years will certainly be large. This rapid development in a country where very few farmers have had any exposure to fish farming practices will be an important measure of how well aquaculture can contribute to food and employment problems in a developing country when it is supported on this scale. Without doubt many countries will be watching this exciting "test case" to see what future aquaculture may play in their development.

In the fall of 1976 an AID survey of fisheries potential in Egypt was conducted to determine which, if any, of Egypt's fisheries activities could benefit from AID assistance. The survey team mentioned several potential areas for assistance but noted especially the potential for aquacultural development.

In the fall of 1977, AID conducted a feasibility study of aquaculture in Egypt to identify the types of fish culture best suited to Egyptian resources and needs, and to determine if these types of fish farming would be economically and financially feasible if developed in Egypt.

Coincidentally other aquaculture studies and/or test projects were being launched in Egypt as well. These include an FAO pilot project at El-Zawya; a World Bank study of aqua-

cultural potential which has led to a proposal to finance about 13,000 ha of production ponds; large Egyptian Government plans for strengthening the fish culture industry; a UNDP study in the Suez Region examining the possible uses of wet delta lands (including aquaculture); a German dairy-fish farming pilot project; and several smaller grants or studies involving adaptive research. Each of these has contributed to the AID study, and as the assistance agencies have worked together looking for answers to similar questions, they have realized the importance of an integrated approach to Egyptian aquacultural development.

The AID feasibility study team looked carefully at Egyptian land, water, labor, feed, fertilizer, and other resources, at market demand for various species of fish (present and projected) and at the existing institutions and infrastructure available to support the proposed new industry.

Land which is well suited for fish farming but which is laden with salt or is excessively wet is available in many locations in the Nile delta. Present costs of reclaiming much of this land for agriculture are prohibitively expensive. The German group working south of Alexandria views the use of land for fish farming as a possible means of upgrading it by the

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removal of salt and the addition of organic matter so that the land can eventually be used in agriculture.

Sufficient water is available from existing irrigation systems to supply many thousand hectares of fish production ponds. In addition a substantial supply of water is available in drainage from irrigated lands, and although this may contain several parts per thousand of salt, it is well suited for culture of selected species of fish.

Because feed grains, grain by-products, and animal wastes are not available in surplus quantities, the most attractive type of aquaculture seems to be a fairly extensive approach using species feeding low on the food chain; taking full advantage of the natural productivity of the waters; and minimizing feed and fertilizer inputs.

Phosphate fertilizers are produced in Egypt and supplies are expected to surpass the country's demand in the next few years, resulting in an exportable surplus. Studies elsewhere have indicated that fertilization of ponds with phosphates alone can increase production substantially in polyculture systems since nitrogen is usually not a limiting factor at low to moderate stocking densities. Application of small amounts of animal manures together with phosphates can be expected to produce respectable yields of the carp-mullet-tilapia combination. This situation opens the door for economical aquaculture in Egypt. Uses of grains in large quantities for aquaculture is questionably economical in Egypt because of the high demand for grain for human consumption and for chicken feed. Phosphates, on the other hand, can be used very efficiently in fish ponds, and will soon be plentiful in Egypt.

Although the most efficient combination of inputs for the Egyptian situation has not yet been completely worked out, it is assumed that inexperienced fish farmers can manage these semi-natural systems well, and that as farmers gain experience, they will be able to manage production systems more proficiently. As optimum man-

agement regimes are worked out and as Egyptian farmers gain experience, it is likely that increased inputs of various fertilizers, feeds, and agricultural by-products can be used efficiently to increase yields. More efficient polyculture systems can eventually be used as a greater variety of species and selected strains of these species become available in Egypt. Adaptive research supportive of the new industry will be carried out during this period of growth and will lead to more sophisticated management practices suited to Egyptian conditions, markets, and resources. This applied research will be oriented toward practical improvements in fish farming methods and will result in specific recommendations to farmers on stocking rates, species combinations, feeds, fertilizers, and general pond management practices.

Some fish farms presently exist in Egypt and these farmers are doing fairly well in spite of the general lack of experience of Egyptian farmers in this field. The Ministry of Agriculture assisted by technical experts from the Inland Fisheries and Fish Culture Division is leading an effort to develop sound fish farming practices and to train Egyptian farmers in their use. The most successful species combination in use at present is a carp-mullet-tilapia mix. Yields from these systems range from 700 to 1400 kg per ha per year. Since good fish husbandry practices are not in general use by farmers, considerable potential for increasing production rates exists.

The USAID aquaculture feasibility study conducted in the fall of 1977 led to the conclusions that USAID could contribute to the development of fish farming in Egypt, and that this contribution could be planned and implemented in a way which would strengthen and support the development activities of the Egyptian Government and of other assistance agencies working in the aquaculture field. The economic and financial feasibility of certain aquaculture systems was demonstrated during this analysis. As a result USAID assembled a project design team in Cairo in March, 1978 to begin working on details of the project design together with Egyptian Government officials.

As a result of these efforts an AID assistance project is now taking shape.

This project will have several major elements: (1) training, (2) a loan fund for farmers, (3) construction of a hatchery-research-extension center, (4) construction or improvement of several additional freshwater hatcheries, (5) assistance with mullet collection, distribution, and hatchery facilities and equipment, and (6) specialized technical assistance through the new center to facilitate program development.

Training will include both long-term and short-term training overseas and a series of short courses and seminars in Egypt. Although a small core of well-trained and experienced biologists exists, there is a need to expand this group considerably to strengthen the country's applied research and extension capabilities if rapid growth of the new industry is to occur.

A grant to the Ministry of Agriculture will be used as a revolving loan fund at concessionary rates to provide capital for small farmers who wish to build fish ponds. Leases of small plots of untillable government land will be arranged for individuals who want to begin raising fish, but have no land. Assistance from personnel at the new aquaculture center will be provided through the extension program, and working demonstrations will be conducted by the center. Fingerlings will be reared at both existing and new hatcheries for sale to farmers, and farmers will be encouraged to rear their own tilapia and carp fingerlings.

The new aquaculture center at Abbassa, in addition to its hatchery and extension role, will be a focal point for applied research on aquaculture and on fish processing, and for training of scientists. The adaptive research needed to assure continual maturation and refinement of the Egyptian aquaculture industry will take place at this center. A team of U.S. experts will assist with the development of Egyptian skills at the center.

One of the most important aspects of this whole development activity involving many donors and several government agencies is the Ministry of Agriculture's actions to plan, coordinate and administer the program. This development will require unusual talents and capabilities and the

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Due to rising costs of marine products, development plans for the next few years are to intensify production of fish from inland waters. This will be done through:

1. Stocking of natural waters and initiating development of new freshwater ponds and brackishwater aquaculture in lagoons;

2. Producing fry from the fisheries stations for aquaculture activities and stocking the natural waters; and

3. Helping fishermen put up their huts and procure boats and nets.

To fill the demand for fingerlings, there are two large freshwater stations located at nearby reservoirs: one in Uda Walawe, established by the Chinese, and the other in Polonnaruwa. The function of the former is to breed mirror carps and Chinese carps for stocking in the reservoir. The station in Polonnaruwa produces *T. mossambica*, some common carp, and gourami. Unfortunately, this station was badly damaged by the November 24 cyclone that hit Sri Lanka.

Aside from the station at Polonnaruwa, five other stations exist or are being developed to produce fry of common carp, *T. mossambica*, and *T. nilotica*. In addition, these stations also receive fry and fingerlings from the Uda Walawe station for holding and stocking in reservoirs.

The only brackishwater fisheries station is located at Pitipana, Negombo. It is presently being improved after having been neglected for years. Its main activities are to gather statistics from catches in lagoons and collect fry for raising to fingerling size for distribution to small-pond owners. The species and number of fry collected from January 1978 to November 1978 were:

Fry of mullet and milkfish were reported to be abundant in some areas of the country.

<i>Mugil cephalus</i> (mullet)	138,000
<i>Chanos chanos</i> (milkfish)	235,000
<i>Etroplus suratensis</i>	24,000 (from breeding pond)
<i>Tilapia mossambica</i>	35,200 (from breeding pond)

Summary

In India, the research and extension efforts in inland fisheries and aquaculture are toward production of fry of Indian major carps and Chinese carps, as well as culture of fishes in ponds, lakes, reservoirs, estuaries and rivers. Emphasis in brackishwater fisheries is on prawns and mullets. Along with these activities is the nationwide trial and adoption of polyculture of the major Indian and Chinese carps and the culture of air-breathing species.

In Nepal, a landlocked country, fisheries are concentrated in small freshwater ponds and natural waters. Emphasis is on extensive development of ponds and lake/reservoir aquaculture integrated with animal husbandry. Paddy-cum-fish culture is also being encouraged. Indian major carps and Chinese carps are the principal species cultured. Tilapia is not being imported into the country because it might not be compatible with locally desired species.

Sri Lanka may be said to be in the

same state of fisheries development as Nepal. Development of its inland water resources was delayed or neglected because of its enormous supply of fish from marine sources. Freshwater reservoir fisheries are much larger and more advanced than brackishwater fisheries. Intensified production from brackish waters is planned.

Chinese carps, common carp, tilapia and some local species are cultured in freshwater, whereas mullet and milkfish are cultured in brackishwater.

Tan Investigates Potential of Carp Culture

Dr. Eddy S. P. Tan of the Department of Biological Sciences, Universiti Sains Malaysia, is currently investigating potential of local riverine carps as species for culture systems in riverine areas where these fish are a valuable source of animal protein and an important source of supplementary income. His research is being undertaken with the cooperation of the Pahang State Government and the Department of Wildlife and National Parks.

Carps being studied include *Leptobarbus hoeveni*, *Tor tambroides*, *Puntius bulu*, *Puntius daruhani*, and *Probarbus jullieni*. Basic

biology of these species has already been investigated, so an assessment of the seasonal availability of fry of selected riverine species is currently being planned to evaluate the possibility of restocking programs for rivers within Malaysia's National Park, as well as for culture purposes by the rural population. When fish of breeding size become available, an induced breeding program will be initiated.

For further information, contact Dr. Tan at the Universiti Sains Malaysia, Department of Biological Sciences, Penang, Malaysia.

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Ministry is presently assembling an interagency coordination and management body as well as taking necessary organizational steps to address this task. The Ministry of Agriculture is to be commended for this ambitious and aggressive undertaking which can add in a very meaningful way to the future animal protein needs of Egypt.