Potential for an Aquaculture Industry in Trinidad and Tobago

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INTRODUCTION

Aquaculture development in Trinidad and Tobago has been limited to tropical aquarium fish. Earlier attempts to develop a food production industry using Tilapia failed, due to a lack of sustained effort by the agencies concerned and poor marketing techniques. We are well aware that aquaculture is rapidly becoming established as a viable industry in many areas of the world and especially in third world countries. We are aware also that agriculture is on the decline in Trinidad and Tobago. It is believed that the boom in the oil industry created a high cash flow making foreign food products more affordable than producing food locally. In addition, available skilled manpower for the agricultural industry has been declining as labor moved in the direction of an expanding industrial base.

Recognizing that in the long term this country must aim for self-sufficiency in food production, it was felt that efforts must be directed now to the revitalization of the local food production industry. This is especially so since in recent years the country has experienced an increasing demand for food, and with an annual growth rate of approximately 3%, it is reasonable to expect that this demand would increase in the future. At present, these increasing demands are being met by increasing imports, which clearly is a short-term solution. In the long term, the solution for satisfying the population's growing demands for food lies not in increasing imports but in boosting domestic food production.

One area in which food production could be revitalized is in fish and shellfish culture. In 1979 fish and fish products comprised 3.4% of the country's total food imports. Trinidad and Tobago and other Caribbean territories are traditionally fish-eating societies. The annual per capita consumption of fish in Trinidad and Tobago is a little over 14.5 kg per person while the annual consumption of about 17.5 million kg exceeds the domestic production of 9.3 million kg. On considering that the populations of most of our commercial aquatic species are on the decline due to heavy exploitation and increasing pollution, it appears opportune for the development of an aquaculture industry locally. Not only will this assist with meeting the country's food requirements, but it would also contribute towards reducing the current pressures on the wild stocks.

Recognizing this, the Institute of Marine Affairs, in cooperation with the Ministry of Agriculture, Lands and Food Production and the Zoology Department of the University of the West Indies, embarked on a strategy for introducing aquaculture as an acceptable and viable food production system in

Trinidad and Tobago. Further recognizing that little was known about aquaculture and its potential locally, it was decided that the first step would be the convening of a seminar which would examine the potential locally in the light of aquaculture operations elsewhere in the Caribbean region, where this food production system has already made significant advances. The major objectives of the seminar were to: (1) Develop an awareness of, and to define, the opportunities for the development of aquaculture as a viable industry in Trinidad and Tobago; (2) Examine the environmental and economic potential which exist for such an industry in this country, and (3) Examine suitable species with potential for culture locally.

Participation in the seminar was open to all interested parties since it was recognized that for aquaculture to be developed successfully there is needed a collaborative approach by researchers, financiers, extension officers, farmers and food purveyors among others.

AQUACULTURE POTENTIAL

The Environment

The seminar concluded that while certain fresh water and marine areas were polluted to varying degrees and as such would pose problems to successful aquaculture development, Trinidad and Tobago did in fact possess under-utilized land and water resources which could be diverted to aquaculture usage, and which if properly managed would not cause any significant disturbance to the ecology.

The marine environment is generally healthy, except perhaps for the Gulf of Paria, which suffers some pollution from oil and other industrial wastes. The Trinidad east coast suffers from a tar ball pollution problem, while the remainder of the coastal areas of Trinidad and Tobago are relatively free from pollution. Unfortunately, most of these areas are exposed to heavy seas which would eliminate most conventional aquaculture techniques. However, potential exists in some of the more protected Trinidad north coast bays and in Tobago at Man-O-War Bay, Bloody Bay and the Bon Accord Lagoon (Fig. 1).

Of the brackish water areas available, most of the more extensive areas are polluted to some extent; however the southern half of the Caroni swamp and the South Oropouche swamp still have good water quality. Extensive areas of unpolluted fresh water swamps are available at Nariva in the east and Los Blanquizales in the southwest. Rivers and streams draining the Gulf of Paria watersheds are unsuitable for aquaculture purposes since they suffer varying degrees of pollution. However, good quality water is available in adequate supply in rivers draining the eastern and northern watersheds of Trinidad, and in all areas of Tobago, though availability is limited there.

Twenty indigenous species of fish and shellfish were identified which possess potential for cultivation. Some of these already have fully developed, commercially proven culture techniques elsewhere, while some are at the developmental stages and others remain to be examined in more detail. The in-

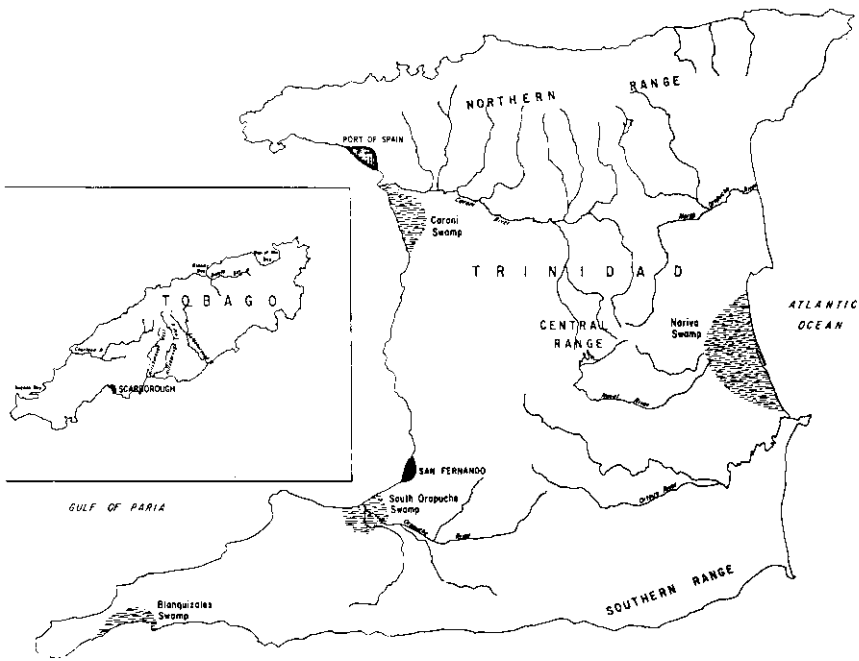

Figure 1. Areas with environmental potential for aquaculture.

troduction of non-native species is currently undesirable due to the potentially serious ecological risks involved.

Fresh Water Species

Some of the more attractive fresh water species are listed below.

Tilapia was introduced in Trinidad from South East Asia in the late 1940's. Wild populations flourish in the region of the Caroni swamp. This species can be intensively cultured in ponds, but is agreeable to extensive culturing also. However, this species has not been able to catch the imagination of the consumer locally, and would thus require careful marketing. It may be possible to increase its acceptability by growing it to larger sizes, processing and packaging it as fillets or steaks.

Another species with promising potential is the armored catfish, the cascadura (*Hoplosternum littorale*). This fish is a local delicacy whose wild populations have been severely depleted. The fish thrives in the Caroni and Nariva swamps. Its ability to tolerate stagnant water, breathe air, and reach marketable size in 1 year gives this species considerable potential for culture locally, both intensively and extensively.

Two other species, *Corydoras aeneus* (puipui) and *Hypostomas robinii* (teta), are in high demand by aquarists in North America and Europe. Both are found throughout the country except in the streams which drain to the Caribbean Sea. The ready market for these species makes culturing especially attractive.

The fresh water prawns of Trinidad, though small with the possible exception of *Macrobrachium carcinus*, are eagerly sought after by the local population. Breeding in captivity has not yet been achieved in Trinidad but appears feasible.

Marine Species

Mullets (*Mugil* spp.) of which there are several species locally, are an attractive group for culture due to their tolerance to varying salinities, diverse feeding habits and excellent eating qualities. However, little is known about the biology of local species. Snappers (*Lutjanus* spp.) are species in high demand locally and could prove with adequate research, a valuable species to culture. However, their biology is not thoroughly known, nor is there much information available on snapper culture.

The black conch (*Melongena melongena*), is another species which is avidly sought after locally. Short larval life stages make this species attractive for culture. The queen conch (*Strombus gigas*), found mostly in Tobago, is in high demand. In fact, its populations in Tobago have been severely decimated. High market demand makes this species worthwhile examining. The Mangrove Oyster (*Crassostrea rhizophorae*) once abundant in the swamps, has been so heavily exploited that few can be found in the swamps today. Culture techniques have been worked out elsewhere and some of these may be directly transferable to Trinidad and Tobago.

Shrimps of the genus *Penaeus* are of high commercial significance locally and support large commercial shrimp fisheries. The high market value and demand, plus the development of transferable culture techniques elsewhere, makes culturing especially attractive.

Economics and Marketing

Aquaculture offers tremendous potential to the investor in the Caribbean, and some of this potential is being realized in Panama, Costa Rica, Cuba and Jamaica, among other places. The Caribbean Development Bank is enthusiastic about aquaculture development in the Commonwealth Caribbean, and is in the process of recruiting a team of consultants to carry out site selection studies. Trinidad and Tobago is one of the areas earmarked for study. Based on their recommendations, there is an indication that funds would be made available for aquaculture development in certain areas.

The Caribbean Food Corporation has also expressed an interest in investing in aquaculture development, while locally the Agricultural Development Bank and the Republic Bank of Trinidad and Tobago (formerly Barclays Bank Ltd.) have indicated that funds are available for aquaculture projects. They have indicated, however, that these funds are not for research purposes but for farming activities.

Coupled with this interest by investors is the fact that Trinidad and Tobago does have a large local market for fish and shellfish because of its relatively high per capita consumption. Farmed species of shrimp, oysters, cascadura and redfish would find a ready market, while there would be need for developing marketing strategies for less desirable species. Export possibilities for

high value species, such as shrimps and oysters, are quite good due to high demands internationally.

CONCLUSIONS AND RECOMMENDATIONS

The seminar concluded that Trinidad and Tobago does have considerable potential for aquaculture development, and that the following favorable conditions exist in the country: (1) Capital availability—the financial resources are available from several sources for scientific and technical expertise, land and equipment acquisition, building facilities, labor, brood stocks and feed, among other things; (2) Natural resources—there exist good unpolluted sources of water, suitable land areas, appropriate species for culture, labor and available markets.

The following recommendations were also made: (1) Regional cooperation—Trinidad and Tobago should establish regional liaison to promote a cooperative effort towards aquaculture development. While this may prove difficult at the political level, it was felt that contacts at the researcher and institutional levels could prove very fruitful, especially in relation to exchange of information, technical assistance and other resources. (2) Government support—for most ventures to succeed, strong government support is required, and aquaculture is no exception. Trinidad and Tobago should promote aquaculture development through the proposed Fisheries Plan of the Ministry of Agriculture, Lands and Food Production. In addition, Government should set aside appropriate land areas and promote the culturing of local species which have already been successfully cultured elsewhere in the region. (3) Education—the concept of aquaculture should be spread locally through an educational program which would make possible an understanding and appreciation of the potential value of aquaculture. (4) Pilot operations—small-scale pilot farms should be established by the Government (Ministry of Agriculture, Lands and Food Production) and private investors to demonstrate the commercial viability of aquaculture as a food production system. The success of small-scale operations could provide the stimulus for large-scale production. (5) Research and development—emphasis must be placed on the long-term development of this food production system. This would require the establishment of research and development programs. Such programs should not only look at scientific and technical problems, but also at the social and economic situation. Training programs should also be developed to provide trained personnel required for such an industry. (6) Aquaculture committee—a joint aquaculture planning committee should be formed comprising researchers, extension officers, financiers and farmers. This committee would be charged with the responsibility for examining the situation locally with the objective of advising on how this country should embark on the development of an aquaculture industry.