

**Recommendations by The Aquaculture Task Force—
Presented to Hon. Gilberto Rivera Ortiz
President, Senate Consumer Affairs Commission
Commonwealth of Puerto Rico
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INTRODUCTION

The demand for fisheries products is high in Puerto Rico. Average annual consumption is about 69 million pounds or 20 pounds per person. Interest among consumers is rising as a result of promotional efforts, the nutritional benefits of seafood, and changes in patterns of income. At present, only 5 percent of the seafood (3.5 million pounds) is provided by local fisheries, the rest being imported as fresh, frozen, or processed products.

The government of Puerto Rico should look for alternatives to meet this high demand for fisheries products. Aquaculture, the farming and husbandry of freshwater and marine organisms, offers the best alternative. This industry can supplement production of seafood without diminishing the natural fish or shellfish populations, and can provide new employment opportunities for Puerto Rico. For example, with year-round growing seasons available, 8,000 to 10,000 pounds per acre of tilapia can be produced annually in grow out ponds. Consequently, less than 1,000 acres of grow out ponds could more than double the present fisheries production.

World total production of fish, crustaceans, and molluscs from aquaculture in 1984 is estimated to have been nearly 8.9 million metric tons. With algae and aquatic plants added, the world harvest probably exceeded 11 metric tons. By the year 2000 the total production of aquaculture is expected to reach 22.2 million metric tons. Aquaculture may be adapted to a variety of locations and circumstances in Puerto Rico. Ponds and large reservoirs are widespread in inland areas. Many lands which are unsuitable or marginal for conventional agriculture can be used for aquaculture. Additionally, many areas in bays or other sheltered coastal regions are appropriate for aquaculture. In these various environments, a number of species of fish and shellfish can presently be cultured or have a high potential for culture in the future.

Aquaculture can be successful for small- or large-scale operations. Therefore, aquaculture has a tremendous appeal to public and private interests. When viewed as a whole, aquaculture involves many activities and employment opportunities which range from the growing, processing, and marketing to

consumption of the final product.

The rate of aquaculture development in Puerto Rico can be accelerated by implementation of the recommendations hereby proposed and through the coordinated use of resources. This will require the appropriate timing and scheduling of activities as well as provisions for long-range direction and support. The goal of aquaculture development, together with its objectives, policies, and recommended actions, offers guidelines for the expansion of the private and public sectors of the industry.

PREAMBLE

Aquaculture can contribute to the attainment of several widely recognized Commonwealth objectives, including:

- Provision of more, and a diverse range of employment opportunities.
- Diversification of the economy of Puerto Rico.
- Greater self-reliance in food supply by replacing imports with locally farmed aquatic products.
- Improvement of the balance of trade by increasing exports of aquatic products.
- Promotion of the use of unutilized and under utilized land and water resources.
- Enhancement of scientific and technological development through research.
- Enhancement of the Commonwealth's quality of life, involving economic, social, cultural, and environmental components, by the wise use of Puerto Rico's human and natural resources.

POLICY STATEMENT

It shall be the Public Policy of the Commonwealth of Puerto Rico to develop aquaculture as a major economic activity and establish the Commonwealth as an International Center of aquaculture expertise in the Caribbean.

OBJECTIVES

Implementation of the aquaculture policy will require the attainment of several objectives. Six broad objectives targeted at expanding the rate of growth in commercial aquaculture production and supporting aquaculture research, training and technology transfer are listed below. The objectives, underscored by key-word subject areas, meet the needs of both the public and private sectors.

1. Achieve a comprehensive and unified approach to support aquaculture and aquaculture-related activities to ensure that Puerto Rico and its

- people derive maximum economic and social benefits.
2. Improve the business climate for commercial aquaculture operations.
 3. Identify new economic opportunities in aquaculture which make wide use of Puerto Rico's human and natural resources. In addition, aquaculture must provide opportunities for the development of numerous complementary industries and services, which have a significant multiplying effect on employment.
 4. Achieve leadership and excellence in international aquaculture research and development, training, and technology transfer.
 5. Provide a wide range of local opportunities in vocational training and formal education at all levels to meet the needs of Puerto Rico's aquaculture industry.
 6. Establish Puerto Rico as a Caribbean and Latin American center for the collection and dissemination of tropical aquaculture information.

Each objective is presented and followed by a statement of rationale and a set of recommended policies that provide long-term guidance on how to achieve the objective. The policies, in turn, are followed by a series of recommended actions.

Objective 1: Comprehensive and Unified Approach

Achieve a comprehensive and unified approach to support aquaculture and aquaculture-related activities to ensure that Puerto Rico and its people derive maximum economic and social benefits.

Rationale

In order to achieve the goal of accelerated aquaculture development through the wise use of Puerto Rico's resources, it is important to develop mechanisms which can produce a focal point of planning, coordination, accountability, and visibility. Moreover, the recommended actions require a high degree of interaction and coordination and stress the necessity of multiple use of personnel and facilities. The present situation does not permit effective implementation of the recommendations without some consolidation and the establishment of formalized relationships among the various government agencies.

Policies

- a. Encourage the formation of mechanisms that will provide unified, timely, and efficient responses to aquaculture needs.
- b. Encourage effective governmental interaction to ensure the timely implementation of aquaculture developmental activities.
- c. Encourage Commonwealth efforts to provide adequate funding for government programs needed to facilitate the development of

aquaculture.

- d. Encourage a high degree of interaction among commercial producers to provide feedback to the government to ensure that aquaculture activities supported by the Commonwealth are responsive to industry needs.

Recommended Actions

- a. Establish an Interagency Commission on Aquaculture to serve as a mechanism to ensure public policy implementation and to advise the Governor.
- b. Assign responsibilities for aquaculture development to either CODREMAR, the Puerto Rico Department of Natural Resources, the Puerto Rico Department of Agriculture, or to any appropriate agency which can best promote the development of aquaculture in Puerto Rico as the Lead Agency to coordinate and implement the actions recommended in this report.
- c. Develop a mechanism within the lead agency, similar to that of the Puerto Rico Economic Development Administration, to handle procedures in a single stop, since there are a number of agencies dealing with permits and regulations for the establishment of aquacultural activities. This mechanism will avoid problems associated with duplication and multiplicity.
- d. To discard the five-year budget plan presented in CODREMAR's Aquaculture Development Master Plan for Puerto Rico, and present a new, realistic budget to the Bureau of the Budget based upon recommendations of the agencies concerned with the development of aquaculture. This budget for aquaculture should provide funds to the lead agency to develop educational programs, finance research, provide loans and loan guarantees, and assist business development.
- e. Include aquaculture in all water and land management programs for Puerto Rico.
- f. Actively pursue international, federal, and private funds to share the cost to the Commonwealth of developing aquaculture in Puerto Rico.
- g. Promote the participation of municipal governments in the development and support of aquaculture, through the use of municipal funds and administrative assistance.
- h. Establish cooperative programs in research and extension that maximize the available human and technical resources of the agencies involved.
- i. Appropriate funds to the University of Puerto Rico and other qualified institutions for the construction and maintenance of experimental research and training facilities, including freshwater and saltwater experimental ponds, laboratories, and classrooms to verify and develop the commercial aquaculture technologies for Puerto Rico.

Objective 2: Business Climate

Improve the business climate for commercial aquaculture operations.

Rationale

The term climate refers to various activities affecting the establishment of a successful aquaculture business. Commonwealth policies and the associated developmental activities can have a profound effect on this climate. The recommendations offered in this section are aimed at fostering the successful coexistence of all scales of commercial aquaculture enterprises.

Policies

- a. Reduce or remove institutional constraints to commercial aquaculture development.
- b. Help assure reasonable access to credit for commercial operations.
- c. Increase the capabilities of existing and potential commercial aquaculturists in establishing and managing operations through the provision of extension and advisory services and hatchery-produced organisms for stocking.
- d. Encourage an increased rate of expansion in aquaculture production through the provision of appropriate incentives.
- e. Provide mechanisms which contribute to the identification and reduction of risks to commercial aquaculture operations.
- f. Encourage the continued assessment of sites well-suited for commercial aquaculture, and promote public policies which specifically identify aquaculture as an alternate use of land and water resources.
- g. Encourage the provision of Commonwealth assistance to identify and develop local and export markets for Puerto Rico's cultured aquatic species.
- h. Encourage the coexistence and viability of all scales of commercial aquaculture operations.
- i. Encourage the expansion of Puerto Rico's feed industry to meet the increasing needs of aquaculture producers.

Recommended Actions

- a. Provide assistance to prospective aquaculturists regarding permit requirements for the establishment of aquaculture operations.
- b. Increase awareness and understanding among federal, Commonwealth, and municipal regulatory agencies of the activities and processes involved in aquacultural production by the dissemination of information. This will enable agencies to review applications more rapidly, effectively, and efficiently through the single stop system already

described.

- c. Provide lenders with information on the costs of construction and operation of various types of aquaculture systems.
- d. Encourage governmental promotional agencies such as the “Oficina Operacion Impacto Empresarial Agricola,” Departamento de Agricultura, to support aquaculture projects which will enhance economic and employment opportunities.
- e. Provide such support services as disease diagnosis and prevention, stocking material, water chemistry and soil analyses, as well as advice on site selection, permits, and business and pond management to existing and prospective aquaculturists as needed.
- f. Support the development of aquaculture through existing loan and loan guarantee programs.
- g. Develop a Commonwealth-funded network, similar to the one implemented by the dairy industry, to foster a joint campaign by the aquacultural community and the Commonwealth to promote “Puerto Rican Aquaculture” as an industry.
- h. Recommend that a stronger promotional effort be made by the lead agency to encourage entrepreneurs to benefit from provisions of the New Industrial Incentives Law regarding aquaculture, and of the programs and services of the Puerto Rico Department of Agriculture.
- i. Provide property tax and incoming excise tax exemptions to aquaculturists for specific periods. Widen the definition of the tools covered by these incoming excise tax exemptions to include other materials and equipment used in all stages of aquacultural operations.
- j. Encourage Commonwealth and federal agencies to provide long term leases of land, at reasonable rates, for land-based aquaculture.
- k. Provide the means of leasing public waters and bottom areas in marine and freshwater environments for aquaculture purposes.
- l. Annually review and monitor current and potential imports of aquacultural products to assess the possible impact upon the local development of aquaculture and determine a course of action.
- m. Encourage the enforcement of regulations to prohibit the use of commercial fishing gear in freshwater, thereby avoiding marketing and quality control misperceptions by consumers. The characteristics of quality and price of wild-caught species could have a negative impact on the image of aquacultural products. Research indicates that channels of distribution can be instrumental in changing consumers’ consumption patterns and achieving consumer acceptance of new products.

Objective 3: New Economic Opportunities

Identify new economic opportunities in aquaculture which makes wide use

of Puerto Rico's human and natural resources.

Rationale

Aquaculture will provide opportunities for the development of numerous complementary industries and services, which have a significant multiplying effect on employment. In order for these aquacultural opportunities in Puerto Rico to reach their full economic potential, diversity and flexibility are essential. Such flexibility should allow for the culture of many species in a variety of culture systems, consequently allowing appropriate utilization of available resources, including both freshwater and saltwater, and prime and marginal lands.

Policies

- a. Encourage the development of culture techniques for species that can substitute for imported aquatic products or which have significant potential for export.
- b. Promote the use of unutilized or underutilized land and water resources for aquaculture.
- c. Encourage aquacultural activities which contribute to both commercial and recreational fisheries.
- d. Promote the multiple use of resources by integrating aquaculture and agriculture, and by using polyculture, thereby increasing diversification, efficiency of production, and employment opportunities.

Recommended Actions

- a. Provide funds for research to develop a basic understanding of life cycles and environmental requirements of promising species.
- b. Study the potential of adapting aquacultural technologies already developed in other countries.
- c. Study the potential of enhancing natural populations of popular sport fishes through release of hatchery-reared juveniles.
- d. Encourage economic efforts, land-use, water-use, and other resource planning efforts to:
 1. Promote projects which increase the availability of water for aquaculture.
 2. Establish protective measures for areas particularly promising for aquaculture to prevent environmental and water resource degradation which could hamper the development of aquaculture in these areas.
 3. Encourage the Planning Board, Department of Natural Resources, and other concerned agencies to foster aquaculture development in areas which are not prone to frequent severe flooding; and to make evaluations on a case-by-case basis in areas which are prone to severe

flooding, since in some cases, such flooding may not represent a hazard to the success of certain aquaculture projects.

- e. Allow establishment of aquacultural activities on a case-by-case basis within conservation areas.
- f. Recommend that the Planning Board, with the input of concerned agencies, identify, secure and allocate suitable lands for aquaculture development.
- g. Support research to reduce production costs, increase yield, and develop new products forms of species currently cultured in Puerto Rico.
- h. Establish demonstration projects to increase public exposure to aquaculture, and to increase aquaculture's credibility, thereby encouraging a supportive public policy for aquaculture, through projects sponsored by public and private agencies, universities, or other suitable entities.

Objective 4: Excellence in Research and Development, Training, and Technology Transfer

Achieve leadership and excellence in international aquaculture research and development, training, and technology transfer.

Rationale

Significant opportunities exist for Puerto Rico to become a leader in international aquaculture research and development, training, and technology transfer. Its natural resources, stable government, infrastructure, and expertise are essential ingredients for success.

Policies

- a. Increase local, national, and international awareness of the advantages of Puerto Rico's geographic location, climate, resources, and long-standing ties with Caribbean and Latin American countries in research, training, and technology transfer programs.
- b. Strengthen Puerto Rico's technical resource base.
- c. Encourage the development of additional facilities.

Recommended Actions

- a. Bring aquaculture meetings, conventions, seminars, conferences, workshops, symposia, etc. to Puerto Rico and provide support for the participation of the Puerto Rican aquaculture community in off-island international meetings and training sessions.
- b. Support advanced short-term training programs and graduate programs in aquaculture, particularly through the University of Puerto Rico and other capable institutions.

- c. Develop cooperative programs with the University of Puerto Rico, other leading universities, and other organizations which would include exchanges of aquaculture specialists, and provisions for visiting professors and researchers.
- d. Consider Section 3 (Exemptions) of the Puerto Rico Industrial Incentives Law and the Special Fund thereby created to finance research and developmental projects in aquaculture. Consider also the 936 section of the U.S. Internal Revenue Code for financing joint aquaculture research, finance, and training ventures with other Caribbean Basin countries.
- e. Encourage scientific research in aquaculture and related appropriate technologies, and disseminate the results to ensure the credibility and feasibility of aquaculture in Puerto Rico.
- f. Procure funding for aquaculture research through various sources, such as municipal, Commonwealth, federal, and private funding sources.
- g. Promote joint ventures with successful aquaculture companies from other countries to facilitate research and technology transfer.

Objective 5: Vocational Training and Formal Education

Provide a wide range of local opportunities in vocational training and formal education at all levels to meet the needs of Puerto Rico's aquaculture industry.

The availability of a sufficient pool of qualified personnel for all aspects of aquaculture is fundamental to the realization of Puerto Rico's aquaculture goal. Vocational training and formal education curricula should be planned to be in harmony with the expanding needs of the industry.

Policies

- a. Encourage the development of vocational aquaculture courses and curricula.
- b. Encourage practical training of Puerto Rican technicians.

Recommended Actions

- a. Foster the development of a curriculum in vocational studies in aquaculture and marine sciences to provide a labor pool of skilled technicians.
- b. Encourage funding from the Puerto Rico Right to Work Administration and other related agencies for continuing educational programs.
- c. Develop training programs to provide ongoing assistance in the business development area of aquaculture to minimize the risk of failure due to lack of proper management.
- d. Develop interdisciplinary programs which would encourage a lateral movement of specialists in traditional disciplines in other areas of

investigation into the field of aquaculture.

- e. Have the lead agency, in coordination with other government agencies, establish a set of guidelines for vocational trainers and vocational training facilities for aquaculture in government-sponsored training programs.

Objective 6: Information Center

Establish Puerto Rico as a Caribbean and Latin American center for the collection and dissemination of tropical aquacultural information.

Rationale

The rapid rate of new technological developments in aquaculture points to the need for a mechanism to provide for the efficient collection and dissemination of information. This mechanism will contribute to the effective management of Commonwealth aquaculture developmental activities, to the improvement of the business climate, to the identification of new economic opportunities, and to the establishment of Puerto Rico's leadership and excellence in the Caribbean and Latin America.

Policies

- a. Encourage the development of formal relationships with national and international organizations for the purpose of information exchange.
- b. Promote Puerto Rico's geographic, cultural, and linguistic advantages as a focal point for information exchange.
- c. Encourage the establishment of effective mechanisms to address the information needs of both the commercial and scientific communities.

Recommended Action

Establish an aquacultural information center for compiling and exchanging information on aquaculture research and commercial development for local, national, and international entities. The Center will provide information on proposed research, early application of the most recent research results, and the application of those results on a commercial basis. Joint Commonwealth and federal and international funding of this activity must be actively pursued.

Addendum: Follow-up and Maintenance of Effort

Recommended Action

Establish an Interagency Commission on Aquaculture to advise the Governor; promote, supervise, and monitor the implementation of these policies; and serve as an interim informational exchange center until the proposed Information Center is established. This Commission should be vested with appropriate authority and placed under the supervision of the Governor's Special

Assistant for Economic Development. Representation of entrepreneurs, universities, and public and private funding agencies must be assured in the Commission.

APPENDIX A
Task Force on Aquaculture Members

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APPENDIX B

Demonstration projects in aquaculture may include but are not limited to the participation of the following agencies:

Commonwealth:

Agricultural Credit Corporation
Agricultural Promotion and Development Administration
Cooperative Development Administration
Corporation for the Development and Administration of the Marine,
Lacustrine, and Fluvial Resources of Puerto Rico (CODREMAR)
Correctional Enterprises Company
Department of Agriculture of Puerto Rico
Department of Commerce of Puerto Rico
Department of Consumer Affairs
Department of Education
Department of Health
Department of Labor and Human Resources
Department of Natural Resources
Department of Social Services
Economic Development Administration
Economic Development Bank
Economic Opportunity, Office of the Governor
Environmental Quality Board
Government Development Bank
Industrial Tax Exemption Office
Municipal Services Administration
Puerto Rico Commercial Company
Puerto Rico Federal Affairs Administration
Puerto Rico Industrial Development Company
Puerto Rico Land Administration
Puerto Rico Land Authority

Puerto Rico Office of Economic Opportunity
Regulations and Permits Administration
Right to Employment Administration
Rural Development Corporation
University of Puerto Rico and attached programs
Volunteer Corps of Puerto Rico

Federal:

Agency for International Development
Army Corps of Engineers
Center for Energy and Environmental Research
Economic Development administration
Environmental Protection Agency
Farmer's Home Administration
Food and Drug Administration
Small Business Administration
Soil Conservation Service
U.S. Coast Guard
U.S. Department of Agriculture
U.S. Department of Commerce
U.S. Department of Education
U.S. Department of Health and Human Resources
U.S. Geological Survey

Private:

Angel Ramos Foundation
B.P.P.R. Foundation
Chamber of Commerce
Chamber of Commercial Wholesalers
Fonalledas Foundation
Food Wholesalers, Importers and Distributors Association
Good Samaritan Foundation
Institute for Community Services
Manufacturers' Association
Private Universities
Private Business Sector
Puerto Rico Community Foundation
Smith, Kline, and French