



# What is Aquaculture?

Reginal M. Harrell, Maryland Sea Grant Extension



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## Introduction

Aquaculture is the farming and husbandry of aquatic organisms under controlled or semi-controlled conditions. These organisms may be plants, fish or shellfish — oysters, mussels, clams, shrimp, crabs, crawfish. Aquaculture is employed for a variety of ends: fish may be raised to stock public waters for sportfishing and for commercial fishing; it may be to save an endangered species; or it may be to harvest a commercially viable crop in ponds or coastal waters.

In simple terms, aquaculture is agriculture: the farmer farms the water instead of the land; depending on the species, the water may be



fresh or brackish or salty. Although aquaculture is a generic term, it generally refers to the culture of plants and animals in freshwater, while culture in saltwater is commonly known as mariculture.

The practice of culturing plants, fish and shellfish under controlled conditions goes back over 3000 years; it was practiced in China and

the Indopacific region at least 2000 years B.C. Aquaculture is the fastest growing segment of agriculture in the United States today. With consumer demand for seafood increasing and interest in aquaculture as a means for satisfying that demand, the prospects for commercial aquaculture are promising.

While aquatic farming has historically required waterfront property — a pond, river, lake or ocean — today's culturists may use tanks or raceways (long narrow tanks) where well water or surface water is pumped through the system. Some of the newest technology involves culturing the organisms in a closed loop system where most of the water

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is filtered (cleaned) and recycled instead of passed through the system. While tanks and raceways have proved to be successful economically, closed loop systems are still in a developmental stage.

### **Why Aquaculture?**

The world's oceans and rivers are fast approaching the limits of fish and shellfish production that can be harvested on a continual basis. The Chesapeake Bay, historically one of the nation's most productive bodies of water, is an all too familiar example where commercial harvests are in decline. While federal and state programs across the country are working to restore stocks in coastal waters, commercial production may still not be able to meet the increasing consumer demand. How can that demand be met? The most plausible explanation is from farming the water.

In addition to the demand for seafood, there is a growing interest in sportfishing. Many public fisheries for recreational angling have had to reduce creel limits (number of fish legally allowed to be caught per day) or have imposed seasons for catching specific species of fish. Some states have had to close fisheries completely. More people are interested in fishing than nature can support. Consequently, numerous government, state and federal agencies produce fish in hatcheries to stock public waters for sportfishing, thereby developing what is known as a put-grow-and-take fishery where small fish are stocked and allowed to grow, and then are harvested by hook and line. The lakes or rivers where fish are stocked either do not have the individual species, or the

systems cannot support adequate reproduction to meet the demand of sportfishermen. Through aquaculture, the angler could be provided with a recreational outlet that may not have been available otherwise.

Aquaculture efforts can also be used to save or restore an endangered or threatened species. These are special situations where, for various reasons, fish cannot reproduce in sufficient numbers, or the progeny do not survive well enough to maintain themselves as a population. In cases such as these, brood stock of the endangered species are spawned in hatcheries, the fry (baby fish) are reared under controlled conditions until they are big enough to fend for themselves, and are then released into the natural environment, with the goal that they will soon be able to sustain themselves naturally. One such case important to Maryland is the striped bass: not only did a state-wide moratorium protect natural stocks, a major restoration effort through hatchery introduction was implemented by state and federal

agencies. Results indicate that conservation efforts are having a positive impact.

### **Requirements for Getting Involved in Aquaculture**

Other workbooks in this series on Finfish Aquaculture and others on oyster aquaculture and crawfish culture provide details on how to get started; however, general startup requirements apply to all species.

### **Water Requirements**

Because aquaculture by definition means farming the water, water sources are crucial — depending on the species and form of culture you engage in, your water requirements will vary. Pond culture, for example, will require more water than tank culture, in which the water is recycled. Likewise, ocean ranching — the releasing of fish as juveniles for harvesting when they return as adults — requires open waters.



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## Location

Location of your operation is crucial from the perspective of the availability of water, terrain, temperature, soils, protection from the environment, such as storms in coastal areas, and other factors. If public waters are being leased, you need access to both the bottom and the water column, that region between the surface and bottom. This is especially important with open water culture such as shellfish or netpen fish culture. Ideally, location should also be close to processors and markets.

## Space

Adequate operations require room for expansion, if the economics allow. In openwater areas, you want to be sure there is enough space between your operation and adjacent facilities to eliminate confusion during harvest, or to act as a buffer zone for maximization of water quality.

## Commitment

Remember that aquaculture is an investment in time and money to farm live organisms. Unless you are willing to spend many hours a day, seven days a week, consider some other investment. This is especially true when culturing fish.

## Permits

Permits are a major concern. Many state and federal agencies require procurement of a diverse range of permits. Bear in mind that in most states, although you may own the land, the state or federal government owns the water, and to use that water, you must obtain all the proper permits. These may include propaga-



tion permits, exotic species permits, discharge permits, navigation hazard permits in open water areas, nontidal wetlands permits, and processing permits, just to name a few. Be sure you contact the state natural resources or agriculture departments for help in procuring these permits before you ever get started.

## Capital

Capital is one of the most important considerations: aquaculture operations are not inexpensive, either to construct or operate. Never consider involvement unless you have done a thorough investigation and answered the following questions sufficiently so that you can develop a sound business plan:

1. What are you producing?
2. Where will your production facilities be?
3. How will you produce your product?

4. To whom will you sell?

If you can answer these questions, you should begin to develop a business plan. Unless your proposed operation looks economically viable, you should seriously reconsider getting started.

## Summary

This publication is not designed to be comprehensive. It provides you with the basics of what aquaculture is so that you can begin taking the next steps for a more informed decision. You should, for example, read *Fish Culture in Maryland: Weighing the Pros and Cons*, #1 in the *Finfish Aquaculture Workbook* series and *Figuring Production Costs in Finfish Aquaculture*, #4 in the same series. If you are interested in obtaining more information, contact the Maryland Department of Natural Resources, the Maryland Department of Agriculture, or the Sea Grant Extension offices listed below.



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### For Further Information

Maryland Sea Grant Extension  
University of Maryland  
Wye Research and Education Center  
P.O. Box 169  
Queenstown, MD 21658  
Telephone: (410) 827-8056

Maryland Sea Grant Extension  
University of Maryland  
Horn Point Environmental  
Laboratory  
Box 775  
Cambridge, MD 21613  
Telephone: (410) 221-8475

Maryland Sea Grant Extension  
University of Maryland  
Chesapeake Biological Laboratory  
P.O. Box 38  
Solomons, MD 20688  
Telephone: (410) 326-7356

Maryland Sea Grant  
University of Maryland  
4321 Hartwick Road, Suite 300  
College Park, MD 20740  
Telephone: (301) 405-7500



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