Aquaculture and Disability

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Introduction:

So you think aquaculture is a new concept? You might be surprised to learn that the Japanese, Chinese, Romans, Egyptians, and Mayan Indians all farmed fish for food prior to 2000 BC.[1] Today, "aquaculture" is the more general term used to define the cultivation and raising of aquatic animals and plants in a controlled aquatic environment for all or part of their life cycle.[1] Another similar term, "aquaponics" is the combination of aquaculture and "hydroponics" (growing plants without soil) in a re-circulating environment.[2] This article will focus on aquaculture.

The most common cultivated fish species raised in the United States include channel catfish, rainbow trout, various types of salmon, hybrid striped bass, tilapia, and yellow perch. Numerous shellfish, shrimp, prawns, minnows for bait, and plants like water chestnuts, hyacinths, and wetland plants are also cultivated.[3] Along with this variety of plants and fish raised, different aquatic systems such as static water ponds, continuous water flow raceway/tanks, re-circulation tanks, and pens/cages can be used in aquaculture operations.

Each aquatic system has different risks associated with proper design choices, adequate investment, and operating requirements. Therefore, before starting an aquaculture operation, the prospective fish farmer or "aquaculturalist" should perform a detailed multi-stage planning process to determine the feasibility for success. For example, the aquaculturalist will need to do an economic analysis which includes total production costs and projected profits. Estimating your production costs should include everything from your initial investment (e.g., land, ponds, buildings, insurance, etc.), your product investment (e.g., fish-stock, water, food, energy, labor, etc.), to your finished product processing/shipping-to-market costs. To project profits, a market analysis should be completed before making any investment in aquaculture. Proximity to fish processing plants, live markets and understanding those markets will assist in determining the most profitable fish species. For example, catfish are typically processed locally and quick frozen, while tilapia are often shipped in live haul trucks to niche markets. Smaller operations may market catfish and rainbow trout through a "catch your own" system as another example. Keep in mind, the cost of labor for large aquaculture farms, can be the most limiting factor. A market analysis will help properly evaluate all the options that need to be considered.[1]

Looking at some of these risks in more detail can be daunting. Different species of fish have different growing seasons, different water temperature requirements, different nutritional requirements, and different tolerances to disease. Therefore, the aquaculturalist must have a detailed understanding of the fish-stock, as well as the aquatic environment. The aquatic environment refers to the available water and its

associated properties (e.g., temperature, level of oxygen, amount of pollutions, etc.). When you start to evaluate all of these conditions, you can understand why aquaculture is risky, and why aquaculture start-ups may have difficulty finding adequate financing. Financial institutions will probably require the aquaculturalist to provide detailed start-up information regarding the investment requirements and expected profitability of the aquaculture operation. Fortunately, different areas of the country have many of the costs for local aquaculture operations already documented.[4]

Aquaculture can play an important part in the world's need for more dietary protein, since fish are more "feed efficient". Fish convert feed into flesh about two times more efficiently than chickens, and five to ten times more efficiently than beef cattle.[1] However, while total U.S. meat consumption (beef, pork, and poultry) increased about 11 pounds per person between 1998 and 2002, seafood consumption increased less than a pound per person.[5] The seafood industry, which includes the aquaculture producers, will need to continue to find ways to develop and market their products. In June 2001, the United States aquaculture production contributed between 200 and 300 million edible pounds, with catfish leading the way. Four states, Mississippi, Alabama, Arkansas, and Louisiana account for 90% of that production.[5] Despite these figures, the United States still imports millions of pounds of fish for consumption, suggesting that there is a healthy market for aquaculture products.

Assistive Technology and Aquaculture

Whether you have a small indoor or a large outdoor commercial aquaculture operation, there are many tasks that need to be performed on a daily basis. Some of these tasks include managing the water levels, maintaining the proper water oxidation, replacing the fish-stock, feeding, and harvesting the fish-stock.

Depending upon your aquaculture operation, many of these tasks could be automated. For example, if your operation uses continuous water flow raceway/tanks, you may be able to automate the water level using sensors controlling the water supply with electronically controlled valves or flood-gates. For the aquaculturalist with a disability, having all these controls in an accessible building, in an easy to reach and operate location, would be preferred. The following image (fig. 1) from the Americans with Disabilities Act Accessibility Guidelines shows recommended elevator control position in relation to a wheelchair. This could be used as a guideline for locating any type of electrical controls used in the aquaculture operation.[6]

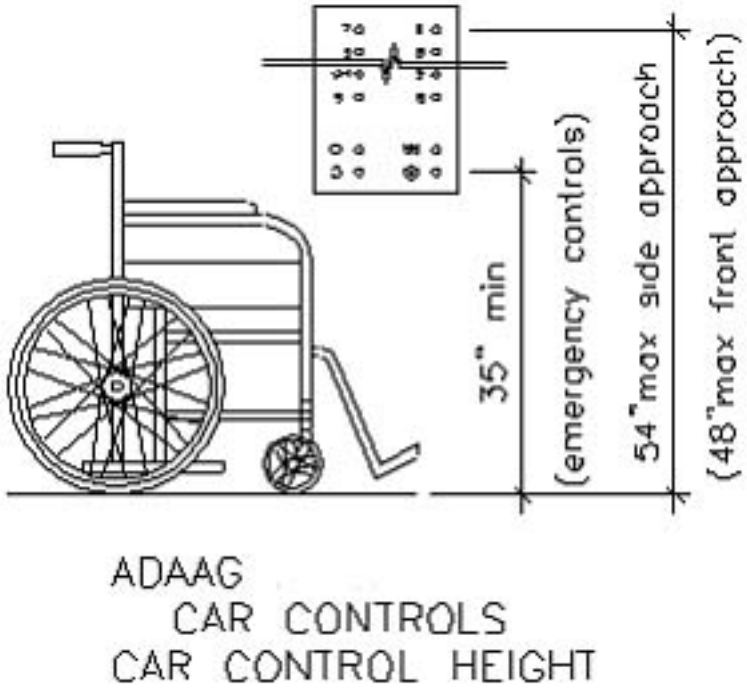

Figure 1, Diagram of a wheelchair showing the Americans with Disabilities Act Accessibility Guidelines for elevator controls height.

There is no substitute for using good engineering design when creating your aquaculture operation. If you are planning to use large static ponds, even something as simple as the type of material used for the pond bottom or the pond shore can be crucial to your success. Proper material choices and proper design can reduce the shoreline erosion from the natural waves created during aeration, feeding, or harvesting the fish.

In Mississippi, where the catfish ponds can range from 10 to 20 acres in size and the water depth may only be 3 to 5 feet, proper aeration is critical. At times, this may require the aquaculturalist get out into the pond using a boat or other flotation device. For an aquaculturalist with a mobility impairment, having a properly designed boat-dock where he/she can use a lift to get into or out of the boat may be necessary.

Getting to and from those large ponds might require using a utility vehicle or pickup truck. Most larger ponds would be laid out on relatively flat soil. If a large amount of supplies need to be hauled to and from the ponds, a pickup truck may be a better solution rather than using a utility vehicle. Depending on the aquaculturalist's disability, there are many assistive technology solutions available (e.g., extending or power seat lifts, hand controls, wheel chair lifts, lift-gate beds that can be lowered, etc.) for adapting a pickup truck (fig. 2 and 3).

Figure 2, Color picture of Access Unlimited's Easy Reach product, which extends the seat out from the pickup truck for ease of transfer from a wheelchair.

Figure 3, Black and white picture of the Monarch Mark 1-A Hand Control.

If you have a disability and are considering an aquaculture operation, you will want to do thorough research into what types of aquaculture operation best match your abilities. If you have a significant mobility issue, you may find it very difficult or impossible to harvest fish in large static ponds, where harvesting is usually done manually with nets. Hiring reliable outside help or a custom fish-harvester to seine the pond may not be a good economic decision considering the high cost of labor[1]. A better option for the aquaculturalist with a significant mobility issue might be to raise tank- or cage-raised fish rather than pond fish. Depending upon your tank- or cage-design, harvesting the fish may be as simple as draining the water or removing the cage from the water supply.

A review of all the tasks necessary in an aquaculture operation should prove very helpful prior to investing time and money in an aquaculture operation that doesn't work out for you or match your abilities. Hopefully, some of the issues presented here along with the *"Is Aquatic Farming for You"* reference listed below, which has an excellent series of checklists, will help to guide you in your decision making process.[7]

References:

[1]. Making Plans for Commercial Aquaculture in the North Central Region
http://www.aquanic.org/publicat/usda_rac/efs/ncrac/plans.pdf

[2]. Aquaponics, http://www.aquaponics.com/

[3]. Aquaculture in the United States: An Introduction to the Industry
http://www.siu.edu/~readi/aqua/factsheets/unitedstates.pdf

[4]. Costs and Returns of Catfish Pond Production in the Mississippi Black Belt Area
http://msucares.com/pubs/techbulletins/tb226.pdf

[5]. Aquaculture Outlook, Seafood Falling as Portion of Overall Livestock Consumption
http://usda.mannlib.cornell.edu/reports/erssor/livestock/ldp-aqs/2004/aqs20.pdf

[6]. Buildings and Facilities Guidelines, ADAAG
http://www.access-by-design.com/adaag/adaag1.htm

[7]. Is Aquatic Farming For You?
http://www.aquanic.org/publicat/usda_rac/efs/nrac/nrac101.pdf

Resources:

Access Unlimitted, http://www.accessunlimited.com/

Monarch Mark I-A Hand Controls, http://www.sacvans.com/products_MPS.htm

Aquaculture Network Information Center, http://www.aquanic.org/

The World Aquaculture Society, http://www.was.org/main/Default.asp

Mississippi State University Extension has several publications on Catfish, Crawfish, Tilipia, Hybrid Stripped Bass and Prawns production. Search the MSUCares Catfish/ Aquaculture Publications at: http://msucares.com/pubs/index.html