SUSTAINABLE AQUACULTURE: CONCEPTS AND PERCEPTIONS

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There have been several efforts to create a conceptual framework for understanding and defining sustainable aquaculture. A recent consensus or stakeholder view has approached sustainability from three perspectives: environmental, economic and sociological. Environmental concerns have focused on the quantity of land, water and energy used; water quality; and control of effluents. Economic issues have revolved around profitability, market demand and feeding efficiency. Sociological interests have centered on employment (jobs), local concerns such as ownership (residency) and aesthetics, and regional sources of inputs - feed, labor, money.

Often, stakeholder views are snapshot or present oriented. The multiple variables affecting sustainability and viability are considered from a here-and-now perspective rather than considering the effects that significant change in one or several variables might cause. Will the aquatic nitrogen loads generated from the sewage effluent of a growing, global human population (15 billion vs. 5 billion people) allow the discharge of any aquacultural effluents? U.S. aquaculture has a highly centralized structure with respect to production and distribution. This centralized development has flourished around an energy rich - at times extravagant - culture and economy. How will increased costs or shortages of electricity, gasoline, and diesel fuel affect the sustainability or survival of the current production system? Does a large, centralized industry provide more jobs and profit or a better quality of life (per capita) than widely dispersed, small scale operations producing at local or county levels?

Nutrient recycling (converting nitrogen back to protein) through different polyculture systems could be more practical and efficient than controlling or treating the effluent discharge associated with traditional, intensive monoculture practices. Phytoplankton and zooplankton occupy sizable respiratory (oxygen consumption) niches in the production pond environment - and have no market value. Careful selection of suitable filter feeding fish and mollusks for polyculture could open up these niches for production of species with greater economic value. It might be more desirable to culture channel catfish with paddlefish and some species of freshwater mussel than face bankruptcy because the effluents from intensive monoculture, production ponds could no longer be discharged.

Ultimately, sustainability may be the aquaculture industry's ability to adapt on a planet with an ever increasing human population which continues to consume its limited supply of non-renewable resources at an alarming rate.