WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2002HI1B

Title: Removal of nitrogenous aquaculture wastes by a wind-powered reverse osmosis system, Year 2

Project Type: Research

Focus Categories: Nitrate Contamination, Water Supply, Waste Water

Keywords: water reuse, reverse osmosis, membrane, aquaculture wastes, nitrogen

Start Date: 03/01/2002

End Date: 02/28/2003

Federal Funds: $21,300

Non-Federal Matching Funds: $42,723

Congressional District: First

Principal Investigator:
Clark Liu
University of Hawaii

Abstract

Tilapia is a major source of protein around the world. In the United States, tilapia farming is the fastest growing segment of aquaculture, and over the last year, domestic tilapia production reached 15-20 million pounds. Rapid accumulation of nitrogenous wastes is one of the major operational problems of aquaculture operation of fresh water tilapia. As a result, water in a fishpond of tilapia culture must be replaced regularly to maintain its water quality. In the mean time, wastewater from the fishpond must be treated to meet the stringent effluent water quality standards. The objective of this project is to develop and test a water circulation system for tilapia aquaculture. This system will use the wind-powered reverse osmosis process to remove nitrogenous wastes produced in a fish tank and reuse the treated wastewater as a fresh water supply. It will lead to a cost-effective and environmental-friendly aquaculture operation. In the first year (March 2001 to February 2002) research of this project a tilapia fish tank with flow control and water quality sampling devices was installed, and the water quality variation in tilapia culture, especially the accumulation of nitrogenous wastes was characterized. At this time, modification of the existing wind-powered reverse osmosis system is being conducted and will be completed by the end of February 2002. In this proposed year 2 research (March 2002 to February 2003), the following research tasks will be conducted: (1) to construct and test a closed aquaculture system of tilapia production with water circulation and reuse, (2) to conduct an economic feasibility analysis of this aquaculture system, and (3) to develop a simulation and optimization model of this wind-powered reverse osmosis nitrogen removal system.