Supporting Development of Non-Fed, Low-Trophic Aquaculture Systems to Address Food Security and Economic Growth in Coastal Communities in Africa, Asia, and Latin America

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Introduction

According to recent FAO statistics, approximately half of the world aquaculture production, including animals and aquatic plants, was achieved without the use of supplemental feeding. Feed inputs are often identified as a constraint to aquaculture expansion, especially in developing countries, making low-trophic species produced in non-fed culture systems well suited to address food insecurity and poverty. Globally, many of these low-trophic species are cultured in marine and coastal environments, dominated by macroalgae ("seaweed") and bivalve shellfish.

Sustainable bivalve and macroalgae aquaculture offers a variety of benefits to smallholder farmers and coastal communities in developing countries through the use of low-tech systems that require minimal inputs. In addition, the production of low-trophic species can also benefit the environment by providing ecosystem services. This type of aquaculture has added benefits for women, who are historically marginalized in the fisheries sector, since these species can be cultured locally with minimal investment and can provide income through the production, marketing, and sales of value-added products.

Bivalve and macroalgae aquaculture however face constraints that may limit adoption in developing countries, including: (1) lack of suitable growing environments; (2) user conflict, property rights, and resource management issues in the near-shore environment; (3) degraded water quality, especially around urban areas where demand is highest, leading to human health concerns and restricted access to markets; and (4) the lack of infrastructure preventing safe post-harvest processing, storage, and transport to markets.

The AquaFish Innovation Lab has addressed these challenges and provided opportunities for the sustainable culture of low-trophic species by developing technologies and enhancing human and institutional capacity to alleviate poverty and increase food security in coastal communities in Africa, Asia, and Latin America. This poster highlights three AquaFish Innovation Lab investigations that focus on low-trophic aquaculture systems.







Nicaragua

Co-Management and Bivalve Sanitation for Black Cockles (*Anadara* spp.)

Black cockles are an economic mainstay of many poor coastal communities in Latin America. Over-harvest and removal of mangroves led to a reduction in the cockle population. The AquaFish Innovation Lab conducted research in Nicaragua in 2009 to achieve the following objectives:

- Determine cockle population densities and size distribution within and outside community-supported no-take zones
- Work with local Aserradores communities to support grass-roots shellfish management efforts
- Conduct outreach to other communities to initiate similar efforts and work with government agencies to expand the adoption of science-based shellfish management.

Four no-take zones (25.56 ha total) within the Aserradores Estuary were chosen, managed and monitored with direct participation by cockle collectors. After five years of monitoring, results indicate that cockle populations increased significantly both inside the no-take zones and in adjacent areas.

Project outcomes included:

- Establishment of no-take zones led to increased cockle population densities
- Increased collaboration between academic and government institutions
- Development of a solar-powered shellfish depuration center in Aserradores.

Tanzania

Spat Collection and Nursery Methods for Shellfish Culture by Women

Zanzibar is a site for innovative work that combines aquaculture development with coastal fisheries management to promote alternative livelihoods. Bivalve shellfish are an important source of protein and micronutrients for women and children, and also serve as the main source of income for women in this region. However, obtaining quality shellfish seed in a sustainable manner has been a longstanding obstacle to the development of small shellfish farms in the region.

The AquaFish Innovation Lab shellfish research objectives in Zanzibar include:

- Develop a small-scale bivalve culture industry for women in Zanzibar
- Improve spat collection techniques and provide training in bivalve shellfish culture methods
- Increase food security and family income with women as primary participants.

Ongoing training activities on spat collection and nursery methods for pearl oyster culture in Zanzibar empowered women, allowing them to earn income from pearl sales, improve household livelihoods, and reinvest in small businesses. Many of these women are now training others in sustainable spat collection techniques, increasing the knowledge-base of the community, and supporting the longevity of the local pearl oyster industry.

Indonesia

Value Chain Analysis of Seaweed in Aceh, Indonesia

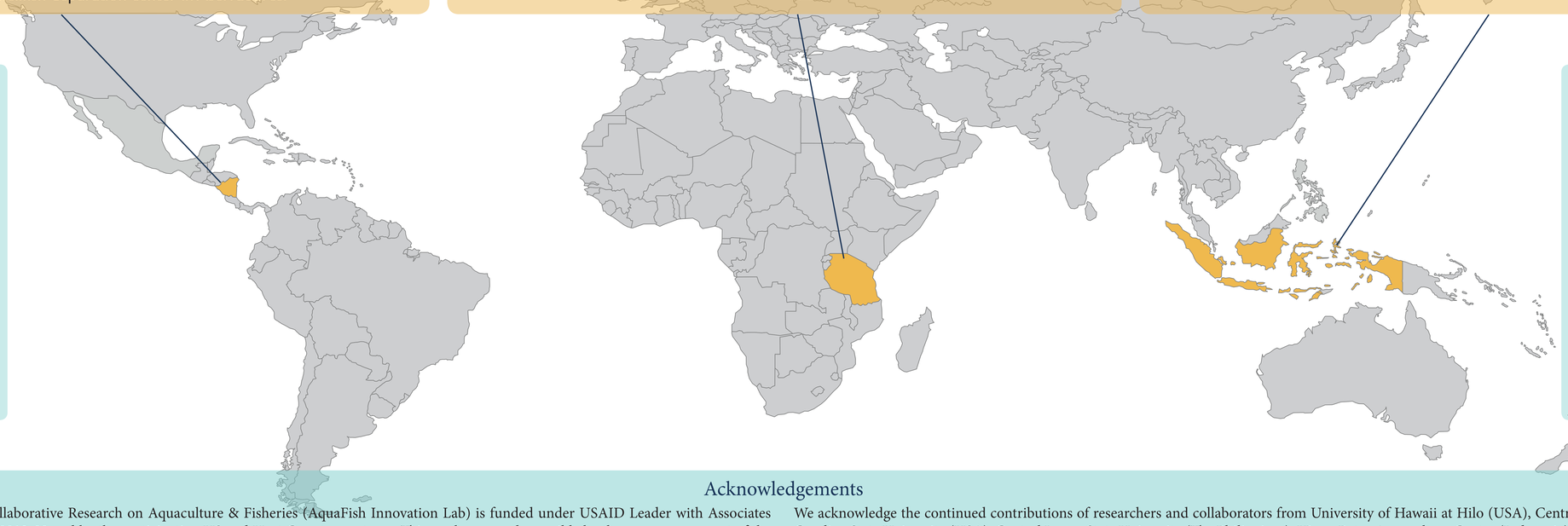
Seaweed is an important aquaculture product in Indonesia, providing livelihood and employment activities to fisher folks in small, coastal communities. AquaFish conducted research in 2009 to:

- Describe and evaluate the existing value chain of seaweed production in Aceh, Indonesia
- Develop recommendations to improve local system efficiency and participation of small- scale seaweed polyculture producers in Aceh, Indonesia.

Primary data on the roles of key players within the seaweed value chain system were obtained through surveys, key informant interviews, and focus group discussions. Key players are seaweed farmers, collectors (or assemblers), interregional shippers/traders, and provincial/regional processors and exporters.

Recommendations in support of the Indonesian seaweed culture industry include:

- Establishment of more seaweed laboratories, nurseries, and cluster-based post-harvest facilities
- Creation of an accreditation program for seaweed processors and manufacturers of end-products
- Increase capacity-building of key players and enhance technology transfer
- Increase access to capital for facility improvements along the value chain.



Benefits to Smallholder Farmers

- Increased food security and employment
- Production of a nutritional source of protein, omega-3 fatty acids, and micronutrients
- Reduced need for inputs (such as feed and fertilizer)
- Use of simple, low-tech production systems

Ecosystem Services

- Low environmental impact
- Turbidity reduction by filtration
- Biodeposition of organics
- Sequestration of carbon
- Creation of structural habitat
- Habitat and shoreline stabilization
- Nutrient uptake

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