

OUTREACH TO INCREASE EFFICIENCY OF AQUACULTURE IN NEPAL

ASIA PROJECT: NEPAL

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Human Nutrition and Human Health Impacts of Aquaculture/Activity/16HHI03UM

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Objectives

1. To expand outreach on school ponds in villages, including provision of water quality testing kits for schools, expansion of school ponds to at least two additional communities, and outreach on aquaculture in general to the communities near our target schools.
2. To conduct surveys to determine recent changes in fish culture practices in rural areas of Nepal and the sources of information that led to these changes.

Significance

Research is critical in determining best practices and possible variations in aquaculture systems throughout the world and how they might adapt to local culture and conditions (Diana, 2012). However, research alone cannot be effective in changing paradigms in aquaculture communities. Outreach of research results and social interactions to advise local communities are also important in changing aquaculture systems to become more sustainable and more profitable (Diana et al., 2013). Such outreach can target key groups to begin education, with the ultimate goal of local practitioners helping each other improve their aquaculture systems. For aquaculture, direct outreach by government or non-government organizations is one effective tool, but organic spread of knowledge from practitioner to practitioner is at least equally effective (Tain and Diana, 2007).

Women play an integral role in the aquaculture and fisheries sectors all over the world. Although women's roles and responsibilities are changing in some countries, there are constraints that limit female participation in aquaculture (Egna et al., 2012). A few such constraints women face in aquaculture and fisheries are time availability and allocation, land ownership and access to water, credit, training, and labor. Lack of training opportunities can trap women in vulnerable and poorly paid positions with no prospects of advancement (FAO, 1998).

Nepal has diverse agro-climatic and socio-economic characteristics, but suffers from limited communication and transportation networks. Most Nepalese live in rural areas at subsistence or near subsistence level. Most of the protein consumed by the rural population comes from cereal grains. Cereal proteins are generally deficient in one or more essential amino acids and are not complete sources of protein unless taken with other protein sources. An additional concern is that people have a habit of consuming only one cereal grain at a time in Nepal. People in the Terai eat more rice, while those in the hills consume more corn. This tends to make their diets unbalanced in nutritional content. However, this diet may be made nutritionally superior by supplementing it with fish.

We developed a project using school ponds and education on the nutritional value and methods of aquaculture to help young people understand the value of fish production and consumption for their

families (Jha et al., 2016a). While many Nepalese attend school, most have only a primary school education, and about 68% of women are illiterate. Therefore, training must take these limitations into account, while still providing for information exchange (Kloebler, 2011). Schools remain the center for learning in a community. Having ponds in the schools produced a practical, hands-on message to the local population that fish are an important constituent to boost nutrition and, hence, residents became encouraged to build fish ponds of their own. This also helps build the capacity of teachers who could spread knowledge on the importance of fish in nutrition to parents during teacher-parent interactions, as well as educating students and adults on issues of environmental sustainability and nutrition.

We consider the results of our school pond project a great success. The construction and operation of these ponds was a very exciting event for the school communities. Often, a number of adults attended events such as stocking and harvesting, as well as visits during our training exercises. In fact, the ponds were so popular, some neighboring farmers constructed similar ponds within a few months of our school pond construction, and the local people wanted advice and materials to construct a community pond on school property. Pre- and post-training evaluation demonstrated that there was a significant increase in knowledge of the students about aquaculture, with a median grade of <40% on the pre-test and of 61-80% on the post-test. Initial knowledge about the nutritive value and production system of fish was very poor, but by the end of the training, the knowledge of students on fish production and nutritive value of fish was significantly increased.

The school pond project, in addition to our earlier project on household ponds in rural communities, have both led to dramatically increasing interest in initiating aquaculture by local people, as well as expanding the program to other schools. We believe a project to continue outreach on school and household ponds and to advise local communities on aquaculture would continue to spread this knowledge and increase food production to poor rural communities. One objective of this proposal is to continue outreach on aquaculture to our target communities to further enhance our previous educational activities.

Since various outreach activities have been a major component of our work in Nepal, we believe it is time to evaluate the relative success of these activities. For this component, we intend to focus on locations where people have received training or on-farm experiments to improve local fish culture. These locations include the school pond communities, locations where we have conducted periphyton enhancement projects, and locations where we have helped in construction of household ponds. For these areas, we intend to conduct a survey to determine how many of our innovations have been included in the common culture practices of local people. We realize farmers may not easily implement changes in practice completely, but may make modifications to their production systems based on how they perceive the practice to improve their yield or profit. Hence, the third objective of this project is to complete a survey to determine recent changes in fish culture practices and sources of information that led to these changes in several of our target communities.

Quantified Anticipated Benefits

We anticipate that at least 2 new school ponds will be built, 40 more students will be educated on the methods of fish farming, and 20 more women will receive training in fish farming and its role in household health. Finally, we believe our survey results will help identify successes in our fish culture experiments and help coordinate future outreach activities in Nepal.

Training of 40 students and 20 adult women through school pond programs at 2 schools. Added training on research techniques for at least five university students in Nepal.

Research Design and Activity Plan

Location

Public schools will be selected from schools requesting to add ponds to their facilities, most likely in the same areas as our previous pond program.

Methods

- 1 *School Ponds:*
 - 1.1 A 200 m² pond will be establishment for two schools.
 - 1.2 Carps and tilapia will be stocked in each pond and the materials necessary to grow them will be provided to each school system.
 - 1.3 School students and teachers will receive regular training about pond construction and farming activities.
 - 1.4 Focal educational activities include: fish pond design; fish farming, including feeding, fertilizing, growing and handling fish; and nutrition education, including fish cooking and eating.
 - 1.5 Each school in the program (including the four already possessing fish ponds) will receive basic water quality testing kits for incorporation in their teaching. Kits will include simple HACH tests for dissolved oxygen, alkalinity, and pH as well as Secchi disks and thermometers. Sufficient chemical supplies will be provided to continue service of these kits for at least 4 years.
 - 1.6 Informal education activities include forming a women's fish farming group.
 - 1.7 Two meetings and discussions on fish farming will be held with groups of women established at each new school.
 - 1.8 Topics on fish farming will be extended, including managing pond depth, pond preparation, species choice, water color, fertilizing, feeding, growing, and harvesting of fish.
 - 1.9 Topics on health and nutrition will also be extended, including fish preparation and the value of regular consumption.
2. *Outreach Survey:*
 - 2.1 Four locations will be selected where various aquaculture enhancement programs have been conducted.
 - 2.2 A survey instrument will be developed and submitted for IRB approval.
 - 2.3 Surveys will be conducted at 50 households with ponds in each location.
 - 2.4 Statistical Design, Null Hypothesis, Statistical Analysis: no improvements will have been implemented in pond culture among communities. Improvements identified will not be a component of material extended in outreach projects to the communities. Statistical analysis: Chi square.

Trainings and Deliverables

- Training: About 40 secondary school students will learn about aquaculture through our curriculum and school pond program.
Approximately 20 women will learn about aquaculture and its role in household nutrition through our new women's groups at the same 2 schools.
Five undergraduate or graduate students will learn about extension and training through involvement in this project.
- Deliverables: New school ponds at two locations yet to be determined.
A survey questionnaire about success of various aquaculture extension done through AquaFish in Nepal.
One fact sheet on school ponds.

Research Project Investigations: Human Nutrition and Human Health Impacts of Aquaculture

Schedule

Establish ponds and women's groups: 1 October through 1 December 2016. Class use of ponds: 1 September 201 through 1 June 2017. Survey data collection: 1 April 2017 through 1 December 2017. Final report will be completed no later than 28 February 2018.