



Program Title: Farmer to Farmer – Aquaculture Niche Project
Grant No – 1071-20-502-3
Regions - Global

Final Report

Due to delays signing contracts and setting up accounts within the University of Arizona, we were a couple of months late starting. Please note contract signing at end of March 2010. And due to health issues with one of our volunteers and unrest in Haiti, we had a difficult time completing the last mission and went past our official end point. Also note that it was brought to our attention that New Caledonia technically is a territory or colony of France and should be considered separately from our list of approved missions. Luckily, another professor and I visited Niger and Morocco recently on an AwF mission. We are submitting these trips into the list as they were part of the AwF program and essentially equivalent to the programs from New Caledonia.

Over all the University of Arizona and Aquaculture without Frontiers have found the opportunity to contribute to the Farmer to Farmer program to be rewarding from the aspects of helping our target beneficiaries, providing additional resources and volunteers, and raising the profile of the work that AwF has been able achieve to promote sustainable aquaculture and assist the rural poor in many countries. We greatly appreciate the opportunity to gain a no cost extension to further our efforts and revisit two of earlier locations to evaluate progress and provide even more assistance to the farmers.

Please let me know if there are any additional data or information that is needed for the Final report and we will forward as soon as possible. It has been a pleasure to work with the Weidemann Associates staff and participate in the Washington DC volunteer recognition and implementers meeting last December. Since that time I have been able to assist several of our colleague implementing partners to find volunteers for their projects.

Sincerely,

A handwritten signature in black ink, appearing to read "Kevin Fitzsimmons", with a long horizontal flourish extending to the right.

Kevin Fitzsimmons, Ph.D.
Volunteer, Aquaculture without Frontiers

1. Work Plan Status

The work plan started a bit slowly due to delays in the contracting and sponsored projects offices at the University of Arizona. This is primarily a result of state budget cuts. The Weidemann Associates staff members were uniformly prompt with contracts and answering questions. We also had some delays with the final missions in Haiti due to remaining problems from the earthquake along with civil disturbances associated with the elections. However, all missions were completed by end of August 2011.

List of missions April 2010 – August 2011

Location	Project	Volunteer	Tentative dates or Completed * w/report**
1. Ranong, Thailand	Soft-shell crabs & seaweed	Kevin Fitzsimmons	April – May **
2. Trinidad & Tobago	Tilapia association	Jason Licamele	July 22 – Aug 2**
3. Banda Aceh, Indonesia	Economic sustainability	Upton Hatch	Aug 5- 15**
4. Philippines	Sustainability	Upton Hatch	Aug 15 -25*
5. Tabasco, Mexico	Fish and vegetable	Dennis McIntosh	Aug. 12-20**
6. Tabasco, Mexico	Biofloc	Traci Holstein	Sept. 4-12**
7. Dinajpur, Bangladesh	Carp hatchery and ponds	Carly Inkpen	September 16-30**
8. Ranong, Thailand	Fish and seaweeds	Kevin Fitzsimmons	September 19-30**
9. Sunderbans, India	Carp hatchery	Ray DeWandel	October 5-16**
10. Tamil Nadu, India	Fish hatchery and fish health	Michael Schwarz	April 8 – 19**
11. Kerala and Karnataka, India	Carp and tilapia culture	Kevin Fitzsimmons	January 13 – 24**
12. Mymensingh, Bangladesh	Pond culture & processing	Kevin Fitzsimmons	January 24 – February 1**
13. Philippines	Polyculture and BMP's	John Woiwode	November 25 – Dec 17**
14. Trinidad & Tobago	Aquaponics and tilapia	Eric Highfield	March 12-19**
15. Tabasco, Mexico	Tilapia and sustainable	Kelly Green	March 18 – 28 **
16. South Africa	Shellfish farming	Jeff Hetrick	March 1-10, 2011**
17. Haiti	Tilapia	John Hargreaves	April 8-16**
18. Haiti	Fish health and sustainable farming	Andrew Kane	May 8 – 18*
19. Morocco	Trout hatchery and farms	James Walworth Kevin Fitzsimmons	May 22-31**
20. Niger	Tilapia and capitan	James Walworth Kevin Fitzsimmons	May 26-29**
21. Indonesia	Seaweeds and shrimp	Dave Kudrna Kevin Fitzsimmons Upton Hatch	July 20 – 28**
22. Thailand	Soft shell crab and tilapia	Kevin Fitzsimmons	July 28 – Aug 3**
New Caledonia	Aquaponics	Jason Licamele	June 17-27 **
New Caledonia	Sustainable shrimp with sea cucumbers	Jason Licamele	December 29 - January 20**

2. Short synopsis of activities by country

1. India, We completed three (3) missions to India, two in the south and one in the north. In all three cases we coordinated with Dr. M.C. Nandeesh, current President of Aquaculture without Frontiers. We assisted and strengthened one farmer's cooperative in each location and two universities in the two southern locations (Kerala and Karnataka).

2. Bangladesh – We completed two (2) missions, with each one devoting time to projects in the Dhaka and Mymensingh areas. We were able to strengthen two groups of small scale farmers in particular. We were also able to provide a guest lecture at Bangladesh Agricultural University and visit and provide advice and recommendations to three tilapia hatcheries. We provided several recommendations to the BAU and the Bureau of Fisheries Research Institute regarding the need for aquaculture extension services. The BFRI has a strong research component including a fairly sophisticated genetics program. While the program has received credit for improved strains, many of the farmers do not know about these strains nor how to utilize them. Diversion of some resources to extension and outreach to farmers would improve this situation. I also recommended better coordination of BAU and BFRI, which are adjacent but have few programs in common. Finally, both institutions would benefit from closer coordination with the various NGO's and aid agencies supporting aquaculture. The outreach and extension has in some cases been left solely to these outside groups. While BAU and BFRI have the best connections to the fish farming community.

3. Thailand, Three (3) missions were completed to assist soft-shell crab farmers in the province of Ranong. Many of the farmers and staff are migrants from Burma. In addition to assisting with the crab operations, we have provided training in seaweed and tilapia culture. The benefits of this integrated farming approach is to improve pond water quality, provide an additional cash crop, and to introduce a healthy sea vegetable to the local markets. Follow up communications have reported that the recommendations to install seaweed cages in the soft shell crab ponds has proven to be successful. More farmers are implementing the change and there are reports of improved water quality and crab survival. Attempts to develop direct sales to the US proved unsuccessful. The low value of the US dollar and the high demand for seafood from China has directed almost all foreign sales to China and the prices offered are much more than US importers are willing to pay. Fitzsimmons made the third trip in July 2011 to visit the Ranong site but also to meet with the CP Group and their contract farmers to promote the polyculture systems demonstrated in Ranong and to visit their experimental site at Surat Thani.

4. Philippines- Two (2) missions were completed to the Philippines. One mission focused on tilapia marketing on Luzon island and assisted several small producers to develop improved value chains for their products. The other mission focused on the island of Negros and provided recommendations to assist several shrimp and tilapia producers to improve their efficiencies and market value of products.

5. South Africa – One (1) mission was completed to South Africa by Jeff Hetrick from Alaska. (May be longest distance traveled for a single Farmer to Farmer mission.) The focus was on bivalves (mussels and oysters) and univalves (abalone). Jeff also provided some guidance on trout production, his specialty before switching to shellfish in Alaska.

6. Haiti – Two (2) missions were completed to Haiti. The first focused on tilapia hatcheries and production, advising several different NGO's and farmer's cooperative. The second mission had a greater emphasis on water quality and fish health. Each mission included two volunteers.

7. Mexico - Mexico has been a major focal point. Three trips were conducted to the state of Tabasco in southern Mexico to work with indigenous farmers. We completed two missions which each included two volunteers, including one of our female volunteers and the third mission was conducted by one of our other female volunteers. One of the volunteers was also asked to extend the visit and travel to the state of Oaxaca to provide assistance to another project supported by an NGO from Mexico City to work with a fishing cooperative that desires to add an aquaculture component.

8. Trinidad and Tobago – Two (2) missions were conducted in Trinidad. Both missions had a focus on multiple use of water through aquaponics. Two different volunteers served and Fitzsimmons also visited twice and contributed on the first mission. The project was well received and also garnered a very nice newspaper article in the local press. The second mission was conducted in March of 2011. This project assisted some of the same initial farmers in the cooperative, but also assisted new farmers and a demonstration project started by a seafood company.

9. Indonesia – Two (2) missions was completed to Indonesia. Both missions were to Banda Aceh, in the area struck by the tsunami. One of the goals was to demonstrate to the farmers polyculture and other sustainable aquaculture methods to replace the monoculture of marine shrimp that had contributed to disease, water pollution and removal of mangroves that exacerbated the damage from the tsunami. The farmers have since further increased their production of tilapia, shrimp and seaweeds. Fitzsimmons, David Kudrna and the first volunteer, Upton Hatch, made a return trip in July 2011. The focus of the return visit was to further advance the seaweed aquaculture aspect. We held separate workshops for the pond managers, mostly men but three women, covering harvest and drying techniques on 25 July. On 26 of July we and for the women who are involved with the processing and cooking of the seaweed projects. We also met with a commercial seaweed buyer to make arrangements for provision of baleing equipment and purchase of bulk seaweed.

10. Morocco – One (1) mission was completed with the primary goal to assist a trout hatchery that would like to be a hub for small fish farmers in the Atlas mountains. We had two volunteers and we advised the hatchery staff on some improved husbandry practices and how they could organize a cooperative and how the farmers would need to make multiple use of water for fish and irrigation of field and vegetable and tree crops. Secondary to this were meetings with Federal Department of Agriculture and Department of Fisheries. We also met with potential investors interested in large scale production and representatives from a large commercial fishing fleet interested in diversification to aquaculture.

11. Niger – One (1) mission was completed. The primary goal was to visit a demonstration farm and provide guidance for rearing fish (tilapia and capitan) integrated with vegetable irrigation.

Special case. New Caledonia – Two (2) missions were completed. The second mission was probably our most strongly supported mission. The local hosts not only provided housing and local transportation, they also paid for half the airfare for the volunteer. The same volunteer was used for both missions.

3. Public Outreach

We have been pleased to have received a nice newspaper article in Trinidad, submitted with the trip report. The mission reports have also been posted on the Aquaculture without Frontiers website.

<http://www.aquaculturewithoutfrontiers.org/projects/>

Fitzsimmons is also preparing an article to be submitted an aquaculture industry magazine describing the overall success of the Aquaculture niche program. We are very pleased with the number of volunteers we were able to support and the number of host groups in 11 different countries who were able to benefit from the program.

4. Case Study: Tabasco Mexico How did Farmer to Farmer – US-AID volunteers address the challenge?

- a. Challenge: Probably the greatest challenge we had with the program was the initial start-up delays due to slow contract and account hang-ups within the University of Arizona. Once these were solved the next greatest challenge was working in Tacotalpa Mexico.

The small village that had requested assistance, Caridad Guerrero, could only be reached by walking across a suspension bridge over a fast flowing river. The volunteers had to be dropped off at the end of a mountain road and then hand carry their gear and materials they brought across the hanging bridge. At one point the small integrated garden they had designed was washed away in a flood and had to be rebuilt. Luckily the fish tanks were high enough on the hillside and could be re-plumbed.

- b. Initiative: The volunteers managed to work with the village fish farmers to identify locally available materials that could be utilized to rebuild the soil and trap the nutrients from the fish effluent. Coconut husks and shredded palm fronds were mixed with sand and silt deposited in the flood to replace the soil that had been washed away. Our Farmer to Farmer – US-AID volunteers conducted workshops at our partner university UJAT and then went to work in the Caridad Guerrero community. Our last volunteer, Kelly Green, was invited and stayed with a host family in Caridad Guerrero during her visit.

- c. Results: An integrated aquaculture agriculture system was developed in an indigenous chol community at Caridad Guerrero, Tacotalpa county in Tabasco. The effluents of 1500 Tilapia, which were fed 2 twice per day at a rate of 5% biomass of Tilapia feed, contained in a 12 m³ geomembrane tank were used to irrigate habanero peppers twice per day. The peppers were grown from seedlings in three agricultural beds (10 x 15m), with a 3% slope to capture effluents for analysis. Sampling of Tilapia and habanero were made each month, total length and weight were taken for the Tilapia and length (height) for habanero pepper. Total product harvest was accomplished by weighing the total production (fruit) of each plant

It turned out that the coconut husk material was especially useful for trapping the effluent and slowly releasing the liquid and nutrients to the sand/silt/husk mix. The peppers, and other vegetables, quickly grew and the root mass helped to bind the materials and further enhance the effluent capture and nutrient availability. The mix eventually formed a type of soil much faster than were seen in the other vegetable plots that had been scoured in the flood. Nitrogen analysis showed high retention from soil matrix and plants. Habanero plants reached 18 cm, and a high amount of nitrogen (around 70%) was retained between the soil matrix and uptake by plants.

A total of 80 participants attended the Integrated aquaculture agriculture workshops. Participants were local farmers, professors, students, and extension government agents and of course the Farmer to Farmer volunteers.



- d. Knowledge generation and sharing : Our partner hosts at the Universidad Juarez Autonoma de Tabasco are sharing these results with other mountain communities and encouraging others to adopt the fish and vegetable growing system.

The second site was developed at a chontal indigenous community in Oxiacaque, Nacajuca county. Except for the agricultural unit measures (5 x 10m) most of the procedure was conducted as described for Caridad Guerrero. The Oxiacaque system is showing excellent progress, habanero plants reached 18 cm and Tilapia 34 g. UJAT will continue to work with these and other communities to extend the positive results of the integrated farming and expect that other communities will adopt the technique. The fact that the program was supported by US-AID Farmer to Farmer program has proven to be valuable as it provides an extra level of confidence in the farmers.

We also plan to publish these results in a peer reviewed science article once the trial is completed in the Oxiacaque village and supported with additional data collection of soil quality and nutrient levels. The trip reports are posted at the Aquaculture without Frontiers website <http://www.aquaculturewithoutfrontiers.org> . We were asked to present our findings at an aquaponics conference in Cancun, Mexico. Fitzsimmons made one presentation on September 22, 2011 and two graduate students from Universidad Juarez Autonoma de Tabasco made a separate presentation on September 23, 2011. The presentations specifically mention the support of US-AID and the Farmer to Farmer Program.

Mercado Mundial en la Producción de Tilapia (World Market Tendencies of Tilapia Production).-Dr. Kevin Fitzsimmons, USA

and

DESARROLLO DE PRACTICAS DE ACUACULTURA SUSTENTABLE EN TABASCO, MÉXICO
USANDO TECNOLOGÍA DE SISTEMAS INTEGRADOS AGRÍCOLAS – ACUÍCOLAS (Developing Sustainable Practices for Aquaculture in Tabasco Mexico, Using Integrated Agriculture-Aquaculture Integrated Systems Technology).- María Fernanda Cifuentes Arroyo