



TABASCO REPORT

**Visit to Tabasco to Review Existing Aquaponic
Systems in Lacandon Villages**

F2F AwF Volunteer
Assignment #4

Julia Laidlaw

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Introduction

This paper is a report for Aquaculture without Frontiers (AwF) as a part of their USAID Farmer to Farmer (F2F) sponsored volunteer program. It is the evaluation of the social impact of Integrated Aquaculture Agriculture Systems (IAAS) in two indigenous village communities in Tabasco, Mexico conducted by Julia Laidlaw from the UN Global Compact Cities Programme (UNGCCP) in January 2013. The report includes a narrative overview of the project and observations of the current situation, a general impact overview, a conclusion and a list of 13 recommendations for current and future projects. These recommendations are grouped around the F2F AwF community project 3 main guiding pillars. They are:

1. **Capacity building;**
2. **Applied technology; and**
3. **Gender equality.**

The evaluator has no previous affiliations with AwF and wishes to highlight the short time frame in which the evaluation took place and to note that all observations and recommendations are based on brief, one-off interactions with project members who were available at the time her visit.

Project Overview

Volunteer Name:	Julia Laidlaw
Beneficiary Organizations:	Lacandon Village Farmers' Cooperative of Oxiacaque, Nacajuca and Caridad Guerrero, Tacotalpa
Host/Partner:	Universidad Juarez Autonoma de Tabasco and indigenous villages of Oxiacaque and Caridad Guerrero
Project Location:	- Villahermosa, Tabasco, Mexico - Oxiacaque, Nacajuca, Tabasco - Caridad Guerrero, Tacotalpa, Tabasco
Assignment:	Evaluate sustainable tilapia – vegetable system in Lacandon village and compare to other aquaponic systems.
Assignment Date:	15 – 18 January 2013

**Brief background on
beneficiary organization:**

In our earlier project two villages of indigenous farmers purchased tanks for fish culture but had no training on how to integrate the fish culture into the irrigation of their vegetable, bean and corn farming. The F2F-AwF project provided hand on training and tech support.

Assignment Objectives:

1. Visit the two farm villages and gather information on how the projects have evolved.
2. Collect some basic data on economics and household impact.
3. Compare to similar projects outside the F2F program.

Tasks:

1. Visit both villages and the UJAT.
2. Conduct interviews with village members involved with the aquaponics projects and determine impacts of the projects.
3. Compare and contrast the results of these projects with other projects in Mexico and abroad that focus on sustainable food production, organic markets and household welfare.
4. Prepare a trip report that recounts procedures, results, recommendations and numbers of farmers interviewed, families impacted, number of women and men interviewed and impacted.

Day 1

Tuesday 15 January 2013

I met with Maestro Leo and Dr Rafael Martinez to discuss projects at Caridad Guerrero and Oxiacaque and new Universidad Juarez Autonoma de Tabasco (UJAT) aquaculture (Robolo) experiments being undertaken in collaboration with a fisherman's co-operative at Jalapita. I outlined my work as a sociologist with Aquaponics and community development.

Day 2

Wednesday 16 January 2013

I was collected at 8.30am by Dr Martinez and we drove to the Universidad Juarez Autonoma de Tabasco (UJAT) Aquaculture Collaborative research centre. I met with Maestro Alejandro who manages most of the Aquaculture and IAAS extension projects. He mentioned that the exotic species Plecostomos (Pez-diablo) has invaded most rivers in the region and are making it more and more difficult for fishermen to fish in the rivers as a way of life. This situation would appear to increase the viability of aquaculture and IAAS in the region as tilapia and tropical garfish (Pejelargarto) are widely consumed and in great demand.

Many farmer co-operatives in Mexico have formed so as to be eligible for government funding or community development opportunities. While this initiative is designed to encourage broader community involvement in development projects, unless time is invested in identifying co-operative objectives and strategies and the member roles, rights and responsibilities, co-operatives can be vulnerable to corruption and fracture. We briefly discussed his experience working on aquaculture extension projects and concluded that while there have been some projects that have continued to grow and be profitable after the UJAT's support has finished, they more often than not fail. He explained that the two most common reasons for project failure are:

1. Corruption: As a project grows and becomes more profitable project members become competitive amongst themselves and causing a split in cooperatives and eventual shut down or stalling of projects for any number of reasons.
2. Poor administration: An example he gave was a project where profits were entirely divided between members at the end of each year without anything left in reserve for the coming year (a cultural custom that is not unusual for Mexicans in general - he believes). While this is 'fair' it does not give the project any security or encourage much confidence in project employees to compromise their existence to a project without reliable resources or vision for the future.

Maestro Alejandro mentioned that another reason for projects stalling might be because communities are more interested in projects that provide a daily wage or an immediate return (most are already stretched for time and money) which means many people drop away from the project – especially when it becomes apparent how little the gain will be when divided amongst a large group. Unfortunately however, often when the project starts to bring in a return for those remaining it can cause friction within the community with some people actively undermining the ongoing success of the project.

We toured the facility and looked at the tropical garfish, a fish local to the area and in great demand for human consumption. He explained that the garfish has been a focus of his investigations for a while and that the next studies on integrated systems are going to involve garfish and cilantro - with the objective of setting up more projects in communities.

We checked out the habanero grow beds and the tilapia fish tank – there are no plants at the moment.



Fig. 1 – Pejelagarto and Tilapia for sale at a one of many similar restaurants on the road between Oxiacaque and Villahermosa

Oxiacaque, Nacajuca

Pertinent History

- Project was set up to farm Tilapia and Habanero in 2010
- Project was set up on the house block (traspatio) of a family.
- The area was severely flooded in 2011 and system has been out of action since then - the tank has recently been moved to higher ground further away from the community and is starting another crop of fish. Have yet to integrate plants.

People Currently Involved (6)

- Mauricio Roman Arias
- Concepcion Mai Mai (Mauricio's wife)
- Apolonia Mai Mai (Concepcion's mum)
- Elisabet Gordillo Garcia (Mauricio's sister-in-law)
- Daisy Mai Mai (Concepcion's sister)
- Felisiano Mai Montejo (Concepcion's dad)

Current Situation and Observations

We arrive unannounced at Oxiacaque because Mauricio, who traveled with us from UJAT had not been able to make contact with anyone and my trip was made with short notice (combined with the political troubles that caused a setback in schedule). We were generously received by Apolonia and Concepcion who gave their time to share their experience with us for over an hour.

Mauricio works at UJAT in the aquaculture experiment systems' management and maintenance and was/is instrumental in the Oxiacaque project's initiation and sustainability because of his motivation and skills. The system was installed after Tecotalpa in 2010 and was going really well but after only 4 months was affected by a moderate flood and then again by a huge flood in mid-2011 after which the town had to evacuate for at least 3 months. This event has left the local population traumatized and very reluctant to invest in new crops with many of the larger fruit trees in the area dying because of prolonged inundation. To date there has not been the opportunity to retrospectively assess the economic viability/profitability of this system.

Following their aquaculture workshops they feel confident in their ability to maintain the system. According to Concepcion before the floods the only real setback was the loss of electricity that would endure for up to 3 days (or more) at a time. To accommodate this they were forced to under stock the tank to allow for time for the pump to start before the water became too toxic for the fish to survive. Alternative power sources had not been considered.

All crops were lost in the second flood and the fish were sold undersize and underprice so as not to abandon them (they would have died because the power was cut). The system was totally destroyed though they managed to salvage most of the materials including the tank. A couple of months ago moved the tank to a property on higher ground (not their own) and set up the production of Tilapia again. The women are the main people maintaining the project and they have a roster for daily jobs and when they need to dis/recharge the water in the tanks (every two weeks) all are present.

Mauricio has negotiated with the landowners, on behalf of his family members, where the tank is now installed. There is no rent is being paid and all deals are by word, but the landowners are interested in forming part of and contributing the project as it grows. I inquired about administration (specifically financial) and they confirmed that all money being spent is being noted. Concepcion said that the new site is better because of its higher level and it has a more consistent electricity supply. The setback is that there is now half an hours travel to get to the system through Nacajuca and the added expense of 14 pesos each way. For this reason it could be beneficial to have the landowners involved – provided roles, rights and responsibilities are clearly defined and agreed upon from the start.



Fig. 2 – Apolonia and Concepcion Mai Mai at the door of their house. The flood waters in 2011 came up just short of the window. The system was installed on the block next to the house.

Concepcion explained that when time and money allows there are plans to turn it into an integrated system with chilies and maybe tomatoes. She said that though they have had no contact with Caridad Guerrero, she would welcome the opportunity to talk with other communities working on similar projects and would be happy to share her experience with people starting out.

Fianacial Details

- Feed 20p/kg (high protein) - 18p/kg (lower protein)
- 1.5-2.0kg feed is required for every 1kg/fish produced
- Fish are generally sold at 300g for Mexican markets
- Fish prices range from 35-40p/kg
- New Travel costs 14p/per-person/one way. For 2 people this is an added expense of 56 pesos a week.
- Electricity - ?
- Rent – 0 pesos

Day 3

Thursday 17 January 2013

Caridad Guerrero, Tacotalpa

Pertinent History

- UJAT was looking to develop programs with a local Universidad Intercultural that had connections/students in Caridad Guerrero active in a farmer's cooperative. This alliance and its work helped UJAT identify this community as ideal to implement the project.
- The community had aquaculture infrastructure/equipment that had been donated by the government but they didn't know how to set it up. They were identified by UJAT to form part of the F2F AwF project and to receive technical support and training.
- The AwF project officially finished in 2010
- The project was initially growing habaneros chilies but since the UJAT project finished it has replaced them with banana trees.
- The number of people involved since initiation has declined dramatically.
- The water from the fish tanks wasn't being recycled because of irregular electricity supply to pump it back up to the fish tank but they were working to filter as much as they could through the plant beds before feeding it into the local creek.

People Currently Involved (5)

- Don Flavio
- Dona Trina (Don Flavios wife)
- Asuncion (Chon)
- Rosario (Chon's wife)
- Lupita (Chon's sister)

Current Situation and Observations

I traveled with Dr Martinez and Ma Fernanda for two hours and discussed the history of the project. I identified that the project site and members we identified based on two main reasons. Firstly, there was an existing co-operative (sociedad) of farmers that had already been successful in applying for aquaculture infrastructure but there was concern about the contamination to the local water ways from tank water was regularly being discharged. The other reason was there was a good connection (through Chon) with the local indigenous (intercultural) University in Oxotlan. A site for the tanks had already been arranged and they had been installed on the land of Farmer 'X' (name not provided), rent-free. Farmer X was not involved in the original planning discussions and education programs because he was unwell.



Fig. 3 – The fish tank at Caridad Guerrero, the home of Don Flavio and his family. The gravel beds are out of view on the other side of his house.

We arrived at Caridad Guerrero and were helped across the swollen stream by Don Flavio and spent the day talking with him and his family about the project.

Initially there was a large group of community members involved however apparently not all were convinced about not growing plants in soil. Farmer 'X', once he became involved, was quite vociferous in his skepticism and when he decided to charge rent from other co-op members (\$2,000pesos/year), project members balked at this added expense, the original project stalled and eventually the co-op disintegrated. He claimed the tanks as his own and people became disillusioned. UJAT had to find funding for another tank which was installed across the creek on Don Flavios land near his house. Don Flavio and his son Chon and their family are the only community members who have persevered with the project.

At the moment the original habaneros have been replaced by 7 banana plants and Dr Martinez speculated that they must have dug through the plastic at the bottom of the gravel beds on order to plant them; there was apparently a problem with iguanas eating the original chillie crop. A lot of the gravel has been removed and used as a floor for the fowl house. Chon commented that in addition to banana plants they use the water to irrigate other plants outside the gravel beds so there is still a level of filtration occurring before it reaches the creek and Don Flavio mentioned that they rarely irrigate during the rainy season because they don't want to drown the plants. Given that in aquaponics some plants in floating rafts beds have their roots in water all the time over hydration should not be an issue provided the water has the right amount of oxygen and nutrients, this confusion might indicate the need to spent more time explaining, demonstrating and reiterating the critical concepts behind aquaponics and the reasoning around not growing plants in soil.



Fig. 4 – Don Flavio amongst the banana trees planted in the integrated systems gravel bed.

Impact Overview

Community	No. of women involved	No of men involved	Estimate of Families Helped	Estimate of Consumers Affected
Oxiacaque	4	2	1 directly and long term. Although a larger number attended the initial capacity building sessions and workshops provided by UJAT (approx 35-40* people).	Still waiting for first harvest
Caridad Guerrero	3	2	1 directly and long term. Although a larger number attended the initial capacity building sessions and workshops provided by UJAT (approx 35-40* people).	Indicated that the whole community (approx 367 people) has benefited from having fresh fish available.

* This figure is an estimation based on the documented names and numbers from UJAT capacity building workshops where members from both communities and a number of rural extension workers were invited to attend.

Conclusion

It was clearly apparent from the two days of interviews with UJAT staff and community members in Oxiacaque and Caridad Guerrero that there is an enthusiasm for such aquaponics projects and their potential as an environmentally friendly economic development tool for small communities. However, unless projections on returns are realistic and sufficient time and energy is invested in the preparing communities for the realities of operating a commercial cooperative enterprise, the social and economic benefits are likely to be more narrowly allocated and short lived than desired.

These projects have high impact potential in terms of increasing local food security, environmentally sustainable economic development and indigenous community autonomy as well as supporting the ongoing development of community operated IAA Systems and research. This will only be achieved if there is a balanced approach to project planning and implementation that encompasses IAAS technology *as well as* horticulture, marketing and business administration and community development, just for a start. Some suggestions are made to address some of the planning and resource shortfalls in the following section of recommendations.

Recommendations

A number of recommendations are made for current and future projects. These are grouped according to the 3 guiding pillars of the projects with an added category for key additional recommendations:

Guiding Pillar #1: Capacity Building

1. **Learn from others.**

Connect projects to larger aquaculture networks - connect local projects and people. Use members of previous projects to inform new projects – share their experience so participants can make informed decisions, share ideas.

2. **Partnership training.**

If working with co-operatives or other similar community groups use the project to strengthen these groups. As previously mentioned many farmer co-operatives in Mexico have formed from the motivation to be eligible for funding or project development opportunities. While this initiative is designed to encourage broader community involvement in development projects unless time is invested in the cooperatives development of clear objectives and strategies and members being made aware of their roles, rights and responsibilities their co-operative is vulnerable to corruption and fracture. There are many NGO's that could partner in the project or individual consultants who could volunteer to provide community co-operative organisational strengthening, capacity building and

training. This training will increase the effectiveness of the organisation and the project and strengthen the overall autonomy of communities.

3. **Financial commitment from members.**

Consider having project members contribute financially to the project - however little. This will clarify commitment of those involved and increase the level of ownership and responsibility felt for the project's success. It will also define member's rights to a project and help inform initial administrative structure right from the outset. This information can also be used as a basis for any administration courses/capacity building.

Guiding Pillar #2: Applied Technology

4. **Recognise change.**

Recognise that not growing plants in soil is not an easily accepted concept for some people - this is not uncommon when working with farmers who are accomplished in traditional farming methods. This is an issue not to be dismissed as it has in the past undermined the success of other IAAS/aquaponics systems. Ongoing education and discussion about this aspect of the technology will give project participants more chances to question and come to terms with it and by having successful systems as a models people are given the opportunity to see that it works.

5. **Encourage the maintenance of genuine Integrated Agriculture/Aquaculture Systems.**

As the shortage of water is not an issue in this region there is no real urgency to build an integrated system that recycles water. There are the obvious environmental benefits but these could be easily dismissed when project members are faced with added expenses of relocating a system or adjusting where the original crop might not be as suitable or profitable as originally projected. Fish appear to bring in greater return than the chillis so there is a danger that systems being built as a part of the scheme could revert to traditional aquaculture systems undermining the potential IAAS experiment and overall social and environmental benefits. As I mentions in point (5) successful systems are extremely useful for education/demonstration sites for new projects and the introduction of new concepts and technology.

6. **Investigate alternative energy sources.**

Investigate alternative power sources suited to the environment and climate of the project site. This would provide another opportunity to employ or build on local skills and increase the production capacity of a system and hence its profitability. This could be included in future funding applications.

7. **Recognise new research opportunities.**

Take advantage of new crop combinations for research such as the banana plants at Caridad Guerrero - this could be helpful in securing future funding and ongoing capacity building and IAAS research.

Guiding Pillar #3: Gender Equality

8. Invest in women.

With high rates of men migrating for work in rural Mexico, women, as seen in both projects, are more likely to be instrumental in running and sustaining these projects in the long term. Thought could be given to including and investing in basic through varied skills training (technical, business administration and basic marketing) that is adapted to their lifestyle demands/timetable so as to enhance the sustainability of such projects.

9. Use project members in community development.

Engaging project members in skill sharing activities encourages critical reflection on projects to date. Concepcion Mai expressed a keenness for skill sharing with other communities based on what she had learnt in the project. Chon was/is a student in rural development and could be a great ambassador for other projects.

Key Additional Recommendations

10. Give more thought to site selection.

Greater consideration needs to be given to the potential environmental and social conditions that might affect the future of the project especially if it falls to the members to make (often costly) adjustments (moving, new equipment) given UJAT and its AwF affiliates are no longer responsible for the project after a year.

11. Be very realistic about short term and long term return estimates of the system involved.

In these projects the original number of participants decreased dramatically to the point that it is being maintained by a single family group. Participants might have decided to leave for any one of the reasons I cited earlier in this report (or others), but if participants are aware of the experimental nature of the project and that there might be minimal gains in the short term it would avoid disillusion. While the current composition of project groups in Oxiacaque and Caridad Guerrero might be an indication of how to start future projects proper consideration will need to be given for a just and acceptable selection criteria so as not to cause friction/envy in the community.

12. Need for liaison person.

It appears to be very useful for a project to have a member who is familiar with aquaculture and/or background dealing with government programs and bureaucracy.

13. Consider temporary bed shelters.

So as to allow for year round watering in areas of high rainfall temporary shelters could be built over plant beds. Thought would need to be given as to the type of materials used so as to keep costs accessible and realistic to community members ability to pay.

**I thoroughly enjoyed my time on this project and working with such great people.
Thank you to everyone involved.**

