

## VOLUNTEER REPORT FORMAT

*To be submitted to CRS at the end of volunteer assignment and shared with the Host*

### 1.1 Assignment information

- a) Volunteer Name: Joseph R. Sullivan
- b) State of Origin: Oklahoma
- c) Host Organization: Ministry of Livestock Development and Fisheries
- d) Assignment: ET 106 Addendum, Fisheries Assessment of Lake Ziway and Lake Langano
- e) Dates of Assignment: May 19 – June 10, 2017
- f) Number of days worked: 22

#### 1.2.1 Objective 1 in your SOW: Assessment of Lake Ziway Fisheries

- a) Progress with the objective: Without long-term reliable data it is not possible to make more than a crude assessment of the fisheries. Nevertheless, there is enough information in the literature. From the local Ministry of Livestock Development and Fisheries fisheries officer, Feyisa Kabeto, from the Ziway fishermen's coop members with whom we met and from my own observations, that can inform future fisheries management directions. There are four commercial fish species in the lake, Nile tilapia (*Oreochromis niloticus*), Common carp (*Cyprinus carpio*), African sharp-toothed catfish (*Clarias gariepinus*), and barbs (*Barbus intermedius*). Fishing methods are gill nets (200 meters long, 4 meters deep, mesh sizes 8 to 12 cm), beach seines and hook and line. The fisheries are conducted at night from non-motorized boats. There are five fishermen's cooperatives with nearly 300 members based in Ziway who buy licenses, pay cooperative fees and utilize a processing facility where most of the fish are filleted before transport to buyers. There is probably an equal number of illegal fishermen who neither buy licenses nor are coop members, but they also do not have access to the processing facility. There are other management areas around the lake with a total legal and illegal fishermen of about 2,000 fishers. There are no proscriptions for preventing illegal fishing. Waste from the processing facility is distributed to the hundreds (thousands?) of Marabou storks, white pelicans, a few hamerkops, sacred ibises and fish eagles.

Lake Ziway is about 435 km<sup>2</sup> in surface area and an average of 2.5 m deep (Breuil 1995). It is estimated to be able to produce 2,000 to 2,500 tonnes of fish sustainably, the majority of which would be Nile tilapia. The largest tilapia sell for about 5 birr; the smallest 3 for 1 birr. The largest catfish may fetch 30 birr and the biggest carp 20 birr. The tilapia I saw at the procession facility appeared to be about the size that would be caught in an 8 cm mesh gill net – about 200 gram fish. The carp were smaller than I would have expected - one to two kgs., again probably a result of the size selectivity of the gill net. I have no point of reference for the barbs. The catfish were largely small, less than a kg, with a few notably much larger expectations. As expected, the tilapia made up most of the catch. The very rough total catch estimate for the day may have been around a ton. In all species, it appeared that the catch only included adult fish.

- b) Expected impacts/results: Although there has been a reported decline in the catch since the cooperatives were formed in 1988, it is not clear how large a change this has been nor even whether the lake is being overharvested. What is clear is that the water is not clear and this is due to poor agricultural runoff practices, deforestation, and unconsolidated soils. Reports from

20 years ago suggest reforestation is the answer, but that is not obvious if it is happening at all (Palin and Reyntjens 1997). The total dissolved solids are around 379 mg/l and the pH ranges from 8.6 to 10. The significance of this is that primary productivity upon which tilapia in particular depend is limited by the total dissolved solids preventing light penetration for phytoplankton growth. Even though the nutrients for phytoplankton growth are high enough in the nearshore area where tilapia like to live, the turbidity has reduced the primary productivity from 3 to 9 times between 1980 and 2004 (Getachew and Seyoum, 2009). The high pH makes any source of ammonia in the lake (such as agricultural fertilizer runoff) more toxic to fish than it would be at lower pH's. Further there is a problem with fluorosis in the Rift Valley due to its volcanic history and the fluoride level in Lake Ziway is on average right at the World Health Organization (WHO) limit for fluoride, though some parts are much higher. Fluoride, As, U, Mo, B, Al, Fe and Mn are all at or above WHO standards for drinking water quality (Rango et al, 2010). The WHO limit for F is 1.5 mg/l; the average concentration in the lake is around 1.4, but nearby wells are often above 10mg./l. Higher calcium level makes F less toxic to the fish but whether the 27.3 mg/l Ca in Lake Ziway is sufficient to reduce toxicity to a safe level for the fish is not clear. Regardless of whether the current fishing level is at, above or below sustainable levels, Rango et al. believe the average lake level is declining about 15 cm/year, so over the long term, the productivity is likely to go down. They note that the difference between the water inflow to the lake and outflow from it is around 74 million m<sup>3</sup>. Thus anything that increases fishing efficiency will only drive the fish stocks down faster and unsustainability will arrive sooner. Further, the demand for fish is not high enough to drive up prices enough to increase the urgency to harvest more fish. Demand for fish in Ethiopia, partly for religious reasons, is the lowest in Africa and only seems to increase during fast times when consumption of meat is not allowed (Seleshe and Lee. 2014). Even this may be changing as some consider fish to be meat since they also have blood.

- c) Recommendations<sup>1</sup>: As noted below, Lake Langano fish should be tested for safe human consumption, but in order to use Lake Ziway fish for meal, silage, etc., it also should be tested it will be acceptable for these purposes. After finding a buyer such as feed processing mills, use the current waste to make fish meal, fish silage or similar products from the fish waste rather than feeding it to the thousands of birds in the area. Profits per coop member will go up without increasing the fish harvest at all. If Alage ATVET College can get their aquaculture program up to the level that requires fish feed, they could be a constant customer for these products. They would simply need to mix one of these fish products with some of the plant resources they already have on campus to create fish feed for themselves and nearby fish farmers (who don't currently exist). Nevertheless, there are other potential customers for these products, even the cosmetics industry for fish oil. It is also possible that the Dutch greenhouses

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<sup>1</sup> **Note:** Only make not more than 6 recommendations. The most useful recommendations for hosts are ones that they can implement themselves with minimal expense. For example, a cooperative might change its financial reporting procedures or hold more regular meetings of its board. Broad recommendations on tax or credit reform, changes in government policy, or investment in large-scale equipment, are usually not within the host organization's reach.

are using imported fish fertilizer in their operations. Investigate this for potential sale to them. Publications on the production of fish meal, fish silage and fish oil are included in the fisheries references folder (FAO 1986, Perez 1995, and Ramakrishnan 2013).

#### 1.2.2 Objective 2 in your SOW: Assessment of Lake Langano Fisheries

- a) Progress with the objective: Lake Langano is smaller than Lake Ziway – about 230 km<sup>2</sup>, but a bit deeper, down to 14 meters. The catch is less, but marketing is all local, so the price per fish is also less, about three birr for the largest tilapia and 10 birr for the largest catfish. An average catch might be about 16 kg of tilapia and 5 kg. of catfish using gill nets about the same length, depth and mesh as for Lake Ziway fish. But the one cooperative does have a refrigerator in which to store fish until they can be sold. Most fishing is in “Little Lake Langano”, an area about 10% of the lake in the northeast corner connected by a strait to the rest of the lake where access and suitability for fishing is not as good. It is unlikely, I think, that fishing only in this area would impact the fish stocks of the entire lake significantly. Fishing is most probably being done sustainably, but without a better market, increased harvest might simply lower prices further for no net gain. Perhaps developing markets in nearby Bulbula might increase demand and thus provide an incentive for expanding into the rest of the lake to harvest more fish, but this will require some local effort by the fishermen.
- b) Expected impacts/results: Turbidity is very high in Lake Langano, around 1,585 mg/l (Rango et al. 2010), thus putting an extreme limit on productivity, but the potential yield is considered by Breuil to be around 1,300 metric tonnes, with current production around 320 mt. Nevertheless, without a better market there does not seem to be a good reason to increase harvest. The fluoride level here is 12.6 mg/l (the WHO limit for drinking water is 1.5 mg/l) and the calcium concentration is fairly low at 9.7 mg/l which would not necessarily protect the fish from fluoride toxic effects. Remember that the fluoride level is much lower and the calcium much higher in Lake Ziway, so fluoride toxicity is less likely to be a problem there. Although the Lake Langano fluoride level can be severe for fish (Singh and Tripathi, 2015), it is possible that adapting and surviving in this environment for millenia may have allowed this stock of tilapia to survive the fluoride exposure while other stocks would not. Although fish do bioaccumulate fluoride, it is not clear to what extent this is happening in the Lake Langano fish or whether human exposure is greater from eating the fish or drinking the water available to them. Relatively little is known about fluoride toxicity to fish, but the presence of fluoride is such a rare problem that it is not included in most aquaculture water quality test kits.
- c) Recommendations:
  - a. I hate to recommend testing the fish for levels of fluoride as this may doom this fishery if results indicate they are too high, but it seems like the only responsible thing to do. As noted above, Lake Ziway fish can be tested at the same time to ensure that they are suitable raw material for value added products. While fluoride is the target of most concern, waters from these lakes approach or exceed a number of WHO parameter

limits for safe drinking water, so the fish should be tested for safe human consumption rather than for one particular toxin.

- b. If the fish are found to be safe, marketing to increase the demand for and price of fish should be done before expanding the fishery harvest effort and these fish also could be used for fish meal, silage, etc, though I think this is less likely than for Lake Ziway fish.

### 1.3 Recommended future volunteer assignment

### 1.4 Action Plan

Recommendation	Specific Action	Responsible person	By when
1. Test Lake Ziway and Lake Langano fish for fluoride and other human health risks	Contract with Analytic Laboratory	Ministry of Livestock Development and Fisheries	September 1, 2017
2. Find potential markets for fish meal/silage/fertilizer	Contact fish mills, and ATVET colleges	Fishermen's Cooperatives	Begin immediately
3. Provide fish meal/silage tech training	USAID Farmer-to-Farmer project	CRS	October 1, 2017
4.			
5.			
6.			

### 1.5 Number of people Assisted

- a) Through formal training (Classroom setup): 7 Ministry of Livestock Development and Fisheries
- b) Through direct hands on practical assistance (Do not double count): 6 Fishermen's Coop members
- c) Out of these above, number of host staffs:
- d) Training/assistance by field

Category	Total	Males	Females
Members/ owners	6	6	0
Employees	7	6	1
Clients/ Suppliers			
Family Members			
Total	13	12	1

### 1.6 Gender

- a) What gender roles did you recognize in your host community? Did these roles play a part in your assignment? How? The local supervisor for the Ministry of Livestock Development and Fisheries was a woman. Six of the 295 Lake Ziway cooperative fishers were women. None of the 65 Lake Langano fishers were women. One woman was making fish soup at the processing facility from fish frames.
- b) How might CRS or the host organization improve opportunities for the women in this host or host community? Microloans for boats and nets.

#### 1.6 Value of volunteer contribution in \$

- a. Hours volunteer spent preparing for assignment: 10.
- b. Estimated value of all material contributions volunteer contributed to host during assignment

#### 1.7 Value of hosts' contribution in \$ (Please consult the host as well): None

- a) Meals
- b) Transportation
- c) Lodging
- d) Translation
- e) Other (Specify)

#### 1.8 Host Profile Data:

Did you obtain any data that supplements or corrects the data in the existing host information as detailed in the SOW? Please list it. There was no statement of work for this subproject. It was an add-on to the original scope of work for aquaculture training.

1.9 Recommendations for CRS: Facilitate, to the extent necessary, making the contacts between the Ministry of Livestock Development and Fisheries and analytic labs for testing the food safety of Lake Langano and Lake Ziway fish. Facilitate, to the extent necessary, making contacts between feed mills, Alage ATVET College, Dutch flower greenhouses and Lake Ziway Fishermen's coops to find markets for fish meal, fish silage and fish fertilizer. Create Farmer-to-Farmer training for coops in small scale fish meal, fish silage and fish fertilizer manufacture.

#### 1.10 Press Release

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**FOR IMMEDIATE RELEASE**

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## **Piedmont, Oklahoma Farmer Fisheries/Aquaculture Specialist Works with Counterparts in Ethiopia**

**Farmer-to-Farmer program promotes economic growth and agricultural development in East Africa**

**DATELINE: Piedmont, Oklahoma, June 9, 2017---** Dr. Joe Sullivan, a retiree from the Alaska Department of Fish and Game from Piedmont, Oklahoma who is a fisheries and aquaculture specialist travelled to Ethiopia for three weeks to share his technical skills and expertise with local farmers. Dr. Sullivan's assignment is part of Catholic Relief Services' Farmer-to-Farmer program that promotes economic growth, enhanced nutrition through access to healthy food, and agricultural development in East Africa. **"Just to get rid of it, processing waste from the Lake Ziway fish cooperatives is currently being fed to hundreds, if not thousands, of local marabou storks, white pelicans, sacred ibis, a few hamerkops and a few fish eagles. This is half a ton of money on the ground every day as it could all be easily converted into fish meal, fish silage and fish fertilizer, perhaps doubling the income to fishers from the same catch,"** said Dr. Joe.

Farmer-to-Farmer matches the technical expertise of U.S. farmers and professionals in agribusinesses, farming cooperatives, and universities with farmers in developing countries to assist them in improving agricultural productivity, accessing new markets, and increasing their incomes. Farmer-to-Farmer is funded by the U.S Agency for International Development (USAID).

In a world where 80% of food is produced by farmers working on small farms or fisheries, the movement to share proven farming and business skills can improve the quality and quantity of the world's food supply. For communities in the developing world who often struggle to produce enough food, this can improve access to a reliable source of food and better nutrition. For the farmers, it can strengthen their path to prosperity.

The goal of Dr. Sullivan's assignment was to **evaluate the Lake Ziway and Lake Langano fisheries**. He worked with 6 local members of fisheries cooperatives and seven of the government Ministry of Livestock Development and Fisheries officers who face a declining annual fish catch, especially of Lake Ziway, as primary productivity of the lake is impacted by agriculture-related siltation. Most of Dr. Sullivan's time was spent in the Main Ethiopian Rift working with the Ministry of Livestock Development and Fisheries. **If successful, converting fish waste into saleable products will increase the monetary return (value added) to the fishers without impacting the catch at all.**



This is Dr. Sullivan's twenty-third volunteer assignment with Farmer-to-Farmer and is one of nearly 500 assignments that focus on improving approaches to local agriculture practices, expanding production of quality food crops and nutrition in Ethiopia, Tanzania, Kenya and Uganda. The program, funded by the U.S. government has been running for nearly 30 years.

CRS is partnering with five U.S. institutions to tap into the rich diversity of the U.S. agriculture community: the National Catholic Rural Life Conference, Foods Resource Bank, National Association of Agricultural Educators, American Agri-Women, and the University of Illinois' College of Agricultural, Consumer and Environmental Sciences.

The volunteers travel to East Africa for anywhere from one to six weeks.

"We are certain that this program will be beneficial not just to the farmers in East Africa but also to the volunteers from America," said Bruce White, CRS' director for the program. "It's going to make the world a little bit smaller and a whole lot better for everyone involved."

For more information, visit [farmertofarmer.crs.org](http://farmertofarmer.crs.org)

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**Catholic Relief Services** is the official international humanitarian agency of the Catholic community in the United States. The agency alleviates suffering and provides assistance to people in need in more than 100 countries, without regard to race, religion or nationality. CRS' relief and development work is accomplished through programs of emergency response, HIV, health, agriculture, education, microfinance and peacebuilding. For more information, visit [www.crs.org](http://www.crs.org) or [www.crsespanol.org](http://www.crsespanol.org) and follow Catholic Relief Services on social media: [Facebook](#), Twitter at [@CatholicRelief](#), [@CRSnews](#) and [@CRSnoticias](#), [Instagram](#), [Pinterest](#) and [YouTube](#).





## REFERENCES

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