



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/Alaska
- c) Host Organization: Ministry of Agriculture, Forestry, Fisheries and Cooperatives
- d) Assignment: Low Cost Fish Processing Technologies
- e) Dates of Assignment: April 30, 2016 - May 21, 2016
- f) Number of days worked: 15 pre-travel, 4 travel days, 18 days in-country for a total of 37 days.

1.2.1 Objective 1 in your SOW: Reduced post-harvest losses of fisheries stock through improved low cost fish processing technologies in handling, processing (drying, smoking etc.), storage and marketing.

- a) Progress with the objective. Gave two presentations, the first was a video on maintaining fish quality from catch to transfer of the catch to the fish tenders or processors. The second was a lecture for several hours to CRS fisheries staff, Ministry of Agriculture, Forestry, Fisheries and Cooperatives staff, Dr. John Garang University professor and 3 students, and two Hanbit Agriculture Technology Research Center instructors. I also provided copies of several fish processing books, and electronic copies of both the last lecture and the reference materials on which much of it was based. The class also canned tilapia, catfish, Nile perch and *Labeo* and then ate it after it had been sitting at ambient temperature for four days. This demonstrated how excess fish currently being discarded could be saved indefinitely for times when fish are not as available. I did not have an opportunity to observe a much fish drying, but did notice that there were no appreciable numbers of flies at the dried fish market in Bor. Nevertheless, there are several sets of plans for solar fish dryers and fish smokers in the "References" folder on the memory stick which I am leaving with CRS.
- b) Expected impacts/results. CRS, University and Ministry staff should be able to transfer the knowledge gained by teaching it to fishermen, fish processors, and fish transporters to increase the value chain from catch to table.
- c) Recommendations¹

1. Catholic Relief Services should work with the Ministry to train someone to fix and later maintain the walk-in freezer behind the Ministry building at Bor Harbor and the freezers on the Ministry boat moored in the Nile next to the walk-in freezer. CRS should not simply repair these freezers. Training someone to fix and maintain them would be much more sustainable. Having a Ministry-employed staff person with cold storage repair and maintenance capabilities would ensure the value and usefulness of these to the fisheries on a long-term basis. Operational freezers could freeze and store fish in a high quality and could also produce some ice for fishers to maintain the quality of their catch.

¹**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.



2. Over the long term, a chip-ice machine would prove better than freezing blocks of ice for fishermen in the Ministry walk-in freezer or around town in various chest freezers. Obtaining a chip-ice machine should be the responsibility of the fishermen's groups, but CRS may be able to facilitate finding and importing something suitable.
3. An FAO-Thiaroye smoker was discussed in class as a smoker that could produce a superior product with fewer than average carcinogens. This smoker is too complex for an average fisher to craft, but a fisherman's cooperative could engage a local metal fabricator to produce this smoker. CRS could bring the fishermen's group and the fabricator together to get this underway. The detailed plans for constructing this smoker are on the memory stick I am giving CRS under the "References" folder.

1.2.2 Objective 2 in your SOW: Increase income earnings for fisheries producer groups in Bor and Twic East Counties

- a) Progress with the objective. The earnings of the fisheries producer groups were not directly affected by the work performed, but should benefit when taught by those who were taught in this project. We spoke with a few individual fishermen and their families at fish camps in the Sudd accompanied by CRS and Ministry personnel, and also some women cleaning fish at three fish delivery sites along the Nile, but did not directly instruct them in improved fish handling and sanitation. This task will remain for the Ministry, CRS and the University based on information I gave them.
- b) Expected impacts/results. Improved sanitation, fish handling and processing techniques will only be adopted if all participants in the value chain see that they can receive more money for making the extra effort.
- c) Recommendations. Negotiate increased prices for improvements to the quality of the fish at each stage of handling. For example, a live fish would receive the highest price, a properly bled fish in ice water would be almost as high. An iced, unbled fish with red gill color would be less than that. Fish with white gills, sunken eyes, etc. less than that. Prices for fish smoked, dried, canned, fresh or frozen would start at this level and go up according to how well they were handled from that point forward, etc. in an additive effect through the value chain.

1.2.3 Objective 3 in your SOW: Develop user guidelines for the low-cost fish processing technologies

- a) Progress with the objective. While class participants received training in this, the first point of progress should be the new fish cleaning station at Bor Harbor. Currently fish are being cleaned in the heavily polluted water of the Nile contaminated by offal from fish and cattle and with pigs and birds wading around in the water. If clean bore hole water can be used when the new cleaning station opens (May 30), processing can be considerably sanitized over what is currently happening. To do this, a water tower with a manifold leading to hoses with nozzles would supply water to each person cleaning fish. As noted above, all of the teaching sessions were attended only by those who would be training those directly involved in the food value chain. So using the Bor cleaning station as an example, the cleaning station manager might be responsible for demonstrating and regulating the proper use of the new fish cleaning station. CRS might take responsibility for training fishers and their families how to can fish. The University or Training

Center staff could train fishers, tenders and transporters how to bleed, ice and otherwise maintain the quality of fresh fish and so forth, all aspects based on the training and resource materials I provided.

b) Expected impacts/results. The class observed the best practices manner of bleeding live fish in ice water and then canning them as a practical, so they should be able to teach these methods to fishermen and processors in the future. I left specific plans for improved smokers and dryers. Nevertheless, as noted above in Objective 2, unless all elements of the value chain see the financial advantage to themselves in following these procedures, the implementation of these practices won't happen regardless of training. If recommendation C2. below is followed, this will eventually set the best practices standards for maintaining fish quality for all area markets.

c) Recommendations.

1. Conduct training workshops for those actively involved in the food value chain focusing on their particular role in the infrastructure.
2. Support any effort to build a water tower and associated manifold, hoses and nozzles for sanitary fish cleaning at the Bor Harbor cleaning station. It would actually be a fairly small effort. Two pictures follow. The first is the Bor Harbor cleaning station as it is currently



configured. The second is a similar fish cleaning station in Alaska except that water is supplied via a manifold, hoses and nozzles.



3. Using these guidelines, develop a relationship between the fish processing chain and the United Nations Mission in South Sudan/Humanitarian Development Consortium to buy fish that have been handled in the proper manner to maintain quality, rejecting that which has not. Most likely the highest demand would be fresh and fresh-frozen, but a quality-assurance program could be put into place that limits the purchases of UNMISS/HDC to only those products which have followed these guidelines. Ultimately, most other area markets will demand this quality as well.

1.3 Recommended future volunteer assignment.

1.3.1 Refrigeration repair and maintenance specialist who can train ministry personnel and other local technicians to repair the Ministry freezer facilities at Bor Harbor, both the land-based facility and the unit on the Ministry boat currently parked on the Nile in front of the land-based facility, and other refrigeration units (and air conditioners) around Bor. There are a huge number of broken freezers around and near Bor that could be extremely useful in the improved handling and processing of area fish if only they worked. It is imperative that CRS not simply fix the Ministry freezers because then they will break again. Instead, the Ministry needs the in-house capability to fix them when they are broken and maintain them so they break less often. Otherwise, a quick fix will soon put the very great opportunity to use the Ministry freezers to support the fishing industry out of reach once again.

1.3.2 I am not sure where CRS staff competence will begin and end with fish processing, especially since they did receive training, but at some point the information has got to get to the end users. There is insufficient time for a volunteer to organize fishers, processors, tenders, etc., but it might be useful for a volunteer to return to Bor after the Ministry and/or CRS organizes and trains the people involved in the various aspects of the value chain to quality control what has been taught



and evaluate what is being practiced. In other places and perhaps here as well, it has been worthwhile conducting training in how cooperatives operate, their value, budgeting, etc.

1.3.3 Consider a feasibility project for using fish traps in the Sudd rather than or in addition to gill nets. The advantage of traps is that fish can be kept alive until harvest. That is, fish kept alive can be sold to the tenders or other fish transporters. This would allow bleeding and chilling to take place on the tenders which can have icewater and thus initially process the fish at the optimal time in the best way. If the traps are too effective, live fish could be moved from the traps into holding pens constructed either of bamboo or netting until the tenders arrived. The disadvantage is that different traps operate best until different conditions that may be available in only a few parts of the Sudd. Crocodile and turtle exclusion devices might need to be installed on the trap openings that would still allow fish to enter. This would require careful coordination with the Ministry and might require access to a motorized boat unless this could be tested along the road system. A fyke net from the US would cost about \$1,000US not including shipping, but the principles on which it is based could be applied to locally constructed traps. Some shallow areas of flowing water would work best for most kinds of traps.

1.4 Action Plan

Recommendation	Specific Action	Responsible person	By when
Organize all components of the value chain - fishers, processors, transporters, wholesalers, retailers	Invite participants, including but not limited to fishers, to cooperative building training sessions. demonstrating how cooperatives can accomplish what individuals working alone cannot.	Ministry of Agriculture, Forestry, Fisheries and Cooperatives	I am not sure what is doable in Bor, but setting this up before the rainy season and heavy fishing season is underway would be desirable.



<p>Teach appropriate fish preservations techniques to each part of the infrastructure</p>	<p>Separate workshops on initial fish processing (i.e. appropriate use of the Bor fish cleaning station) fish canning, smoker building and smoking, dryer building and drying. Another workshop composed of fish smoking personnel and local fabricators can put together a cooperative-owned FAO-Thiaroye smoker for products with fewer carcinogens.</p>	<p>Catholic Relief Services, Dr. John Garang Hanbit University, Agriculture Technology Research Center</p>	<p>Use of the Bor Fish Cleaning Station should happen in conjunction with the opening of this facility. Other workshops should begin before the heavy fishing season is underway.</p>
<p>Negotiate value increase to each part of the value chain</p>	<p>Facilitated meeting to negotiate improved prices for improved product</p>	<p>Catholic Relief Services?</p>	<p>Before heavy fishing season begins,</p>
<p>4. Facilitate obtaining canning supplies and chip-ice units</p>	<p>CRS imports canning supplies and re-sells at cost to canning groups after training. Develop recycling policy/procedures. Also buy small chip ice unit that can be rented and later sold to fishers/transporters</p>	<p>Catholic Relief Services</p>	<p>Before heavy fishing season begins.</p>



5. Train Ministry personnel in refrigeration repair	Bring a refrigeration/freezer specialist to teach Ministry and local entrepreneurs how to fix and maintain the Ministry frozen storage facilities and other smaller freezers in the Bor area.	Catholic Relief Services through the USAID Farmer-to-Farmer Program	Before the heavy fishing season is underway.
6. Work with UN military forces to create a large customer for improved fish products.	Begin discussions with the UN Mission in South Sudan and the Humanitarian Development Consortium to purchase only quality controlled fish products from the value chain	Catholic Relief Services sponsors the discussion	As soon as improved fish handling procedures appear to be implemented

1.5 Number of people Assisted *Simon, please fill this information in. Thanks.*

- a) Through formal training (Classroom setup)
- b) Through direct hands on practical assistance (Do not double count)
- c) Out of these above, number of host staffs
- d) Training/assistance by field

Category	Total	Males	Females
Members/ owners			
Employees			
Clients/ Suppliers			
Family Members			
Total			

e)

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 fishers were primarily men, and their wives seemed to be the initial processors of the fish. At Bor Harbor, almost all of the people cleaning fish were women though a few men were involved in scaling Nile perch.
- b) How might CRS or the host organization improve opportunities for the women in this host or host community? Women have a larger role in processing once the fish have been landed, but none were involved in the fish canning practical. I noted that the men seemed to be much less efficient at cleaning and filleting the fish than the women we observed elsewhere and the volume of fish in each jar was less than it might have been had the women been involved. Consequently, I would focus on women as the students for fish canning classes in the future. In like manner, it appears that, while men might be more involved in building fish smokers and fish dryers, it will be the women who will be more likely using them. Consequently, mixed classes for this sort of workshop will be important. The men will learn how to build the devices, but the women will learn how to use them and why they are used in that manner. So, if there is a wrinkle in the construction that would undermine the usefulness of the smokers, dryers, etc., the women might be able to point that out and get what they need.

1.6 Value of volunteer contribution in \$ 18,330.79US

- a. Hours volunteer spent preparing for assignment: 120 (\$150/hour)
- b. Estimated value of all material contributions volunteer contributed to host during assignment: \$330.79US

1.7 Value of hosts' contribution in \$ (Please consult the host as well): \$0

- a) Meals - none
- b) Transportation - none
- c) Lodging - none
- d) Translation - none
- 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.

1.9 Recommendations for CRS: CRS staff, in coordination with the Ministry, the University and the Training/Research center should conduct fish processing workshops and facilitate relationships between all parts of the chain from the fishermen to the end users. Regarding assisting the Ministry in restoring the function of their cold storage facilities, I recommend capacity building in fixing and maintaining those facilities rather than an outright gift. That is, have someone teach them how to fix and maintain the machinery rather than employing someone to get it done. In like manner with the canning and chip ice equipment and supplies, facilitate the import, but make sure that the end users eventually pay for it, perhaps on a delayed basis as funds from sales become available. It may be wise to retain at least some of it on the CRS-Bor campus for awhile.

Regarding canning in particular, I believe it is very important for the CRS staff to become very familiar with canning before attempting to teach it to anyone else. So several rounds of canning and sampling the



products are in order first. In the demonstration class, I only added 1/2 teaspoon of salt to each pint jar to get a sort of baseline taste for the product. Local tastes might dictate adding tomatoes or onions or hot sauce to produce a more desirable, salable product. We had some difficulty controlling the pressure; I think the fish might have become mushy due to pressures around 15 psi rather than 11 (it must be at least 11 to be safe), but experimenting with the heat source might produce pressures closer to 11. Also each species of fish may respond differently to canning, in this case, the catfish seemed to be most suitable or at least the product was superior to the others. Finally do not be afraid to pack chances of fish with bones into the jars (the class filleted the fish). The bones crystalize and break into something not at all objectionable, and are easy and good to eat. I myself would not pack the jars with fins.

1.10 Press Release

FOR IMMEDIATE RELEASE

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Piedmont, Oklahoma Area Volunteer Travels to South Sudan to Share Skills with Local Farmers

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

Dr. Joseph R. Sullivan, a fisheries and aquaculture specialist from Piedmont, Oklahoma travelled to South Sudan for three weeks to share his/her technical skills and expertise with local farmers. Dr. Sullivan's assignment is part of Catholic Relief Services' Farmer-to-Farmer (FTF) program that promotes economic growth, food security, and agricultural development in East Africa.

“South Sudan is one of the few countries in the world with an overabundance of fish resources. Careful management and good quality handling of the highly-prized fish from here can be a very sustainable food resource for the people of South Sudan and can form the basis of a very profitable economic export for this country,” said Dr. Sullivan.

Funded by the U.S. Agency for International Development (USAID), the five-year program matches the technical assistance of U.S. farmers, agribusinesses, cooperatives, and universities to help farmers in developing countries improve agricultural productivity, access new markets, and increase their incomes.

In South Sudan, Dr. Sullivan worked with the Jonglei Food Security Program in low-cost fish processing and value added training and giving technical assistance to fishermen and their families to enable them to preserve the food quality of the fish they catch and create value-added products to generate income. This project was essentially a training of trainers so we may never know how many beneficiaries will be reached, but staff from Catholic Relief



Services, the Ministry of Agriculture, Forestry, Fisheries and Cooperatives, the Dr. John Garang University and the Hanbit Agriculture Technology Research Center were trained and it is these students who will carry this knowledge to the fishers and processors and transporters all the way to the final consumers. **[Other details are optional]**

Dr. Sullivan's volunteer assignment is one of nearly 500 assignments that focus on agriculture, food security and nutrition in Ethiopia, Tanzania, Kenya and Uganda. This is the first time CRS has been involved in the 28-year-old Farmer-to-Farmer Program funded by the U.S. government.

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 U.S. volunteers will travel to East Africa for anywhere from one to six weeks, their expenses covered by USAID.

“One thing we are certain of is 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 for everyone involved.”

For more information, visit 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 nearly 100 countries, without regard to race, religion or nationality. For more information, please visit crs.org or crsespanol.org.