



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: James Brady
- b) State of Origin: Alaska
- c) Host Organization: Ministry of Livestock and Fisheries – Bor County, Jonglei State
- d) Assignment: Fisheries data collection and management
- e) Dates of Assignment: 30 April – 21 May, 2016
- f) Number of days worked: 19 days were spent in South Sudan

1.2.1 Objective 1: Establish tools and methodologies for the Ministry to improve collection of harvest data used for fisheries management (Harvest Monitoring).

Progress with the objective:

Introductory and informational meetings were held at the offices of senior Ministry officials, including: Minister Mayen Ngor Atem, Geunthoy Gak, Acting Director General Livestock & Fisheries, and James Majok Naper, Director of Fisheries, Jonglei State. At the time of my assignment the Ministry of Livestock and Fisheries (MoLF) had recently been merged with the Ministry of Agriculture and Forestry and the Ministry of Co-operative and Rural Development to operate as a single Ministry under leadership of Minister Mayen.

The Ministry of Agriculture, Livestock, Forestry, Fisheries and Co-operatives, led by Minister Mayen is responsible for Jonglei State. The ministry offices that we visited did not have electricity, and computers and other ministry resources such as tractors and vehicles had been destroyed or stolen during the 2014 crisis. Minister Mayen explained that people that were working when the war first broke out in 1983 are now too old to go back to work. While those that were born since that time think of income as something provided through international aid. The Hanbit Agriculture and Technology Training Center was in part established to help bring about a change in this thinking. South Sudan has a lot of resources that could provide livelihoods to its people, but in the words of the Minister, “you can’t eat potential”.

The MoLF maintains its office for the Director of Fisheries (James Majok) near Bor Harbor. Director Majok and his staff told us that the Nile River fisheries resources are very diverse, productive and underutilized. MoLF staff are knowledgeable of the identification of the species of fish that are commonly landed, as well as other fish species in the river reportedly including (according to Majok) some species that may not be recognized in current scientific literature. In some cases, for example *Clarius*, fish are referred to by genera where there may be several species in a genera. Processing is mainly done by sun drying and some smoking, according to Majok, although we did not see smoked fish or the smoking process. Dry fish are preferred by people in Jonglei state while Juba people prefer smoked fish. According to Director Majok, Juba fishermen come to Bor county to fish and typically smoke their catch. This fish generally bypasses Bor Harbor, transported directly to Juba by boat or truck. Fishermen are organized in groups (fish camps) of 30 or more individuals. Buyer/transporters come from Juba in power boats bring ice and purchase fish in the round from fishermen operating in the camps. Fish are also delivered to trucks on the road system who also carry ice. Fish are not weighed or enumerated at the time that the buyer purchases them, and there is no paper record of the transaction.



There are a total of 18 Ministry staff, 5 staff are potentially available to assist with the sampling of fish. Peter Garang Kuol was assigned to work with me on my assignment, other staff were present at key demonstrations and presentations.

Bor County maintains a tax collection office (staffed by Majok Dau Wal, rate collector at Bor Harbor) and collects a tax on fish harvested in the county. The tax is 1 SSP / fish. There appeared to be little exchange of information or coordination between the Bor County tax collection office and the MoLF, although Director Majok said records were shared once a month. A new tax policy of 10% of the fish sale price was proposed prior to the conflict, but has not yet been implemented. Fish tax is only collected at the landing sites, for example Bor Harbor, consequently buyers/transporters that purchase fish on the river can return to Juba and escape paying the Bor county fish tax. The Rate Collector maintains a ledger of daily fish landings, which appear to be the only time series of landing data currently maintained at Bor Harbor. Data are collected on only six species (or genera): *Heterotis*, *Tilapia*, *Gymnarchus*, Nile Perch, *Clarias* & *Alestes*. Species such as *Mormyrus* and *Propterus* were absent on the ledger pages examined. Further evaluation of these data are needed.

Regulatory structure governing fisheries remains a bit unclear at the time of writing. Director Majok told us that there are fishing regulations that prohibit capturing fish with electricity, poison, and explosives. The most common gear type used is set gill nets. Mesh size must be 10 cm or greater and twine must have 60 filaments (thus mono filament nets are prohibited). It was not made clear to me where regulations are recorded, how they are communicated to users, and how they may be modified or updated. Enforcement of regulations by ministry staff is minimal, or nonexistent. There is not any licensing or registration of fishermen or fish buyers. Although we did not observe other gear types in operation, long lines using hooks are also used as a commercial gear type. We did observe cast nets being used in small lakes and ponds around Bor. This capture method is likely used for subsistence catches not commercial.

We were given the opportunity to visit some of the fishing camps on the river first by car then on a later occasion by meeting a boat generously supplied by ACTED. Fishing groups generally have a chief, or head person and the chief may set additional rules for the area fisheries, including closing some areas for periods of time to allow for replenishment of stocks or protection of habitats. Fishermen generally build their own gill nets. The boat trip to the Sudd fishing camps (ACTED boat) occurred on 11 May, 2016. We met the boat at Jarwuong, which is a village accessible by car located a few kilometers south of Bor. On this trip we crossed a major channel of the river and entered a small channel/slough leading to Lake Barmakol. Two camps were visited, Dalnom and Thonymom. Fishing nets (gill nets) were observed in operation on the lake. Plastic water bottles were used as corks (floats) and the nets were several hundred meters in length, stationary (presumably anchored in some way) and un-attended at the time they were observed. At one of the fish camp, measurements were recorded on a net that was being pulled from a boat (small fiberglass canoe), and being stacked and cleaned. The mesh size was approximately 15 cm stretch measure, meshes appeared very uniform for a hand tied net. The floats were made from slices of foam rubber soles of old sandals and the weights were made from tear drop shaped chunks of a dark heavy wood approximately 20 cm in length. An estimate of the nets length was made by measuring the

distance between two floats or weights and counting the total number of floats. Net length was estimated to exceed 500 m. Depth was 13 meshes or about 2 m. Field notes for these measurements are contained in the yellow Rite in the Rian Book #1 left with the MoLF (Director Majok & staff). Boats in the camp were dugout canoes and fiberglass canoes. The fiberglass canoes had been provided by an aid organization. These boats were roughly 5 m in length. A fish buying boat was observed on the lake. It's engine was not working and the ACTED boat assisted it to the nearby fish camp. This boat and others that we saw were similar in design of welded sheet metal construction and about 13 to 15m in length. Outboard motors were 40 Hp. Additional data on boats is contained in the yellow Rite in the Rain book left at the MoLF office.

Table 1. Fish landing sites on Bor vicinity. GPS coordinates are in decimal degrees, WGS-84, captured using Gaia GPS on an iPad.

Name	Lat.	Long.	Notes:
Bor Harbor	6.20472	31.55235	Bor Town, South Sudan
Leudier	6.22018	31.54647	Near Freedom Hotel
Jarwuong	6.16715	31.55756	Road accessible fish camp/village
Dalnom	6.17391	31.51534	West of Jarwuong, called Fishing Boat in field notes
Thonymom	6.16696	31.51843	West of Jarwuong, (banana camp in field notes)
Langbar			North of Bor, not visited
Pariak			(1 hr north of Bor) CRS is building fish marketing shelter

Because of the complexity of the fishery and the capacity limitations of the Ministry (ie. The Ministry lacks vehicles to travel to landing sites, and has no operational boats to visit fish buying stations), efforts to establish a harvest monitoring program were focused at Bor Harbor. This is the landing site in Bor with the greatest amount of activity in terms of fish landings and is also the location of the Director of Fisheries office. Fish arrive at Bor Harbor each day usually around 8:30 am and at random time up to about 11:00 am. Fish are brought in by boat, typically the larger boats (15 meter powered boats) that are transporting other goods. These boats deliver dry fish from fishermen on the river, and may also deliver fresh whole fish. Fish are also delivered to Bor Harbor by motorcycle in rice bags. Three or four fish marketing stations are manned principally by women. Whole fish are laid out on tarps. Nile Tilapia, *Oreochromis niloticus*, were by far the most numerous of fish observed, although species composition varies daily. Tilapia are often sorted by size by the ladies manning the fish marketing stations.

Table 2. Fish species observed at Bor Harbor, 9-13 May, 2016.

Scientific name	Common Name	Number
<i>Oreochromis niloticus</i>	Nile Tilapia	983
<i>Heterotis niloticus</i>	Bonytongue	517
<i>Gymnarchus niloticus</i>	Gymnarchus	31
<i>Clarias gariepinus</i>	Catfish	22
<i>Propterus aethiopicus</i>	African Lungfish	7



abundant type of dried fish we observed. Ministry staff (Peter) were instructed on counting the number of braids (sometimes using estimations or average weights) and then expanding that to the number of whole fish. *Heterotis niloticus* was most commonly used in the braided fish, but braids may also contain other species (*Gymnarchus niloticus* for example). Specific examples of methods for expanding dry fish braid counts to estimates of whole fish are contained in Power Point Slides 22 & 23.

A presentation was made at the Hanbit Agriculture and Technology Center on Tuesday 17 May, 2016. This was attended by Ministry staff, John Garang University students and faculty, in addition to CRS field agents and staff. (CRS Bor staff have attendance sheet). Sustainable fishing programs were discussed highlighting key principles contained in the FAO Code of Conduct for Sustainable Fisheries (FAO 1995, pdf copy contained in the "Literature" folder of the USB drive given to the Ministry, University and CRS). Harvest monitoring was presented as the most basic and vital of fisheries statistics used for the sustainable management of fisheries. Examples of the benefits of harvests monitoring for recognizing trends in fishery performance and health of the stocks was presented and discussed using data from Alaskan salmon fisheries (PP Slides 6 & 7). The Harvest Monitoring portion of the presentation reviewed four basic harvest monitoring methods, one of which (Landing Receipts) is out of reach for the Ministry at this point in time. The most feasible approach is Port Monitoring (PP Slides 15-24), and initially limiting the Port Monitoring effort to Bor Harbor. Once this program becomes operational additional ports or monitoring stations could be added using the Bor Harbor methods as an example. A suggested protocol was outlined for the harvest monitoring program, including data collection sheets (PP Slides 17 – 24).

Expected impacts/results

The capacity of the Ministry is limited in terms of boats, vehicles and computers, however Director Majok said that human resources are available for conducting harvest monitoring and stock sampling programs. Implementation of this suggested approach limited to Bor Harbor would be feasible as only the human resources and the data notebooks provided would be necessary. Harvest data becomes more valuable over time as more data is collected and shifts in species composition and abundance become more apparent. Regular and systematic collection of the data is of importance. One cannot see trends from a snapshot in time. I expect it will be difficult to the Ministry to initiate the harvest monitoring program for this reason. If they can overcome the obstacles of initiating a long term monitoring program, they will see its benefit more and more as time passes. The benefits of these data become broader and will be used in manors that unforeseen at this time. Presently the Ministry feels that the fisheries resources of South Sudan are underutilized. It is true that the Nile and the Sudd are tremendously productive habitats. From what I have seen in terms of the ranges in sizes of fish and the diversity of species landed, there is no evidence of overexploitation. This is unique in the World's fisheries, most of which are overfished, and places the important responsibility of sustainable management on the Ministry. With fisheries development comes more efficient harvest methods and the need for more active harvest management to preserve fisheries for future generations.

Recommendations¹

Recommendation 1. The Ministry develop a written Harvest Monitoring operational plan that clearly states the goals of their harvest monitoring program with measurable and achievable objectives. The plan should provide the methodologies for enumeration of landings at Bor Harbor, and address data storage, and a periodic reporting schedule. This plan could serve as a model for future harvest monitoring in other area of Jonglei state as the Ministry gains additional capacity.

Recommendation 2.

Implement the harvest monitoring plan at Bor Harbor, collecting harvest data. Harvest data collected by county tax collectors should be compared to data collected by the Ministry to evaluate the accuracy and usefulness of the tax data. Following this comparison, an evaluation should be conducted to determine if the two monitoring systems can be merged to maintain the integrity of the Ministry's more systematic and comprehensive approach, while leveraging the usefulness of the county's historic tax records. When procedures and regular reporting of Bor Harbor landings become well established, the practice would be a model to apply to other fishing ports in Jonglei State using the Ministry's field extension agents.

1.2.2 Objective 2: Establish tools and methodologies for the Ministry to improve assessment of fish stocks and species identification (Stock Assessment).

Progress with the objective

After initial assessment of the fishery as outlined in Objective 1 above, a Stock Sampling training program was initiated. I constructed three fish measuring boards in Alaska before coming to South Sudan. In addition, I brought a metric tape measure, a Taylor hanging scale that could weight fish up to 32 Kg +/- 0.5 Kg, and two Rite in the Rain field notebooks for recording field data (PP Slide 36). The Rite in the Rain notebooks can serve for data collection for both harvest monitoring data (Objective 1) and stock sampling (Objective 2). The Rite in the Rain paper is made to preserve its integrity when wet so that data can be collected during the rainy season. For accurate fish identification I brought a listing of 176 species of freshwater fish of Eastern Africa generated from www.fishbase.org. This has links to fish identification pages for each species. In addition I downloaded and printed out the field note pages for 32 species that were likely to occur in commercial harvests near Bor, based on various reports. PDF versions of these pages were provided on USB drives to the hosts. In addition species identification can be cross referenced and keyed from "Fishes of Ethiopia" by Dr. Redeat Habteselassie. Training Ministry staff (Peter) and some CRS staff on fish sampling for length and weight started on May 9th and continued through the balance of the week. Fish were sampled at Bor Harbor and also at fish camps visited using the ACTED boat. Three or four students from John Garang University participated in the fish length and weight

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.



sampling as well. Participants learned the method for measuring Total Length (TL) using the fish boards, and taking fish weights. Average weights were taken for fish smaller than 1 Kg in weight (PP Slide 38). In total 119 fish were sampled (PP Slides 28 & 29).

Expected impacts/results

The fish sampled during the week of May 9th form a basis from which additional analysis will be possible as more samples are taken. An outline for the Ministry to develop a stock sampling operational plan was presented (PP Slides 32 – 43). While describing length weight relationships for fish species in the White Nile might be an initial objective for continued sampling, future sampling may focus on monitoring the length and weight averages of the commercial harvests. These statistics will be increasingly useful as the fishery develops and could provide indicators of the health of the fish stocks and if coupled with fishing gear studies could be used to better understand the selectivity of harvesting practices. It is important that the Ministry continue to monitor these data through time for indicators of stress resulting from harvest pressure.

Recommendations

Recommendation 3. Develop and implement an ongoing stock sampling program building from the methods presented and centered at Bor Harbor. An initial samples size for length and weight relationships by species would be 100 fish.

Recommendation 4. Using the Ministry's Field Extension Agents at other ports, implement the sampling plan in more distant locations. Analyze results to determine if regional differences exist in species composition, and average weights, and/or condition factors.

1.2.3 Objective 3: Train fisheries staff on data collection methodologies, analysis and reporting

Progress with the objective

Starting with field data collection, Ministry staff & others learned that data integrity starts with the hard copy (paper) data collected in the field. These forms form a historic record that may need to be referenced to answer questions at a future date when data analysis is undertaken. Data sheets should be filled out completely including the name of the organization that owns the data (the MoLF), the names of samplers, the date that data were collected, units and notes on deviations. Quality control methods were discussed and should be incorporated in the data maintenance starting the day that the data were first collected. In addition to a review for accuracy and completeness by the person(s) that collected the data (QC-1), data sheets should be reviewed by a more senior manager (QC-2). There should be a system for checking raw data out to another organization such as the University.

Simple analysis methods for length weight data were discussed. Data collectors should understand the bias in the sampling, for example taking length and weight data from fish landed at Bor Harbor, represents these data for the harvested fish, not the population, which includes young fish that have not grown to a size that can be captured by the fishing gear (gill nets). A data set of 20 *Heterotis niloticus* was used to demonstrate the method for developing a length vs weight relationship (PP Slide 30). Methods were also demonstrated for calculation of condition factor (k) from length weight data (PP Slide 31). The structure

of a spreadsheet based database using Microsoft Excel was demonstrated, including reference tables for standardization of species naming and location codes. A table in the Excel workbook was demonstrated for the sole purpose of cataloging metadata.

Expected impacts/results

One of the principles discussed for sustainable fisheries management (PP Slide 5) is the necessity for the Ministry to maintain and ongoing research program. The MoLF now has some of the tools necessary to collect harvest data as well as length weight data for the stocks commercially harvested. The sample sizes collected during the week of sampling with the MoLF are not adequate and further sampling is suggested. Sample sizes of 100 fish for each species were suggested as a sampling goal for developing length weight relationships. With the Ministry's responsibility to develop the fisheries of Jonglei state comes the responsibility to collect and maintain the necessary data. While the MoLF now has the manpower and knowledge to collect length weight data at Bor Harbor, their capacity to convert the data to electronic data and conduct data analysis is limited. It is suggested that an ongoing partnership arrangement with the University be established. By sharing data with the University the Ministry will benefit from the analysis and summarization of the data. Students benefit by having meaningful data from their local fish resources to learn fishery analysis methods. A long term benefit for the Ministry is developing fishery experts at the University that might be employed by the Ministry in the future.

Recommendations

Recommendation 5. Develop a co-operative research program partnering the Ministry (Department of Fisheries) with the John Garang Memorial University of Science and Technology (JGMUST). This research plan should set out long range goals and achievable objectives focusing on current and future information needs of the Ministry for the sustainable development and management of the White Nile and Sudd fisheries. The plan should provide University students with a permitting authority to conduct fisheries research in the Sudd, and establish data sharing agreements between the Ministry and JGMUST.

Recommendation 6. Incorporate CRS Fishing Groups into the research plan to utilize their traditional ecological knowledge of the fishery, better understand information needs from the harvesters perspective, and engage the harvesters in data collection. Examples of components that might be included: establishing a log book system to monitor a specific net fished in a target habitat type; evaluation and development of new harvesting methods; and development of live fish storage methods for improved fish quality and value.

1.3 Recommended future volunteer assignment

A future volunteer assignment could be to assist the MoLF, JGMUST and the Fishermen Groups in the developing and implementing a Cooperative Fisheries Development and Research Plan for the White Nile and Sudd. Among other topics the plan might direct the advancement the understanding of: 1.) methodologies for harvesting, transporting and processing of fishery resources to maximize the value chain to all users, 2.) addressing information needs for sustainable fisheries management and development, 3) applied research directed at expanding understanding of fish life histories, utilization of aquatic habitats, fish migration, reproduction, inter-species interactions, fishing gear selectivity, and modernization of the fishing fleet. Directions of the plan would be developed by

focus groups, involving key stakeholders to insure buy-in and incentives for each of the parties in the cooperative arrangement.

1.4 Action Plan

Recommendation	Specific Action	Responsible person	By when
1. Harvest monitoring operational plan	Completed document	Director of Fisheries	1 month
2. Implement harvest monitoring and compare with tax records	Regular visits to Bor Harbor to enumerate fish	Director of Fisheries and staff	1 year
3. Stock sampling at Bor Harbor	Length & weight sampling report	Ministry staff	Generate report when sample objectives are met (3 months)
4. Stock sampling at other ports	Sampling at ports in Table 1	Ministry field extension agents	1 year
5. Cooperative research plan	Signed agreement	Director of Fisheries and Dean of College of Fisheries JGMUST	6 months
6. Fishing group research program	Agreement and implementation	Fishing group leaders, Ministry of Fisheries, and JGMUST	3 months

1.5 Number of people Assisted

- Through formal training (Classroom setup) **26 +/- (JGMUST presentation & Hanbit Tech Center Workshop)**
- Through direct hands on practical assistance (Do not double count) **9 (including 2 CRS Staff)**
- Out of these above, number of host staffs: **4 Ministry staff**
- Training/assistance by field **9 (including 2 CRS Staff)**

Category	Total	Males	Females
Members/ owners			
Employees (CRS ?)			
Clients/ Suppliers			
Family Members	0	0	0
Total			

1.6 Gender

- What gender roles did you recognize in your host community? Did these roles play a part in your assignment? How?

Nearly 100% of the Ministry staff that I worked with were male. The only exception was Mary _____ who spoke on Minister Mayan's behalf at the Workshop on 17 May 2016. All of the



University students (15) and faculty (2) that I worked with were male. The fishermen that we met were all male, while the fish traders at Bor Harbor were predominately female.

- b) How might CRS or the host organization improve opportunities for the women in this host or host community?

I suggest promote the higher education for women and engage them in the JGMUST fisheries and environmental sciences programs. The Ministries should be encouraged to recruit women into entry and mid level positions. CRS could lead by example by hiring women into mid level positions. It appeared to me that women on CRS Bor staff were either in low level positions (kitchen staff) or at senior management level.

1.6 Value of volunteer contribution in \$

- a. Hours volunteer spent preparing for assignment 60 hrs @\$125/hr = \$7,500
- b. Estimated value of all material contributions volunteer contributed to host during assignment \$250

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

- a) Meals 0
- b) Transportation 0
- c) Lodging 0
- d) Translation 0
- 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:

1.10 Press Release

FOR IMMEDIATE RELEASE

VOLUNTEER CONTACT: [Name]

[Title]

[Phone]

[E-mail]

[US City] Area Volunteer Travels to [Country] to Share Skills with Local Farmers

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

FOR IMMEDIATE RELEASE



CONTACT: [Name]
[Title]
[Phone]
[E-mail]

[City] Area Volunteer Travels to [Country] to Share Skills with Local Farmers

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

[Name], a [title] from [city, state] travelled to [country] for [x] weeks to share his/her technical skills and expertise with local farmers. [Name]'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.

“[Volunteer quote],” said [name].

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 [country], [name] worked with [Host] in [value chain] training and giving technical assistance to [type of beneficiaries] to enable them to [Goal of the assignment]. Up to [Number of beneficiaries] beneficiaries were reached. [Other details are optional]

[Name]'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.*