

IMPROVING THE CATCH DATA COLLECTION SYSTEM FOR SOMALI FISHERIES: PROJECT KALLUUN

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ABSTRACT

In order to comply with requirements of IOTC (Resolution 10/02), the Ministry of Fisheries and Marine Resources (MFMR) is improving its collection of fisheries data. IOTC requires catch and effort data to be collected, continuously, according to craft-gear combination and craft type, covering a wide range of species and size categories, for all major large pelagic varieties. Somalia's existing decentralized data collection systems faced challenges fulfilling the requirements of IOTC: they had low sampling coverage, poor species identification, high levels of species aggregation, a lack of gear-based data, and low resulting accuracy of statistics. The uncertainty resulting from poor quality of the statistics has been discussed in the IOTC WPDCS during the last few years.

Therefore, Somalia has taken actions to improve the catch data collection system for pelagic fisheries. Project Kalluun – a partnership between MFMR, City University, Secure Fisheries, and FAO – will pilot new fisheries data collection and community engagement. Its objective is to strengthen the data collection, processing, and reporting system to enhance the quality of data by increasing coverage and representativeness. Efforts have been made to improve sampling area selection, train data collectors on sampling and species identification, and revise data forms. Special attention was paid to identify and record species managed by the IOTC.

Project Kalluun will expand throughout Somalia. Fisheries Inspectors working for MFMR have partnered with CU marine science students to collect foundational catch data (e.g., species, length, weight, boat metrics) based on a standardized form. The study has originated in Liido and Hamarweyne as a pilot area; later (it is hoped), the model will be introduced to all other waters in Somalia.

INTRODUCTION

As the Somali Ministry of Fisheries and Marine Resources (MFMR) strengthens its mandate to provide quality fisheries data to stakeholders in the region, including the IOTC, it is proceeding with plans to implement data collection at landing sites. At the 13th Session of the Working Party on Data Collection and Statistics in November 2017, Mr. Abdirahim Ibrahim Sheikheile presented a report, *Development of a Central Database for Artisanal Fisheries in Somalia*. This report provided foundational information on the biology of fisheries in Somali waters, the economic importance of fisheries, and the state of scientific data collection in Somalia.

Reports suggest artisanal, small-scale fisheries in Somalia land between 30,000 and 60,000 mt of fish per year. This range is based on numbers estimated by the FAO (low end) and numbers from catch reconstruction by Sea Around Us (high end). A Fishing Vessel Registration project, initiated by MFMR and FAO, documented over 4,300 fishing vessels used by the artisanal fleet and over 65,000 fishermen throughout Somalia. Finally, the ex-vessel value of fish caught by the artisanal and subsistence fleets in Somalia is about \$58 million USD, resulting in over \$100 million to the Somali economy each year.

The lack of consistent and comprehensive scientific data for Somali fisheries is a significant challenge to management of fisheries resources. The Somali region requires organized, standardized, and consolidated collection of fishery catch and effort data. Catch data are necessary for stock assessment, tracking domestic and export markets, understanding patterns in fish populations, and anticipating changes in fisheries.

Consequently, the MFMR Department of Marine Policy Planning and Statistics outlined a project to close this data gap. The report outlined a plan for sampling 19 landing sites throughout Somalia using trained Fisheries Inspectors. These inspectors, some employees of MFMR and some community members, will collect data ten days per month. Data collection will focus on estimates of catch per unit effort and total effort (number of vessels), by species. The project will cost about \$377,000 USD to initiate.

This report is an update on these efforts. Here, we report preliminary data gathered from Liido landing site and from fish markets in Mogadishu. We also describe Project Kalluun – a partnership between MFMR, City University, FAO, and Secure Fisheries – that will pilot data collection and community engagement in Liido landing site.

STATUS OF DATA COLLECTION BY MFMR IN SOMALIA

Ministry of Fisheries is collecting artisanal fisheries data on a sampling basis. The primary sampling unit is the landing site. From a list of landing sites obtained from frame surveys, four landing sites are randomly selected. Data collected include targeted species caught by boats using specific gear. Due to technical and financial burdens, the data collected to date from different fishing districts of the marine sector have never been processed or analyzed.

However, combining and extrapolating according to the total number of boats, total number of fishing days, and the boat utilization ratio, these data could be used to generate estimates of total landings by species, boat types and fishing gear in selected districts and landing sites. These catch trends should also be reported in national annual fisheries statistics reports to comply with requirements of IOTC (Resolution 10/02) if processed and analyzed accurately. This information (especially the catch trend) is crucial for the management of the fishery.

Since 2014 when Somalia joined the IOTC, national annual fisheries statistics reports, specifically for the artisanal sector, have not been produced. This is due to the lack of manpower and financial resources that limit the regular collection of the basic data from the landing sites as well as a lack of human capacity to analyze the entered data and produce fisheries statistics. It is of the highest importance to solve both problems.

However, since 2016, MFMR has been looking for means to improve its artisanal fisheries statistics. The shift to a federal administration structure has made this work very difficult. Project Kalluun was established to pilot new fisheries data collection and community engagement. The purpose of the project is to provide timely, relevant, accessible, useable, and cost-effective information to improve the management of marine fisheries resources and to strengthen the data collection, processing, and reporting system to enhance the quality of data by increasing coverage and representativeness. Efforts have been made to improve sampling area selection, train data collectors on sampling and species identification, and revise data forms. Special attention was paid to identify and record species managed by the IOTC. This data collection is based on the same main principles employed in Somalia, i.e., asymmetrical collection of catch data from selected landing sites on selected days.

RECENT IMPROVEMENTS IN DATA COLLECTION

Considerable effort has been taken to get reliable artisanal fisheries statistics. In summary, unreliable statistics confuse fisheries management on three fronts. Biologically, they bring greater uncertainty into the biomass estimation process by reducing confidence in the accuracy of fisheries management advice. Politically, they reduce the public's confidence in the ability of fisheries managers to monitor and manage the resource on their behalf. Economically, they limit the economic and social understanding of the position and viability of the fisheries sector. Therefore, this section will explain recent improvements to market data collection through community participation in data collection and the type of data to be collected in marine waters of Somalia so as to improve artisanal fisheries statistics.

Somalia's marine artisanal fisheries are based on the use of local, traditional, and primitive methods of fishing. According to the 2016 frame survey (MFMR 2016), there are 4,200 fishing vessels in marine waters. About 80% of the fishing vessels are GRP 6-10-meter outboard and inboard powered open vessels. The remaining 20% are canoes. The primary gear includes shark nets, gillnets, hand lines, fish traps, long lines, gillnets, ring nets, and scoop nets. Generally, there is a wide distribution of fishing vessel types and gear (shark nets, gillnets, hand lines and long lines) used in all fishing districts along the coast.

Somalia has 65 landing sites in marine waters (MFMR 2017). Catches are landed each day in all 65 landing sites. The landed fish is of different species. They are landed from different types of boats using different types of gears and different gear sizes. Table 1 lists the vessel count by types in the regional states of Somalia and the Benadir region.

Table 1. Fishing boat counts by regional government – 2015 and 2016.

Regional States	Total Boats per Region
Somaliland	594
Puntland	1,697
Galmudug	565
Hirshabelle	320
South-west	386
Jubaland	495
Benadir (Mogadishu)	243
Total Boats	4,300

Source: Statistics Unit - Ministry of Fisheries and Marine Resources & FAO-Info graphics-Somalia Fisheries-en

In small scale (artisanal) fisheries like those described in Table 1, it is impractical and nearly impossible to collect data from all landing sites on a daily basis. This is due to limited finances, manpower, low technological capacity, difficulties in infrastructure, and geographical conditions. The amount of potential data available from all 65 landing sites is very large based on the number of total boats. As a result, comprehensive enumeration is difficult and hardly practical. Stamatopoulos, in FAO (2004), underlined that, “in small scale fisheries, the amount of information regarding total landings, species composition, prices, etc. is so large that the use of a census approach (total enumeration) is unreasonable and sampling techniques are almost regularly employed”. Therefore, the most cost effective way for Somalia to collect artisanal fisheries data is through sampling. This assessment is supported by Papaconstantinou et al. (2002), who concluded that in designing fisheries data collection systems, sampling procedures minimize operational costs, time, and logistics. Accordingly, under Project Kalluun, MFMR, FAO, Secure Fisheries, and City University have initiated pilot data in Liido landing site in the Benadir. Additionally, City University initiated data collection at Liido and Hamarweyne markets.

PRELIMINARY MARKET DATA COLLECTED FROM MOGADISHU

The Marine and Fisheries Institute at City University in Mogadishu is training the next generation of fisheries scientists: one day, these students will move forward to work as fishers, fish traders, and fisheries scientists within the MFMR and other fisheries offices around Somalia. Today, these students are receiving training in data collection, fish biology, fisheries science, and data analysis to prepare them for the future.

During 2017, two students visited fish markets at Liido and Hamarweyne in Mogadishu every month. They identified, counted, and recorded the fishes they found for sale at the market. In some cases, fish were identified to species, but in some cases, fish were identified at higher taxonomic levels (species were aggregated). This project provides some of the first quantitative data about fish catch from waters near Mogadishu in decades. While market data cannot help measure catch per unit effort, it is a first step toward understanding relative abundance of fish in Somali waters (Table 2), identification of species targeted by the Somali artisanal fleet (Table 2), and estimates of monthly variability in fish availability (Table 3 and Figure 1).

Table 2. Count of individual specimens of the fish most commonly found in Liido and Hamarweyne markets during January – December 2017.

English name	Somali name	Count
Spinefoots	Saanfiid	3617
Kawakawa	Dhiiglow	2385
King mackerel	Yuumbi Cadde	1830
Spotted mackerel	Saynab	1780
Sea bream	Tartabo	1253
Yellowfin tuna	Jeedar	1035
Jacks	Shiiran	774
Skipjack tuna	Sanuuro	712
Spotted fish	Majabto	601
School shark	Jeerjeer	455
Emperors	Dhuubaani	382
Striped bonita	Shaamshuuter	364
Shark	Libaax	357
Red fish	Booray	296
Billfishes	Daanburi	275
Mahi-mahi	Sucbaan	255
	Madaxgoys	247
Sturgeon fish	Xabkoole	233
	Dhabaqo	220
Lady fish	Dooldool	203
	Yuumbi Baxrayd	187
Longface emperor	Huriwaa	184
	Boorad	137
Bigeye tuna	Roobmawaaye	120
Sky emperor	Dhag-gaduud	119

Species managed by the IOTC were commonly found for sale in these two Mogadishu-based markets (Table 2). Kawakawa, King mackerel, yellowfin tuna, skipjack tuna, billfishes, and bigeye tuna appeared in the top quartile (23%), by numbers, of the fish sold in these markets. Other commonly-caught fish include coral-associated coastal fishes (spinefoots, sea bream, jacks, snappers, and emperors) and pelagic fishes (sharks, bonita, mahi-mahi, and ladyfish).

Counts of fish for sale give a biased view of fish targeted by fishers and does not account for the effort expended to catch fish. For example, one spinefoot fish (family Siganidae) weighs less than one kilogram, whereas a kawakawa can weigh up to 14 kilograms.

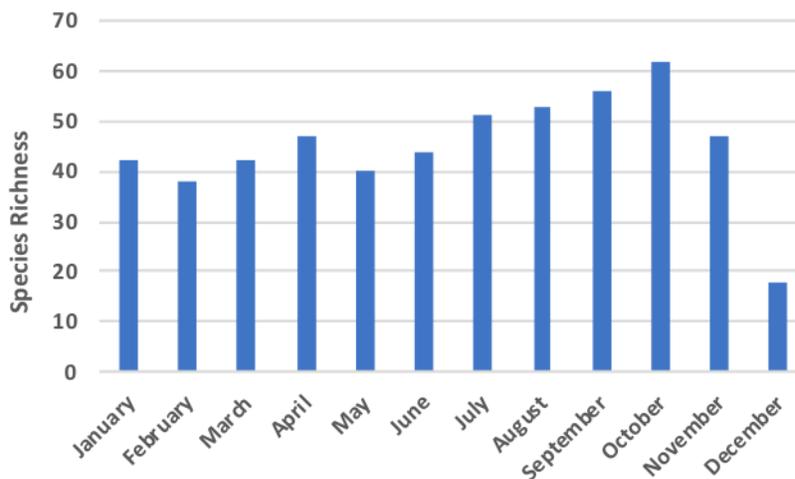
Monthly occurrence provides a different perspective on abundance or availability of fish to the Somali markets. Table 3 shows the number of months in 2017 that a species or type of fish appeared in the markets analyzed. Kawakawa, yellowfin tuna, and king mackerel (all IOTC-managed species) appeared in 11 of 12 months. On the other hand, the smaller coastal fishes such as spinefoots, emperors, and seabreams appeared during only eight or fewer months of the year.

Table 3. Number of months in 2017 a fish type appeared in the Hamarweyne or Liido markets for sale. *This indicates the relative abundance on a temporal scale for each fish type. Data reported represent only fish that appeared in six or more months. An additional 77 fish types appeared in at least one month during 2017.*

English name	Somali name	Hamarweyne	Liido	Average
Kawakawa	Dhiiglow	12	11	11.5
Yellowfin tuna	Jeedar	11	11	11
King mackerel	Yuumbi Cadde	11	11	11
Mahi-mahi	Sucbaan	12	8	10
Jacks	Shiiran	10	9	9.5
Billfish	Daanburi	11	7	9
	Yuumbi Baxrayd	8	10	9
	Aarjoo	9	7	8
Spinefeet	Saanfiid	11	5	8
	Baalalay	6	9	7.5
Shark	Libaax	9	6	7.5
Cobia	Taqo\ Silqo	9	6	7.5
	Wayanbuuro	9	6	7.5
	Faray	10	4	7
	Gaduudow (Jikojiif)	10	4	7
Spotted fish	Majabto	10	4	7
Spotted mackerel	Saynab	9	5	7
Emperors	Dhuubaani	8	5	6.5
Longface emperor	Huriwaa	8	5	6.5
	Mayaanso	10	3	6.5
Skipjack tuna	Sanuuro	5	8	6.5
Sea bream	Tartabo	8	5	6.5
Surgeon fish	Xabkoole	8	5	6.5
	Cambarshe	6	6	6
	Madaxgoys	8	4	6

Finally, species richness per month shows all months except December are relatively similar (Figure 1): in December, only 18 fish types were found in the markets, but in all other months at least 38 (February) and up to 62 (October) fish types were found. On average, 45 different fish types were found in the markets near Mogadishu each month.

Figure 1. Species richness (number of species) of fishes for sale in the Liido and Hamarweyne markets, by month.



PROJECT KALLUUN

Project Kalluun is a partnership between the Somali MFMR, City University, Secure Fisheries, and FAO to develop a pilot program for catch data collection. Initially, we began this project in Liido landing site near Mogadishu. The presence of all partners near Mogadishu facilitated this choice. Ultimately, Project Kalluun will expand to locations throughout Somalia. Fisheries Inspectors working for MFMR will partner with students in relevant marine science or fisheries courses to collect foundational catch data (e.g., species, length, weight, boat metrics) based on a standardized form. The on-going pilot study in Liido will last six months and it began in September 2018 with training and November 2018 with data collection.

The main goals of the pilot study are:

- To test the ability of data collectors to identify fish to species level, reliably
- To test proposed data collection forms and refine data collection accordingly
- To engage fishing communities and sensitize stakeholders to the benefits of catch data collection
- To estimate the time and financial commitment data collection will require
- To serve as a model for expansion to other landing sites in Somalia

The partners in Project Kalluun have assumed separate but complementary roles as follows:

- MFMR: Provide Fisheries Inspectors for data collection, approve data collection form and materials, participate in community meetings, receive and archive all data collected in the project.
- City University: Provide student data collectors, collect data in Mogadishu ports/landing sites, host community meetings, share data with partners.
- Secure Fisheries: Coordinate on-the-ground partners through our Field Manager, contribute to form creation, develop training materials, guide students in data analysis, integrate findings into [Project Badweyn](#).
- FAO: Lead technical trainings on fish identification and measurement and data collection, provide support to reporting bodies (e.g., IOTC).

We expect Project Kalluun to provide the following results and outcomes:

- Updated catch and effort data for the Somali coast
- Training of 6 – 18 Somali college students on fish identification and data collection
- Use of data in student research projects
- Creation of institutional knowledge at Somali universities for continuation of data collection
- Testing and validation of catch assessment survey form adapted to Somali context
- Inform estimates of stock sustainability and status for important fisheries at MFMR
- Create foundation for future efforts at traceability in Somali export markets
- Improve understanding of fish distribution and seasonality in Somali waters
- Contribute directly to MFMR efforts at fisheries management

To date, Project Kalluun has conducted its first data collection at Liido Beach landing site. Six City University students collected data from six artisanal boats as they landed their fish on two consecutive mornings. The data collection will continue monthly for six months.

FUTURE EXPANSION

The partners of Project Kalluun are committed to refining the data collection process so it is scalable to other communities. In 2019, Project Kalluun will expand to Bosasso in Puntland and to Berbera in Somaliland. In Berbera, the project will incorporate FairFishing (a fishing NGO and cooperative) and the Berbera Maritime and Fisheries Academy. In 2020, we plan to expand to Kismayo in Jubaland. The project will then cover the four main fishing ports in Somalia.

Ultimately, standardized data collection forms will be adopted by the Ministries of Fisheries in the Regional Members States and the Federal Government. The MFMR will collect and archive these data. After several years, sufficient information should be available to begin fisheries management planning. It is our hope the students trained at City University, Berbera Maritime and Fisheries Academy, and other institutions of higher learning will lead these efforts.

CONCLUSION

This report discusses the recent improvements to collection of artisanal fisheries statistics in Somalia through an ongoing pilot data collection, analysis, and management. Manpower, technological, and financial limitations are the main sources of unreliable and inaccurate fisheries statistics in Somalia.

The recommended improved system, which is based on sampling and community participation in data collection, appears likely to generate more benefits than costs. Patterning with University students will reduce the workload of data enumerators and data entry personnel. Ultimately, reaching a goal of sampling ten days per month will require dedicated personnel. With the help of partners, data enumerators will have more time for other activities during the remaining twenty days.

Artisanal fisheries are not particularly high on the political agenda at the regional state level unless there is a direct revenue benefit. MFMR had given the whole task of data collection to community members who are closer to the landing sites. Building up the data collection and analysis capacity of data collectors should be a key task before the implementation of the improved system. This will give data enumerators and data entry personnel at the regional level the chance to acquire knowledge related to data collection and processing. The improved system in the artisanal marine fisheries in this pilot project will be used as a model for a similar initiative in other water bodies within the country.



Finally, the existing management regime is based on open access and community management. Since Somalia has adopted a Federal system it should take steps to eliminate this common property right. The regional states should establish a license control mechanism. It is important to document the total number of fishing vessels operating in the fishery. Then, entry into the fishery can be closed to new entrants for one year, but existing licenses should be tradable. Only those who need fish for home consumption should be given limited permits. This might be the start of the introduction of total allowable catch (TAC). With accurate and reliable data, it will be easier to know exactly how much should be harvested from the stock. By making use of TAC and property rights such as licenses, policy makers may be able to maintain a desired fishing effort so that the fishery operates at a reasonably efficient point from the social perspective.