ASSESSMENT OF ARTISANAL FISHING GEARS IMPACT ON KING FISH (*Scomberomorus commerson*) IN THE KENYAN MARINE ECOSYSTEM.

Isaac Wafula Barasa.
Division of Marine and Coastal Fisheries
Kenya Fisheries Service.

Stephen Ndegwa
Head of Statistics
Kenya Fisheries Service.

Abstract:

A study was conducted to provide an overview on the various fishing gears used by artisanal fishermen to determine the most effective gear used to catch King Fish (*Scomberomorus commerson*).The main objective of this study is to identify the opportunities for improvement of the existing fisheries management strategies, focusing on fish biodiversity and conservation. The study focused on artisanal Fishermen that use hand lines, gill nets, monofilaments, trolling lines, ring net and long lines fishing gears. Data collection was undertaken through Catch Assessment Survey (CAS) and Fishing Effort Survey (FES). An analysis of the data collected was done which showed the sum sample landings for trolling lines was 19108 kgs, hand lines 16996 kgs, gill net 14158 kgs and ring net 2842 kgs. Gear versus average weight of fish caught in kgs showed trolling line 11.3 kg, long line 11 kg, hand line 7 kg and gill net 5 kg. Monthly counts for samples taken recorded September as the peak with 334 counts, December 285 counts, July 264 counts and October 233 counts. Gear type versus number of fish caught per gear; Hand line 978 pieces, trolling line 586 pieces and gill net 466 pieces. In conclusion trolling line was the most effective gear used to catch king fish, followed by hand lines on average weight landed. Trolling lines caught the biggest sizes of king fish, while hand lines caught more numbers of king fish than trolling lines. This study shows clearly artisanal gears that are active in catching king fish in terms of weight per each piece of fish and size are trolling lines and hand lines as well as gears that have insignificant impact on the king fish population .i.e. Monofilaments, long lines, reef seines. etc.

Keywords: Fishing Gear, Sample size and weight, Catch Assessment Survey, Fishing Effort Survey.

INTRODUCTION;

Coastal and nearshore ecosystems are some of the richest areas of marine biodiversity globally that support considerable human populations; at least 50% of people on Earth live and work within 200 km of a coast. Coastal zones are threatened by many factors – pollution, habitat loss and degradation, intense harvest of marine resources – that are driven by human activities on land and at sea. As human populations have expanded, fishing pressure in coastal areas has intensified and coastal fisheries increasingly play a central role in the economies and livelihoods of people around the world by providing food and source of incomes to coastal communities. Coastal zones are home to a wide range of fishing fleets, from artisanal or small-scale vessels to large-scale industrial vessels that employ an equally broad range of fishing gears and practices. These fleets support millions of households and drive local, national and, in some areas, international markets and economies.

Kenya is endowed with vast Coastal and marine fisheries resources in the Indian Ocean and the brackish waters covering a stretch of straight coastline of (640km) and 880km including the inlets and bays. The coastline supports a vibrant nearshore fisheries comprising of an artisanal fishing fleet with a variety of gears and methods involved. The coastal and marine waters fisheries give employment to over 13,000 fishers. According to UNEP (1988) over 250,000 persons depend on coastal and marine fish production which is estimated to represent approximately 5.0% of the total catch in the country. Despite the artisanal fisheries production remaining fairly constant over the years there has been an increasing number of new entrants into the fishery and development of new fishing gears and methods. This poses a challenge to the management of the fisheries resources occasioned by the dynamics of craft gear inputs as it constraints approaches to quantify fishing capacity of the entire active coastal artisanal fishing fleet. (Frame Survey 2014).

The National fisheries policy objective is to ensure sustainable management of fisheries using the best scientific evidence available. This requires a sound knowledge of the status of fish stocks at a given time, and how these stocks would respond to different levels of exploitation. The realization of this policy objective needs information about the status of fisheries and the dynamics of the fishing fleets impacting these fisheries. The data and information required have multiple uses including analyses to provide scientific advice for policy decision making, monitoring and compliance to the set management standards and to be used by the fishing industry. To obtain such data and information a wide array of tools and approaches are available to monitor and collect fishery dependent data including fishing effort, catch data and biological data. These approaches include vessel monitoring systems (VMS) that record the location of the vessel in time and space, logbook reporting system, catch assessment surveys, biological surveys, frame surveys, port sampling programs and onboard observer programs.

In the past, much of the attention has been focused on quantifying fishery catches as a measure of fishing intensity by placing data collectors at landing sites. Corresponding fishing effort data has often times not been collected due to the lack of sufficient resources dedicated towards fisheries data collection and the complexity of vessel and gears used and the dispersed nature of the coastal artisanal fisheries where landing may occur in far-flung unmonitored sites. While catch information is useful, it does not directly address one of the fundamental issues of fisheries sustainability, namely direct and indirect impacts by a fishing gear on habitats, target and non-target species . Catches in many areas have remained stable however; coastal fishing effort (number of vessels, gear, and methods) has been changing markedly over the years. The widespread pattern of catches associated with substantially higher quantities of gear deployment, modification of gears and catching techniques illustrates the limitations of only monitoring catch statistics as many of the ecological impacts.

Materials and methods.

Description of the Catch assessment Survey areas.
This survey was focused on 22 landing sites, where data collectors were stationed to monitor the types of fishing gears, types of vessels and modes of propulsion used to access fishing grounds, time in and time out was recoded. Information on the fishing areas targeted was obtained from the fishers.

Data Collection sites.

Data collection sites were as shown in figure 1.
From the North coast on the Kenya Somalian border, Kiunga was the first data collection site heading downwards towards the South on the Kenya and Tanzanian border, the last data collection site was vanga, covering a stretch of straight coastline of (640km) and 880km including the inlets and bays. Data collectors were chosen from local fisheries personnel who reside near the landing sites. This data was collected from 2013 to 2016 on monthly basis.

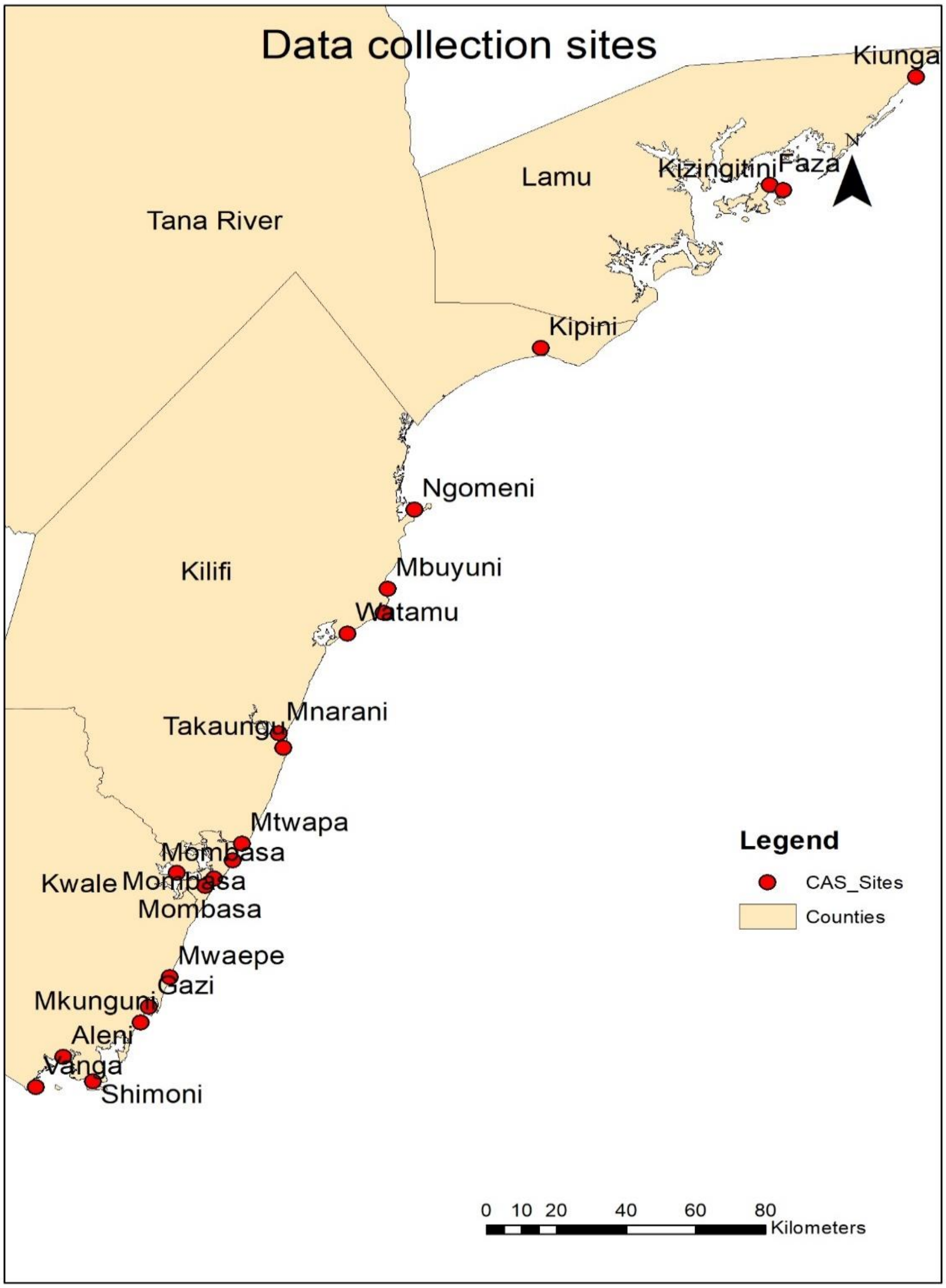

Figure 1. Distribution of data collection sites.

Results;

The results from the data collected were recorded and projected in tables as shown below. This data was analyzed using excel work sheets on pivot tables. Table.1. highlights results under the sum of sample weight in kgs, figure.2 the raised catch in kgs, Table.2 gear type versus number of fish caught, Table.3 gear types versus the average size of fish caught in cm and Table.4. Catch frequency per month.

Table 1. Sum of Sample weight.

Sum of Sample Wgt. (kgs)	
Main Gear Type 2	Total
BS (beach seine)	19.22
CN (cast net)	28
GN (Gill net)	14158.35
HL (hand lines)	16996.95
HR (Harpoons)	102.5
LL (long lines)	205.5
MF (monofilaments)	1128.3
OT (others)	899
RN (Ring net)	2842.28
RS (Reef seine)	76.8
SG (Spear gun)	369.95
ST	17.8
TL (Trolling lines)	19108.05
TR (Traps)	74.5
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Grand Total	56027.2

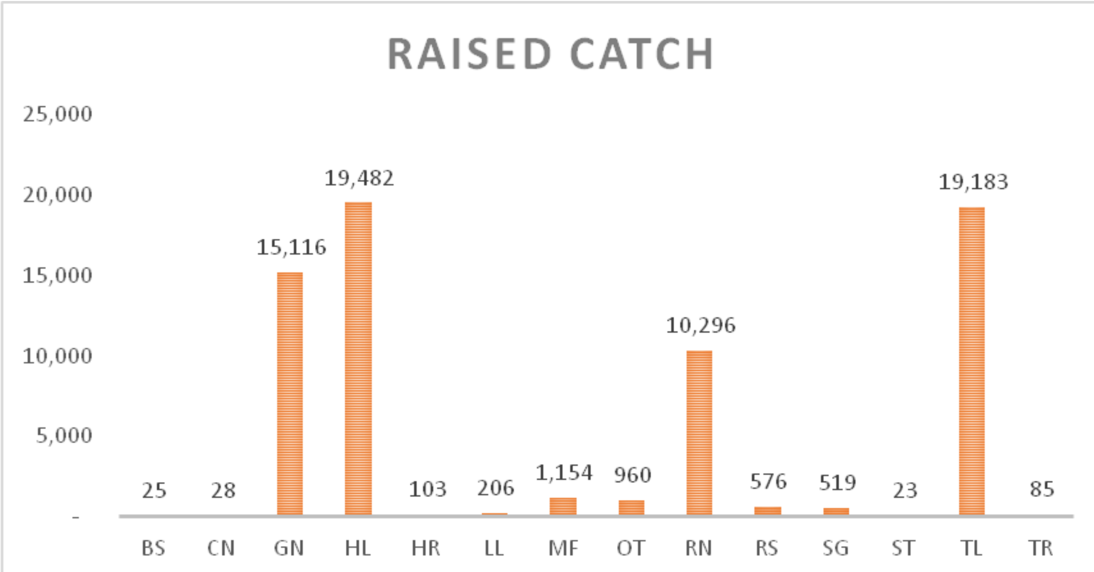

Figure.2. Raised catch gear versus weight.

Table. 2. Gear type versus number of fish caught.

Gear type	No of fish
BS	5
CN	2
GN	466
HL	978
HR	2
LL	5
MF	138
OT	51
RN	99
RS	3
SG	47
ST	5
TL	586
TR	17
	2404

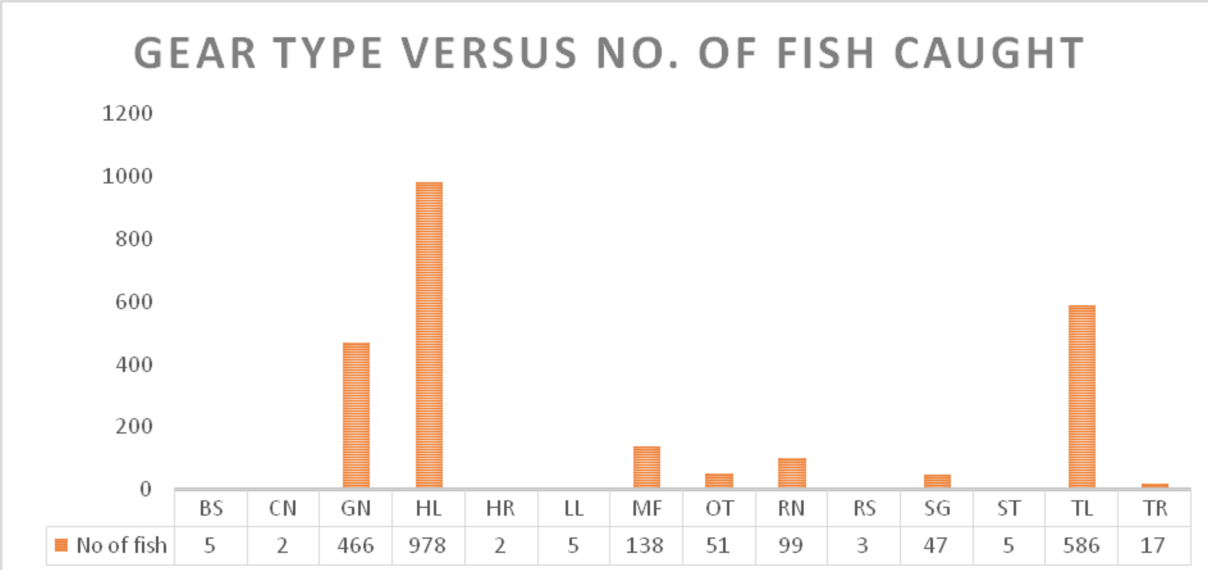

Figure. 3. Gear type and number of fish caught

Table.3. Gear types versus the average size of fish caught

Gear	Average size
BS	0.9
CN	3.5
GN	5.1
HL	7.0
HR	10.9
LL	11.0
MF	3.7
OT	8.6
RN	3.2
RS	3.2
SG	3.7
ST	2.3
TL	11.3
TR	1.7

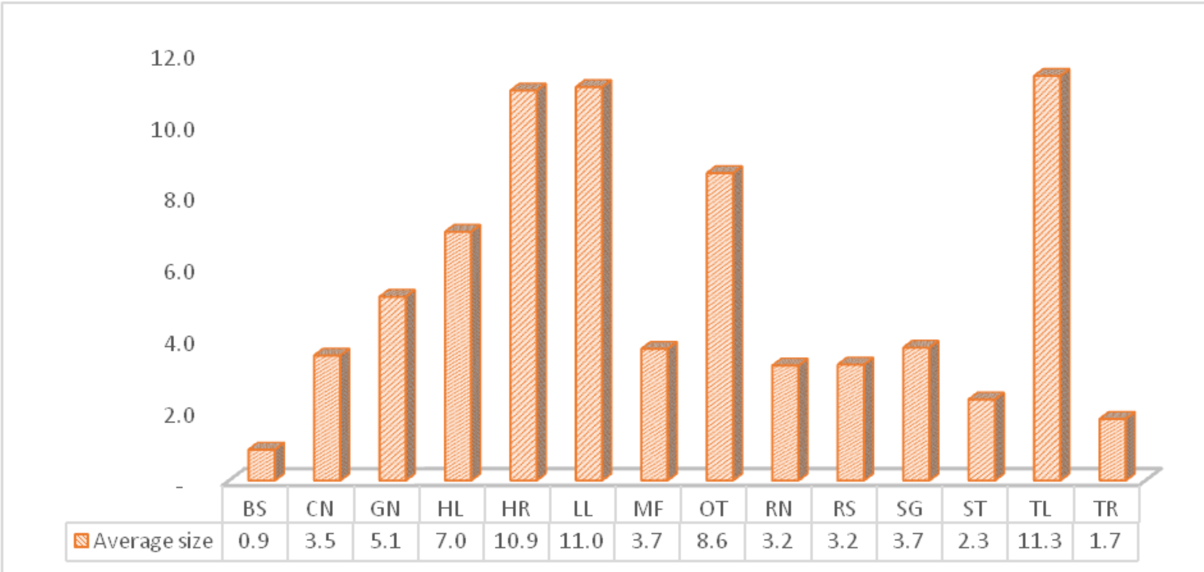

Figure. 4. Average size of fish caught per gear type.

Table.4. Catch frequency per month.

Month	Frequency
Jan	148
Feb	169
Mar	225
Apr	83
May	53
Jun	163
Jul	264
Aug	226
Sep	334
Oct	233
Nov	223
Dec	285

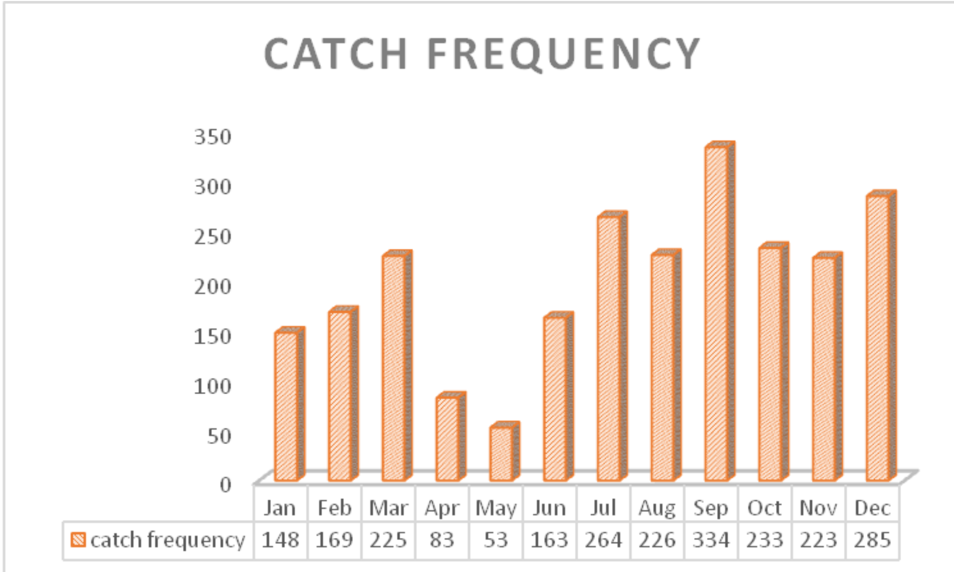

Figure.5. Catch frequency per month

Discussion and conclusion.

An analysis of the data was done using excel sheet with pivot tables;
Table 1. Shows the following results;
Sum sample weight for all the fishing gears showed, trolling lines with the highest 19108.5 kgs, hand lines 16996.95 kgs, gill nets 14158.35 kgs, ring net 2842.28 kgs and monofilaments 1128.3 kgs. Other gears had insignificant sum sample weights.
Figure.2. shows raised catch; gear against weight. Hand lines have the highest with 19482 kgs, trolling lines 19183 kgs, gill nets 15116kgs, ring nets 10296 kgs and monofilaments 1154kgs. In Table.2. Gear type versus number of fish caught per gear; shows hand lines with highest 978, trolling lines 586, gill nets 466 and monofilaments 138. In Table.3. Gear types versus the average size of fish caught, trolling lines 11.3 cm, long lines 11 cm, harpoons 10.9 cm, others 8.6 cm hand lines 7cm, gill nets 5.1 cm, spear guns 3.7 cm, monofilaments, ring nets and reef seines 3.2cm, traps 1.7cm and beach seines 0.9 cm.
Table.4. Catch frequency per month had September with the highest frequency of 334, December 285, July 264, August 226, March 225 and the lest frequency was recorded during the month of May 53.

In conclusion, from the results obtained, gears that showed significant impact on king fish population were trolling lines, hand lines, gill nets, ring nets and monofilaments. Gears that had insignificant impact on king fish population in terms of catch were, cast nets, reef seines, beach seines, traps, harpoons, long lines, spear guns and others. Gears that caught very small sizes of king fish were beach seines, reef seines, ring nets, monofilaments and cast nets. These gears can be restricted for catching king fish. Catch frequency per month showed September as the peak month king fish were caught followed by December, July, August and March respectively. King fish management measures/plan can be formulated based on these assessment results.

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