



Kenya
VISION 2030

**KENYA MARINE AND FISHERIES RESEARCH INSTITUTE
FRESH WATER SYSTEMS**

**ASSESSMENT OF THE SOCIO-ECONOMIC EFFECTS OF ILLEGAL FISHING ON
LAKE NAIVASHA FISHERIES AND RECOMMENDATIONS FOR MANAGEMENT**

**TECHNICAL REPORT
KMF/RS/2021/ C825(2)**


MAY 2021

DOCUMENT CERTIFICATION

Certification by Director, Freshwater Systems

I hereby certify that this report has been done under my supervision and submitted to the Director.

Name: Dr. Christopher Mulanda Aura (PhD)

Signature: 

Date: 17TH MAY 2021

Certification by Director General, KMFRI

I hereby acknowledge receipt of this Report

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ABSTRACT

Illegal fishing is a threat to the sustainability of fisheries in Lake Naivasha and this study assess the socio-economic effects on illegal fishing practices. The study was conducted in the four landing beaches of Lake Naivasha in the month of December 2020. The study aimed to assess the impact of illegal fishing on the sustainability of the fishery of Lake Naivasha. Results indicate that 12.1% of the respondents were female and while 87.9% were male, with a majority of respondents being of age groups (55%) were of the age group 18 - 35 years followed by 36 - 45 years at 27%. The study found that a large number of the respondents were mature individuals who had some level of family commitment with dependants of between 1 to 4 people at 61.1 % and 31% having dependents from 5 to 7 people. Eighty-seven percent of those interviewed were licensed fishermen while a paltry 13% operated without licenses, while 97% indicated recording their fish landings as 0.9% had not.

Most respondents adhered to the laid down fishing regulations while only 9.5% have been apprehended for various malpractices in Lake Naivasha. Most significantly is the violation of the regulation on use of wrong mesh sizes, fishing in breeding areas and having more than the stipulated number of fishing nets. Some of the effects of illegal fishing cited include; reduction in annual catches and income for fishers, destruction of habitat and increased competition among the fishers. The respondents were of the view that in order to curb illegal fishing by there was need for increased patrols and enforcement and enactment of serious penalties. The study recommended that the County government of Nakuru channel more resources to the Monitoring Control and Surveillance (MSC) activities and where possible establish a revolving funds that would utilize fine from prosecution penalties on fisheries related issues to strengthen the MCS system. There was also need to explore the possibilities of alternative livelihoods to create additional employment opportunities to reduce illegal activities in the Lake.

1.0 INTRODUCTION

Fishing is an important source of food for humanity and a provider of employment and economic benefits for those involved in this activity, especially in developing countries (FAO, 1995). It has been observed that the importance of fish and fishery tends to increase with the undeveloped local economies (Arlinghaus et al. 2002). This situation is compounded by the nature of artisanal fisheries where the resource is viewed as an open access where there is no upper limit on the catch; and availability of various gears and methods which negates the FAO Code of Conduct for Responsible and sustainable fishery. Illegal, unreported, and unregulated (IUU) is an enormous problem that costs the global economy up to \$23B a year (FAO, 2014). In the western Indian Ocean 18% of the catch qualifies as IUU. Inland fisheries are even more vulnerable to IUU due to the ease of access, increased unemployment and human population pressure. Illegal fishing comprises of all forms of unauthorized harvest of fish and fisheries resources. This practice is a matter of great concern especially in the inshore and coastal areas, where small-scale fisheries operate (Bene et al. 2007; Salas et al. 2007; FAO 2016).

Lake Naivasha is one Kenyan's inland fishery waters within a fragile ecosystem impacted by anthropogenic activities such as, horticultural farming, ranching, geothermal power generation among other economic activities (Waithaka et al. 2017; Morara et al. 2021). The fishery of the lake is based on introduced fish species whose history is provided by Njiru et al. 2017. Waithaka et al. 2018 noted that the fishery of the lake plays an important role in the local economy of Naivasha town, by providing food, employment opportunities and incomes. According to (Muchiri and Hickley 1991) the Lake Naivasha commercial fishery started in 1959 using gill nets for tilapias and rod and line for sport fishing to catch the largemouth bass, with the blue-spotted tilapia and largemouth bass being the most abundant fish species landed between the 1970s and the year 2000. However, poor fishing methods utilized by most of the fishers towards late 1990s resulted in the decline of the fish stocks to unsustainable levels leading to the near collapse of the fishery in the year 2000 (Hickley et al. 2015).

Despite the various management interventions that were laid down to enhance the stocks recovery including the control of fishing effort, the resource has continuously experienced high exploitation in recent years. The pressure is partly due to the increasing human population around the lake

(Onywere et al. 2012), causing increased demand for fish in Naivasha town and other neighbouring urban centres (Njiru et al. 2017).

Since 2013, Lake Naivasha's fisheries Management has increased the yearly number of fishing licences by nearly four-fold from 50 to 184 boats (Waithaka et al. 2019; Morara et al. 2021). This desperate measure was to control IUU fishing incidences by accommodating a segment of the fishermen who felt left out of the resource's benefits.

Nonetheless, there is an influx of unlicensed fishing activities in Lake Naivasha using seine nets, monofilament nets and hooks and line. Beach seining by illegal fishers has the potential to affect the performance and sustainability of the fishery of any lake (Muchiri et al. 1991). Further, IUU fishing pose a serious threat to the fishery rendering futile the efforts by the State Department of Fisheries of controlling the fishing effort. Waithaka et al. (2017) recorded and postulated that the angling fishery as an emerging fishery in Lake Naivasha with a likely hood of the trend increasing. There is also use of gillnets of less than the recommended minimum size of 4 inches used to specifically target smaller sized fish. This trend of targeting juveniles and brooder fishes using prohibited nets increases the overall fishing effort beyond the permitted levels.

IUU fishing can lead to so many impacts including, but not limited to, economic, environmental, social, ecological health and nutritional impacts. The aim of this study however, was to assess the socioeconomic effects of illegal fishing practices on Lake Naivasha and provide recommendations for management

The specific objectives were:

- i. To identify the characteristics of the fisher folk community in Lake Naivasha
- ii. To determine fishers' knowledge and perception of illegal fishing activities
- iii. To determine the effects of illegal fishing on Lake Naivasha fishery
- iv. To highlight the fishers' recommendations for curbing illegal fishing in Lake Naivasha

2.0 MATERIALS AND METHODS

2.1 Description of study area

Lake Naivasha is one of the shallow freshwater bodies in Kenya, although the second largest after the gulf part of L. Victoria. The lake lies on the eastern Rift Valley floor (0° 46'S, and 36° 20'E) at about 1890 m above sea level (Figure 1). Its surface area varies between 110 and 160 km² during the dry and wet spells, respectively. The primary inflow is from River Malewa, with a catchment area of about 1730 km² which discharges about 90 % of the lake's water. The rest of the recharge comes from River Gilgil, with a catchment area of 420 km² and other small ephemeral streams. The lake basin consists of three distinct water bodies – the Main Lake, Oloidien Lake and Crater Lake (Sonachi). The Main Lake is the largest and freshest of the three, with conductivity values being mostly below 400 μScm^{-1} . It hosts the highest aquatic biodiversity and various species of introduced fish, forming the lake's bedrock. Oloidien Lake is connected to Main Lake through underground flows, but the occasional connection on the surface during high water levels is possible. Therefore, this study was conducted on the four landing of Lake Naivasha (Figure 1).

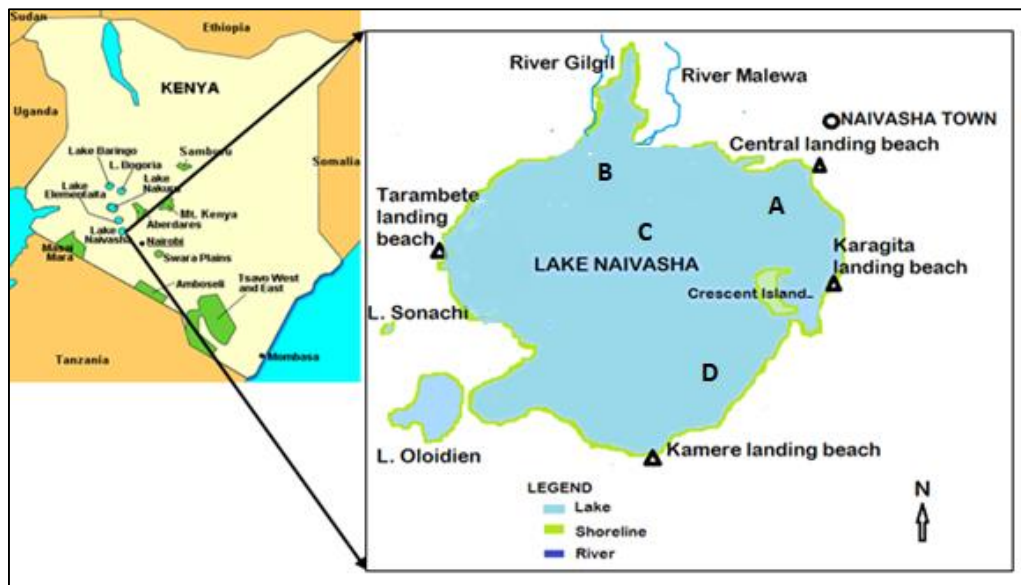


Figure 1 Map of Lake Naivasha showing the main landing sites along the lake

2.2 Research design

The study was conducted by staff from Kenya Marine and Fisheries Research Institute at the four designated landing beaches - Central, Karagita, Kamere and Tarambete. Structured questionnaires were randomly administered to people found at the four landing sites for four consecutive days between 9.00 am and 4.00 pm to collect quantitative data on illegal fishing activities.

2.3 Data collection and analysis

Data on the demographic characteristics of the fisher community in the four beaches included age structure, education level, gender and occupation collected. In addition to this demographic characteristics, gear used, licensing status, boat ownership was also collected. Data on fishers' knowledge and perception on existing legislation, compliance, frequency of IUU occurrences and the penalties were recorded. Data on the impacts of illegal fishing and recommendations on how to curb illegal fishing in Lake Naivasha was also collected. This data was then pooled and analysed using Microsoft Office Excel and is presented.



Plate 1 KMFRI officers interviewing a respondent in Karagita beach

3.0 RESULTS

3.1 Demographic Characteristics of fisher community

The survey interviewed a total of 231 respondents with Kamere and Karagita beach having the highest number of respondents at 30% each while Central had 20% and Tarambete had 19 %. Of those interviewed 12.1% were female and 87.9% were male which is an indication of low involvement of women in the fisheries sector. Most of those interviewed were of the age group of 18 - 35 years (55%), followed by 36 - 45 years at 27% while those of 55 years and above constituted 4% of the respondents .(Table 1).

Table 1 Summary of demographic data from the respondents

Characteristics		N	Proportion (%)
Gender	Female	28	12.1
	Male	203	87.9
	n	231	
Age	18 to 35	128	55
	36 to 45	63	27
	46 to 55	30	13
	55>	10	4
	n	231	100
Education level	Primary	90	39
	Secondary	111	48
	College	27	12
	Graduate	3	1
	n	231	100
Occupation	Fishermen/crew	197	88
	Trader	17	8
	Others	9	4
	n	223	100

Of those who participated in the survey 48% had attained secondary level of education, 39% had acquired primary level of education, 12% had attended tertiary college while 1% had a diploma/ certificate from the university. The fishing crew/ fishermen constituted at least 88% of those interviewed, followed by traders at 8%. While the rest (net repairers and transporters) totaled 4%. The study found that most of the respondents were married at 68%, single 18% while polygamous were 6%. Majority of the respondents were those with dependants of between 1 to 4 people at 61.1 %, followed by dependents from 5 to 7 at 31%, while 7.5% of respondents had household number

of greater than 7 people. The least was at 0.4 % with no dependents. It implies that the respondents are people with commitments and conscious of the need to conserve the resource as their life line

3.2 Fishing activities

The study found that Beach Management Unit members comprised 92% of the respondents most of whom have been in the fishery for less than 5 years 49%, while 41% had been in fishery for 6 - 15 years and 10% for < 1 year (Table 2). Of those interviewed, only 26% were boat owners. It was also found that 87 % of the respondents had licenses with 13% operating without licenses. The study found that there was a small group of fishers that used hooks and line at (3%) while a majority use gillnet 97% (Table 2). It was noted that only 23% of the respondents had an alternative source of income as majority largely depended on fishing activities (Table 2).

Table 2 Information on fishing activities from the respondents

Fishing Activities	Response	N	Proportion (%)
Member of BMU	Yes	213	92
	No	18	8
	n	231	100
Years in fishing activity	<1	24	10
	1 to 5	113	49
	6 to 15	94	41
	n	231	100
Own a boat	Yes	59	26
	No	172	74
	n	231	100
License Ownership	License	148	87
	No license	23	13
	n	171	100
Gear type used	Hooks	6	3
	Nets	198	97
	n	204	100
Last 1 year fishing primary source of income?	Yes	179	88
	No	25	12
	n	204	100
Alternative source of income	Yes	47	23
	No	156	77
	n	203	100

3.3 Knowledge of illegal unreported, unregulated, illegal fishing

The study found that 94% of the respondents had knowledge of what illegal fishing entails and 5% did not have an idea. It's worth noting that 97% knew the requirement of recording fish landings with the designated data officers. Majority of the respondents (55%) indicated that the landings were to be reported to fisheries department while the rest had different responses, with 0.9% indicating they did not know where they are supposed to report their landing (Figure 2).

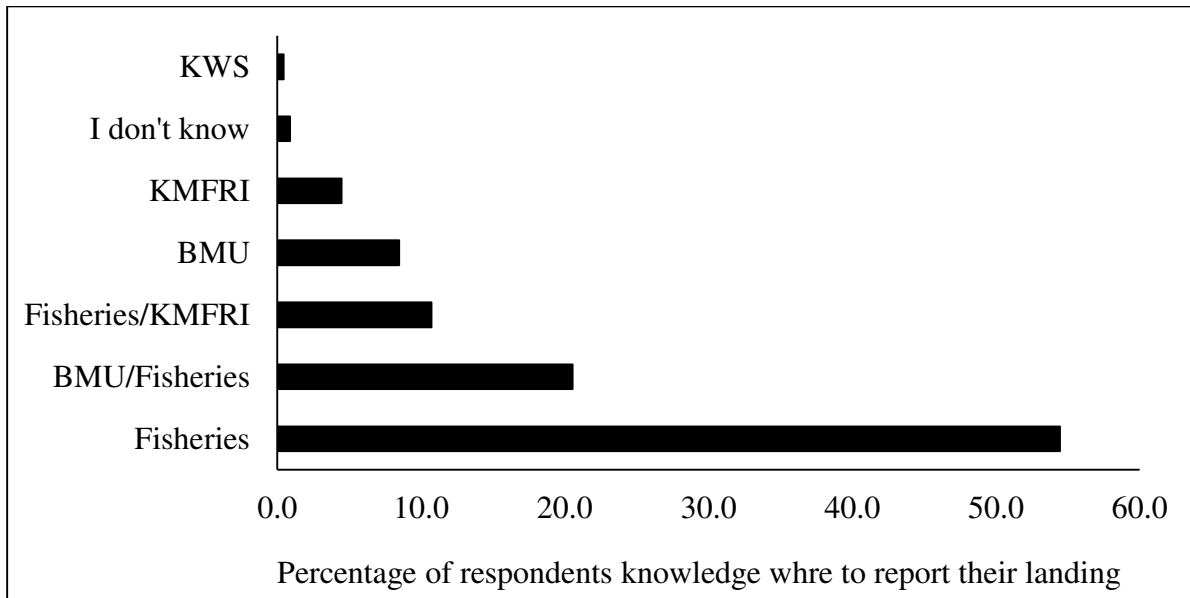


Figure 2 showing knowledge of respondents on authorities responsible for recording landing

The most common fishing regulations that were violated by the fishers constituting IUU fishing were related to the undersize mesh size, fishing in breeding areas and allowable number of nets at 35%, 34% and 14% respectively (Figure 3).

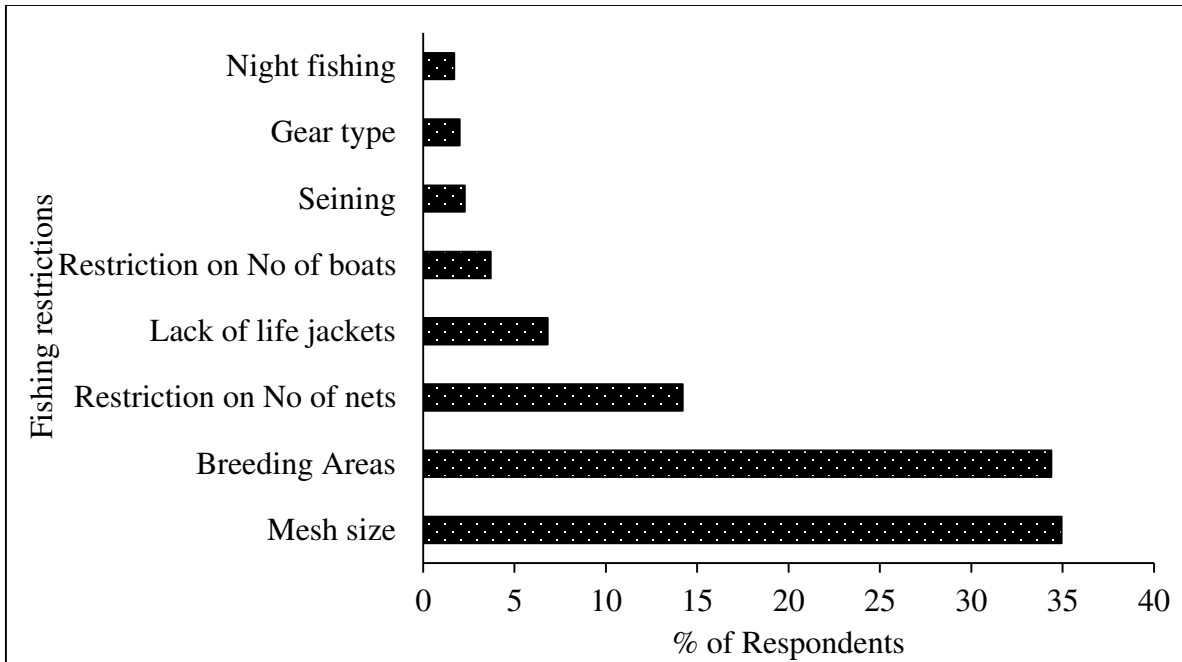


Figure 3 Types of fishing restriction identified by the respondents

Most of the respondents (95%) reported they were aware of the penalties for violation of the fisheries regulations. The rest (5%) were not aware of any. It was also noted that 88% of the fishermen are knowledgeable of illegal fishing activities (Figure 4). Out of the 231 respondents 9.5% have been apprehended for various fisheries malpractices in Lake Naivasha. Use of undersize net was the recorded as the most violated regulation.

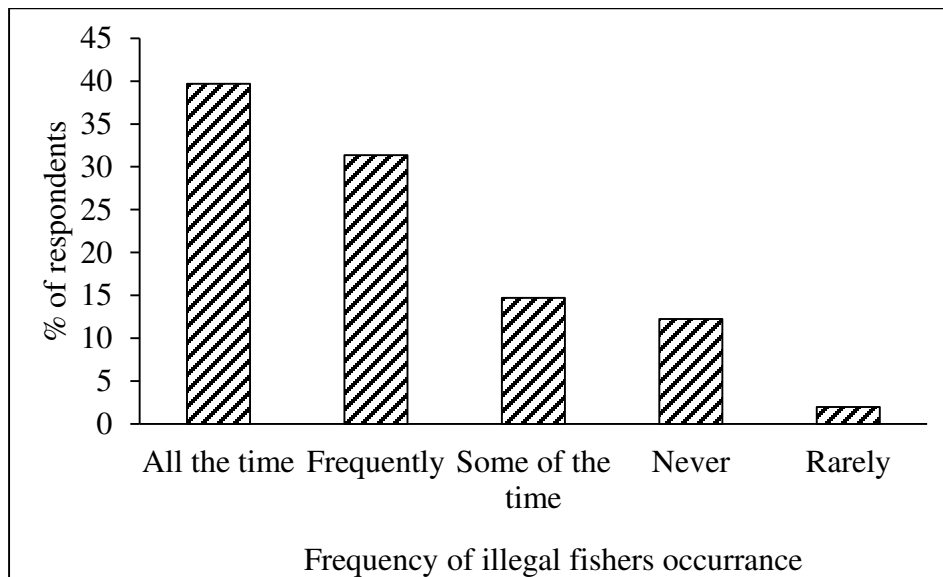


Figure 4 Fishers knowledge on the occurrence of illegal fishing in Lake Naivasha

3.4 Effects of IUU fishing on Lake Naivasha fishery

Illegal fishing in Lake Naivasha affects the fishery in various ways. In this study 76% of the respondents felt that illegal fishing activities reduces their annual catches while 78% felt it reduces their annual income (Table 4). Figure 5 shows the respondents perception on the impacts of illegal fishing on the fishery. Theft of catch and destruction of nets by illegal fishers were the cited effects (28.4% and 21.8% respectively). Apparently there was little or no conflict (0.4%) between the legal and illegal fishers.

Table 3 Impact of illegal fishing on catch and income of Lake Naivasha fishers

Response	Catch last 12 months (%)	Income last 12 months (%)
Increased	11	10
Reduced	76	78
Not changed	13	12

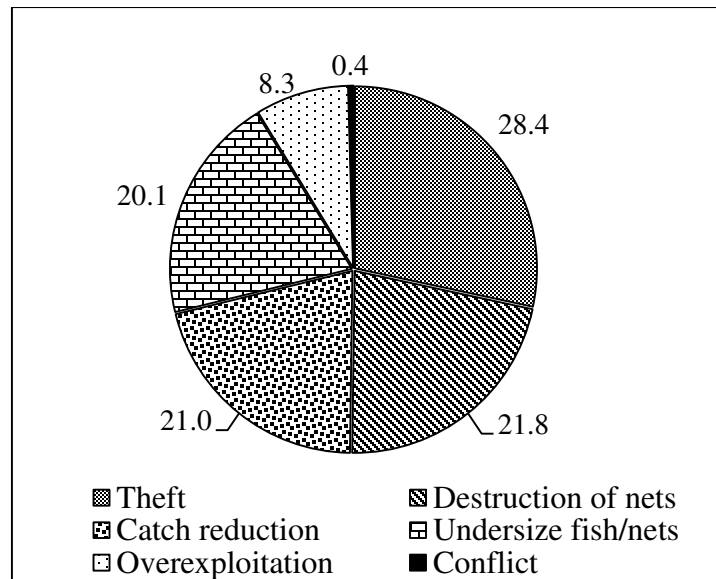


Figure 5 impacts of illegal fishing on the fishery of Lake Naivasha.

Apart from the impacts on catches and income for the fishers 83% of the respondents indicated that other effects of illegal fishing were the disruption of ecosystem 4%, increased competition 12% and unrecorded catches 4% and increased corruption cases 1%. The unrecorded catch per day was estimated to range from 25 – 3000 kg with an average of 1061.5 kg per day. This had a range

of prices from Ksh. 50 to 600 with an average of Ksh.197.2. These results translate to unrecorded earnings to the fishermen of Ksh. 209,327 per day or about Ksh. 76M per year.

3.5 Suggested recommendations for curbing illegal fishing

The preferred actions to curb illegal fishing are patrols and enforcement with punitive penalties Table 5. This study found that 51% of the respondents opined the regular patrols currently being conducted by the department of fisheries were not effective. On the other hand, 61% of the respondents implied that the penalties against IUU fishing were not punitive enough to curb increasing illegal fishing trends (Table 5).

Table 4. Respondents’ opinion on the actions to curb IUU fishing in Lake Naivasha

Regular patrols effective			Penalties to illegal fishing - Punitive		
	Respondents	%		Respondents	%
Yes	100	49	Yes	80	39
No	104	51	No	123	61
n	204	100	n	203	100

The main reasons cited for weak the penalties are the low fines charged on the perpetrators and corruption of the fisheries enforcement officers Table 6

Table 5 Respondents’ opinion on the causes of weak punitive measures against IUU fishing.

Not punitive reasons	Respondents	%
Corruption	42	45
Court orders	1	1
Fine too low	47	51
No penalties	3	3
n	93	100

The measure to effectively and successfully curb IUU fishing in Lake Naivasha are highlighted in Figure 7. Increasing the patrols and proactively licensing of the illegal fishers (56.7% and 12.1 % respectively) were suggested as the most possible methods.

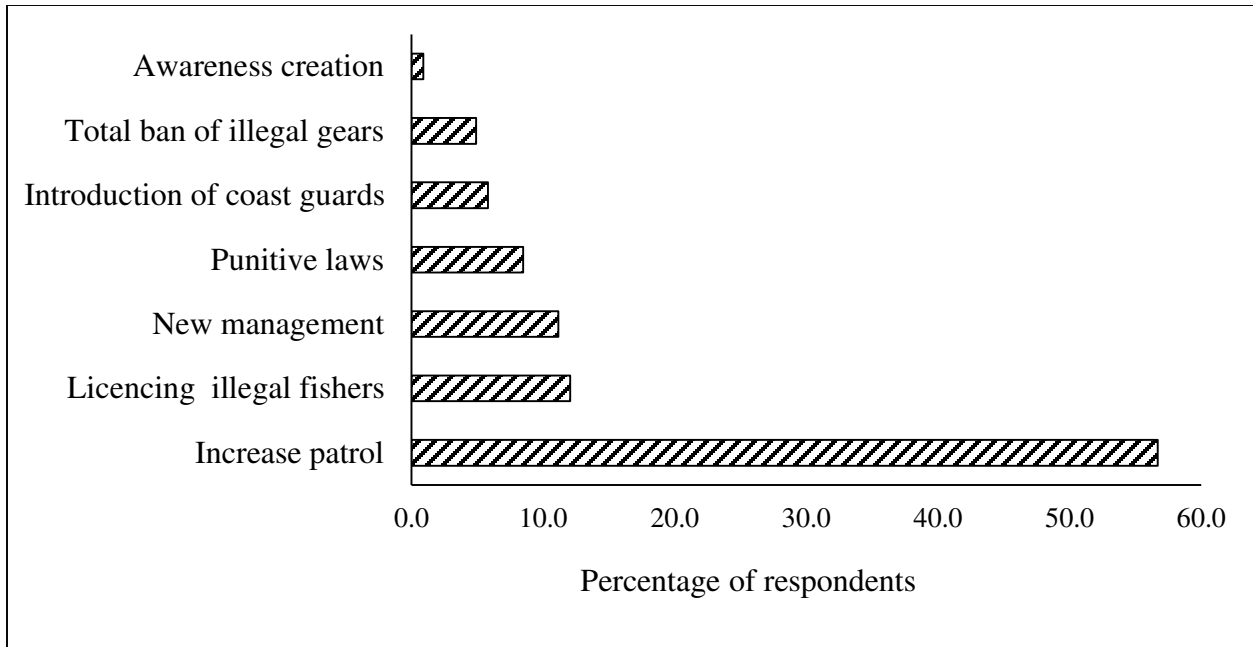


Figure 2 Distribution of the suggested actions to curb illegal fishing in Lake Naivasha

4.0 DISCUSSIONS

Despite being artificially enhanced, the fishery of Lake Naivasha is a hub of various forms of socio-economic and livelihood benefits for an estimated 4000 people who are both directly and indirectly engaged in fishing (Morara et al. 2021). A previous study (Waithaka et al. 2019) had reported the youth dominance, comprising about 67% of the fishing population in Lake Naivasha fishery. The same study observed that most of these fishers have limited formal education, thereby being unable to tap into alternative jobs and livelihood opportunities. Therefore, fishing becomes the easiest option for most of the unemployed people. As a result, illegal fishing has become a major challenge to the sustainable fishery management of Lake Naivasha (Morara et al 2021; Njiru et al. 2017; Waithaka et al 2017). In the present study, male and youth dominance among the respondents corroborates the above literature and points to increased influx of the male youth in the sector. However, it is important to point out there is low involvement of women in capture fisheries. The high number (87%) of respondents without tertiary education, most (68%) of whom are married with dependants of between 1 to 4 households is an indication of the high level of unemployment in the county as well as the pressure that the resource is subjected to. As a result, this could potentially pose a challenge to resource conservation if the fisher folks are not engaged and supported to access alternative livelihoods. Limited opportunities for obtaining income among the respondents implies high fishing pressure with its associated illegalities will continue to pose a management challenge and sustainable exploitation of the resource.

A majority of the respondents indicated that they had BMU membership and were aware of existing fisheries regulations governing Lake Naivasha. However, within this group about 13% still operated without licenses using various methods. This could suggest complacency of the BMU officials and state department of fisheries in enforcing fisheries regulations and bringing culprits to book. It may also point to weaknesses in monitoring control and surveillance (MCS) (Kundu et al. 2010).

The nature of artisanal fishery world over including Lake Naivasha, is the open access mentality where fishers view the resource as free and open for all with disregard to any management measures. This comes with its own challenges when it comes to resource management and sustainability. According to this study, the open access mentality has resulted in increased fishing pressure resulting to IUU, leading to decline in catches and reduced incomes.

IUU translates to an unrecorded catch of about 387 tonnes and an income Ksh. 76M per annum according to the study findings. Most of the respondents recommended more stringent measures be enacted, including stiffer penalties to deter the perpetrators of the IUU, increased and more regular patrols, and a change in management and provision of licenses to all. While these suggestions could be addressed through the review of fisheries Act some of the proposals may not be sustainable in curbing illegal fishing.

This is because the resource is already overstretched due the continuous influx of human population in search of livelihoods or greener pastures. Onywere et al. 2012, noted that the area around Lake Naivasha was among the sub urbans regions with the fastest growing human population. Therefore, Increased patrols and change in management can only be seen to deter illegal fishing only for a given time/ season. Success in stamping out illegal fishing is through collaborations with local communities to participate and take responsibility for, the management of the resource.

5.0 CONCLUSION AND RECOMMENDATIONS

The following conclusions were drawn from the study

- There is a reduction in catch and income for the fisher community which supports livelihoods of over 4000 people directly and indirectly for livelihood
- IUU fishing activities leads to loss of socio and economic opportunities which has negative effect on food security and resource conservation.
- Illegal fishing has negative impact on the ecosystem through habitat destruction
- IUU fishing undermines efforts to conserve and manage fish stock in capture fishery

Recommendations

- Create awareness and understanding of the nature of as well as the impact of illegal fishing among senior public servants and politicians to increase will to implement viable MCS
- There is need for the government and donors to explore the approach of having alternative livelihoods projects in attempt to diversify the economies of the local communities to ease pressure on the resource and reduce illegal fishing activities.
- Ensure adequate and robust legislation to support prosecutions with strict penalties and custodial sentences
- The County government of Nakuru consider establishing an MCS funds that will be supported from the fines paid by those prosecuted for any fishery offence to be plowed back for strengthening the MCS system.

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7.0 ANNEXES

Annex 1: Submission Letter to 6 Director Fresh Water Systems

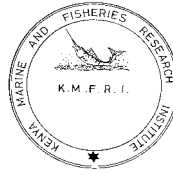
KENYA MARINE AND FISHERIES RESEARCH INSTITUTE

E - mail: kmfrinaivasha@gmail.com

When replying please quote

Ref. No. KMF/RS/2020/ C5 (i)

Please address your reply to
Station Coordinator



NAIVASHA CENTRE
P.O. BOX 837
KISUMU
KENYA
DATE: 16/05/2021

Ag. Deputy Director
Fresh Water Systems
Kenya Marine and Fisheries Research Institute
P.O. Box 1881
Kisumu

RE: SUBMISSION OF PERFORMANCE CONTRACTING REPORT FOR 2020-21 FY

KMFRI Freshwater Systems (FWS) successfully implemented the 2020-2021 PC target activities. Hence, herein attached please find the report on “Assessment of the socio economic effect of illegal fishing on Lake Naivasha fisheries and recommendations for management”.

Thank you.

A handwritten signature in blue ink, appearing to read "Waithaka Edna".


Waithaka Edna
Station Co-ordinator

Annex 2: Submission Letter to the Director General

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KENYA MARINE AND FISHERIES RESEARCH INSTITUTE

TELPHONE: KISUMU 254770567443
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When replying please quote
Ref. No. KMF/RS/2021/ C5.i
If calling or telephoning ask
For: Dr. Aura
Please address your reply to
DIRECTOR GENERAL



KISUMU CENTRE
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KISUMU
KENYA
DATE: 17/05/2021

The Director General
Kenya Marine and Fisheries Research Institute
Headquarter and Mombasa Centre
P.O. Box 81651 080100
MOMBASA

RE: SUBMISSION OF TECHNICAL REPORT FOR PC PERIOD 2020-21


The above refers,

KMFRI Freshwater systems (FWS) have successfully implemented the 2020-2021 PC on
**"the assessment of the socio-economic effects of illegal fishing on Lakes Victoria
Naivasha fisheries and recommendations for management"**.

Herein attached is the technical report and fact sheet, which highlights activities involved.

We therefore submit this report and fact sheet for your perusal and dissemination to the
relevant stakeholders. Your support is highly appreciated.

Thank you.


Dr. Christopher M. Aura (PhD)
Ag. Director - FWS

Ag. Director - FWS
Dissemination
21/05/2021

Annex 3: Dissemination to Sub County Fisheries Officer

KENYA MARINE AND FISHERIES RESEARCH INSTITUTE

Telephone 020-8021560/1
020-2353904
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When replying please quote
Ref: no:
and date:
If calling or telephoning ask
For:
Please address your reply to:
The DIRECTOR



HEADQUARTERS
P.O. Box 81651
MOMBASA
KENYA

KMF/TECH/RPTS/20-21

Date: 24th May 2021

To: Sub County Director Fisheries

Dear Sir/Madam,

RE: ASSESSMENT OF THE SOCIO ECONOMIC EFFECT OF ILLEGAL FISHING ON LAKE NAIVASHA FISHERIES AND RECOMMENDATIONS FOR MANAGEMENT

Kenya Marine and Fisheries Research Institute (KMFRI) is a state corporate body, established in 1979 under the Science and Technology Act (Cap 250), which has since been repealed by the Science, Technology and Innovation Act No. 28 of 2013. KMFRI is under the Ministry of Agriculture Livestock and Fisheries. The institute is empowered to carry out research in marine and freshwater fisheries, aquatic biology, aquaculture, environmental chemistry, ecological, geological and hydrological studies, socio-economical as well as chemical and physical oceanography.

In this regard, KMFRI conducted a number of research expeditions in 2020-2021 financial year in freshwater systems in Kenya in Lake Naivasha and came up with technical report and Fact sheet/brief.

The purpose of this letter is to share the findings on **“Assessment of the socio economic effects of illegal fishing on Lake Naivasha fisheries and recommendations for management”** as information for possible management and conservation measures of the aforementioned systems.

Attached herewith please find the technical reports and Fact sheet/brief for your perusal and further action.

Yours Sincerely,

A handwritten signature in blue ink, appearing to read 'Chris', is written over the typed name.

Dr. Christopher M. Aura (PhD)

For: Director/KMFRI



Received

Annex 4: Dissemination to Kamere Beach

KENYA MARINE AND FISHERIES RESEARCH INSTITUTE

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020-2353904
Mobile: 0712003853
FAX: 020-2353226
E-mail: director@kmfri.co.ke
When replying please quote
Ref: no:
and date:
If calling or telephoning ask
For:
Please address your reply to:
The DIRECTOR



HEADQUARTERS
P.O. Box 81651
MOMBASA
KENYA

KMF/TECH/RPTS/20-21

Date: 25th May 2021

To: Beach Management Unit (BMU) Chairman
P.O. Box Kamere

Attn: Wesley Kimutai

Dear Sir/Madam,

**RE: ASSESSMENT OF THE SOCIO ECONOMIC EFFECTS OF ILLEGAL FISHING
ON LAKE NAIVASHA FISHERIES AND RECOMMENDATIONS FOR MANAGEMENT**

Kenya Marine and Fisheries Research Institute (KMFRI) is a state corporate body, established in 1979 under the Science and Technology Act (Cap 250), which has since been repealed by the Science, Technology and Innovation Act No. 28 of 2013. KMFRI is under the Ministry of Agriculture Livestock and Fisheries. The institute is empowered to carry out research in marine and freshwater fisheries, aquatic biology, aquaculture, environmental chemistry, ecological, geological and hydrological studies, socio-economical as well as chemical and physical oceanography.

In this regard, KMFRI conducted a number of research expeditions in 2020-2021 financial year in freshwater systems in Kenya in Lake Naivasha and came up with technical report and Fact sheet/brief.

The purpose of this letter is to share the findings on "Assessment of the socio economic effects of illegal fishing on Lake Naivasha fisheries and recommendations for management" as information for possible management and conservation measures of the aforementioned systems.

Attached herewith please find the technical reports and Fact sheet/brief for your perusal and further action.

Yours Sincerely,

A handwritten signature in black ink, appearing to read 'Chris', is written over the printed name.

Dr. Christopher M. Aura (PhD)
For: Director/KMFRI



Handwritten initials in blue ink, possibly 'CA', are written to the right of the stamp.

KENYA MARINE AND FISHERIES RESEARCH INSTITUTE
P.O BOX 837-20117
NAIVASHA



Attendance list

Dissemination of 'Assessment of the socio-economic effects of illegal fishing on Lake Naivasha fisheries and recommendations for management' at Kamere beach on 25th May 2021

S/No	Name	Organization	Contacts	Sign
1	ALICE MUTIE	KMFRI	alice.mutie@kmar.or.ke	
2	EDNA WAKIKURU	"	837 kamere	
3	George N. Motara	"	"	
4	JOSEPH WASUJI	KEFS	0921356590	
5	Eric Karanja	Kamere (Boatowner)	0790326121	
6	Daniel Ong'andu	Kamere Boat owner (Kamere)	0746313401	
7	RUTH WANJAKI	Boat owner Kamere	0720534338	
8	Grace Ngunyi	Boat owner Kamere	073509518	
9	FAITH IRARA	Boat owner (K)	090412988	
10	Grace Wambui		070690981	
11	GRACE MUGO	TRADER	0716680151	

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S/No	Name	Organization	Contacts	Sign
12	FREDRICK OLUWKE	CREW	0718969923	Ju
13	CAREM ATIENO	BOAT OWNER	0714739430	(ED)
14	Abraham kip kago	BOAT OWNER	0729390085	[Signature]
15	IONN OROSO	BOAT OWNER	0721535059	[Signature]
16	MARGALET TUCHE	KMA	0726237982	[Signature]
17	TOM WASSMAN	KMA	0724252801	[Signature]
18	JULIUS OKINDO	KMA	0723089900	[Signature]
19	Margary Kimisai	B.M.O B.O	0729707666	[Signature]
20	EDWIN ANGBIR	K.C.G.S	0711972424	[Signature]
21	FRANKINE TJUN	BOAT OWNER	0720508255	[Signature]
22	JOHN MURONGI	Boat	07549926693	[Signature]
23	Anthony Carua	B.M.U	0728594930	[Signature]
24	9 GINEANE KARAIKI	CREW	0728595801	[Signature]
25	PETER WACHIRA	BOAT OWNER	07203338676	[Signature]

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S/No	Name	Organization	Contacts	Sign
26	FREDRICK NYAUDE	Boat owner (BMD)	0725731557	
427	MAYMILWAH AMURGA	BOAT OWNER (BMD)	0728528653	
25	NATHIEL MURICU MURIA	BOAT OWNER (BMD)	0721579846	
	JAMES B. BUKUMA	Crew	0721780646	
	SOSPETER OUSGIC	BOAT OWNER (BMD)	0713885014	
	Wallace W'jau	Boat owner BMD	072882361	
	JAMES NJENGA	BOAT OWNER BMD	0723944491	

Annex 5 Dissemination to Tarambete beach

KENYA MARINE AND FISHERIES RESEARCH INSTITUTE

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and date:
If calling or telephoning ask
For:
Please address your reply to:
The DIRECTOR



HEADQUARTERS
P.O. Box 81651
MOMBASA
KENYA

KMF/TECH/RPTS/20-21

Date: 26th May 2021

To: Beach Management Unit (BMU) Chairman
P.O. Box Tarambete

Dear Sir/Madam,

RE: ASSESSMENT OF THE SOCIO ECONOMIC EFFECTS OF ILLEGAL FISHING ON LAKE NAIVASHA FISHERIES AND RECOMMENDATIONS FOR MANAGEMENT

Kenya Marine and Fisheries Research Institute (KMFRI) is a state corporate body, established in 1979 under the Science and Technology Act (Cap 250), which has since been repealed by the Science, Technology and Innovation Act No. 28 of 2013. KMFRI is under the Ministry of Agriculture Livestock and Fisheries. The institute is empowered to carry out research in marine and freshwater fisheries, aquatic biology, aquaculture, environmental chemistry, ecological, geological and hydrological studies, socio-economical as well as chemical and physical oceanography.

In this regard, KMFRI conducted a number of research expeditions in 2020-2021 financial year in freshwater systems in Kenya in Lake Naivasha and came up with technical report and Fact sheet/brief.

The purpose of this letter is to share the findings on "Assessment of the socio economic effects of illegal fishing on Lake Naivasha fisheries and recommendations for management" as information for possible management and conservation measures of the aforementioned systems.

Attached herewith please find the technical reports and Fact sheet/brief for your perusal and further action.

Yours Sincerely,

A handwritten signature in black ink, appearing to read 'Chris', is written over a blue circular stamp.

Dr. Christopher M. Aura (PhD)

For: Director/KMFRI

Deserved
BMU TARABETE BEACH
P. O. BOX 698, KASARANJI
TEL: 0758-092 605
Date
[Handwritten signature]

KENYA MARINE AND FISHERIES RESEARCH INSTITUTE
P.O BOX 837-20117
NAIVASHA



Attendance list

Dissemination of 'Assessment of the socio-economic effects of illegal fishing on Lake Naivasha Fisheries and recommendations for management' at Tarambete beach on 26th May 2021

S/No	Name	Organization	Contacts	Sign
1	Dial Omeri	BFIU	0758092605	
2	MARGARET SICHUKI	BEAT own	0727327424	
3	Sarahubalo others	BEAT owner	0710628499	
4	BEH NUNGARI KAMAU	BOAT OWNER	0748582575	
5	ANNET LUKWING	BOAT OWNER	0705494111	
6	AURORA NJARUA	committee member	07236211026	
7	Gilbert Mwahe	committee member	0727383161	
8	Joel Gatune	Member	0720048738	
9	Wae Hamigwa	Boat Owner	0794829445	
10	DANICA ELIAT	BMU	0724235011	
11	MUSIP VERDI	BMU	0724661860	
12	Alice Mutie	KMPRI	0721764162	

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S/No	Name	Organization	Contacts	Sign
1	EMILY MUTHARA	KMFRI	0721 006753	
2	George Mwangi	KMFRI	0718 053335	
3.	Tom o. Nyoro	KMFRI	0710389710	
4	JAMES LOKSUSA	BMVU	0759 013211	
5	JOSEPH NSONGOMWANGI	BMVU	07212459098	
6	JULIUS KIMANI	BQVU	0715446822	
7	MACE MUTHEI	BMU	0708542176	
8	John Kambule	BQVU	0720720201	
9	David Odongo	BMU	0711764051	
10	Jacob Mwangi	BMU	07338440475	
11	Michael Nyagunya	BMU	0798968566	
12	Manny Wawinya	BMU	0795554821	
13	Chris Kungole	BMVU	0727378379	
14.	John Ngunja	BMVU	0758092533	

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S/No	Name	Organization	Contacts	Sign
1	KENETH Komony	fish trader	0720284248	<i>[Signature]</i>
2	Jabisa O'Brien	fish owner	07055050014	<i>[Signature]</i>
3	Jackson Esei	fish trader	0728581158	<i>[Signature]</i>
4	Pamela Anuoch	trader	0703605219	<i>[Signature]</i>
5	Raphael Iking	B.M.U	0723709460	<i>[Signature]</i>
6	BATVIA BOGAYA	B.M.U	0705885610	<i>[Signature]</i>
7	Mohamed Ali	B.M.U	0727363199	<i>[Signature]</i>
8	ESTHER WARIAMU	BOAT OWNER	0703291712	<i>[Signature]</i>
9	SHAMEL KARANJH	BOAT OWNER	0701598489	<i>[Signature]</i>
10	Sumuel Mwangi	BOAT OWNER	0719723475	<i>[Signature]</i>
	Sampson Muetheki	BOAT OWNER	0719068847	<i>[Signature]</i>

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P.O BOX 837-20117
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S/No	Name	Organization	Contacts	Sign
14	Jackson Kibera	BMU	0727231027	<i>[Signature]</i>
15	Joseph Mwangi	BMU	0724428485	<i>[Signature]</i>
16	Samuel Kimani Mwangi	BMU	0796341188	<i>[Signature]</i>
17	Bernard Kibera	BMU	0707052883	<i>[Signature]</i>
18	Lilian Mwangi	BMU	0721571263	<i>[Signature]</i>
19	Joliana Anyago	BMU	0191776851	<i>[Signature]</i>
20	Idriss Mwangi	BMU	0703807525	<i>[Signature]</i>
21	Geoffrey K. Njoro	BMU	0715281423	<i>[Signature]</i>

Annex 6: Dissemination to Central Beach

KENYA MARINE AND FISHERIES RESEARCH INSTITUTE

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and date:
If calling or telephoning ask
For:
Please address your reply to:
The DIRECTOR



HEADQUARTERS
P.O. Box 81651
MOMBASA
KENYA

KMF/TECH/RPTS/20-21

Date: 27th May 2021

To: Beach Management Unit (BMU) Chairman
P.O. Box Central Beach

Dear Sir/Madam,

**RE: ASSESSMENT OF THE SOCIO ECONOMIC EFFECTS OF ILLEGAL FISHING
ON LAKE NAIVASHA FISHERIES AND RECOMMENDATIONS FOR MANAGEMENT**

Kenya Marine and Fisheries Research Institute (KMFRI) is a state corporate body, established in 1979 under the Science and Technology Act (Cap 250), which has since been repealed by the Science, Technology and Innovation Act No. 28 of 2013. KMFRI is under the Ministry of Agriculture Livestock and Fisheries. The institute is empowered to carry out research in marine and freshwater fisheries, aquatic biology, aquaculture, environmental chemistry, ecological, geological and hydrological studies, socio-economical as well as chemical and physical oceanography.

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Attached herewith please find the technical reports and Fact sheet/brief for your perusal and further action.

Yours Sincerely,

A handwritten signature in blue ink, appearing to read 'Chris'.

Dr. Christopher M. Aura (PhD)

For: Director/KMFRI

Received By Roseline



KENYA MARINE AND FISHERIES RESEARCH INSTITUTE
P.O BOX 837-20117
NAIVASHA



Attendance list

Dissemination of 'Assessment of the socio-economic effects of illegal fishing on Lake Naivasha fisheries and recommendations for management' at Central beach on 27th May 2021

S/No	Name	Organization	Contacts	Sign
	ALICE MUTHIE	KMFRI	0921764167	<i>[Signature]</i>
	EDNA KATHAKA	KMFRI	0789206913	<i>[Signature]</i>
	NICK OGBOTE	Bent's Center	0723996615	<i>[Signature]</i>
	DWIDI GEORGE	B.M.V	0730987527	<i>[Signature]</i>
	JOM NYORO	KMFRI	0710389710	<i>[Signature]</i>
	George N. Morang	KMFRI	0718003335	<i>[Signature]</i>
	Alford Ojeda D.	B.M.V	0789596496	<i>[Signature]</i>
	Benter J. Omondi	B.M.V.	0920875075	<i>[Signature]</i>
	Grace Anyango Alach	B.M.V	0720036715	<i>[Signature]</i>
	Peninah Adhiambo	B.M.V	0715898817	<i>[Signature]</i>
	Vivian imai	B.M.V	0703572973	<i>[Signature]</i>
	Roseline Achieng	B.M.V	0721614109	<i>[Signature]</i>

KENYA MARINE AND FISHERIES RESEARCH INSTITUTE
P.O BOX 837-20117
NAIVASHA



S/No	Name	Organization	Contacts	Sign
	EVERLYNE KUSAKIISA	B.M.U	0700715026	
	VIOLET AYESA	B.M.U	0712751904	
	MILWA AKUMBI	B.M.U	0736392497	
	MARY WANGIWI	B.M.U	0700259496	
	EMERILIE AGUDU	B.M.U	0714043374	
	LYDIA RUTH NYONG'ORA	B.M.U	0726927766	
	ELIZABETH NYONG'OLA	B.M.U	0713622078	
	Linet Wangiri	B.M.U	0713678113	
	MARGAN OTHINI	B.M.U	0740671888	
	DAVID OTHIEN	B.M.U	0746192650	
	Florence Moring	B.M.U.	0723347337	
	MATKORINHA DIONO	B.M.U	0713977071	
	Esther Mwangi	B.M.U	075759729	
	Sydney Mwangi	B.M.U	07222351679	

Annex 7: Fact sheet on assessment of the socio-economic effects of illegal fishing on Lake Naivasha fisheries and recommendations for management



KENYA MARINE AND FISHERIES RESEARCH INSTITUTE

FRESH WATER SYSTEMS

FACT SHEET

KMF/RS/2021/ C5 (i)

**ASSESSMENT OF THE SOCIO-ECONOMIC EFFECTS OF ILLEGAL FISHING
ON LAKE NAIVASHA FISHERIES AND RECOMMENDATIONS FOR
MANAGEMENT**



May 2021

This study aimed to assess the socioeconomic effects of illegal fishing practices on Lake Naivasha and provide recommendations for management

AUTHORS

Mutie, A.,
Waithaka, E.,
Morara, G.N.,
Boera, P.,
Loki P.,
Nyamweya, C.,
Aura C.M.

KMFRI Headquarters
P.O. Box 81651 – 80100, Mombasa
Tel: +254 (041475151/4)
Email: kmfridirector@gmail.com

KMFRI Naivasha Station
P.O. Box 837 – 20117, Naivasha
Tel: + 254786663467
Email: kmfrinaivasha@gmail.com

INTRODUCTION

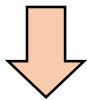
Lake Naivasha is one Kenyan's inland fishery waters within a fragile ecosystem impacted by anthropogenic activities. The fishery of the lake is based on introduced fish species and plays an important role in the local economy of Naivasha town, by providing food, employment opportunities and incomes. Naivasha commercial fishery started in 1959 using gill nets for tilapias and rod and line for sport fishing to catch the largemouth bass, with the blue-spotted tilapia and largemouth bass. However, poor fishing methods utilized by most of the fishers towards late 1990s resulted in the decline of the fish stocks to unsustainable levels leading to the near collapse of the fishery in the year 2000. Despite the various management interventions that were laid down to enhance the stocks recovery including the control of fishing effort, the resource has continuously experienced high exploitation in recent years. The pressure is partly due to the increasing human population around the lake, causing increased demand for fish in Naivasha town and other neighbouring urban centres. Since 2013, Lake Naivasha's fishery Management has increased the yearly number of fishing licences by nearly four-fold from 50 to 184 boats. This desperate measure was to control IUU fishing incidences by accommodating a segment of the fishermen who felt left out of the resource's benefits. Nonetheless, there is an influx of unlicensed fishing activities in Lake Naivasha using seine nets, monofilament nets and hooks and line. IUU fishing pose a serious threat to the fishery rendering futile the efforts by the State Department of Fisheries of controlling the fishing effort. IUU fishing can lead to so many impacts including, but not limited to, economic, environmental, social, ecological health and nutritional impacts.

Objectives

- v. To identify the characteristics of the fisher folk community in Lake Naivasha
- vi. To determine fishers' knowledge and perception of illegal fishing activities
- vii. To determine the effects of illegal fishing on Lake Naivasha fishery
- viii. To highlight the fishers' recommendations for curbing illegal fishing in Lake Naivasha

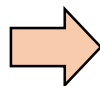
METHODOLOGY

Study Area: L. Naivasha



- ✓ Kamere beach
- ✓ Central beach
- ✓ Karagita beach
- ✓ Tarambete beach

QUESTIONNAIRES



What data was collected?

- ✓ Demographic data (age, gender, marital status, occupation)
- ✓ Fishing activities (boat ownership, license, BMU membership)
- ✓ Knowledge of IUU (fishing restrictions, penalties, report on landings)
- ✓ Effects of IUU fishing on Lake Naivasha fishery (changes in catches, income)

STUDY'S KEY FINDINGS

i. Demographic Characteristics of fisher community

Table 1 Summary of demographic data from the respondents

Characteristics		N	Proportion (%)
Gender	Female	28	12.1
	Male	203	87.9
	n	231	
Age	18 to 35	128	55
	36 to 45	63	27
	46 to 55	30	13
	55>	10	4
	n	231	100
Education level	Primary	90	39
	Secondary	111	48
	College	27	12
	Graduate	3	1
	n	231	100
Occupation	Fishermen/crew	197	88
	Trader	17	8
	Others	9	4
	n	223	100

ii. Fishing activities

Table 2 Information on fishing activities from the respondents

Fishing Activities	Response	N	Proportion (%)
Member of BMU	Yes	213	92
	No	18	8
	n	231	100
Years in fishing activity	<1	24	10
	1 to 5	113	49
	6 to 15	94	41
	n	231	100
Own a boat	Yes	59	26
	No	172	74
	n	231	100
License Ownership	License	148	87
	No license	23	13
	n	171	100
Gear type used	Hooks	6	3
	Nets	198	97
	n	204	100
Last 1 year fishing primary source of income?	Yes	179	88
	No	25	12
	n	204	100
Alternative source of income	Yes	47	23
	No	156	77
	n	203	100

STUDY'S KEY FINDINGS

iii. Knowledge of illegal unreported, unregulated, illegal fishing

94% of the respondents had knowledge of what illegal fishing entails and 5% did not know

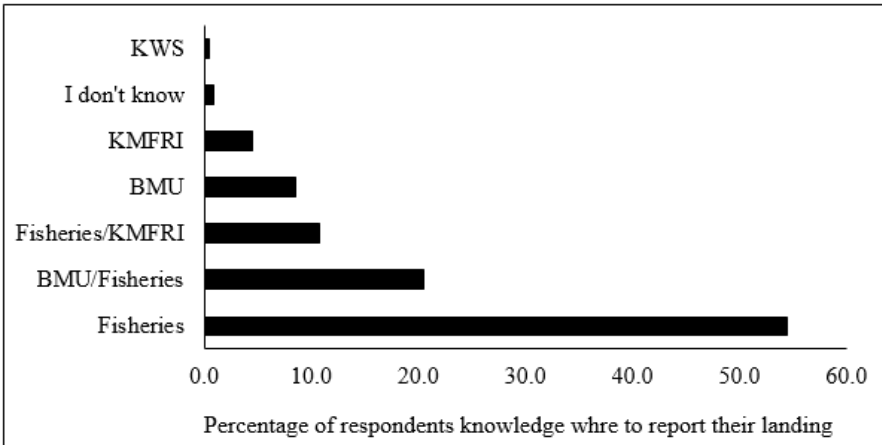


Figure 2 showing knowledge of respondents on authorities responsible for recording landing

Out of the 231 respondents 9.5% have been apprehended for various fisheries malpractices in Lake Naivasha.

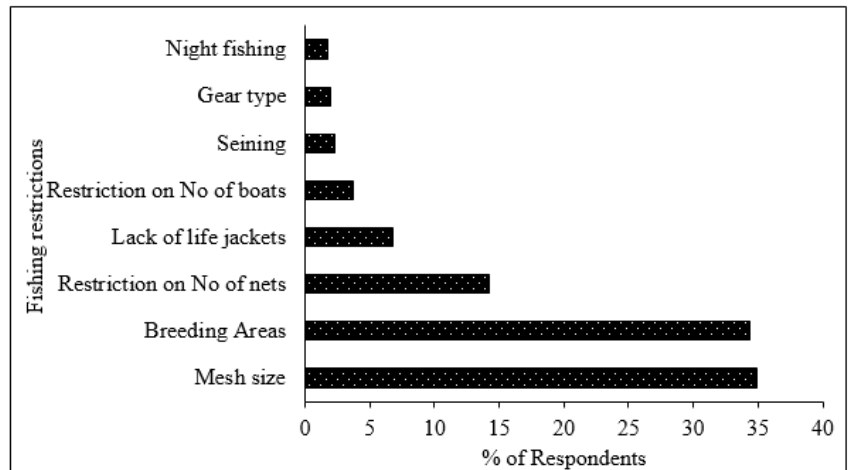


Figure 3 Types of fishing restriction identified by the respondents

STUDY'S KEY FINDINGS

iii. Effects of IUU Fishing on Lake Naivasha Fishery

Table 4 Impact of illegal fishing on catch and income of Lake Naivasha fishers

Response	Catch last 12 months (%)	Income last 12 months (%)
Increased	11	10
Reduced	76	78
Not changed	13	12

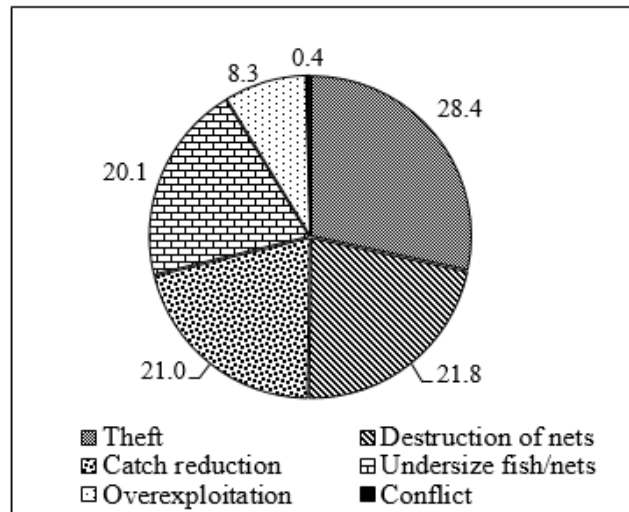


Figure 5 impacts of illegal fishing on the fishery of Lake Naivasha.

The unrecorded catch per day was estimated to range from 25 – 3,000 kg with an average of 1,061.5 kg per day. This had a range of prices from Ksh. 50 to 600 with an average of Ksh.197.2. These results translate to unrecorded earnings to the fishermen of Ksh. 209,327 per day or about Ksh. 76M per year.

STUDY'S KEY FINDINGS

v. Suggested recommendations for curbing illegal fishing

Table 5. Respondents' opinion on the actions to curb IUU fishing in Lake Naivasha

Regular patrols effective			Penalties to illegal fishing - Punitive		
	Respondents	%		Respondents	%
Yes	100	49	Yes	80	39
No	104	51	No	123	61
n	204	100	n	203	100

Table 6 Respondents' opinion on the causes of weak punitive measures against IUU fishing.

Not punitive reasons	Respondents	%
Corruption	42	45
Court orders	1	1
Fine too low	47	51
No penalties	3	3
n	93	100

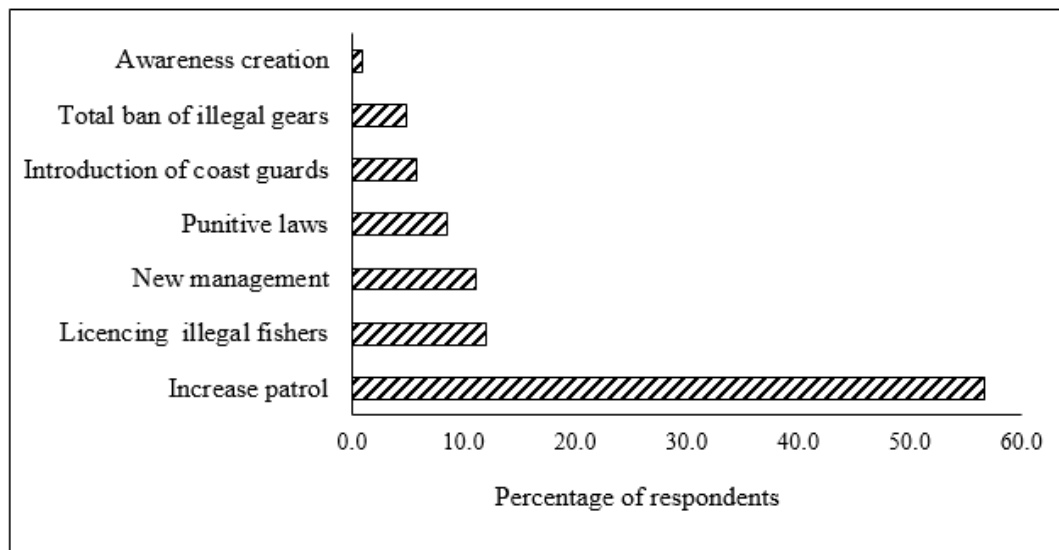


Figure 7 Distribution of the suggested actions to curb illegal fishing in Lake Naivasha

CONCLUSIONS

Based on this study, illegal fishing activities has resulted in reduction of catches and income for the fisher community which supports livelihoods of over 4000 people directly and indirectly

RECOMMENDATIONS

- ✓ Create awareness and understanding of the nature of as well as the impact of illegal fishing among senior public servants and politicians to increase will to implement viable MCS
- ✓ There is need for the government and donors to explore the approach of having alternative livelihoods projects in attempt to diversify the economies of the local communities to ease pressure on the resource and reduce illegal fishing activities.
- ✓ Ensure adequate and robust legislation to support prosecutions with strict penalties and custodial sentences
- ✓ The County government of Nakuru to consider establishing an MCS fund that will be supported from the fines paid by those prosecuted for any fishery offence to be plowed back for strengthening the MCS system.

**Vision**

A Centre of Excellence in innovative research in marine, fisheries for Blue Economy Development

Mission

To generate and disseminate scientific information for sustainable development of the Blue Economy.

Core Values

To fulfil her mandate and realize its mission, the operations of KMFRI will be guided by the following core values:-

- ◆ Integrity,
- ◆ Transparency and accountability
- ◆ Professionalism
- ◆ Team work
- ◆ Equity and equality

Annex 8: Planning meeting minutes

Research meeting at the Naivasha station Library on 10/11/2020

Members present

1. Edna Waithaka
2. George Morara
3. Alice Mutie
4. Patrick Loki
5. Dickson Odongo
6. Tom Nyolo

Agenda

1. PC Targets 2020/2021
2. Monthly sampling

The meeting was opened by a word of prayer from George Morara at 10.00am.
Summary of the discussion are shown below:

PC Target	Activity	Date
Assess the use of the hook and line on the fishery of Lake Naivasha, and recommend an allowable number and size for fisheries sustainability and management by 20 th February, 2021	The team shall set experiments and engage fishermen who are currently using hooks to obtain the necessary data	12 th to 17 th Nov. 2020
Investigate the fishery status of Lake Ol Bolossat and Lake Nakuru to inform Management by 29th May, 2021	-Stock assessment: Composition, maturity, length weight -Water quality	30th Nov. to 3 rd Dec 2020 (L. Nakuru) 4 th to 5 th Dec (L. Ol Bolossat)
Assess the socio-economic effect of illegal fishing on the Lakes Victoria and Naivasha fisheries and make recommendations for management by 31 st May, 2021	-A tool to be developed by 24 th Nov 2020 -The team will have focus discussion group with key informants in fisheries sector to generate data	7 th to 10 th Dec 2020

The monthly sampling activity was scheduled for 20th to 27th Nov 2020.

Being no any other business, the meeting ended at 1.00 pm

Chairperson
Edna Waithaka

Secretary
Alice Mutie

Sign 

Sign 

Annex 9: Memo for sampling

70-5

196

KENYA MARINE AND FISHERIES RESEARCH INSTITUTE

P.O BOX 837-20117

NAIVASHA

INTERNAL MEMO

FROM: RESEARCH

TO: STATION CO-ORDINATOR

DATE: 9/12/2020

RE: Assessing the socio-economic effects of illegal fishing on the Lake Naivasha Fishery

A team will be administering survey questionnaires to Kamere, Karagita, Central and Tarambeta beach to collect data to answer the above PC target.

The proposed activity will be for 4 days from 10th to 15th December 2020.

BUDGET

No.	Name	Per No	Lunch (Ksh)	Days	Total (Ksh)
1	Edna Waithaka	1842	1000	4	4,000
2	Tom Nyolo	1006	1000	4	4,000
3	Alice Mutie	2064	1000	4	4,000
4	Patrick Loki	1275	1000	4	4,000
5	Dickson Odongo	1479	1000	4	4,000
6	Lucy Wanja	1507	750	4	3,000
7	Peter Kombo	1512	750	4	3,000
8	Joseck Miruka	1750	750	4	3,000
9	Monicah Maina	2175	1000	2	2,000
10	BMU	-	1500	4	6,000
11	Stationery	-	-	-	5,000
12	Vehicle Fuel		110*30litres/day		13,200
	TOTAL				55,200 ✓

Thank you.

Alice

Alice Mutie

RO II

Action taken
[Signature]
10/12/2020
1

Accountant
This is approved
for payment.
[Signature]
9/12/2020

Annex 10: Work ticket

These headings to be completed by Issuing Officer

KENYA MARINE & FISHERIES RESEARCH INSTITUTE

10277

TRANSPORT - DAILY WORK TICKET DEPT. KMFRI TICKET NO KM

PREVIOUS W.T. NO. 10276 REG. NO. KCA 183 E MAKE NISSAN NAVARA UNIT INSTITUTE LABORATORY NAIVASHA
DICABIN

Driver's Name and Number		Number, Name and Designation of Authorizing Officer		Specimen Signature of Authorizing Officer	
1	JOSEPH MURUKA 1750 4	1	2175 - MERICAH N. MAINA K.C.I.I	<i>[Signature]</i>	
2		2	1445 - NASHON BROKO HRM OJI	<i>[Signature]</i>	
3		3	2064 - ALICE MUTIE RS II	<i>[Signature]</i>	
		4	1006 - TOM N JOLLO SLT	<i>[Signature]</i>	

Date	Driver's No.	Details of Journey and Route in full	No. and Signature of person authorizing Journey	Oil drawn (Litres)	Fuel drawn (Litres)	Voucher No. or L.P.O. No.	Time		Speedo Reading end of Journey	Kilometres of Journey	
							Out	In			
(1)	(2)	(3)	No. (4)	Signature (5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
01/12/20	1	KMFRI NUS OFFICE - KAYOLE (R)	2	<i>[Signature]</i>				5:40 AM	8:10 AM	135524	1
1/12/20	1	KMFRI NUS OFFICE - NYAHURU L. OLBOCOT (R)	2	<i>[Signature]</i>				7:17 AM	6:17 PM	135425	101
2/12/20	1	NYAHURU L. OLBOCOT - KMFRI NUS OFFICE (R)	3	<i>[Signature]</i>	41.96	10410		6:07 AM	3:11 PM	135688	203
2/12/20	1	NYAHURU L. OLBOCOT - NAKURU TOWN (R)	3	<i>[Signature]</i>				4:07 PM	5:49 PM	135740	52
3/12/20	1	NAKURU TOWN - KMFRI NUS OFFICE (R)	3	<i>[Signature]</i>	36.95	12637		5:00 AM	6:20 PM	136031	291
4/12/20	1	NAKURU TOWN - KMFRI NUS OFFICE (R)	3	<i>[Signature]</i>				5:17 AM	5:20 PM	136340	309
4/12/20	1	NAKURU TOWN - KMFRI NUS OFFICE (R)	4	<i>[Signature]</i>				6:18 PM	8:49 PM	136451	111
7/12/20	1	KMFRI NUS OFFICE - NAKURU TOWN (R)	2	<i>[Signature]</i>				8:00 AM	8:17 PM	136657	206
8/12/20	1	KMFRI NUS OFFICE - NAKURU TOWN (R)	2	<i>[Signature]</i>	30.05	10552		7:13 AM	8:31 PM	136860	203
9/12/20	1	KMFRI NUS OFFICE - NUS TOWN (R)	2	<i>[Signature]</i>				12:50 PM	2:10 PM	136879	19
9/12/20	1	KMFRI NUS OFFICE - KAYOLE (R)	2	<i>[Signature]</i>				5:00 PM	6:55 PM	136905	26
10/12/20	1	KMFRI NUS OFFICE - KAYOLE - KAMERE (R)	4	<i>[Signature]</i>	30.05	11515		8:05 AM	11:30 AM	136986	33
10/12/20	1	KMFRI NUS OFFICE - NUS TOWN - KAYOLE (R)	5	<i>[Signature]</i>				11:41 AM	2:00 PM	136998	30
10/12/20	1	KMFRI NUS OFFICE - KAMERE (R)	5	<i>[Signature]</i>				2:25 PM	3:38 PM	137031	33
10/12/20	1	KMFRI NUS OFFICE - KAYOLE (R)	4	<i>[Signature]</i>				4:10 PM	5:39 PM	137057	26
11/12/20	1	KMFRI NUS OFFICE - KAYOLE - KAYOLE (R)	4	<i>[Signature]</i>				8:44 AM	3:00 PM	137117	60
11/12/20	1	KMFRI NUS OFFICE - KAYOLE (R)	4	<i>[Signature]</i>				3:10 PM	5:17 PM	137148	31
19/12/20	1	KMFRI NUS OFFICE - KARINGATA MARKET (R)	2	<i>[Signature]</i>	57.65	11631		9:14 AM	9:50 AM	137151	3

Date	Driver's No.	Details of Journey and Route in full	No. and Signature of person authorizing Journey		Oil drawn (Litres)	Fuel drawn (Litres)	Voucher No. or L.P.O. No. or Cash Voucher No.	Time		Speedo Reading end of Journey	Kilometres of Journey
			No. (4)	Signature (5)				Out (9)	In (10)		
14/12/20	1	Kmfri Nvs Office - Tarambete	(R) 2	[Signature]				10:00 AM	5:35 PM	137230	79
15/12/20	1	Kmfri Nvs Office - Warambete	(R) 2	[Signature]				8:14 AM	1:26 PM	137522	88
15/12/20	1	Kmfri Nvs Office - Nvs Town	(R) 2	[Signature]				1:30 PM	2:31 PM	137340	18
15/12/20	1	Kmfri Nvs Office - Nvs Town	(R) 2	[Signature]				3:45 PM	4:21 PM	137356	16
15/12/20	1	Kmfri Nvs Office - Kayole	(R) 2	[Signature]				4:36 PM	5:41 PM	137381	25
16/12/20	1	Kmfri Nvs Office - Kayole - B/Hotel	(R) 4	[Signature]				6:44 AM	10:24 AM	137440	79
16/12/20	1	Kmfri Nvs Office - Nvs Town	(R) 2	[Signature]				10:37 AM	11:11 AM	137455	15
16/12/20	1	Kmfri Nvs Office - Nvs Town	(R) 2	[Signature]				1:33 PM	2:17 PM	137476	21
16/12/20	1	Kmfri Nvs Office - Kayole	(R) 4	[Signature]				5:35 PM	6:40 PM	137506	30
17/12/20	1	Kmfri Nvs Office - Kayole - B/Hotel	(R) 4	[Signature]				6:30 AM	8:51 AM	137533	27
17/12/20	1	Kmfri Nvs Office - Kayole	(R) 2	[Signature]				9:51 AM	10:55 AM	137557	24
17/12/20	1	Kmfri Nvs Office - Kayole	(R) 2	[Signature]				3:15 PM	5:00 PM	137586	28
17/12/20	1	Kmfri Nvs Office - Kayole	(R) 4	[Signature]				6:08 PM	7:11 PM	137615	29
18/12/20	1	Kmfri Nvs Office - Kayole - B/Hotel	(R) 4	[Signature]	65.2	11779		7:13 AM	8:47 AM	136642	37
18/12/20	1	Kmfri Nvs Office - Obanur	(R) 2	[Signature]				8:54 AM	11:10 AM	136684	42
18/12/20	1	Kmfri Nvs Office - Nvs Town	(R) 2	[Signature]				11:52 AM	1:21 PM	137704	20
18/12/20	1	Kmfri Nvs Office - Kayole	(R) 2	[Signature]				2:03 PM	3:33 PM	137730	26
18/12/20	1	Kmfri Nvs Office - Kamde - Kayole	(R) 2	[Signature]				4:10 PM	6:20 PM	137822	92
21/12/20	1	Kmfri Nvs Office - Kayole - Jitich	(R) 4	[Signature]				6:38 AM	10:11 AM	137854	32
21/12/20	1	Kmfri Nvs Office - Delemare	(R) 2	[Signature]				2:28 PM	3:42 PM	137873	19

DRIVER'S REPORT OF DEFECTS

Date	Defects	Action taken by Officer i/c

SUMMARY OF WORK TICKETS

Totals - Fuel and Oil drawn	Ltr. (fuel)	Ltr. (Oil)	Certified all entries checked.
			Details entered in Vehicle
Fuel in Tank to be carried forward	Ltr.		Log Book.
Total Distance (km)			Designation
Miles per litre (fuel)			Station
Miles per litre (Oil)			

Annex 11: Evidence of the fieldwork activity.



Annex 12: Questionnaire used for the survey

KENYA MARINE AND FISHERIES RESEARCH INSTITUTE

Assessing the socio-economic effect of illegal fishing on the Lake Naivasha fishery

A Survey Questionnaire

Date.....

Collector.....

This survey is being undertaken by Kenya Marine and Fisheries Research Institute (KMFRI) to collect information on illegal fishing in Lake Naivasha.

You are kindly requested to participate in this exercise which will take about 30 minutes. Your responses will be highly appreciated and the information you give will be treated with utmost confidentiality.

Socio-demographic characteristics

1. What is your gender? Male Female
2. Age (years) 18-35 36-45 46-55 >55
3. Marital status Single/Never married Married (Monogamous)
 Polygamous marriage Separated/Divorced Widowed
4. Educational Level Primary Secondary College – Certificate
 College – Diploma Graduate
5. Household Size 1-4 5-7 > 7
6. Occupation

General information and fishing activities

7. Are you a BMU member Yes No
8. How long have you been in fishing activity < 1year 1-5 years 6-15yrs
9. Do you own a boat Yes No
10. Are you licensed to fish? Yes No
11. Which gear type do you use? Nets Hooks
12. What is your position on the boat
13. Was fishing a primary or secondary source of income for your household during the last 12 months? Primary Secondary
14. Do you have an alternative source of income? Yes No

Unreported, unregulated, Illegal, fisheries

15. Do you know what is illegal fishing?
 Yes No I don't know
 16. Are you required to report landings from your fishing trips to any authorities?
 Yes No I don't know
- If yes who?

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17. Are there limits on the number of licenses allowed?

Yes No I don't know

18. Is fishing restricted in any way? Yes No I don't know

If yes, what are the types of restrictions?

.....
.....

19. Are there penalties for violating the rules?

Yes No I don't know

20. Do you usually see illegal fishers in your fishing area? Yes No I don't know

If yes, how frequent?

All the time Frequently Some of the time Rarely never

21. Had you ever had your boat or fish taken or confiscated for any reason?

Yes No

If yes, Why?.....

Impacts

22. Does illegal fishing impact your catch? Yes No I don't know

How?.....

23. Over the past 12 months your fish catch has

Increased not changed reduced

Why?

.....
.....

24. Over past 12 months your income has

Increased not changed reduced

Why?

.....
.....

25. What is your average catch per day?

0 – 10 kg 11-50kgs 51-100kgs Over 100kgs

26. What is the average price per kg of fish?.....

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27. In your view how much do you think we lose per day as unrecorded catch (kgs)?.....

28. Does illegal fishing impact your livelihood? Yes No

Explain:

.....
.....

29. Does illegal fishing impact the Lake's ecosystem

Yes No I don't know

If yes, how?.....

.....

30. Would you say illegal fishing has an effect on the fishery of lake Naivasha?

Yes No I don't know

How?.....

.....

31. What can you say about the state of peace and order in your beaches?

Increased Decreased Reduced

Recommendations

32. Are the regular patrols effective Yes No

33. Is the penalty on illegal fishing punitive enough Yes No

If no explain.....

.....

34. What do you think can be done to better curb illegal fishing in Lake Naivasha?