ISSN: 2347-5129
IJFAS 2014; 1(5): 98-107
© 2013 IJFAS
www.fisheriesjournal.com
Received: 20-03-2014
Accepted: 30-04-2014

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An analysis of the livelihoods of Lake Edward fisher communities

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ABSTRACT
This paper presents results of Lake Edward fishing communities' livelihoods analysis and goes further to highlight livelihood options that the respondents preferred to engage in. The research was based on the notion that creating livelihood options would help to reduce fisher's over-dependency on the fishery resources and ensure sustainable fisheries management. Fishing has been contributing up to 80% of fishers' incomes, although over 74% indicated that fish catches had declined over the last two years. All respondents lacked appropriate skills to engage in activities that were compatible with the national park sanctuaries. Most respondents also owned low value assets, most of which were not used for production. The study recommends building capacities of fishers to engage in livelihoods that are compatible with the national park sanctuaries like bee keeping and mushroom production and also training in areas of intensive agricultural practices.

Keywords: Livelihoods, Fisher communities, Lake Edward, Sanctuaries, Livelihood assets

1. Introduction
Artisanal fishing has always been an important source of employment for Uganda's fishing communities. However, from 2005 to date, the fisheries sector has experienced a decline in fish catches, for example fish catches for Lake Edward, George and the Kazinga channel was 96,000t in 2005 but declined to 88,000t in 2009, 67,000t in 2011 and 52,000t in 2012 (UBOS [1], 2008; UBOS [2], 2013). The reduction of Lake Edward catches had resulted into fishers resorting to fishing in areas where fishing is prohibited under section 22 (1) and 74 (a) of UWA Act cap 200 and hunting piscivorous birds which were traditionally respected (Mwede [3] 2009). Beyond the biological factors, the causes of this decline include: the use of illegal fishing gears and fishing in breeding areas (NDP [4] 2010).
A number of remedies have been suggested to rejuvenate the fisheries; key among them is improving management, (DSIP [5], 2010). The other important remedy is highlighted by Mwede [3] (2009) who emphasized putting in place alternative income generating activities for fishers. Alternative livelihoods can reduce over-dependency and over-capacity of the fishery resources, fishing effort, enhance stock recovery and ultimately ensure successful Fisheries Management (Asiedu and Nunoo [6], 2013). In view of the second remedy, this project aimed at identifying and prioritizing alternative livelihoods for fishers who live in national park sanctuaries around Lake Edward. The study began with making a livelihood analysis conducted within the framework of the Sustainable rural livelihoods of human, social, natural, financial and Physical capital as Developed by the Department of International Development (DFID) which are combined in pursuit of the different livelihood strategies.
Lake Edward lies at an elevation of 920 meters, is 77 km long by 40 km wide at its maximum points, and covers a total surface area of 2,325 km^2 (898 sq m), making it the 15th-largest on the African continent. The lake is fed by the Nyamugasani River, the Ishasha River, the Rutshuru River the Ntungwe River and the Rwindi River. It empties into the north via the Semuliki River into Lake Albert. Lake Edward lies completely within the Virunga National Park in Democratic Republic of Congo (DRC) and the Queen Elizabeth National park in Uganda. About two-thirds of its waters are in the DRC and one third in Uganda.

2. Materials and Methods

The study was carried out on Lake Edward and covered fisher communities of Kayanja, Katwe (Kasese district), Kishenyi and Kazinga (Rubirizi district) and Rweshama (Rukungiri district) landing sites. The target groups were the primary lake users who are the boat owners and boat crew members. Data collection involved a documentary review of relevant literature, sample survey questionnaires, Focus Group Discussions and Key Informant interviews. A sample survey questionnaire was also used to interview 85 boat crew members and 43 boat owners four of which were women. The number of women in the sample was small because there were few female boat owners. However, since there were no female boat crews, all the 85 respondents were males. Focus Group Discussions (FGDs) were held with groups comprising between 11-14 members of the boat crew and boat owners independently at each landing site. FGDs were mainly used during the ranking of alternative livelihood options. In addition, the Queen Elizabeth National park Community Conservation Warden and two officers belonging to Kasese district Local Government Fisheries Department were interviewed. The KII were mainly used in identification of possible livelihood options. Questionnaire data were entered into the SPSS computer software where frequencies, means, cross tabulations were run and are presented in the form of figures and tables. Content analysis was used to analyze the qualitative data.

3. Results and Discussions

3.1 Socio-demographics

3.1.1 Age of respondents

The information in fig 1 below indicates that most respondents were within the age groups of 21 to 50 years. The dominant age group was the one of 21-30 years, which suggests that there were high school dropouts as it is within the age group that people are expected to be joining and completing higher institutions of learning in Uganda. Fig 1 also shows that involvement in fishing seems to reduce with age such that after 60 years, people are leaving fishing. This is partly due to the fact that fishing is a labour intensive activity which has to be done by very energetic persons. Diversifying livelihoods is therefore important in order to ensure that the aging fishers have alternative sources of livelihoods as they reduce time spent on fishing or even as they completely abandon fishing.

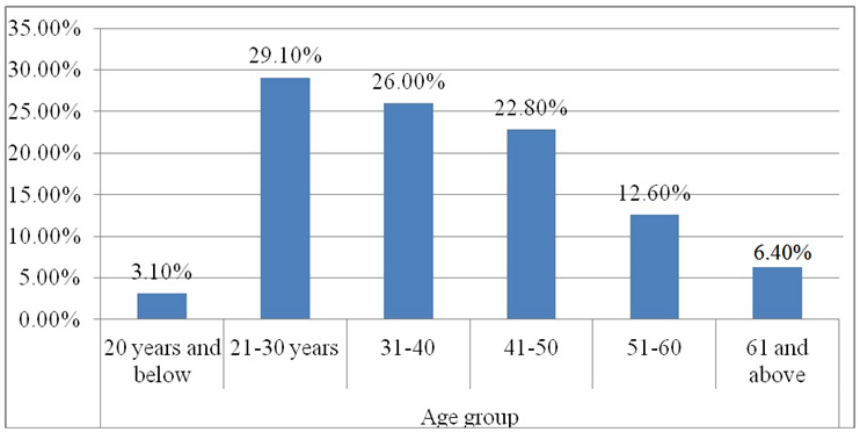

Fig 1: Age of respondents

3.1.2 Marital status

Most respondents were married (Fig. 2) and they had relatively large family size and many dependents (Average of 6-10) which is a common situation for most Ugandan families. It has been indicated that Uganda has the second highest fertility rate (6.4) in Africa (Uganda Population report [7], 2012). Diversifying fisher communities' livelihoods would equally be important in the persuit of sustaining the large family size and many dependents.

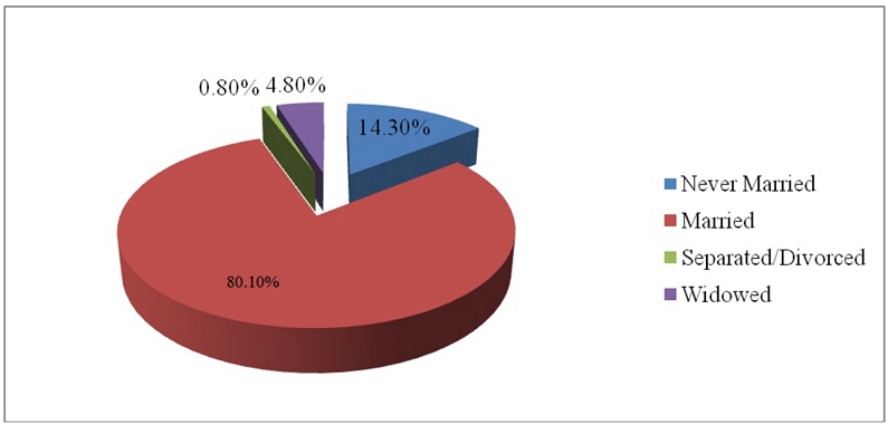

Fig 2: Marital status of respondents

3.1.3 Respondents place of birth

Most respondents were in-migrants to the landing sites, but originating from the districts where the landing sites were located apart from Kishenyi and Kazinga whose majority of respondents originated from other districts (Table 3). According to FGDs, most of them had been attracted by the quick money associated with fishing, especially now that they owned small pieces of land (refer to physical capital section). Some respondents, especially the boat crew also indicated that they got attracted to fishing because it did not require startup capital.

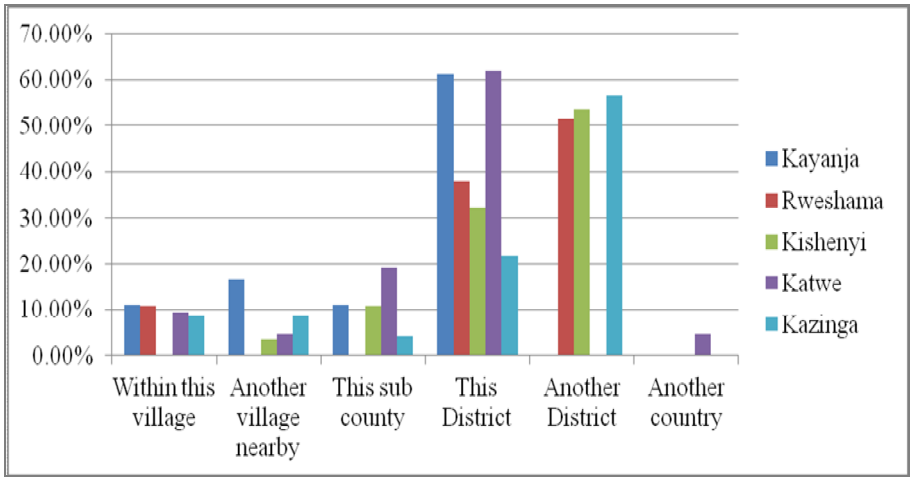

Fig 3: Respondents' place of birth

4. Livelihood Analysis

This section presents the findings, interpretation and discussions of the research findings. In the section, fishers' livelihood analysis is presented within the framework of the Sustainable rural livelihoods of human, social, natural, financial and Physical capital as Developed by DFID which are combined in pursuit of the different livelihood strategies (Ian [8], 1998).

4.1 Human capital

4.1.1 Educational levels: Fig. 4 shows that almost all the respondents had not reached senior four implying that there were high numbers of school dropouts among fishers. According to (Westaway [9], 2009), there are high drop outs among fishers and attributes this to the availability of paid work, group influence (often in relation to fishing) and poverty. It should be noted that fishers' poor education is an obstacle to creating and finding employment in other sectors. However, alternative programs such as Functional Adult Literacy (FAL) can help to enhance fishers' capacities in alternative livelihood options.

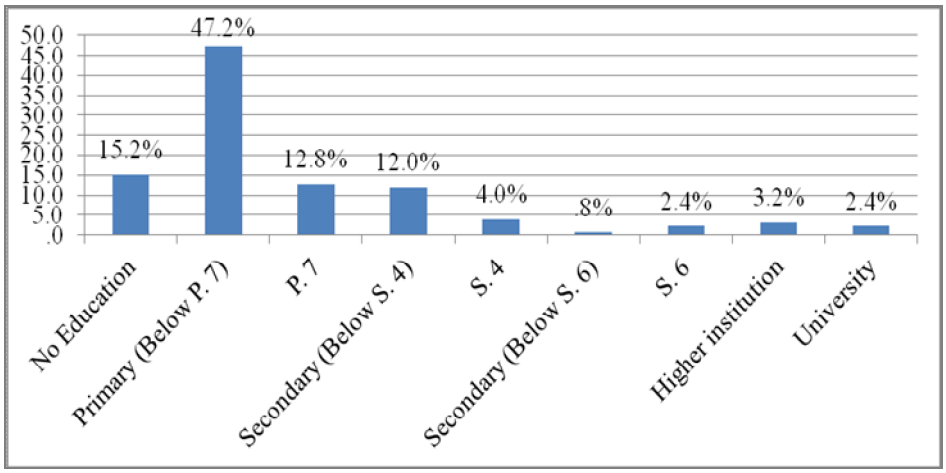

Fig 4: Respondents' level of education

4.1.2 Seeking extension services

One of the ways in which fishers can enhance their skills is through seeking extension services. Fig. 5 below shows that almost half of the respondents (44.5%) had not sought any extension services. It also shows that extension services sought were normally in crop farming, livestock farming, fish trading and fish processing. Although they had received extension services in crop and livestock farming, these were not carried out at these landing sites because of being national park sanctuaries. Extension services were mainly sought from National Agriculture and Advisory services (NAADS) for crop and livestock farming, whereas that for fish trading and

processing was mainly sought from Fisheries staff and NAADS. Extension for fish processing was sought from Fisheries staff and Community Based Organizations/Non-Governmental Organizations (CBOs/NGOs).

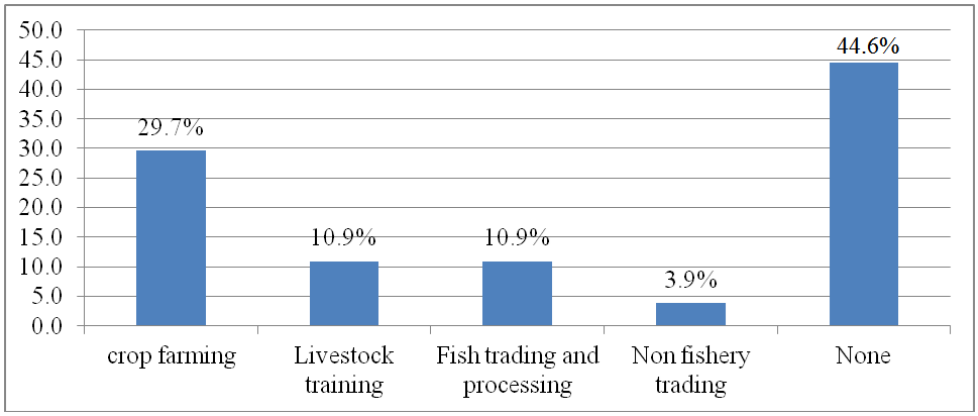

Fig 5: Type of extension services sought by respondents

4.1.3 Trainings

In view of the importance of training, the study sought to establish whether fishers had attained some livelihood enhancement training. Results indicated that most boat owners (76.7%) had received training compared to 48.2% of the boat crew. This was partly because boat crew members spent a lot of their time on the lake compared to boat owners; so some training was held in absentia of the boat crew members. In addition, boat crews have limited capital investment in fisheries inputs hence limited stewardship to fisheries sustainability and losses incurred due to fisheries law enforcement. Since this training was mainly received by boat owners, and not boat crew members it means that people who did the actual fishing (boat crew) missed out on knowledge relevant to their activities which would result into a perpetuation of illegalities.

The major training received was in fisheries management with few respondents reporting that they also received training in crop farming, livestock farming and saving culture enhancement (Table 1). Training is important in efforts of diversifying fishers' livelihoods as indicated by (Asiedu and Nunoo [6], 2013) that a well-designed livelihood scheme is needed to improve suitable skills among the fishers. The lack of skills in alternative livelihood options implies that they will continually depend on fishing and remain more vulnerable to poverty especially when fisheries shocks and stresses intensified.

Whereas most training in fisheries management had taken place in the last six months, that of crop and livestock farming had taken place in the last one year, implying that the frequency of farming related trainings was low and sometimes not sufficient according to respondents. Training in fisheries management, fish handling and processing was mainly done by Fisheries officers and BMUs. Training in crop, livestock and poultry was mainly done by NAADS whereas training in saving culture was mainly done by the CBOS/NGOs. Basing on the above trainings provided as indicated above, it can also be concluded that fishers had not received training in livelihood options that were compatible with the national park sanctuaries.

Table 1: Type of training received

	Last six months	Last one year	Last 2 years	Beyond 2 years	Does not remember	N
Legal fishing	64.6%	12.5%	2.1%	18.8%	2.1%	48
Crop farming	23.5%	41.2%		29.4%	5.9%	17
Livestock farming	37.5%	50.0%		12.5%		8
Poultry	50.0%	16.7%	16.7%	16.6%		6
Saving culture	100.0%					11
Post-harvest	100.0%					3
Fish processing	100.0%					3

Source: Survey data

4.1.4 Training required

The sustainable livelihood approach emphasizes that the target population is involved in identifying and addressing livelihood priorities. In view of this, the fishing communities were sensitized about the type of livelihood options that can be carried out in the national park sanctuaries. Having conceptualized these livelihoods, they were involved in a ranking exercise in order to come up with a list of what they preferred which is presented in table 2. The livelihood options had been identified after a series of consultations between the fisheries research team and UWA and included: Mushroom production, soap production, crafts production, tailoring,

poultry, salt mining, bee keeping, candle production, tourist guides. In order to enhance adoption of these livelihoods, it is important that capacity building is carried out.

Table 2: Livelihood options selected by fishers in the order of preference

Name of landing site	Category of fishers	Livelihood options by preference
Kishenyi	Boat owners	1. Mushroom production 2. Tourist guides 3. Soap production 4. Poultry
	Boat crew/ Baria	1. Poultry 2. Bee keeping 3. Mushroom production
Katwe	Boat owners	1. Tourist guides 2. Poultry 3. Salt mining
	Boat crew/ Baria	1. Poultry 2. Soap production 3. Tailoring 4. Bee keeping
Kazinga	Boat owners	1. Mushroom production 2. Poultry 3. Crafts production 4. Tailoring
	Boat crew/ Baria	1. Poultry 2. Tourist guides 3. Bee keeping
Rweshama	Boat owners	1. Bee keeping 2. Soap production 3. Poultry 4. Mushroom production
	Boat crew/ Baria	1. Soap production 2. Bee keeping 3. Candle production 4. Poultry
Kayanja	Boat owners	1. Tourist guides 2. Poultry 3. Crafts production 4. Bee keeping 5. Soap production
	Boat crew// Baria	1. Soap production 2. Poultry 3. Tourist guides 4. Tailoring

4.2 Social capital

4.2.1 Belonging to social groups

Social groups are one of the indicators of social capital. In view of this, respondents were asked whether they belonged to any and results indicate that most people belonged to groups that were operating locally (Fig. 6). FGD results indicated that there were fishers who belonged to more than one group for; example, some fishers at Kazinga landing site belonged to both "*Kazinga Turwanise Obworo"* Association and "*Kazinga Bataka"* Development Association. This helped them in widening their savings, having a multiplicity of sources of credit, but above all enhancing cohesion with a wide range of persons. FGDs revealed that through social cohesion, certain knowledge and skills and experiences were shared. Actually, it was through such cohesions that some fishers learnt fishing moreover at no cost, and when the catch was good, even the person who had been taken on to learn fishing would be given part of the revenue from the catch.

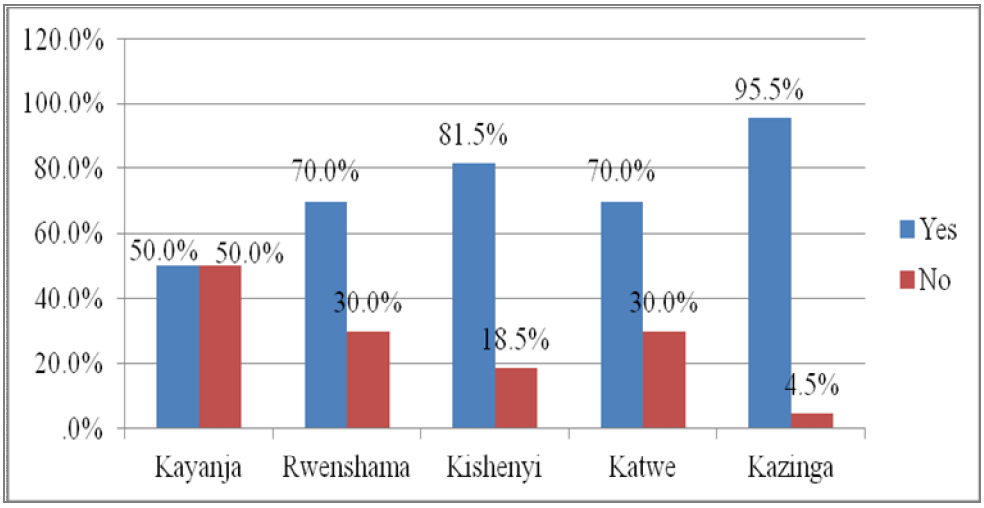

Fig 6: Respondents belonging to social groups

4.2.2 Benefits from social groups

Most respondents had benefited from the groups, mainly through accessing credit and saving their money (Fig. 7). Also among the important roles that the groups played was that they helped members during problems, for example, offering money to someone who had lost a relative. FGDs also revealed that such groups enabled fishers to have avenues for sharing knowledge, experiences as well as enhancing social cohesion. Strengthening such groups and making interventions through them can aid in widening the uptake of livelihood options. It has been indicated that groups can offer a cost-effective vehicle for service delivery and promote broader civil society objectives (Heather and Ann [10] 2001).

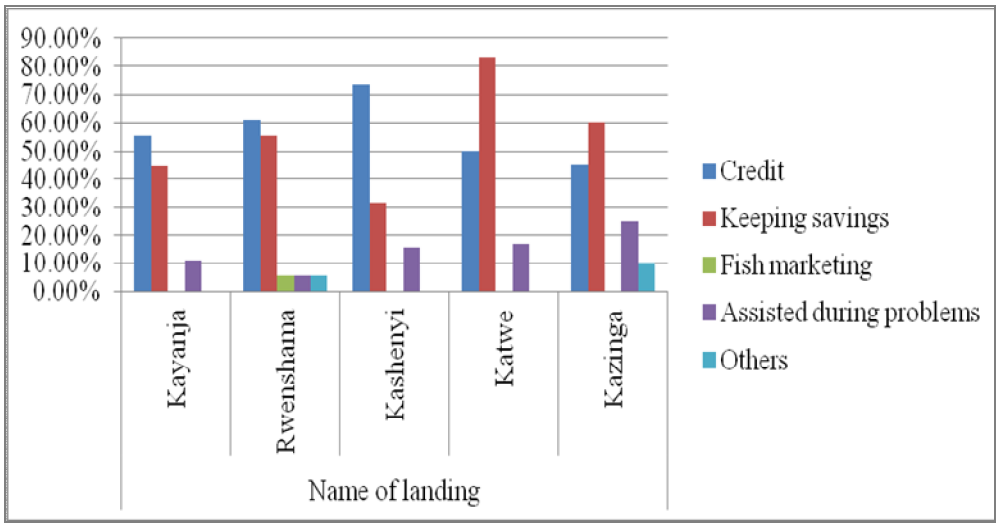

Fig 7: Benefits from groups

4.2.3 Challenges of groups

The challenges are presented in figure 8 below with the major ones being mistrust and low capital. Mistrust resulted in fear to save and discouraged many from joining, resulting into low clientele and savings. In order to strengthen such groups, such challenges need to be addressed.

4.3 Natural capital

The main natural asset from which a livelihood was derived was the lake where fishing was done and was also a main source of domestic water. Fishers spent an average of 4.6 and 5.4 days a week fishing during bad and good seasons respectively, and they targeted mainly *Oreochromis niloticus* (55.8%) and *Bagrus docmak* (35.5%) (Table 9). However, most *Oreochromis niloticus* fishers (74.3%) indicated that catches were declining, 18.1% said catches had increased, whereas 7.6% indicated that catches had remained about the same. Similarly, most *Bagrus docmak* fishers (75%) also indicated that catches had decreased, 13.9% reported an increase whereas 11.1% reported that catches had stayed the same. National statistics have shown that catches from Lake Edward, George and the Kazinga channel have decreased from 88,000t in 2009, 67,000t in 2011 and 52,000t in 2012 (UBOS [1], 2008; UBOS [2], 2013). If this trend continues amidst lack of alternative livelihood options, the livelihoods of fishers will be at stake, not to mention the negative effects it will have on the national economy

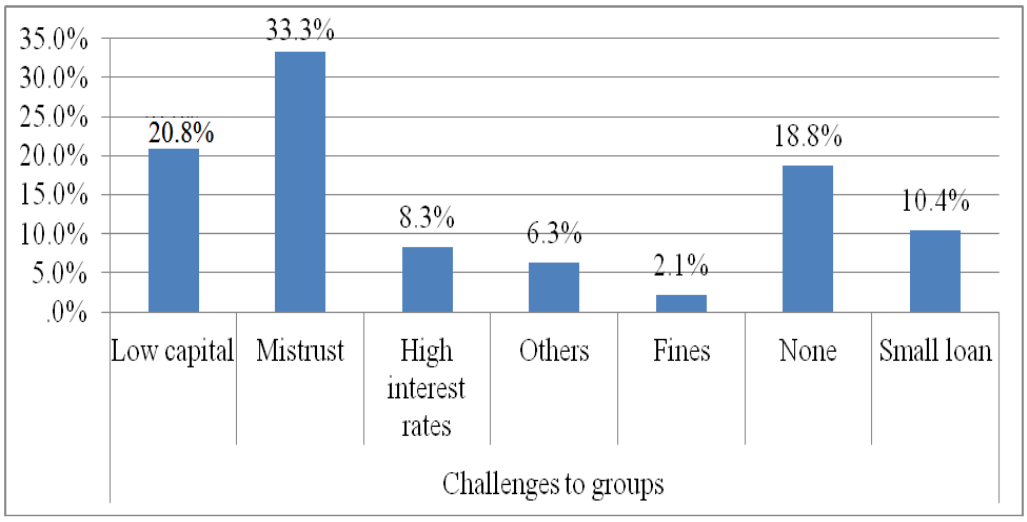

Fig 8: Challenges to social groups

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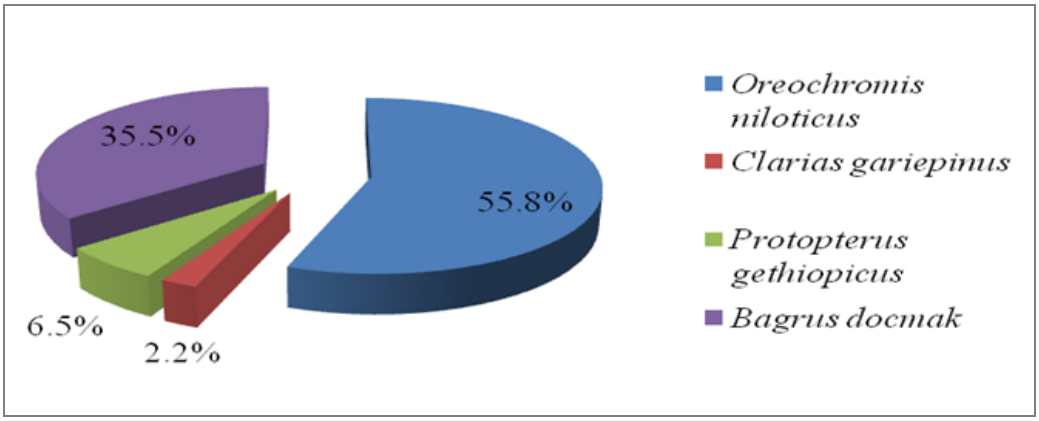

Fig 9: Fish targeted

The other major natural asset was land and 74.4% of boat owners (n=32) and 68.6% (n=57) of boat crew members reported to own land which some used for agriculture. Since the landing sites were located in the National Park sanctuaries, the land was located far away (average of 33kms with others being up to 235 km distance). Some fishers, especially boat owners owned small plots of land at the landing sites. These were for purposes of constructing houses and where one needed, engaging in livelihood activities that are allowed in the national park sanctuaries like crafts making, mushroom production among others. Beyond the sanctuaries, they would be allowed to practice selected activities like bee keeping on Uganda Wildlife Authority (UWA) land; although this necessitated Memorandum of Understanding (MoU) between the fishers and UWA.

Boat owners owned relatively large pieces of land compared to the crew members whose majority (62%) owned either an acre or less. At least over 52.4% of the boat owner respondents owned over an acre of land compared to 37.8% of the boat crew who owned the same size of land. In addition to owning relatively large pieces of land, boat owners utilized an average of 86% of their land for production compared to boat crew members who utilized 54% of their land for the same purpose. From the above information, it can be concluded that one of the reasons fisher communities, especially the boat crew resorted to fishing as their main activity was the lack of adequate land to practice farming. Moreover, the "little" earnings from fishing amidst their low saving culture could not enable them to buy land. Coupled with the lack of skills in alternative livelihood enhancement, fishers found themselves depending more on the lake whose resources are also dwindling.

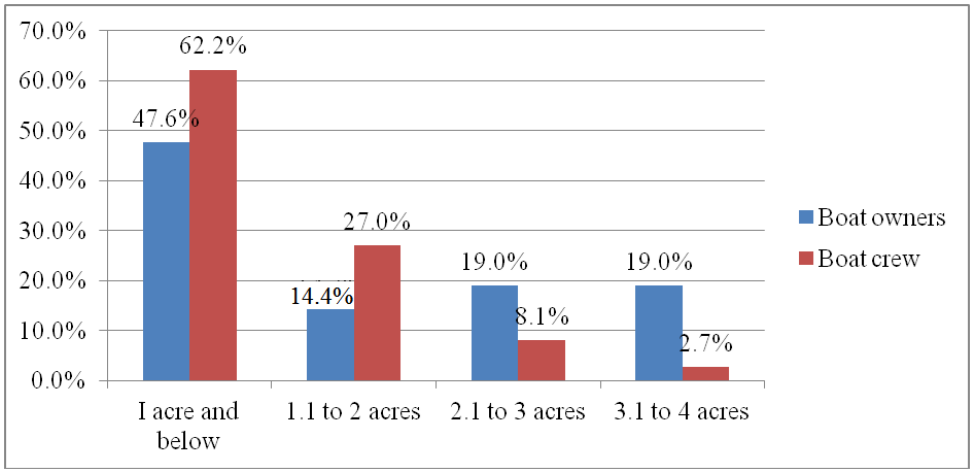

Fig 10: Acreage of land owned by respondents

Due to small land holdings amidst the need to expand on agricultural production potential, a few respondents rented land to practice some agriculture (Table 3). Boat owners rented relatively large pieces of land which literary meant that they were likely to benefit more from rented land compared to boat crew members. The amount paid per season, which was normally six months is given in table 6 below.

Table 3: Amount and cost of renting land

Fisheries activity		Land rented in (acres)	Amount for renting in US$
Boat owners	Mean	5	51
	Maximum	5	80
Boat crew	Mean	1	41.5
	Maximum	2	72

4.4 Physical capital

This section looked at both the fisheries and non-fisheries assets. With respect to fisheries, physical assets, boat owners owned an average of one boat with up to 8 respondents owning 2 boats and one owning 3 boats. Boats were valued at an average of US$: 342.7. Fishers mainly used gillnets and on average, they owned 49 gillnets. The average mesh size of gill nets was 4 inch and each gill net was valued at an average of US$: 9.1. Hooks were not commonly used, but those who used them indicated that they used hooks of average size of 8 and owned an average of 1,125. Costing an average of US$: 0.04 per hook.

4.5 Alternative Livelihoods

At least 52% did crop farming, 15.6% did livestock farming, whereas 5.4% were engaged in poultry but mainly on small scale. The major crops grown for income were coffee, cotton, maize, groundnuts, beans, cassava and sweet potatoes. The major livestock owned were: goats, cows and poultry (Table 4). However, the average proportion of income from the alternative livelihood options was generally less than 30% (refer to financial capital section). In addition, most of the agriculture practiced was to boost household food security. As already indicated, these activities were mainly done in their home areas, although some few livestock existed at some landing sites which also contravened UWA laws.

Table 4: Number and type of livestock owned

Fisheries activity		Cattle	Goats	Pigs	Sheep	Chicken	Ducks
Boat owners	No of respondents	3	19	2	2	9	1
	Average number of animals	7	13	2	2	10	10
Boat crew	No of respondents	4	24	2	1	15	2
	Average number of animals	8	2	2	1	8	4

4.6 Other assets

4.6.1 Production and consumption assets

The most physical productive assets owned were rental houses, with most of the houses being non-brick, but iron roofed (n=19) valued at an average of US$: 478.1 followed by the brick iron roofed houses (n=9) valued at average of US$: 1316.5. The other high value productive assets were motorcycles (n=4) valued at an average of US$: 702.5, outboard engines (n=4) and bicycles (n=4) valued at an average of US$: 50.8.

Most consumption assets owned by most respondents were of low value and they included: mobile phones (n=62) valued at an average of US$: 25.8, radios (n=68) valued at an average of US$: 12, non-brick, but iron roofed brick house (n=34) valued at an average of US$: 550.7, brick residential house (n=18) valued at an average of US$: 1760, plots (n=17) valued at an average of US$: 1351.1 and bicycles (n=15) valued at US$: 59.5. There were other assets like Television sets and DVD players which however were owned by very few respondents.

5. Financial capital

5.1 Fisheries incomes, expenditures and credit services

Earnings from fishing varied between categories with boat owners earning far more than boat crew (table 5). In addition, the average proportion of income from fisheries activities was higher for boat crew (79%) compared to boat owners (70%). On the whole, however, 27.8% of the respondents derived all their livelihoods from fishing. By landing site, apart from Kayanja landing site, where fisheries contributed a lower average proportion of 63% to the total income, the rest of the landing sites, it was over 75% with Kazinga reporting up to 80%. The one for Kayanja fishers was low, partly due to the fact that some fishers around there were not far away from their homes so they found time to engage in other income generating activities especially farming even after fishing. However, due to the fact that most of their income was from fisheries, it was important to ensure that alternative livelihood interventions target both categories of fishers.

For expenditures, the largest proportion of income for boat owners (58%) and boat crew/barias (66%) was spent on food items and other daily household needs. This was partly because most household food items for both the boat owners (67.7%) and boat crew members (86.2%) were sourced from the market.

An assessment of fishers savings indicated that although the proportion of savings from fisheries incomes was higher for boat crew (21% of their incomes) than boat owners (16% of their incomes), in real monetary terms, boat owners saved more, that is, annual average of US$: 867.4 compared to US$: 600 for the boat crew members. This is attributed to the big investments and the gains from fishery activity compared to boat crews that are hired labour and are mainly paid not more than 30% of the earnings from the catch.

For credit sources, most respondents indicated that they got credit from their groups since there were no formal institutions at the landing sites. However, through FGDs, some few respondents also indicated that they saved and got credit from banks like Centenary and Pride Microfinance, which were however over 40 kilometers away from the landing sites. Such banks were normally located in major towns like Kasese, Rukungiri and Ishaka.

Table 5: Estimates of perception annual incomes and expenditures in US Dollars

Boat Owner			Boat Crew		
Est. annual earnings	**Est. annual food expenditure**	**Proportion of food exp. to total earnings**	**Est. annual earnings**	**Est. annual food expenditures**	**Proportion of food exp. to total earnings**
3961.8	2316.3	58%	2372.2	1557.3	66%

5.2 Incomes from alternative livelihoods

5.2.1 Crop farming

As was indicated before, most of the crop produce was to boost household food supply as opposed to being a source of income. Therefore, very few earned from the sale of crop produce (Table 6). This was partly due to the small pieces of land owned, high usage of indigenous technologies, and lack of land as well as high cost of renting land which discouraged many.

Table 6: Annual average earnings in US$ from the sale of crops

Crop	Average annual earnings	Highest amount earned in a year	No. of respondents
Coffee	612.8	1920	6
Cotton	1113.6	1440	2
Maize	182	400	6
Ground nuts	220	576	3
Beans	106.6	200	3

5.2.2 Incomes from livestock and poultry

Results from the sale of livestock and poultry indicate that at least boat owners were able to sell high value animals and therefore earned better than boat crew. Boat owners earned highly from goats and cattle, whereas boat crews earned highly from chicken (Table 7). Most boat crew spent much of their time on the lake which left them with no time to look after animals. On a general note, however, there were not many respondents who earned from selling of livestock and livestock products. Results also indicated that very few respondents were dealing in the sale of milk, eggs and other livestock bi-products; actually only one respondent for both crew and boat owners for each of the by-products.

Table 7: Average annual incomes US Dollars from the sale of livestock and poultry

		Cattle	Goats	Sheep	Poultry
Boat owners	Average income	3,200	121.3	----	20
	No of respondents	1	6		1
Boat crew	Average income	300	64	24	45.5
	No of respondents	2	5	1	4

6. Conclusion and Recommendations

In view of the findings, it's important to note that the fishing communities living in national park sanctuaries depended mainly on fishing. They also lacked appropriate knowledge of the kind of livelihood options that were allowed in the national park sanctuaries. Due to the ever increasing pressure on fisheries resources, amidst low engagement in alternative livelihoods, earnings were declining.

In order to improve incomes, food security, and general welfare of Lake Edward fisher communities, it is important to build their capacities in identified livelihood options. This will also result into sustainable fisheries management. Fishers also need regular trainings in intensive agriculture practices in order to utilize their small pieces of land

7. Acknowledgement

This work conducted through NaFIRRI benefited from the World Bank funded project under Agriculture Technology and Advisory Services (ATAAS). The authors are grateful to National Agriculture Research Organization (NARO) and National Fisheries Resources Research Institute (NaFIRRI) for the support and guidance given to the study. The authors also appreciate the Queen Elizabeth Community Conservation Officer, Fisheries Officers of Kasese and Rubirizi districts, BMU chairpersons and the fishers for all the support and information given to researchers.

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