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Socio-Economic Challenges Faced by Fisheries Management Institutions Mitigating Fisheries Conflict in Homa Bay County, Kenya

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Abstract:

Fisheries conflicts are among the persistent problems affecting the security of food, livelihoods and fishing environments crucial to poor fishing communities in developing countries world over. In Kenya, the same has been a major problem and it has taken government's efforts to curb. One of the strategies introduced more so in Homa Bay County is the Co-Management Strategy in which all stakeholders are involved. Although this co-management strategy has been suggested as a solution to the problem of fisheries use, conflicts still persist. The study examined the effectiveness of co-management strategy mitigates fisheries conflicts in Homa Bay County. It was to determine that socio-economic challenges affect the effectiveness of the Fisheries Management Institutions (FMIs) in mitigating fisheries conflict in Homa Bay County. The common property theory was used in the study. This study was guided by a conceptual framework of common property. The framework was based on the driver-problem-issue- intervention analysis that put into context the dynamics of variables that addressed the objectives of the study. The research design used was descriptive in nature. The population of the study was 18, 300 registered members of BMUs. Multi stage sampling was used to identify two beaches in each of the five divisions namely: Mfangano, Mbita, Lambwe, Central and Gwasssi. The study established that there were about 100 registered members in each BMU. 40% of BMUs from each of the five divisions were sampled, resulting to 39 BMUs. From each BMU sampled, 10 registered members were randomly sampled. The sample size was therefore, 390. Data was collected using structured questionnaires, interview schedules, observation and Focus Group Discussions (FGDs). In terms of analysis descriptive statistics was generated to build a picture of the respondents' characteristics, this was done using SPSS. Inferential Statistics used the regression models and ANOVA. For each objective, the decision to reject or fail to reject the null hypothesis was based on the significance of coefficients ($p < 0.05$) of the related variables in the fitted regression. The study found out that FMIs policy mechanisms had a positive influence on fisheries conflict. In objective two, the study however, found that there is no relationship between community perception and performance of the FMIs as failed to reject the null hypothesis. The study also found that socio-economic challenges were an impediment in the mitigation of fisheries conflict. The findings of this study support and add knowledge to previous studies on fisheries conflicts. The study therefore, will contribute to the field of conflict management within the broader context of co-management strategy in the fisheries sector, thus leading to harmonious coexistence at the beaches, sustainable utilization of fisheries resources and improved livelihood of the people. The research suggests further studies targeting cultural issues that may be causing fisheries conflicts and cross border fishing that is causing fisheries conflicts.

1. Background of the Study

Fisheries conflicts are being experienced world over, as these conflicts are among the persistent problems affecting the security of food, livelihoods and fishing environments crucial to poor fishing communities in developing countries. Most intractable conflicts arise from excessive fishing efforts due to increasing population and economic motivations (Hauss, 2003). The socio-economic challenges that have been discussed ranges from inadequate funds; poor infrastructure; monitoring fishing activities; corruption; inadequate support from the government; gender issues and conflict of interest.

Fisheries systems are lively, complex, indeterminate and poorly understood. These factors contribute to the difficulties in fisheries management experienced by governments and stakeholders. A fishery system encompasses not only fish and the physical environment that supports them, but also all the associated social and economic structures: fishers, fishing companies, processors and suppliers, policy instruments, monitoring and enforcement. On a global scale fishery are

suffering gross depletion of fish stocks, adverse impacts upon the marine environment, escalating overcapacity, declining profitability of fishing fleets and social upheaval. This raises a vital question: why does fisheries management flop?

Formation of BMU structures in Kenya started in 2004, and by 2006, most of the BMUs had been established. Establishing the BMUs built on beach committee arrangements in existence since the early 1960s (Abila *et al.*, 2006). Even though adoption of the lake fisheries co-management program was viewed as a good option for regulating the exploitation of the fisheries, catch and effort continue to expand on Lake Victoria (Kolding *et al.*, 2008), this leads to concerns about the ability of the co-management program to manage this valuable fisheries in a sustainable manner.

Notwithstanding the many functions of BMUs (LVFO, 2005), their main function was to enhance the level of compliance of fisheries rules and regulations, thereby fostering responsible fishing practices for the lake (LVFO, 2007). Cinner *et al.* (2009) offers a comprehensive assessment of the roles of BMUs as enshrined in the Beach Management Regulations, including boundaries/membership of BMUs, rule-making, enforcement and monitoring, and partnership roles of nested institutions. Inefficiencies have emerged, however, that negatively affect Beach Management Unit's (BMU) abilities to perform their titled roles of sustainable fisheries management (Abila *et al.*, 2006; Ogwang *et al.*, 2009).

2. Problem Statement

Fisheries are dynamic social-ecological systems that are already experiencing rapid changes in markets, exploitation and governance. The increasing exploitation and export of fish products, fast development of fishing beaches, fish markets and urbanization, human activities are threatening the aquatic environment, and lake resources.

Fisheries resources co-management concept has gained heightened acceptance among government, development partners and community institutions as appropriate fisheries management systems. In this new approach, stakeholders become the stewards of the resources and are therefore involved in the decision making, implementation and monitoring process, Bennett *et al.*, (2001). This management approach in Homa Bay County has been actualized through the formation of one hundred and thirty-three Beach Management Units (DoF-Suba, 2010).

Although this co-management strategy has been suggested as a solution to the problem of fisheries conflict and exploitation, evidence on the ground indicate that the problem of fisheries resource conflicts and over-exploitation still persist. This therefore called for the need to examine fisheries conflicts within these units to understand the gaps in relation to the effectiveness of the existing institutions and management mechanisms in adequately responding to these conflicts.

Zwieten P. A. M. *et al.* (2003) says co-management is an emerging trend and is usually applied in the management of common property resources, such as fisheries especially capture fisheries, floodplains and forests. Hence, there is an increasing realization among fisheries managers that fisheries management must include participatory approaches, to address the many challenges and or complex issues including many interests, interest groups, disciplines and issues.

Studies have estimated that artisanal fisheries use one-fifth as much capital and create a hundred times more jobs per dollar invested unlike large-scale fisheries (FAO, 2000). Yet in many developing countries, small-scale fishers live close to, or below, the subsistence level or at any rate, amongst the lowest socio-economic groups with low incomes, poor living conditions and little political influence (Enger and Smith, 1983; Panayotou, 1982). The resources on which these people depend are still largely natural fish populations.

It is estimated that at least 50 million people in developing countries are directly involved in the harvesting, processing and marketing of fish and other aquatic products and world-wide fish production provides some 150 million people with employment. Inland aquatic resources maintain to be under pressure resulting from loss or dilapidation of habitat or over fishing. The United Nations Food and Agriculture Organization (UNFAO) estimates that almost 70% of fish stocks for which data are available are completely exploited, extremely over-fished, or otherwise are in the urgent need of management (FAO, 2000).

In his research findings, Béné (2003) characterized the defining of poverty in fisheries by associating with natural factors (fishing resource) and its associated exploitation level as an old paradigm. These have been exacerbated by Gordon's (1954) and Hardin (1968) with their perception that poverty is associated with the common property nature and open access of the fishing resource, ignoring other possible factors that can contribute to poverty in communities that their livelihoods mostly depends on the common resources.

The free or open-access nature of the fisheries allows many people to enter the fishing sector which afterwards leads to the economic and perhaps biological overexploitation of the resources and rent dishonesty. According to Hardin (1968), the common property nature of the fishing resources leads to misfortune of the commons due to the illogical exploitation of the resources. According to Hardin (*ibid*): "*Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. Freedom in a common brings ruin to all*".

The low opportunity incomes in small-scale fisheries has also been explained as the reason for poverty in fishing communities; for the reason that small-scale fisheries are usually situated in rural, remote areas with very few alternative employment opportunities. There is also the perception that the fishery is "an employer of last resort" and therefore because of its open-access nature offer a livelihood to the poorest people through fishing activities.

The greatest development challenges facing Lake Victoria and its basin are the socio-economic and ecological problems, which are mainly related to the inter-linkage between poverty and environmental degradation. These are further exacerbated by the lack of capacity among the concerned institutions to manage the resources of the Lake basin, both human

and natural, in a sustainable manner. Likewise, the judicial and institutional frameworks that govern the socio-economic activities have so far been wrongly conceived and enforced, and in an uncoordinated manner. Sustainable growth is one prerequisite for poverty alleviation in any country.

In the fisheries sector women have not been seriously empowered. Empowering women and escalating their income is the best way to address poverty within households. Men at almost all levels dominate the fisheries sector and this domination, together with the lower status of women in many cultures around the lakes, shows that women have not benefited from fisheries capital in East Africa, specifically, Uganda and worldwide as much as they could. Women are not very much occupied in fisheries and around 40% of traders and processors are women. The implementation of fisheries co-management and the formation of Beach Management Units (BMUs) provide ideal opportunities to increase the participation of women in both fisheries management and development.

Traditionally, Women been excluded from fisheries management structures and must be encouraged to become more involved, to increase their benefits received from fisheries resources. BMUs were initially formed in many parts of the lake in the late 1990s. At that time, BMUs were not obligated to have women on the committees and thus few women were involved in running BMUs.

Fishery capital in Kenya are managed by the Department of Fisheries through the Fisheries Act (Cap 378) and Maritime Act (Cap 250) of the Laws of Kenya the Kenya Marine Fisheries Research Institute (KMFRI), created as a state corporation through the Science and Technology Act (Cap 250), undertakes fisheries research. These two institutions, which have frequently been in different ministries, are currently under the Ministry of Livestock and Fisheries Development. Due to the lack of a fisheries apex institution at the ministry level, these two institutions lack a mechanism for setting coordinated agenda. Other public institutions concerned with fishery activities include regional development authorities under the Ministry of Regional Development, Ministry of Environment and Natural Resources, universities and public laboratories. The large-scale export-oriented private sector is organized under the Kenya Fish Processors and Exporters Association (AFIPEK), which has promoted industry self-regulation, marketing and interfacing with the government. The small, medium and large-scale fish traders in Kenya are considering the formation of an umbrella organization. A major shortcoming is that most of the small-scale traders are not organized into strong associations. Fishermen are being short of strong cooperatives or associations, although there are efforts by several organizations, including the newly launched Beach Management Units (BMUs) to organize this vital group. In addition to these private sector players, there are several civil society and non-governmental organizations (NGOs) working in fisheries, especially on socio-economic and conservation issues (GoK, 2005).

Fisheries in the different water-bodies of Kenya are at different levels of exploitation. Lake Turkana stocks are considered underexploited, chiefly due to poor road infrastructure and long distances from main market centres. Some of the Indian Ocean stocks are also seen as underexploited. Fishing in Lake Victoria is seen to be at its maximum sustainable level, while such lakes like Naivasha and Jipe are viewed to be overexploited. The river line system is exploited by artisanal fishers for household ordomestic consumption. Kenya's aquatic ecosystem and species are faced with both anthropogenic and natural threats such as proliferation of alien invasive species, pollution, uncontrolled water abstraction, deforestation, siltation and unregulated physical developments (GoK, 2005).

According to GoK (2005) Fish trade in Kenya get around mainly artisanal fishers; intermediaries involved in product transference to the markets, usually with some value addition such as drying, smoking and deep-frying; and a large-scale export-oriented processing sector currently consisting of about 18 EU-certified firms. In the local and regional markets, tilapia is the main species and is more often than not traded fresh, with smaller quantities in dried or smoked form. Other species traded in commercial quantities in the local market include *omena*, Nile perch (*Mbuta*), tuna, kingfish, shrimps and lobsters. The major export is of Nile perch fillets from Lake Victoria, accounting for about 90% of the country's total fish export products. Other export products include tuna, shrimps, lobsters, octopus and squids. Trade is hampered by a poor network of roads into production sites and lack for cold storage and preservation in ice. There are no auction systems for fish, a factor that also contributes to high price differentials across locations. As a result, there are significant post harvest losses, which also restrict market expansion. Sanitary standards imposed by major export destinations, and other non-tariff barriers to trade, also limit Kenya's international trade in fish and fishery products.

Considering the fact that population growth in the Lake Victoria basin is in the region of 3% and that 50% of the population live under poverty line, a substantial growth is required in order to alleviate poverty to any significant degree. The growth that has been seen in the region over the last few decades has mainly been based on the exploitation of natural resources. Some of it is linked to finite resources, such as mining activities (mainly diamonds and gold), other parts of it linked to agriculture and fisheries (Oyugi Aseto, 2002).

BMUs are expected to have in place a mechanism that supports the sustainable utilization of the resources and poverty alleviation through improved planning and resource management. Fishers' views were collected to understand whether these objectives have been achieved or not and 98% acknowledged their BMUs having rules/by-laws that regulate fisheries. Luomba (2013) asserts that conflict resolution and controlling illegal fishing are the major reasons why fishers think that their BMUs have formulated rules, to ensure that hygiene is maintained at landing sites; controlling illegal fishing; protection of breeding and young fish; and reduction of conflicts among fishers. This is also supported by responses from key informants, who indicated that BMUs have managed to have made some achievements through formulating by-laws, controlling illegal fishing and migrants and also have improved the hygiene conditions at their landing sites. Despite having

this in place, (Luomba; 2013) found that BMUs are constrained by lack of working tools and equipment, inadequate capacity to enforce measures and awareness, and lack of support from other stakeholders.

On addressing the issue of poverty, (*ibid*) states that the BMUs are supposed to have a savings scheme and also self-help projects that are beneficial to all the members. However, in his study he found from his key informants that although there exist both formal and informal savings schemes at the landing sites none are operated by the BMUs. Similarly, the BMUs have not initiated income generating projects to provide alternative source of income to fishers to address the challenges of poverty. The attempts to establish income projects have been constraints by lack of skills and expertise within BMU leadership.

Luomba (2015) in his study found that background of the fishermen affects fishers' attitude towards performance of BMUs in some activities. For instance, those with primary education are less satisfied with BMU performance in data collection and initiation of projects than those with secondary education and those who never went to school. On the other hand, those who are new in the fishery are more positive with the performance of BMUs in project initiation than those who have stayed long in fishery. Crew members are more positive towards BMU performance in collecting revenues, conducting meetings and data collection than other occupation in the fisheries. Main source of income for majority of people at the landing sites Actions taken by the BMU to manage fishery Development programmes that the BMU have initiated to generate income and reduce poverty among fishers Achievements made by the BMU since its formation. (*Ibid*)

Chirwa (1997), states that despite the decentralization of the fishery, gill nets and seines of various types are the commercial gears mostly used while hook and line and cast nets are mostly used for survival/domestic fishing. The use of large seines with increasingly smaller mesh sizes appear to have increased in recent years, and this has contributed considerably to the depletion of stocks. Boats used in inland fisheries are un-motorized or plank boats and the economic and socio-cultural attributes are still that the fishers and their families are dependent on the fishery for their survival. Many at times, they have no substitute or alternative source of income or access to other sources of food production. Therefore, they need an income to access their needs and this explains why all fisheries are market-oriented.

The ownership of means of production is either owned by the fishers themselves or by those not directly involved in fishing activities and the capitalistic system of ownership seems to have led to more advanced technologies being introduced. This has increased fishing effort and in many cases, caused the crisis in resource management. The market characteristics of fishers are that many traders are involved in the marketing of produce, and fishers are not entirely dependent on just one or a few traders. In Southern Africa, fish processing and trading is predominantly a male activity, and the traders rarely live among or within the fishing communities. In West Africa, fish processing and trading is a female occupation which is often undertaken by the fishermen's wives.

Putnam et al. (1993) claimed to see an interrelationship between organizational activity at the local level in the fishery and degree of democracy in society in general. Social capital is to Putnam features of social association such as trust, norms and networks that can improve efficiency in society by facilitating coordinated actions. Norms regulate the actions of members so that they comply with collective rules and the collective action that arises from this compliance will in turn strengthen overall solidarity in society (Putnam et al 1993). Social capital is a reserve or resource for the society in general, according to Putnam. While social capital originates in local level norms and trust, its effects must, according to him, be measured at the group or society level.

Evans (1996) disagrees with Putnam on what is to be identified as the sources of social capital. Where Putnam sees norms and trust as prerequisites for social capital, Evans emphasizes the significance of links between state and society for the existence of social capital (Evans1996). Evans and Putnam have differing views on the foundation of social capital, but they both tend to explain social capital as a micro level quality that is potentially beneficial to larger groups.

World Bank (2001) sees social capital as an important resource for the very poor. In its policy documents, the World Bank claims that social capital will contribute to local level trust and stability that will enhance economic transactions among the poor. It is affirmed that the being of social capital contributes to cost reduction for firms and entrepreneurs and also enables poor people to start small enterprises and increase their income. Social capital is seen as a factor with an important role to play when attempting to reduce poverty levels in developing countries (World Bank 1998). However, other views have it that; many people especially the poor, have been pushed out of this business due to a range of reasons. Fish commerce is very tricky with limited capital and therefore the weak people are driven out from the sector. Some people are weak because they cannot organize the money. This is a socio-economic challenge even to the FMI's.

Lake Victoria fisheries, the gap between the owning and labouring classes between fishers within the industry is extremely high. Most of the real fishing is done by crews who do not own shares in boats or gears, they entered into fishery as last resort (*they are the fishermen because they are poor*). Although crews always paid with a share of the catch, but a higher percentage of the catch goes to owners of boats and gears (Wilson et al., 1999).

Manahamis (2008) states that, it is worth known that the market institution setup and business practice within the fishery has made both boat owners and crews continue to live in poverty situation. The marketing-cum credit relationship between fishers and the processing plants and middlemen, has made fishers weak and powerless in influencing important and key issues like setting of fish prices and better business environment. Therefore, such market institution setup can lead to the conclusion that boat owners "*are poor because they are fishermen*" which in the model not shown but just focused on the open access nature of the fisheries and ignore other factors like markets.

The poverty situation in Lake Victoria communities is multi-dimensional that differs from one group to another from deprivations to capabilities social exclusion inequality and rights based issue (Ogwang' et al., 2009; Onyango, 2009; Onyango and Jentoft, 2010). The continued poverty in the fisheries sector provided the ground for the formation of co-management with the thought that empowering the locals in resource management enhances the access and rights of pro-poor to natural resource management and supporting their participation in policy and governance processes which are crucial for poverty reduction. Within the Lake Victoria formation of BMUs was a positive step towards achieving this (Onyango and Jentoft, 2007).

A BMU mandate is to ensure orderly, safe and effective use, management and operation of fish landing sites. Also, to initiate credit and savings schemes for fishers, develop and implement income generating projects with the aim of reducing fishing pressure and effort on the lakes resources, raise awareness of and provide training to its members in fishing techniques, the marketing and processing of fish, and support cooperative and fishers' self-help groups among many others.

Kashilika (2013) in his Master thesis found the following to be the challenges facing BMUs in combating illegal fishing: inadequate of boats for patrol (fishery patrol vessel); inadequate source of revenue; difficult in getting information about illegal fishing; BMUs leaders being involved in illegal fishing; the lives of BMUs officials being in threatened by big fishers who are involved in illegal fishing and lastly BMUs leaders are involved in a task of combating illegal fishing without payment, this situation reduces the working morale.

Similarly, Odongkara *et al.* (2007) found that problems faced by BMUs in carrying out their duties to diverse, including: inadequate co-operation between BMU committee and the assembly; inadequate equipment to carry out work like boats, engines and fuel; Conflict in roles with Marine Police and Fisheries staff; inadequate security during patrolling; lack of motivation in terms of pay for the work that they did; piracy and theft of fishing equipment, namely gear on the lake; being less empowered, BMUs are often undermined by Government authorities.

Cinner *et al.* (2009) states that Local communities have been found to fill some gaps in the regulatory design outside the legal framework: "First offences are often dealt with by warnings or within a community, even though there is no legal requirement to do so." Sanctions can be imposed on members of Beach Management Units e.g. for non-compliance of fisheries regulations Actual enforcement capacity lies primarily with the provincial administration, though there are cases of members apprehending someone who is violating rules.

Fatuma Musa (2012) in the coastal context, problems exist with access to beaches through the beach buffer zone, between the high-water mark and privately developed land. This zone has often been "illegally possessed or encroached on by private developers", denying public access to the beach and its Beach Management Units. As Musa *et al* highlight, "this conflict, coupled with corruption has compounded the problem of non-compliance and inadequate enforcement of the laws."

Problematically, enforcement requires skills and training, which can be lacking at local level. For the co-management system to work successfully, capacity building is required. Oluoch *et al* (2009) assessed eight coastal Beach Management Units and found a significant gap between expectations and actual management capacity. They concluded that most institutions had insufficient capacities, skills, and experience to effectively manage marine resources. The lack of technical capacity means that a stock assessment cannot be effectively carried out to supply information which would advise and inform regulation and enforcement.

The Fisheries (Beach Management Units) Regulations, 2007 are centred on an institutional reform to facilitate effective co-management of fisheries through Beach Management Units. The large number of Beach Management Units created indicates a success for this institutional redesign. Nevertheless, as mentioned above, most of these units have insufficient capacities, skills, and experience to effectively manage marine resources. Moreover, several problems remain with the institutional restructuring of fisheries resources.

One such problem is access to Beach Management Units and fisheries resources for small, household, and artisanal fishers. Many external, small-scale fishermen, who believe they have historical fishing rights at landing site, even if only on a migratory basis, feel that Beach Management Units and their exclusive rights over landing sites restrict fishing rights for small-scale fishers. Similarly, conflicts have emerged within Beach Management Units, as those small-scale and artisanal fishers who are members of a unit struggle to compete against large scale operators for access to fisheries resources. These conflicts are both internal and external to the Beach Management Units and have not yet been resolved by the new institutional structures (Gitonga, 2012).

Another remaining challenge for Beach Management Units is achieving greater participation of women. Despite the Fisheries (Beach Management Units) Regulations requiring that "in as far as possible" at least three members of the executive committee should be women, this aim has not been achieved. While exact figures for female participation are lacking, their roles are often confined to processing fish and transporting it to markets. In contrast, management posts responsible for collecting revenues and attending government seminars are primarily held by men (*ibid*).

A further challenge is securing adequate funding for Beach Management Units. The financial sector has been slow in offering loans to fisheries personnel and Beach Management Units on the grounds of uncertainty of repayments and because Beach Management Units do not possess the legal status necessary for group loans. This leads to a lack of funds to purchase fishing gear, vessels etc (*ibid*).

Women feel discriminated against in aquaculture, but to a much lower extent, and are far more representatively involved. There are a few specifically women-managed aquaculture activities. Women on the whole don't wish to go to sea and aren't particularly wanted, so whilst ensuring that women can participate if they so wish (i.e. no unfair barriers) there is little

point in pushing for greater involvement. However, for some small scale, discrete inshore fisheries there could be scope for community based management (CBM), an approach both potentially beneficial in itself, and one offering women a more widely acceptable as well as a more genuine role in the primary production segment.

Lastly, the success of Beach Management Units is hampered by social and health problems in the fisheries communities. In addition to a high prevalence of HIV/AIDS amongst the fishing community, waterborne diseases, such as cholera and dysentery, pose problems. These are compounded by a lack of adequate health facilities for fisheries communities (*ibid*). The first cases of HIV/AIDS in Africa were identified in 1982 among fishermen at the Kasensero landing site on the shores of Lake Victoria in Rakai District in Uganda (Jefferis et al. 2007). It was nicknamed the "slim" disease since it was a strange disease that made people thin before dying (Jefferis et al. 2007). Throughout the period of 1981-1985, Uganda was in the midst of a civil conflict, war and political chaos that caused a devastated economy and stagnation (Jefferis et al. 2007). There was abuse of human rights, violence, military intimidation and refugee situation that facilitated the spread of HIV/AIDS through unprotected sexual intercourse. This period 1982-1985 was also characterized by denial about the HIV/AIDS epidemic (Jefferis et al. 2007). The situation at that time provided a favourable environment for the spread of the HIV infection.

The first cases of HIV/AIDS in Kenya were reported in 1985 in Lake Victoria Nyanza province among the Luo and the Basuba fishing communities (Pickering et al. 1997; Barnett & Whiteside 2002). The Luo nicknamed the disease "*chira*" which they believed was a curse on those who did not follow the Luo and the Basuba custom and beliefs. In addition to the civil war in Uganda, the major trans-highways shared by the three countries, and the seasonal mobility of Lake Victoria fishing communities have also acted as hubs for the spread and increase of the disease. Kuhanen (2009), explain that the Kisumu-Uganda-Tanzania trans-highways and trading centres developed dense local and regional sexual networks which enabled HIV to spread rapidly among the "risk groups" and local people of the busiest trading towns and villages. Since the emergence of HIV/AIDS at the shores of Lake Victoria in 1985, the HIV/AIDS related illness and mortality remains highest among Lake Victoria artisanal fishers compared to the rest of the population (Pickering et al. 1997; Pitcher & Hart 1995; Gordon 2006). This trend underpins the global literature reporting higher HIV/AIDS rates among fishing communities (Kissling et al. 2005; Gordon 2005).

3. Descriptive Analysis of the Study Variable

When the respondents were asked about the socio-economic challenges face by the Fisheries Management Institutions (FMIs), they responded as in the table below.

	Don't Know	Strongly Disagree	Disagree	Agree	Strongly Agree	Total
	Percentage					
Inadequate funds	2.3	2.3	14.1	28.8	52.4	100.0
Vast geographical area	2.6	.3	74.8	19.3	3.1	100.0
Corruption	4.1	2.1	10.8	38.7	44.3	100.0
Gender Issues	1.0	2.3	67.5	25.8	3.4	100.0
Poor infrastructures	.3	.8	3.6	21.6	73.8	100.0
Conflict of interest	1.0	1.0	12.9	72.0	13.1	100.0
Monitoring fisheries activities	3.1	2.8	40.6	50.6	2.8	100.0
Cultures	1.8	5.1	63.2	17.7	12.1	100.0

Table 1: Socio-Economic Challenges Faced by FMIs in Mitigating Fisheries Conflict

Source: Field Data (2016)

From the statistics above, 81.2% of the respondents were in agreement with the fact that FMIs face the challenge of inadequate funds; whereas 16.4% of the respondents were of the contrary opinion. This is an indication that the FMIs will not effectively mitigate fisheries conflict. This therefore, calls for more allocation of resource by government to the department fisheries to enhance the department's operations.

Corruption is yet another challenge the FMIs are facing. As can be seen from the above table, 83% of the respondents cited corruption as one of the major challenges. This calls for serious measure to be put in place by government to curb corruption.

Another challenge of FMIs is poor infrastructure. For example, 95.4% of the respondents said that infrastructure is one of the major challenges, while only 4.4% had a contrary opinion. This call for serious improvement of infrastructure to enable the FMIs operates swiftly in mitigating fisheries conflicts.

Conflict of interest is yet another challenge. For instance, 85.1% were in agreement that conflict of interest is another challenge to the FMIs in relation to mitigation of fisheries conflict. On the other hand, only 13.9% dissented.

The government and stakeholders therefore, must campaign against conflict of interest in the management of fisheries sector. Fisheries officials and BMU leader must declare their interest should there be any.

Legal framework is yet another challenge. As can be seen from the above table, 55% of the respondents said that current legal frameworks are faulty and should be improved. They suggested that they should be involved policies that inform the frameworks.

Apart from the above discussed socio-economic challenges, the following were also cited as challenges to the BMUs in the execution of their duties: Inadequate equipment like boats, engines and fuel to carry out work; conflict in roles with Marine Police and Fisheries staff; Inadequate security during patrolling and BMUs being less empowered, are sometimes undermined by Government authorities.

However, culture and monitoring fisheries activities were seen as not being serious challenge to the FMIs.

4. Inferential Analysis of Socio-Economic challenges and Fisheries Conflicts

H₀₃: Socio-economic challenges have no significant effect on the effectiveness of Fisheries Management Institutions in mitigating fisheries conflicts.

A regression model to determine the relationship between Socio-Economic challenges (independent variable) and Fisheries Conflicts (dependent variable) was carried out in the study. This provided the output of model summary, ANOVA and regression coefficients observed.

Model	R	R Square	Adjusted R Square	Standard Error of the Estimate
1	.378 ^a	.143	.140	.41566
a. Predictors: (Constant), Socio-Economic Challenges (SEC)				

Table 2: Socio-Economic challenges and Fisheries Conflicts model summary

Socio-Economic Challenges was regressed on Fisheries Conflicts and the model was found to be insignificant ($F(1,387) = 64.356, p=0$) with a goodness of fit of 14.3% (R squared = 0.143) as shown in **Table 2 and Table 3**. This shows that 14.3% of the variation in Fisheries Conflicts is accounted for by Socio-Economic Challenges. The fitted regression model was Fisheries Conflicts = 0.417SEC + 1.509 as observed in **Table 4**, which implies that one-unit increase in Socio-Economic Challenges index increases Fisheries Conflicts by 0.417 units.

Model	Sum of Squares	df	Mean Square	F	Sig.	
1	Regression	11.119	1	11.119	64.356	.000 ^b
	Residual	66.863	387	.173		
	Total	77.982	388			
a. Dependent Variable: Fisheries Conflicts						
b. Predictors: (Constant), Socio-Economic Challenges						

Table 3: ANOVA^a Socio-Economic challenges and Fisheries Conflicts

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.509	.147		10.271	.000
	Socio-Economic Challenges (SEC)	.417	.052	.378	8.022	.000
a. Dependent Variable: Fisheries Conflicts						

Table 4: Coefficients^a Socio-Economic challenges and Fisheries Conflicts

Therefore, the null hypothesis that "Socio-Economic Challenges have no significant effect in mitigating fisheries conflicts in Homa Bay County" is **REJECTED**.

The regression model for this relationship is:

$$Y = 1.509 + 0.417SEC$$

5. Discussion of findings for Socio-Economic Challenges and Fisheries Conflicts

This section discusses the research findings based on the study objective three that focused to examine the community perceptions of the Fisheries Management Institutions mitigate fisheries conflicts in Homa Bay County.

Table 2 shows that the correlation coefficient is 0.378. This indicates that the correlation among the independent and dependent variables is positive. The coefficient of determination, R^2 , is 14.3%. This means that close to 14.3% of the variation in the dependent variable (Fisheries conflicts) is explained by the independent variable (Socio-economic challenges). Thus, the study established that the relationship between Socio-economic challenges of the FMIs and Fisheries conflict is positive. The coefficient of 0.417 indicates, on average, an increase in Socio-economic challenges increases the fisheries conflict by 0.417 units.

Stakeholder conflict is another Socio-economic challenge in Homa Bay County. In agreement with Arlinghaus (2005) who states that fishing requires and interacts with wild living organisms. He further states that: at times, anglers and others engaged in recreation occupy the same space, generating intra-sector conflict. However, one of the greatest sources of conflict in the future is likely to be fish welfare and the more fundamental and ideologically driven animal rights movement (Arlinghaus *et al.*, 2007).

Another challenge according to Randomski *et al.*, (2001) is controlling effort and harvest. He says: In order to address the conservation issues that have been identified in his paper, it is necessary to control or limit fish mortality. He says that, although both fish and wildlife managers make extensive use of harvest regulations such as bag limits, the actual effect of these traditional harvest regulations is debatable. Most regulations focus on controlling actual harvest or other sources of fish mortality through the use of size-based harvest limits and daily bag limits. This does not necessarily reduce total annual fish mortality as overall effort is not controlled.

In Table 1 monitoring fisheries activities has been a challenge to the FMI because of inadequate resources. Inadequate monitoring can lead to destruction of aquatic resources through use of illegal fishing gear. Kanyerere *et al.*, (2009) also assert that destructive fishing methods as such as use of poisons and explosives as a socio-economic challenge to mitigation of fisheries conflict. These two are prohibited in all water bodies; however, fishermen continue to illegally use the same. He further says; specific fishing gears such as *Nkacha*, an open water seine, only allowed in Lake Malombe and not on other water bodies. Despite such mesh and gear limitations, there remains a proliferation of illegal fishing gear in the fisheries (*ibid* 2009).

A table 1 show that, 83% of the respondents were in agreement that corruption was a serious socio-economic challenge for the FMIs. This is in agreement with the findings of Zannetell and Knutt (2002) that cite corruption and bribery as also a challenge that disrupt any process of development, governance and management.

6. Conclusion

The study found that socio-economic challenges have negative effects on the effectiveness of the FMIs. Issues to do with poor infrastructure; inadequate funds; corruption; inadequate support from government; conflict of interest and poor monitoring fisheries activities were found to be the major socio-economic challenges faced by the FMIs.

Lastly, the study also established that the FMIs are facing a number of socio-economic challenges such as poor infrastructure and inadequate funds to enable them run their operations effectively. This really slower their operations and therefore, makes them receives negative criticisms for the public. Other socio-economic challenges include corruption, conflicts of interest by different stakeholders, poor monitoring of fishing activities. All the above hinders adequate operations of the FMIs.

7. Recommendations

Based on research findings, the following recommendations to the implementation of co-management in Kenya are given as follows: On issues to do with socio-economic challenges, we recommend that marriage policies at the beaches should be strengthening to prevent or minimize issues of *jaboya* (sex/prostitution for free fish). It should also be a policy that fish prices should be controlled by the BMUs. The BMUs officials, officers from the department of fisheries and opinion leaders should be able educate the fishers and the fishmongers on the need to peaceful coexistence within the community. This will help to reduce the conflicts especially the verbal insults and quarrel among them. Fisheries department should be provided patrol boats to enhance their mobility and that all fishermen to join welfare. That all BMUs finances must be audited to enhance accountability

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