

## **Community Perception on Co-Management Strategy in Mitigating Fisheries Conflicts at Homabay County in Kenya**

Orwa N. T. Odhiambo<sup>1</sup>, Vike Lucy<sup>2</sup>, Kimeli M. Chirchir<sup>3\*</sup>

<sup>1</sup>Senior Lecturer, Kenya School of Government,  
Kenya School of Government, Baringo, Training Department, P O Box 91-30400, Kabarnet, Kenya

<sup>2</sup>Senior Lecturer, Kenya School of Government,  
Kenya School of Government, Baringo, Department of Research, Consultancy and Policy Advisory, P O Box 91-30400, Kabarnet, Kenya

<sup>3</sup>Principal Lecturer & HoD  
Kenya School of Government, Baringo, Department of Research, Consultancy and Policy Advisory, P O Box 91-30400, Kabarnet, Kenya  
\*corresponding author

**Abstract:** There has been conflict in the fishing industry world over. Fisheries conflicts are among the persistent problems affecting the security of food, livelihoods and fishing environments crucial to poor fishing communities in developing countries. 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 in mitigating fisheries conflicts in Homa Bay County. It was guided by a specific objective: to find out Community Perception on the Co-Management Strategy in mitigating fisheries conflicts in Homa Bay County. The common property theory which assumes that individual interest will not prevail over the best interest of the community as a whole and Marx's Conflict Theory which assumes that Conflict theory states that tensions and conflicts arise when resources, status, and power are unevenly distributed between groups in society and that these conflicts become the engine for social change were 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 Gwassii. Homa Bay County was selected because it has the largest share of L. Victoria and highest number of BMUs in the country. The pilot study established that averagely 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 yielding a sample of 390. The respondents were also clustered as Fishermen; Boat Owners; Fish Traders and Owners of fishing gears and government officers. Data was collected using structured questionnaires, interview schedules, observation and Focus Group Discussions (FGDs). Descriptive statistics was generated to build a picture of the respondents' characteristics utilizing SPSS tool. Inferential Statistics was also employed through regression models and ANOVA. The study found out that Co-Management Strategy mitigates fisheries conflict. The study also found that the community perception of co-management strategy was positive. Lastly, study also found that challenges faced by Co-Management strategy were an impediment in the mitigation of fisheries conflict. The findings of this study support and add knowledge to previous studies on fisheries conflicts. It is envisaged that the study 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 study suggests more stakeholders should be involved in the policy formulation and that there should be more seminars and training of stakeholders. Studies also suggest further research targeting cultural issues and cross border fishing that is causing fisheries conflicts.

**Keywords:** Teenage Pregnancies, School Girls, Peer Pressure

---

### **1. Introduction**

The term 'fishing' covers an extensive variety of actions or activities including a wide range of techniques, purposes, target species and members. Many authors' use the terms 'fishing' and 'fishing industry' to mean only one part of the full scope of activities that conceivably fall inside the ambit of these terms. For this venture, 'fishing' and 'fishing industry' have been used in a way well-defined by FRDC and the Australian

recreational fishing crest body, Recfish, to cover three noteworthy fishing segments in Australia: the commercial sector, comprising enterprise and persons engaged with wild-fish fishing and aquaculture, including both delivering and preparing fisheries assets or items available to be purchased (this segment is additionally alluded to as the 'fish business'); the recreational sector, involving undertakings and individuals associated with recreational, game or subsistence angling exercises that don't include offering the results of these exercises; the customary division, containing ventures and people associated with giving fisheries items to Aboriginal and Torres Strait Islander individuals as per their conventions (FRDC, 2000).

As used along these lines, fishing covers marine and freshwater exercises, and target species living in the wild or in caging. It incorporates exercises including creatures that are not angle in a zoological sense, for instance scavengers like crabs, shrimp and lobsters; shellfish like clams and mussels; and cephalopods like octopus and squid. (FRDC, 2003) These activities provide a scope of food and non-food items available to be purchased or subsistence. Cases of major non-food items from the business are pearls, aquarium fish, and fish-inferred manures. The word "conflict" comes from the Latin word *conflictus*, which means collision or clash Galtung (1971). Conflict refers to some form of friction, or discord arising within a group when the beliefs or actions of one or more members of the group are either resisted by or unacceptable to one or more members of another group.

Fisheries conflicts are typically complex problems from both an environmental and political perspective. These conflicts in the fishing industry are being experienced world over, as fisheries conflicts are among the persistent problems affecting the security of food, Source of living and fishing situations vital to underprivileged or poor fishing communities in developing countries. Most intractable conflicts arise from excessive fishing efforts due to increasing population and economic motivations (Haus, 2003). Fisheries conflicts can lead to negative conflicts in the world. In Europe for example, Glaser (2017) states that, fisheries conflict can lead to armed conflict. Think about the outrageous twentieth century cold war amongst Iceland and the United Kingdom indicated that countries were ready to shield desired fishing ground with military power. Glaser (2017) further states that, fisheries are the major source of protein for one billion people and provide basic income to over 43.5 million, of which 95 percent live in developing countries. Based on the overhead aquatic inhabitants it can be said that tussle over fish resource is one of the sources of world conflicts.

In the United States of America, there is across the board portion strife emerging from between sanctioned water crafts and recreational fishers in Puget Sound (Washington Department of Fisheries, 1990), between ethnic group in the Gulf of Mexico (Maril, 1983), amongst inshore and offshore processors in Eastern Bering Sea (Freeman, 1988), between gear groups in the (Western Pacific Fisheries Management Council, 1986) and between factory trawlers and owner-operated vessels on the West Coast (Pacific Fisheries Management Council, 1991).

In Australia and New Zealand, the premise of fisheries conflict between conventional, recreational and business asset clients are moving from physical rivalry of fish to financial and legitimate contentions over social properties (Kearney, 2001), while in Europe one of the major significant conflicts is that between the cormorant (*Phalacrocorax* species) and inland fisheries and aquaculture. Cowx additionally expresses that, in the previous 30 years the quantity of rearing and overwintering extraordinary cormorants has expanded drastically transverse over Europe. Cormorants are presently thought to be more successive and far reaching in Europe than whenever over the most recent 150 years. Populations have come back to a few zones after a long nonappearance and have likewise moved into previously vacant regions. This expansion depends on the land appropriation of two subspecies: the considerable cormorant (*Phalacrocorax carbo*) that lives on the Atlantic drift (the "Atlantic race"), and the subspecies *Phalacrocorax carbo sinensis* (the "mainland race"), which lives on the landmass from Western Europe over the entire of the Asian Continent to China and India. Comparable substantial increments in the quantity of cormorants have additionally been found in North America with the twofold breasted cormorant (*Phalacrocorax auritus*) (Cowx, 2003).

In south Asia where the population depends significantly on fish as an essential wellspring of dietary, protein and wage age than some other individuals on the world. This has prompted overfishing coming about to fisheries conflicts. For instance, Silvestre *et al.* (2003) express that, the consequences of overfishing in South and Southeast Asia are that coastal fishing stocks have been extremely exhausted and that the resource have been finished down to 5-30 percent of their unexploited levels. The scuffle for fish and fishing grounds are the real reasons for fisheries conflicts in these zones.

Bangladesh, for example, which is number four in inland fisheries generation on the world over, fishing, is its second major agrarian monetary program. Bangladesh as a nation vigorously relies upon fishery for a wellspring of food protein, source of living and income. For example, fisheries supply an approximated 60% of the aggregate animal protein required. Covering an approximated aggregate of 3 916 828 ha, the inland catch fishery delivered 961 458 mt fish in 2012-2013 that spoke to 28.19% of aggregate fisheries production of the nation (FRSS 2014). Inland together with seaside fisheries of recent, have encountered different issues and

difficulties, for example, overfishing, serious resource debasement or degradation, jam, environmental change and variability, to say yet a couple (Islam, 2012). These elements joined with institutional clumsiness, the influx of new member fishers, control over fisheries resources and space, broad use of disallowed and ruinous fishing practices have prompted the spread of disputes among fishery associates or stakeholders in inland fisheries of Bangladesh (Jahan *et al.* 2009, 2014; Islam 2012). Species, for example, hilsa shad (*Tenualosa-ilisha*) among all fisheries constitute the entire fishery of Bangladesh valuing BDT (BOBLME, 2012). About 11% of the nation's aggregate fish deliver is contributed by the hilsa fishery (DoF, 2015). It is anticipated that the greater part a million people rely upon it for their vocations (Mohammed and Wahab, 2013). The hilsa fishery is otherwise called the biggest estuarine fishery on the planet regarding get (Blaber, 2000) and constitutes a long-standing economic activity in the Meghna River basin. Fishers typically use float gill nets (locally known as *gultijal*, *konajal*), monofilament gill net (*currentjal*) and seine net (*berjal*) to catch hilsa, of which later types net are unlawful.

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. Its against this backdrop that the the main objective of this study was to assess community perception of the co-management strategy in mitigating fisheries conflicts in Homa Bay County.

## 2. Literature Review

Tsuneo Akahat (1993) states that verifiably, fishery relations among the countries bordering the Sea of Japan, the Republic of Korea (ROK, or South Korea), the Democratic People's Republic of Korea (DPRK, or North Korea), Japan and Russia, have been characterized by conflict instead of participation or cooperation. In numerous African nations, modern fisheries have been conceded authorization to work in inadequately directed conditions. An evaluation of the condition of fisheries management in Central and West Africa in 2016 set up that not as much as a quarter of the states/countries had wide fisheries management designs or plans, the fundamental apparatus for controlling and observing fishery execution. Complete logical research is frequently missing for everything except the most high-esteem fisheries. Expansive zones of the fisheries sector, therefore, left unregulated, leaving the fishing business profoundly unprotected against unsustainable misuse.

In Ghana, conflicts arising out of fishing operations result from either all the dissimilar types of fishing crafts struggling to fish in the same fishing grounds and for the same species of fish or lack (on the part of both the industrial and artisanal operators) of respect for the traditional and industrial fishing norms and ethics. As a result, with such an huge size of the artisanal fishing fleet (over 8,000 canoes), plus the inshore and industrial fleet – all competing for the exploitation of the same depleting resources within the same limited fishing grounds (up to 60m depth zone), the incidence of frequent fishing conflicts tends to the natural causes, and cannot be over-emphasized.

In East Africa, Lake Victoria in specific, the Uganda forces have confronted Kenyan fishermen over an island on their shared border. Glaser (2017) off the coast of Somalia, disputes between the foreigners and domestic fishing vessels have been implicated in the rise of piracy and hostage taking. Such conflicts arise because of boats and fishers being in the same fishing grounds at the same time scrambling for the scarce resource (fish). In Kenya, the same has been a major problem and it has taken the government efforts to curb the conflict among the conflicting communities in the fishing sector. In Homa Bay County form/nature of fisheries conflict are not any different from those of the rest of the world. These include fishermen versus fishermen; conflict due to zoning; stealing of fishing gears by fishermen and the likes. Other forms of conflicts include fishermen verse boat and fishing gears owners due to stealing of fish to give women who offer them (fishermen) sex for free fish. Therefore, fisheries conflict in Homa Bay County has become a major challenge among the fisher flock, and mitigating these conflicts has remain elusive. The beach leadership in this County started as a clan or family affair at fish landing sites. Each of these sites was started as a point along the shore used by

members of that family or clan for land fish, and also as a place to keep boats and gears. Initially, these sites were very peaceful because they were small and were placed under control and command of a family/clan elder (LVEMP, 2003).

According to IRFS (2011) Kenya has a relatively small coastline with a narrow continental shelf. Fisheries are however a major activity in the country, although the marine sector is overshadowed by the freshwater sector – primarily the fishery on Lake Victoria targeting Nile perch. Surprisingly, marine fisheries are insignificant relative to the freshwater fisheries – off some 145 000-t reported in 2005 (Ministry of Fisheries Development web site), only about 5%, or 6 823 t was reported as “marine”. Whereas the marine fishery is largely “artisanal”, the fresh water sector is both “industrial” and artisanal. Landings are dominated by the Lake Victoria region (133 526 t in 2005) – in recent years catch volumes from Lake Victoria have however declined underpinning the need to better manage and increase utilization of the marine sector. Fisheries are however recognized for their strategic value. In the 2008 -2012 (dated January 2011) “Fisheries Strategic Plan”, it is stated that “Fisheries are an important source of livelihood to fishing communities in the country.

They additionally add to food security and give raw materials to creation of animal feeds and in addition fish oil and bioactive molecules for the pharmaceutical industry. Fisheries bolster assistant businesses, for example, net making, boat building material, pontoon building and repair, transport, sports and recreation”. The key arrangement additionally expresses that approximately 80,000 individuals are straightforwardly associated with fishing and about 800,000 indirectly included. The fisheries sub-sector contributes around 0.5% to national GDP (Economic Survey 2008). Strikingly, the technique likewise expresses that the “marine fishery potential is assessed at 150,000 t of business fish and different species against genuine arrivals of around 7,000 t yearly” and that the potential this asset can give through Fisheries Partnership Agreements (FPA) will require remote vessels to arrive an extent of the reap in Kenya for preparing along these lines making work openings at the drift (IRFS, 2011).

Abila *et al.* (2006) affirms that Lake Victoria fishery contributes enormously to the financial advancement (socio-economic) of the riparian states. The East African Community has designated the lake basin as an 'economic growth zone', with the possibility to form into a noteworthy economic region. The fishery is imperative in making business openings, for the most part provincial based, in this way decreasing country urban relocation. Fish is likewise a rich wellspring of creature protein for human utilization and gives crude material (fishmeal) for animal protein. The fish business adds to GDP of the riparian states and has kept on being a critical wellspring of outside trade income through fish exports to the territorial and global markets. Moreover, the fish businesses add to the national and county governments' incomes through the different charges imposes and permit expenses. The sector has likewise contributed specifically and by implication to the change of physical framework and social offices, for example, streets, schools and healing centers, especially in remote fishing community.

Homa Bay County in particular, Fishing is the main economic activity, with the county controlling over 80% of the Lake Victoria Beach front in Kenya. Mbita Town is a leading fishing zone with over 80% of its inhabitants being fishermen (HBCG, 2017). Fish is an important source of human food in the country with the Dagaa and the Tilapia species constituting the bulk of fish species consumed in the domestic market. These comprise both markets within the immediate hinterland of the production areas, and the domestic regional markets of which the main clusters include Nairobi, Kisumu, Mombasa, Nakuru and Eldoret. Abila (2002) further states that fish subsector also plays a significant forward linkage role in providing inputs to the animal feeds industry, especially the beef, dairy and poultry subsectors. Animal feed, commonly known as fish meal is derived from the processing of Nile Perch skeletons (frames) and guts, which remain after the popular fish fillet is extracted and mainly exported and the Dagaa (omena).

Gross Domestic Product and Government Revenue: The contribution of the fish subsector to GDP has increased significantly with the emergence of export markets for the Nile Perch. The value of output increased from Kshs 0.8 billion in 1991 to Kshs 2.2 billion in 2001. Despite this growth, the subsector's contribution to DP has remained relatively small accounting for a mere 0.3% in 2000. In terms Government revenue, the subsector is also relatively small, though observers contend that this could be much higher if only the revenue correction systems were more effective and efficient (Abila 2002).

James MuriithiNjiru, Director/ CEO KMFRI explains Fisheries is an important sector in Kenya providing direct employment opportunities to over half a million people and supporting over 2m people indirectly. The future of fisheries is promising if we can fully exploit off shore areas and commercialize fish farming. Cage farming has picked up in Lake Victoria, supplementing the declining capture fisheries. The sector can therefore significantly contribute to the Blue economy. Kenya's fisheries and aquaculture sector contributes approximately 0.54 percent to the country's GDP (2013). Fish consumption has been declining from a modest 6.0 kg/caput in 2000 to 4.5 kg/caput in 2011. The value of fish exports was about USD 62.9 million in 2012, or about 5 times greater than the USD 12.3 million in fish imports. In 2013, around 129 300 people derived their

livelihood from fishing and fish farming activities (including 48 300 in inland waters, 13 100 in coastal waters fishing and around 67 900 in fish farming).

According to FAO (2015), total fishery and aquaculture production in 2013 amounted to 186 700 tons, with 83 percent coming from inland capture fisheries (of which Lake Victoria contributed about 90 percent). Catches of Nile perch - the most sought and mainly exported fish species – seriously declined due to overfishing after the 2000 peak at 110 000 tons but since 2007 stabilized around an average of 45 000 tons per year. Marine capture fisheries produce less than 9 000 tons per year, comparatively much less than neighboring countries. Freshwater aquaculture development in Kenya in the new millennium is remarkable, especially in 2009–2010, making Kenya one of the fast-growing major producers in Sub-Saharan Africa. From the annual production of about 1 000 tons in 2001–2006, the harvest of farmed fish leaped to over 4 000 tons in 2007–2009. In a nationwide fish farming mass campaign launched by government in 2009, the total area of fish ponds was increased from 220 ha to 468 ha by building 7 760 new fish ponds. Together with the improved seed supply and supports covering other aspects, it led to a hike in farmed fish production reaching 23 501 tons in 2013, more than four times of the production in 2009. The main species produced in 2013 was Nile tilapia (75 percent), followed by African catfish, common carp and rainbow trout. Mariculture is not yet practiced commercially, despite its potential demonstrated by trials (ibid).

The Government is looking into ways of promoting aquaculture and using cured fish products for food relief programs in order to enhance national food security (Abila *et al.*, 2006). The main issue in the capture fisheries sector is one of overcapacity in Lake Victoria and the symptoms of overexploitation (increasing conflict, overfishing, and falling incomes) that accompany it. This issue is being addressed in cooperation with neighboring countries through the Lake Victoria Fisheries Organization (LVFO), and through the Regional Plan of Action for the Management of Fishing Capacity in Lake Victoria that was agreed in March 2007.

In concurrence with Priscoli (2002) and Warner (2000) natural resource conflict can be caused by poor correspondence, contrasts of recognition, sense of self fights or ego battles, identity contrasts, differences in views about right or wrong (conflict of values), contrasts in interests and structural factors. Conflict of fishing varies greatly between regions and between times. It is generally associated with the utilization of fish resources is considered rare. Shortage is related with generation issues, to be specific less fish can be gotten by anglers (insufficient fish). In Homa Bay County issues such as jurisdiction; fisheries management mechanism; human activities in relation nature conservation; and stealing of fishing gears by fishermen are believed to be real wellsprings of fisheries conflicts.

Fisheries conflict also occurs between fishermen due to bad methods of fishing that destroys even young and immature fish. This has been major concern for the FMIs since maintaining and preserves the aquatic life. The department has come up with policy concerning the size or inches of the fishing gears (nets). Additionally, in concurrence with Bennet (2002), use rights are a standout amongst the most disputable issues in marine fisheries as far back as people fished in the oceans, waterways and seas, and even before public policies emerged to manage the fisheries management. In Homa Bay County, access to common resource (Lake Victoria) and its misuse is one of the significant reasons for fisheries strife or conflict. Bennet (2002) further argues that mounting pressure on a rapidly dwindling resource base from a rising population, changing consumer preference towards fish and fish products, globalization, competition from coastal zone development (for example, tourism, housing, infrastructure, aquaculture, agriculture, etc.), increasing fishing effort and number of fishers have greatly contributed to conflicts within fishing communities.

Related to the assertion above is the argument that there is overexploitation of the already degraded fish habitat. Coupled with increasing global demands from a growing population, commoditization of fish and fisheries products, an evidently inadequate fisheries management, and the whole gamut of other human interventions have led to unprecedented increase in the level and magnitude of fisheries related conflicts (Ahmed *et al.*, 2004). All in all, the parties associated with the dispute are a group of conservative or traditional fishermen. Numerous brands of conflict caused by assorted variety of fishermen's' recognition about the administration of fish resource. Warner (2000) recognized four factors that can clarify the emergence of conflicts over fish resource, including the opposition of natural resources (expanded reliance on natural resources, in this way expanding rivalry). The government and the community should take note of the fact that power in task within the dynamics of fisheries, a complex bio-economic system where assorted interaction among normal assets, people and organizations give plentiful open doors for clashes. Conflict develops when "the interests of at least two groups conflict and no less than one of the gatherings tries to declare its interests to the detriment of another gathering's advantages" (FAO, 1998). Conflicts of this type do not really need to be rough or profoundly troublesome, in any case; in actuality numerous disputes that emerge because of contrasting interests are low-level, peaceful marvels (Warner, 2000). Peaceful clashes or non-violence in fisheries, require not be disregarded as they may posture dangers to food security, job and ecological security when unabated (Salayo *et al.*, 2008).

With the advent of the central government, the work of fisheries management has been the domain of the Department of Fisheries, the challenges have been many because the number of interested parties in the exploitation and utilization of fish and fisheries products including fishing industry in general have increased geometrically while the number of fisheries personnel had been increasing arithmetically or at times decreasing (Caddy *et al.*, 1995). To protect fisheries from fast approaching breakdown, the government chose to change the way to deal with fisheries management from centralized control and command to the integrated approach where key partners who are subject to the fisheries for their livelihood are associated with management decision making and other activities (ILEG, 2005). Co-management has been advanced as a method for enhancing the viability and proficiency of fisheries management for the last twenty years, perceiving that the integration of resources users in management ought to advance understanding, possession and responsibility (Berkes, 2007, 2009; Pomeroy, 2007). The term co-management can be defined as the sharing of responsibility as well as authority between the government and local resource users to deal with a resource (Jentoft, 1989; Nielsen *et al.*, 2004). In the literature, co-management covers a wide range of management courses of action and the measure of responsibility as well as authority that the government and local resource users have will differ and rely on nation and site-specific conditions (Pomeroy, 1995).

Fisheries co-management is an entrenched idea and practice, with numerous cases of co-management game plans over the world, and, with more confirmation and understanding developing; the complexities of co-management have 'unfolded' (Berkes, 2007) Building on this experience, lately increasing emphasis has been given to government concerns inside fisheries, recognizing the requirement for partners to meet up to create approaches and settle on choices concerning public life (Kooiman *et al.*, 2005; 2008; Symes 2006).

Both the concepts of co-management and governance have been further built on by bringing in concerns about the ability of co-management and governance arrangements and processes to respond to, and cope with, sources of uncertainty and, procedures to react to, and adapt to, wellsprings of vulnerability and framework complexities and decent variety (both biological and social), basic highlights of common asset frameworks. Versatile co-management and versatile management are approaches that convey to the fore worries about vulnerability, and dynamic, perplexing and various frameworks, featuring the need for institutions that are flexible and responsive (Armitage *et al.*, 2007a). Traditional and self-management of natural resources, and fisheries in particular, has been around since early times. However, co-management is an approach that has been more recently adopted globally in response to the perceived failure of centralised management of fisheries in avoiding the decline of fish stocks, and to a lack of government resources to manage fishery resources effectively. Bringing together fishers, government officials and others operating within a fisheries sector, co-management systems and processes vary in terms of the nature of power sharing, composition and functions.

Co-management imparts numerous highlights to different sorts of organizations and co-operative environmental governance game plans including various actor (Berkes, 2002; FitzGibbon, 2004). In any case, a critical characteristic for co-management is the presence of at least one strong vertical connection between the community or user and the government, including formal arrangement for sharing obligations and authority (Berkes, 2002; Borrini-Feyerabend *et al.*, 2007). Furthermore ad hoc public contribution to decision making or minor consultation is regularly not viewed as co-management.

The term Co-management is generally new, where its most punctual use has been followed to late 1970s (Pinkerton, 2003). Nonetheless, as specified beforehand, the act of intensity partaking in resource management goes back to prior times (Ostrom, 1990). Most meanings of Co-management involve some systematized course of action for participation in management and decision-making, a dynamic organization using the parameters and premiums of local fishers and communities, supplemented by the capacity of the state to give empowering arrangements and enactment and in addition authorization and other help.

The motivation raised by adaptive co-management and adaptive government is testing or challenging. The two methodologies are nearly interlinked, with Folke *et al.* (2005) proposing that adaptive co-management is a path through which adaptive governance can be operational. Key characterizing highlights of adaptive co-management have been distinguished by Olsson *et al.* (2004), Folke *et al.* (2005), Armitage *et al.* (2007b) and others, for example, learning-by-doing, managing vulnerability and complexity, coordinated effort and power sharing, and management flexibility. Notwithstanding an expanding enthusiasm for adaptive co-management and adaptive governance, inquire about by Kooiman *et al.* (2005; 2008) accentuates the significance of connection in administration, alluding to intuitive governance as the path forward, to build the manageability of the 'framework to-be-governed'. An evaluation of manageability can be useful in distinguishing limitations on viable administration and empowering enhancements in administration to be made.

Community-based co-management is the main practical answer for most of the world's fisheries and is a successful method to manage aquatic resources and the livelihood of communities relying upon them. Under such an administration or management framework, duty regarding resources is shared between the government and users. On the smallest scale, this may include leaders and fishers from various towns consenting to abstain

from fishing in each other's waters (Kelley *et al.*, 2011). In the Second annual Progress Report of the Ministry of State for Planning National Development and Vision 2030 of May 2011, Co-management is an ecosystem to fisheries management, which is a generally new management idea that recognizes and defines the environment to incorporate human and offers a practical choice for accomplishing maintainable fisheries use. In the new approach, partners are the stewards of the assets and are, in this way, engaged with the basic leadership, execution, and checking forms. This new approach additionally gives a system to overseeing fisheries, for instance on account of Lake Victoria.

This co-management strategy in Homa Bay County has been actualized through the formation of Beach Management Units (BMUs). These are community Co-Management Strategy, legally empowered and registered with the Department for Fisheries that bring together everyone involved in fisheries at a shoreline, pontoon/boats proprietors, vessel team, brokers, processors, watercraft manufacturers and repairers, net repairers and others to work with government and different partners in overseeing fisheries assets and enhancing the vocations of community members. The diverse associates are required to be enlisted with BMU to be permitted to work in fisheries. Every BMU along has an Assembly of all registered members and an elected Committee. The formation process and registration of a BMU is set out in the Harmonized BMU Guidelines, which are implemented at the national level (LVFO, 2005). Beach Management Unit is a group of stakeholders that constitute a fishing community whose main functions are fisheries planning, management, conservation and development in their locality in collaboration with the local and national governments (Lwenya *et al.*, 2007). This new approach has been suggested as a solution to the problems of fisheries resource use conflicts and overexploitation.

Other benefits include stakeholder participation in decision making process motivates the fishers to adhere loyally to the regulations. It also restricts the enormous costs of managing common property resources. In co-management approach capacity building is mainly community based across gender, age and professions. (Odongkara *et al.*, 2007)

Fisheries are complex dynamic bio-socio-economic systems and the many interactions amongst natural resources, humans and institutions give ample opportunities for conflicts. Internal fishery conflicts emerge over allocation of rare fish resource, the division of fishery gains and management arrangements between fishermen and governments (WFC-Bangladesh, 2005). There have been few studies of the institutional aspects of fisheries conflicts. Given the increasing recognition of the role of institutions generally, this appears to be an important omission. For example, little attention is paid to the way communities can and do co-operate over natural resource usage which might explain why conflicts do not emerge in some situations Bennet *et al.* (2001).

There has been much study on fisheries from around the world. However, these studies have ignored the aspect of conflict and conflict management resolution mechanisms (Lwenya *et al.*, 2007). Homa Bay County is among the Counties in Kenya where a lot of fishing takes place and thus experience a lot of fishing conflicts. Homa Bay County was chosen for the study because it has the largest share of Lake Victoria in Kenya (that is about 80% of the lake) and naturally, it is the biggest fish producer. Secondly, Homa Bay County has the highest number of registered beach management units (133 BMUs) and by extension the highest proportion of water surface accounting up to 11.3 % of the total County area. This study will therefore try to assess how conflict is mitigated within the County. Not all conflicts are unwanted as a few questions turn into an impetus for much required changes for arrangement and economic enhancements. Nevertheless, a structure for dissecting clashes in fisheries is important to sort out mediations significant to the idea of contentions, the requirements and limits of fisheries partners in the area (FAO, 2006).

### **3. Materials and Methods**

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 Gwassii. Homa Bay County was selected because it has the largest share of L. Victoria and highest number of BMUs in the country. The pilot study established that averagely 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 yielding a sample of 390. The respondents were also clustered as Fishermen; Boat Owners; Fish Traders and Owners of fishing gears and government officers. Data was collected using structured questionnaires, interview schedules, observation and Focus Group Discussions (FGDs). Descriptive statistics was generated to build a picture of the respondents' characteristics utilizing SPSS tool. Inferential Statistics was also employed through regression models and ANOVA.

#### 4. Results and Discussion

##### **Descriptive Analysis of the Study Variable: Community Perception on Co-Management Strategy**

When asked about their perceptions on whether the fisheries department and BMUs is effective, transparent, legitimacy, competency, networking and timeliness in relation to mitigating of fisheries conflicts, most of respondents rated the two institutions as discussed below. It was also learned that these FMIs often sensitize and train local people about the benefits of co-management as a strategy in mitigating fisheries conflicts. Moreover, there are regulations with the objective of environment protection such as ban on disposing garbage in the lake and using destructive gears (explosive, chemical, small net size, etc.).

Table 1: Community Perception on effectiveness of Co-Management Strategy (N=389)

	Low	Moderate	High	Very high	Percentage
	Percentage				
Effectiveness	7	34	42	17	100
Transparency	18	33	33	16	100
Competency	10	30	42	18	100
Timeliness	15	26	35	24	100
Networking	11	16	34	39	100

Source: Survey Data, 2016

##### **Community Perception on Effectiveness of Co-management Strategy**

The study found out a positive perception of the fishing community on FMIs mitigating fisheries conflict. The results in Table 1 show that, 42% and 17% of the respondents were of the opinion that both BMUs and Fisheries department (co-management strategy) do respond effectively to fisheries conflict, whereas, 34% of the respondents were of moderate view while 7% gave the said institutions low scores. This is an indication that the FMIs are really trying to respond to the fisheries conflicts in Homa Bay County. This is a glimmer of hope to the fishing community and this findings are in agreement with the findings of Gjertsen (2005) who prior carried a similar study and established that the fishing community has seen benefits of MPAs as a management strategy is constantly increasing and has boosted hopes of improving declining fish stocks and increasing fish catches in impoverished areas. Another study by Chaigneau (2008) also confirms that co-management arrangement of fisheries is viewed positively. In his study, he found that most of the fishermen interviewed believed that MPAs were more positive towards the execution or support of these stores than the other fishermen, with 88% of answers being positive. This could be in part owed to their higher hopefulness about the future of the fish stocks and hence the sustainability of the fisheries.

##### **Community Perception on Transparency of Co-management Strategy**

Concerning transparency, the FMIs working in the co-management arrangement were ranked low as show Table 1 for instance, 18% of the respondents ranked low, 33% of the respondents ranked moderately 33% while 16% ranked highly. This calls for serious sensitization over transparency and those officials who lacks the quality of being transparent should be sacked from the positions they hold so as to enable the fishing community to have faith in the institutions mitigates fisheries conflict. Similarly, just as the findings of Mayhew (2016), the fishing community of Homa Bay County view FMIs as institutions riddled by corruption. This was established during the Focus Group Discussions. Mayhew (2016) pointed out concerns over perceived “corruption” among officers and managers responsible for enforcing the regulations. Corruption is yet another challenge the FMIs are facing. In her study, Mayhew (2016), described corruption as the abuse of power, usually through accepting bribes or favoring certain individuals or groups of people. Similarly, Co-Management Challenges, 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. Corruption was also cited the study by Eggert and Lokina (2008). Incapability to enforce rules also owing to dishonesty and corruption (Eggert & Lokina, 2008; Kundu *et al.*, 2010); clanism and family relations; and BMU leaders are discouraged and unmotivated, resulting in their culpability in these activities. While Eggert and Lokina (2008) look at clannism in terms of favouritism, the study views the clannism as a negative issue which eventually leads to the problem of conflict between fishermen and the landing site (*wath*) owners.



The study also found some negative aspect of the FMIs such as corruption. Some members of the fishing community said that patrols made by the FMI aimed at controlling and managing the fisheries sector are done with an aim of getting bribes. For instance, during the FGD at Uterere beach, a member asserted that:

Some of the officers from the department of fisheries are corrupt as they are allowing some fishermen to use wrong fishing gears so long as they have been given *kitu kidogo* (bribe).

He went further and said:

*Unaweza kuona hao masifa wa serikali wakishika nyavu zile sharia hakurusu kutumiwa ziwa Victoria lakini bada ya dakika chache tu uwaona wale wavuvi na nyavu zao zilishikwa wakitega samaki na yale nyavu zilishikwa* (You can see officers from the fisheries department arresting and confiscating wrong fishing gears) however, within a short while you will be surprised to see those fishermen arrested fishing and at the same time using the very wrong gears that were confiscated. *Hiyo ni ufisadi* (That is corruption).

This is an indication that co-management strategy is faced by corruption as the respondents have cited the problem of corruption which interferes with the effectiveness of co-management.

### **Community Perception on Competency of the FMIs**

The results in Table 1 on issue of competency, 18% of the respondents ranked very high, 42% of the respondents ranked high and therefore agreed that the FMIs in co-management arrangement are competent in resolving fisheries conflict, while 30% of the respondents were of moderate opinion concerning the same. However, 10% were of contrary opinion and as a result rank low. This is an indication that majority of the fisher folk have faith in the FMIs and their co-management arrangement. The study findings on competency is however, contradicts the findings of Djama (1992) who expresses that: The contention between the artisanal and industrial fishery has been a long standing and troublesome issue because of the absence of implementation of the fisheries control and regulations. Specifically, the identification of trawlers acting unlawfully by artisanal fishermen is not adequate in light of the fact that the enactment perceives just reports from a sworn officer - either from the Port Authority, the Navy or from the Ministry accountable for fisheries (Djama, 1992). Further, for the reason that all the time none of these is available when the harm is done, confirm from the artisanal alone is exceptionally hard to consider. Besides, regardless of whether the report is finished by a sworn officer, and the illicit vessel is fined, there is no arrangement in the real fisheries enactment for any pay to be given to distinctive anglers rather, the fine goes to general society treasury.

### **Community Perception on Timeliness/promptness of the FMIs**

Concerning timeliness, Table 1 show that 24% and 35% of the respondents ranked the institutions very high and high respectively, while 26.2% of the respondents raked them moderately and only 15% of the respondents rank the FMIs low. The community perception on the Co-Management Strategy is generally positive since the work done by the FMIs could be acknowledged by the FGD in Litare beach. For instance, one of the boat owners in Litare beach had to say the following concerning the FMIs:

The BMU officials are very prompt in case of emergency. The BMU though do not have enough patrolling boats, but they always community with other BMUs in case of an emergency and the people or fishermen affected may be help. *Kwahivyo tunawapongeza* (Because of that we appreciate them).

In support of his stand concerning the BMU, a lady owning fishing gears further praised the FMIs and said:

BMUs mitigate fisheries related conflicts. This is through coming up with rules and regulations governing all the operations within a beach. The fishermen, fish traders, owners of the fishing gears, boat owners and even shop owners within the beaches have to follow these rules and regulation, without which one can be even expelled from the beach. They (BMU officials) use these rules to resolve conflicts that may be arising from the fisheries sector.

The assertion of the respondents is indication that co-management is very fast in reaching to arrears they are need and therefore prompt in solving fisheries issues.

The above findings are in agreement with the findings of FAO (2011) that a MPA system can likewise work in a social sense by encouraging shared administration duties, normal administration strategies such as patrolling and responding to fishermen distress calls, financial efficiencies and learning openings. It can reinforce the administration of individual MPAs by giving normal guidelines and sharing of learning and

experience. Then again, in the event that it is too vast and extends over an extremely wide range of authoritative layers and structures, it might wind up hard to administer. However, FAO (2011) also established that an extra potential advantage of a system of MPAs instead of a solitary (apparently bigger) MPA, is that the system might be stronger to an extensive variety of dangers. A system can give additional strength to nearby fiascos, for example, an oil slick, or to an administration disappointment. In the event that the system spreads security over a wide land territory and along an inclination of climatic administrations, it might give more versatility to environmental change than would a convergence of MPA assurance in one or a couple of spots. MPA arranges in connection to angle (FAO, 2011)

**Community Perception on Networking of the FMIs**

Similarly, on the issue of networking, 39% and 34% of the respondents raked the institutions very high and high respectively.16% averagely ranked them while10% ranked them lowly. This is a positive indication that the institution does network with other institutions and the community. The government therefore needs to reinforce this attribute so that it is maintained. This is in concurrence with Mayhew (2016) who in his study found that the fishers views FMIs in their co-management arrangement positively. For example, among his respondents (fishers) who felt the marine reserve benefited them, claimed it increased their catch owing to the “spillover effect” of the no-take zones. Some participants also mentioned that MPAs further encourage fishers to work in the tourism industry. Examples of this include one fisher who said to her that “reserves and preserves make it more beneficial to get involved in tourism – they phase out fishermen” (Dangriga fisher) and another claiming that despite the South Water Marine Reserve (SWCMR) decreasing his catch, it increased his income as a tour guide (Placencia fisher). So, in this regard FMIs are really beneficial.

Similarly, IUCN-WCPA (2008) states that ecological systems are shaped when the natural connections among and within upgraded environmental capacities or functions. So as to upgrade the organization and management of natural systems, social or institutional systems are shaped through correspondence, sharing of results and coordination among establishments. The two kinds of systems ought to be viewed as, social/institutional and natural, keeping in mind the end goal to upgrade the advantages of a more comprehensive approach. A network of smaller MPAs may have more adaptability to alleviate unfortunate social effects than a solitary extensive MPA. The defensive advantages of MPAs, and additionally the expenses brought about through access and use restrictions, are frequently more effectively disseminated among seaside networks and other client gatherings of marine environments in a MPA arrange than in a huge, single MPA. It might likewise offer chances to spread expenses and drawbacks over different networks, as opposed to amassing them in one network – as could be the situation with a solitary extensive MPA. This could be especially pertinent in tropical creating nations, where the whole waterfront zone is being abused by the networks situated along that drift (FAO, 2011).

Fishers may profit more from a system than from a solitary MPA on the off chance that it expands the quantity of grown-up angle that relocate over the limits of the secured regions (the spillover impact that makes fish accessible to fisheries). This is a consequence of the regularly more noteworthy measure of limit per unit territory secured than in a solitary MPA. It will, be that as it may, increment the powerlessness of fish assets, and the proper harmony amongst security and overflow ought to be looked for. Therefore, MPA systems must be planned with the portability of the focused-on angle species as a primary concern, to guarantee that a suitable level of insurance is stood to the fish moving over the MPAs in the system. In the event that a system is comprised of MPAs that are too little, they may offer almost no or no assurance for grown-ups of versatile species. Also, except if an MPA is sufficiently expansive to hold a portion of its pelagic eggs as well as hatchlings, it isn't self-managing (*ibid*).

**Fisheries Conflicts addressed by FMIs (Co-Management) address Fisheries Conflicts**

When asked about their perceptions on whether the fisheries department and BMUs are addressing various fisheries conflicts, the respondents gave varied responses as shown in Table 2.

Table 2: Conflicts addressed by Fisheries Department and BMUs (N=389)

	Don't Know	SD	D	A	SA	Percentage
	Percentage					
Fishermen - Fishermen conflict	3	1	11	52	33	100
Fisheries Department- Fishermen conflict	4	2	41	42	11	100
Wildlife Department-Fishermen conflict	3	3	54	32	8	100

	Don't Know	SD	D	A	SA	Percentage
	Percentage					
Owner of fishing gears-Fishermen conflict	3	2	16	63	16	100
Landing site owners-Fishermen conflict	4	2	64	21	9	100
NEMA-Fishermen conflict	5	3	77	12	3	100
Fish traders-Fishermen conflict	2	2	17	41	38	100
Immigrant fishermen - Fishermen conflict	4	2	52	33	9	100

Source: Survey Data, 2016

**Key:** SD=Strongly Disagree; D=Disagree; A=Agree and SA=Strongly Agree.

As can be seen from Table 2 85% of the respondents said or were in agreement that the said above institutions do address Fishermen versus Fishermen conflicts, while only 15% of the respondents disagreed that fishermen versus fishermen conflicts are addressed by these institutions. Concerning Fisheries Department versus Fishermen conflicts, 53% of the respondents were also in agreement that these FMIs above addresses fisheries department versus fishermen conflicts. Similarly, 79% of the respondents said the FMIs are indeed addressing fish traders and fishermen conflict. Also, 79% of the respondents were in agreement that conflicts between owners of fishing gears and fishermen are properly addressed by the above said FMIs. This is a good indication that most common fisheries conflicts are addressed by the said FMIs, and therefore, the FMIs should be further strengthened. For example, in Remba Island, one of the fishermen said:

BMUs has been of help to many fishermen and the entire fishing community as a whole in resolving fisheries related conflicts between the local fishermen and those coming from Uganda. This has significantly reduced deaths that used to occur deep inside of the lake prior to the formation of BMUs.

However, it was realised that conflicts concerning fishermen versus NEMA, landing site owners and wildlife are poorly handled by the FMIs as can be seen from the table 2, 85% of the respondents said that the FMIs cannot resolve NEMA-Fishermen conflicts, whereas 70% of the respondents said that the FMIs cannot resolve Landing Site owner-fishermen conflicts. On the same breath, 60% of the respondents said the FMIs cannot address Wildlife-Fishermen conflict. This calls for more support from the mainstream government to strengthen the FMIs.

As shown in Table 2, majority of the respondents are in agreement that the FMIs (co-management strategy) addresses most of the fisheries conflicts. Tables 1 and 2 are therefore an indication that the fishing communities in Homa Bay County value and appreciate the work done by the FMIs that mitigates fisheries conflicts. These finding are in agreement with the findings of Nguyen (2012) who found that the community-based-management of fisheries is viewed positively. He found that there is a positive perception of the locals fishing community towards the *Giang Xuan* Fisheries Association since the association has managed to come up with positive fishing policies which have managed to mitigate fisheries conflicts.

Further, in agreement with Wagner (2012) majority of the fisher fork agrees that the Co-Management Strategy are very effective in mitigating fisheries conflicts. Wagner asked her respondents in villages with Marine Protected Areas (MPAs) whether they would support the increase or scale up MPAs or making the existing MPAs lager. A majority of 85% of respondents answered “yes” to creating more or larger MPAs. This was because they view these FMIs as a boost in the protection of breeding grounds and marine life, prevents illegal fishing, protects fish for the future, and improves income of the fishermen.

However, this study also found that found that FMIs to a larger extent do not solve the problem of immigrant fishermen. As shown in table 1.2 54% of the respondents disagreed with the assertion that the FMIs addresses and resolve fisheries conflict. This problem of not being able to address and resolve the immigrant fishermen was also established by Mayhew (2016). For instance, she said that concern raised by survey respondents was the growing number of fishers in Belize waters, many of whom are non-Belizeans that have obtained a fishing license illegally and take products extracted from Belize waters back to other countries.

Inferential Analysis of Community Perception on Co-Management and Fisheries Conflicts

A regression model to determine the relationship between Community Perceptions (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.

Table 3: Community Perception and Fisheries conflicts Model Summary (N=389)

Model	R	R Square	Adjusted R Square	Standard Error of the Estimate
1	.042 <sup>a</sup>	.002	-.001	.44849

a. Predictors: (Constant), CP

Source: (SPSS Output from Field Data, 2016)

Community Perceptions was regressed on Fisheries Conflicts and the model was found to be insignificant ( $F(1,387) = 0.687, p=0.408$ ) with a goodness of fit of 0.2% (R squared =0.002) as shown in Table 4 and Table 3. This shows that 0.2% of the variation in Fisheries Conflicts is accounted for by Community Perceptions. The fitted regression model was Fisheries Conflicts =  $-.026CP + 2.475$  as observed in Table 1.5, which implies that one unit increase in Community Perception index decreases Fisheries Conflicts by 0.026 units.

Table 4: ANOVA<sup>a</sup> Community Perception and Fisheries Conflicts (N=389)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.138	1	.138	.687	.408 <sup>b</sup>
	Residual	77.844	387	.201		
	Total	77.982	388			

a. Dependent Variable: Fisheries Conflicts

b. Predictors: (Constant), Community Perceptions

(Source: SPSS Output)

According to the findings from Table 5, Community perceptions had no influence on the Fisheries Conflicts in Homa Bay County, Kenya, since its relationship was observed to be statistically insignificant ( $p=0.408; t= -.829$ ).

Table 5: Coefficients<sup>a</sup> Community Perception and Fisheries Conflicts (N=389)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Standard Error	Beta		
1	(Constant)	2.745	.087		31.603	.000
	Community Perceptions (CP)	-.026	.031	-.042	-.829	.408

a. Dependent Variable: Fisheries Conflicts

(Source: SPSS Output)

The regression model for this relationship is therefore:

$$Y = 2.745 - 0.026CP$$

### Discussion of Finding for community Perception on Co-Management Strategy

The study found out a positive perception of the fishing community on FMIs mitigating fisheries conflict. Thus, the study established that the relationship between Community perceptions and Fisheries conflict is negative. The coefficient of -0.026 indicates, on average, an increase in community perception decreases the fisheries conflict by 0.026 units. Contrary to the above, Luomba (2015) found that, 90% of fishers perceived Beach Management Units (BMUs) on the Tanzania side of Lake Victoria to be very effective in solving fisheries conflicts, formulating laws and keeping inventories. Nevertheless, he also realized that the fishers also ranked the BMUs performance low in terms of data collection, patrolling fishing grounds and initiating development projects.

Despite all the above, a regression analysis found that community's perception has got no significant effect on the FMIs performance. Table 1.5 shows the correlation coefficient is 0.042. This indicates that the correlation among the independent and dependent variables is negative. The coefficient of determination,  $R^2$ , is 0.2%. This means that close to 0.2% of the variation in the dependent variable (Fisheries conflicts) is explained by the independent variable (Community perceptions).

## 5. Conclusion

It emerged from the study that the fishing community perceive the FMIs (co-management strategy) positively. The majority of the respondent said that the com-management arrangement between the FMIs is effective, transparent, competent and timely respond or address fisheries conflicts in Homa Bay County. The study also established that FMIs in their co-management arrangement do network even with other departments such as tourism and the likes. However, the regression analysis indicated that community perception does has no effect in the performance of FMIs in mitigating fisheries conflicts. The next chapter focused on the challenges faced by Co-management strategy.

## 6. Recommendations

It is recommended that through the state department for fisheries, the Kenyan government should develop and implement programs that seeks to foster the principle of co-management of fisheries in the region so as to minimize conflicts and optimize ecological, social and economic benefits.

## 7. References

- [1]. Abila, R.O., Odongkara, K. O. and Onyango P. (2006): *Implementing Co-management of Lake Victoria's Fisheries: Achievements and Challenges*, Kenya Marine and Fisheries Research Institute (KEMFRI), Kenya.
- [2]. Abila R.O. (2002). 'Socio-economic Analysis of the Fishery Co-operatives of Lake Victoria (Kenya)'. PhD Thesis, University of Hull, UK.
- [3]. Ahmed, A., A.D. Capistrano and M. Hossain (2004): *Experiences of Partnership Models for the Co-Management of Bangladesh Fisheries*. Fisheries Management and Ecology 4 (3), 233–248.
- [4]. Akahat Tsuneo (1993): *From Conflict to Cooperation: Fishery Relations in the Sea of Japan*, Pacific Rim Law and Policy Association.
- [5]. Allison, E. H. (2001): Big laws, small catches: global ocean governance and the fisheries crisis. *Journal of International Development*, 13,933–950.
- [6]. Armitage, D., F. Berkes, N. Doubleday (2007b): Introduction: Moving Beyond Co-management. In D. Armitage, F. Berkes and N. Doubleday (Eds.), *Adaptive Co-management: Collaboration, Learning, and Multi-Level Governance*. Vancouver: UBC Press: 1–15.
- [7]. Ban, N. C. & Vincent, A. C. J. (2009): Beyond marine reserves: exploring the approach of selecting areas where fishing is permitted, rather than prohibited. *PLoS ONE*, 4(7), 6258.
- [8]. Baratt C. Seeley J. and Allison E. H. (2014): Lacking the Means or Motivation? Exploring the Experience of Community Based Resource Management among Fisher folk on Lake Victoria, Uganda, *European Journal of Development Research*, 1-16.
- [9]. Bavinck, M. & Johnson, D. (2008): *Handling the legacy of the blue revolution in India—social justice and small-scale fisheries in a negative growth scenario*. American Fisheries Society Symposium, 49,585–599.
- [10]. Beddington, J. R., Agnew, D. J. & Clark, C. W. (2007): Current Problems in the Management of marine fisheries. *Science*, 316, 1713–1716.
- [11]. Bennett E., Neiland, A., Anang E., Bannerman P., Rahman A., Huq S., Bhuiya S., Day M., Fulford-Gardiner M., and Clerveaux W. (2001): *Towards a better understanding of conflict management in tropical fisheries management; evidence from Ghana, Bangladesh and Caribbean*. Portsmouth. University of Portsmouth, CEMARE Research Paper 159
- [12]. Bennett E (2002): *Management of conflict in tropical fisheries*. CEMARE Final Technical Report (R7334)
- [13]. Berkes F. (2002): Cross-scale institutional linkages: perspectives from the bottom up. In: Ostrom, E., Dietz, T., Dolsak, N., Stern, P.C., Stonich, S., Weber, E.U. (Eds.), *The Drama of the Commons*. National Academy Press, Washington DC, 293–321.
- [14]. Berkes, F. (2007b): Adaptive Co-management and Complexity: Exploring the Many Faces of Co-management. In D. Armitage, F. Berkes and N. Doubleday (Eds.), *Adaptive Co-management: Collaboration, Learning, and Multi-Level Governance*. Vancouver: UBC Press: 19-37.

- [15]. Berkes, F. (2008): Community conserved areas: policy issues in historic and contemporary context. *Conservation Letters*, 2, 19-24.
- [16]. Blaber, S. J. (2000): *Tropical Estuarine Fishes: Ecology Exploration and Conservation*. Oxford, UK: Blackwell.
- [17]. BOBLME (2012): *Management advisory for the Bay of Bengal hilsa fishery*. Regional Fisheries Management Advisory Committee.
- [18]. Branch, T. A., Jensen, O. P., Ricard, D., Ye, Y. & Hilborn, R. (2011): Contrasting global Trends in marine fishery status obtained from catches and from stock assessments. *Conservation Biology*, 25, 777–786.
- [19]. Borrini-Feyerabend Grazia, M. Taghi Farvar, Jean Claude Nguingui and Vincent Awa, (2007): *Co-Management of Natural Resources: Organizing, Negotiation and Learning-by-doing*, Kasperek Verlag, Mönchhofstr. 16, 69120 Heidelberg, Germany.
- [20]. Caddy, J. F. and Mahon R. (1995): *Reference Points for Fisheries Management*, FAO Technical Paper 347.
- [21]. Castillo, D. & Sayse L, A. K. (2005): Simulation of common pool resource field experiments: a behavioral model of collective action. *Ecological Economics*, 55, 420–436.
- [22]. Cinner, J.E and McClanahan, T.R. (2006): Socio-economic factors that lead to Overfishing in small-scale coral reef fisheries of Papua New Guinea. *Environmental Conservation*, 33, 73-80.
- [23]. Chan, K. M., Pringle, R. M., Ranganathan, J., Boggs, C.L., Chan, Y.L., Ehrlich, P.R. (2007): When agendas collide: human welfare and biological conservation. *Conservation Biology*, 21, 59–68
- Cowx Ian G. (2003): *Interactions between Fish and birds: Implications for Management*, Oxford, Malden, MA.
- [24]. Djama T. (1992): Conflicts in coastal fisheries in Cameroon, In B.P. Satia and B. Horemans (Eds). *Workshop on Conflicts in Coastal Fisheries in West Africa*, Cotonou, Benin, 24-26 November 1993. Cotonou, IDAF Project 64p. IDAF/WP/53 DFO - Suba (2010): Annual report for 20009-2010 Financial Year.
- [25]. DoF (2015): *Fisheries statistical report of Bangladesh, 2013-2014*. Fisheries Resources Survey System, Department of Fisheries. Ministry of Fisheries and Livestock, Government of the People's Republic of Bangladesh.
- [26]. FAO (2015): *Nile Perch Fisheries Management Plan for Lake Victoria: 2015-2019*.
- [27]. FAO (1998): *Integrated Coastal Area Management and Agriculture, Forestry and Fisheries*. Rome: FAO.
- [28]. Folke, C., Carpenter, S., Elmqvist, T., Gunderson, L., Holling, C.S., Walker, B., (2002): Resilience and sustainable development: building adaptive capacity in a world of transformations, International Council for Science, *ICSU Series on Science for Sustainable Development No. 3*.
- [29]. FRDC (2000): *Investing for tomorrow's fish: the FRDC's Research and Development Plan, 2000 to 2005*. Canberra: FRDC.
- [30]. FRSS (2014): *Fisheries statistical yearbook of Bangladesh*. Fisheries Resources Survey System (FRSS), Department of Fisheries, Bangladesh. 30(52).
- [31]. Galtung, J. (1971): "The Middle East and the theory of conflict," *Journal of Peace Research* 8(4), 173-206.
- [32]. Geheb, K. (1997): *The Regulators and the Regulated: Fisheries Management, Options and Dynamics in Kenya's Lake Victoria Fishery*. D. Phil. Thesis, Brighton: University of Sussex, 287.
- [33]. Gell, F and Roberts, C.M. (2003) Benefits beyond boundaries: the fishery effects of marine reserves. *Trends in Ecology and Evolution*, 18, 448-455.
- [34]. Gjertsen, H. (2005): Can Habitat Protection Lead to Improvements in Human Well-Being? Evidence from Marine Protected Areas in the Philippines, *World Development*, 33, 199-217.
- [35]. Glaser Sarah (2017): *Fish Wars: How Fishing can Start and Stop Conflict*, Ocean Conference, UN Conference to Support Implementation of Sustainable Development Goal 14.
- [36]. Hansen, G.J., Ban, N.C., Jones, M. L., Kaufman, L., Panes, H. M., Yasué, M. & Vincent, A. C. J. (2011): Hindsight in marine protected area selection: a comparison of ecological representation arising from opportunistic and systematic approaches. *Biological Conservation*, 144, 1866–1875.
- [37]. Hauss, Charles (2003): "Addressing Underlying Causes of Conflict." Beyond Intractability, Eds. Guy Burgess and Heidi Burgess, *Conflict Information Consortium*, University of Colorado, Boulder.
- [38]. Islam, M.M. (2012): *Poverty in small-scale fishing communities in Bangladesh: Contexts and responses*. Ph.D. Thesis, University of Bremen, Germany.
- [39]. Jahan, K.M., Salayo, N.D., & Kanagaratnam, U. (2009): Managing fisheries conflicts through communication planning: Experience from inland fisheries of Bangladesh. *Fisheries Research* 99(2), 112-122.

- [40]. Jentoft, Svein (1989): "Fisheries co-management: Delegating government responsibility to fishermen's organizations", *Marine Policy*, April 137-154.
- [41]. Jentoft, S., and T. Kristoffersen (1989): Fishermen's co-management: the case of the Loftoten fishery. *Human Organization* 48(4), 355-365.
- [42]. Kearney R. E. (2001): *Fisheries Property Rights and Recreational-Commercial Conflict: Implication of Policy Development in Australia and New Zealand*, Elsevier, Marine Policy.
- [43]. Kevin Leleua, Frédérique Alband, Dominique Pelletiera, Eric Charbonnel, Yves Letourneur , Charles F. Boudouresque (2011): *Fishers' perceptions as indicators of the performance of Marine Protected Areas (MPAs)*. *Marine Policy* March 2012, 36(2), 414–422.
- [44]. Kolding, J., Modesta. M., Mkumbo.O., Van Zwieten.P. (2014): Status, trends and Management of the Lake Victoria fisheries. *FAO Tech Pap* 579.
- [45]. Kothari C R (2004): *Research Methodology: Methods and Techniques*, 2<sup>nd</sup> edition. New Delhi. New Age International Publishers.
- [46]. Kooiman, J., M. Bavinck (2005): The Governance Perspective, in Kooiman, J. *et al.* (Eds.) *Fish for Life: Interactive Governance for Fisheries*, 11–24.
- [47]. LVEMP (2003): Report of East African Task Force on Harmonization of Fisheries Legislation.
- [48]. LVFO (2001): *Guidelines for Beach Management Units (BMUs) on Lake Victoria*, *Proceedings of Regional seminar*, 24th November, Jinja, Uganda.
- [49]. LVFO (2005): *Guidelines for Beach Management Units (BMUs) on Lake Victoria*, *Proceedings of Regional seminar*, 24th November, Jinja, Uganda.
- [50]. Lwenya C, Yongo E, Abila R (2007): *Mobile fishers: The scale and impact of movement of fishers on fisheries management in Lake Victoria*. Kenya Marine and Fisheries Research Institute, Kisumu.
- [51]. Maril R. L. (1983): *Texas Shrimpers: Community Capitalism, and the Sea*. College Station: Texas A & M Press.
- [52]. Mayhew, David (2006): "Congress as Problem Solver" in *Promoting the General Welfare*, Eric Patashnik and Alan Gerber, eds. Brookings Institution Press
- [53]. McClanahan, T.R and Mangi, S. (2001): The effect of a closed area and beach seine exclusion on coral reef fish catches. *Fisheries Management and Ecology*, 8, 107-121.
- [54]. McClanahan, T. R. (2008): Management of area and gear in Kenyan coral reefs. In T. R. McClanahan, & J. C. Castilla, *Fisheries Management: Progress towards sustainability* (pp. 166-185). London, UK: Blackwell Press
- [55]. Mosqueira, I., Côté, I., Jennings, S. & Reynolds, J.D. (2000) Conservation benefits of marine reserves for fish populations. *Animal Conservation*, 4, 321–332.
- [56]. Muthiah, C., Pillai, N. G. K., Kasim, H. M. & Bhat, U.S. (2003): *Seerfishes. In Status of Exploited Marine Fishery Resources of India* (eds. M. M. Joseph & A. Jayaprakash), pp.45–50. Central Marine Fisheries Research Institute, Kochi, India.
- [57]. Negi, C. S. (2010): The institution of taboo and the local resource management and conservation surrounding sacred natural sites in Uttarakhand, Central Himalaya. *International Journal of Biodiversity and Conservation*, 2(8), 186–195.
- [58]. Nielsen B. and Hansen H. (2004): Effect of grape pomace rich in flavonoids and antioxidants on production parameters in dairy production. *J. Anim. Feed Sci.*, 13 (Suppl. 1), 535-538.
- [59]. Njaya F., (2007): Governance Challenges for the Implementation of Fisheries Co-Management: Experience from Malawi, *International Journal of Commons*, 1(1), 137-153.
- [60]. Odongkara K., Ntambi B., Mbilingi B. (2007): *Governance in Co-Management on the Lake Victoria fisheries, Uganda, Implementation of Fisheries Management Plan*. National Fisheries Resources Research Institute, Jinja
- [61]. Ogwang O. Vincent, Joyce Ikwaput Nyeko and Radhmina Mbilinyi (2009): "Implementing Co-management of Lake Victoria's Fisheries: Achievements and Challenges", *African Journal of Tropical Hydrobiology and Fisheries* 52–58.
- [62]. Onyango P.O and Jentoft S. (2007): *Embedding co-management: Community based Fisheries Regimes in Lake Victoria*, Tanzania, International Conference on Community Based Approaches to Fisheries Management, Dhaka: The World Fish center, p. 38-42
- [63]. Luomba J. Onyango (2015): *Fishers' Attitude towards Performance of Beach Management Units in Regulating Fisheries and Reducing Poverty: A case of Two BMUs, Lake Victoria Tanzania*. BioPublisher Publishing Platform.
- [64]. Olsson, P., C. Folke, and T. Hahn. (2004): Social-ecological transformation for ecosystem management: the development of adaptive co-management of a wetland landscape in southern Sweden. *Ecology and Society* 9(4): 2.

- 
- [65]. Ostrom, E. (2007): *A diagnostic approach for going beyond panaceas*. Proceedings of the National Academy of Sciences of the United States of America, 104, 15181–15187
- [66]. Ostrom, E. (1990): *Governing the commons: the evolution of institutions for collective action*. Cambridge University Press, Cambridge.
- [67]. Pacific Fisheries Management Council (1991): *Report 1, Stock Abundance Analysis for the 1991 Ocean Salmon Fisheries*, Portland, OR: Author
- [68]. Pinkerton E. (2003): Towards Specificity in Complexity: Understanding Co-Management from a social science perspective. In: Wilson, D.C., Nielsen, J.R., Degnbol, P. (Eds.), *The Fisheries Co-management Experience*, Kluwer Academic Publications, Dordrecht, The Netherlands, pp. 61–77.
- [69]. Pomeroy, R. S. & Berkes, F., (1997): *Two to tango: the role of government in fisheries co-management*. Marine Policy 21, 465–480.
- [70]. Pomeroy and Rivera-Guieb (2005): *Fishery Co-Management: A Practical Handbook*, CABI, IDRC, Groton, CT, USA.
- [71]. Pomeroy, R. S., Mascia, M. B., and Pollnac, R. B. (2007): Marine Protected Areas: the social dimension. In FAO (Ed.), *Report and documentation of the expert workshop on Marine Protected Areas and fisheries management: Review of issues and considerations*. Rome, 12–14 June 2006. FAO Fisheries Report No. 825, Rome, pp. 149–181.
- [72]. Pramitasari, S. D., Gallardo, W. E. and Ebberts, T. (2015): Fishers Perception and Attitude Toward Local Knowledge and Local Practices and Its Role in the Fisheries Management: a Case Study in Mae Klong River, Samut Songkhram, Thailand, *Turkish Journal of Fisheries and Aquatic Sciences 15: 795-804 (2015)*
- [73]. Priscoli, J.D. (2002): *Participation, Consensus Building and Conflict Management Training Course*. UNESCO - international hub port. 187.
- [74]. Ruddle, K. and Satria, A. (2010): Managing coastal and inland waters: pre-existing aquatic management systems in South East Asia. *Dordrecht: Springer*, 188. doi: 10.1007/978-90-481-9555-8
- [75]. Russ, G.R and Alcala, A.C. (1996): Do marine reserves export adult fish biomass? Evidence from Apo Island, central Philippines. *Marine Ecology Progress Series*, 132, 1-9.
- [76]. Silvestre G., Garces LR, Stobutzki I, Ahmed M, Valmonte-Santos RA, Luna CZ, et al. (2003): South and south-east Asian coastal fisheries: their status and directions for improved management, conference synopsis and recommendations. In: Silvestre G, Garces LR, Stobutzki I, Ahmed M, Valmonte-Santos RA, Luna CZ, Lachica-Alino L, Munro P, Christensen V, Pauly D, editors. *Assessment, management and future directions for coastal fisheries in Asian countries*. Worldfish, Center conference proceedings 67. Penang, Malaysia: WorldFish Center; 2003
- [77]. St Martin, K. (2001): Making space for community resource management in fisheries. *Annals of the Association of American Geographers*, 91, 122–142
- [78]. Sutinen, J. G., and K. Kuperan. (1999): A socio-economic theory of regulatory compliance. *International Journal of Social Economics* 26(1-3):174-193.  
<http://dx.doi.org/10.1108/03068299910229569>
- [79]. Wade, R. (1994): *Village republics: economic conditions for collective action in south India*. ICS Press, San Francisco, California, USA
- [80]. Warner M (2000): *Conflict Management in Community-Based natural resource Projects: experiences from Fiji and Papua New Guinea*. Working Paper 135, London Overseas Development Institute.
- [81]. WFC (WorldFish Center, Bangladesh) (2005): *Gender case study. Community-Based Fisheries Management Project (Phase-2)*. Unpublished official records, Dhaka, Bangladesh: World Fish Center, pp. 36.
- [82]. Worm, B., Hilborn, R., Baum, J.K., Branch, T.A, Collie, J.S., Costello, C. (2009): Rebuilding Global Fisheries. *Science*, 325,578–585.
- [83]. Yamane, Taro. (1967): *Statistics, An Introductory Analysis*, 2nd Ed., New York: Harper and Row.