

Competing Claims in a Multipurpose Lake: Mapping Resource Conflicts on Lake Kariba

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Abstract

Lake Kariba is a transboundary artificial water body originally constructed for the generation of hydro-electric power. It is now a multi-purpose resource that supports economic activities such as commercial fishing, artisanal fishing, aquaculture, tourism and water transport. These economic activities have given rise to intra-sectoral and inter-sectoral resource-use conflicts. This paper discusses these conflicts. The paper also recommends possible interventions which can be employed to enhance stakeholder dialogue and conflict resolution.

1. Introduction

Lake Kariba is an artificial impoundment in Southern Africa on the Zambezi River (Figure 1). The lake is a transboundary resource that is shared between Zambia and Zimbabwe. Kariba dam (Photo 1) was built during the Federation of Rhodesia and Nyasaland between 1955 and 1959, to provide hydro-electric power to Northern Rhodesia (Zambia) and Southern Rhodesia (Zimbabwe).

According to Coche (1971), the Federal Hydro-Electric Board was constituted to oversee the construction of the Kariba dam. In 1956, the Federal Power Board was created to replace the Federal Hydro-Electric Board. The mandate of the new Board was the generation and distribution of electricity within the Federation. In 1964, the Federal Power Board was replaced by the Central African Power Corporation (CAPCOR). CARPCOR was later replaced by the Zambezi River Authority (ZRA).

The lake has a total surface area of 5 500 km² at capacity, a maximum width of 40km, a mean width of 19.4km, a maximum depth of 120 metres, a mean depth of 29.2 metres and a shoreline length of 2 164km (Kenmuir 1983).

Over the years, multiple users have emerged. These include the inshore small-scale gill-net fishers, offshore commercial fishers who are referred to as Kapenta operators, hoteliers, houseboat operators, recreational fishers and fish farmers. The term “Kapenta” is the local name for the Tanganyika sardine (*Limnothrissa miodon*).

During the pre-impoundment period, the riparian Tonga communities engaged in fishing activities on a subsistence basis to complement subsistence farming and hunting (Zambezi

Valley Consultants 2001, p. 6). Scudder (2005, p. 9) also noted that prior to the construction of the Kariba Dam, information on fish populations was based mainly on the indigenous knowledge of the local Tonga, who knew most of the species by name and caught them using a variety of fishing gears including baskets, traps, spears and poisons. Due to the depth and flow rate of the primary channel of the Zambezi River, fishing was restricted to the river's edge, floodplains and tributaries (Scudder 2005, p. 9).

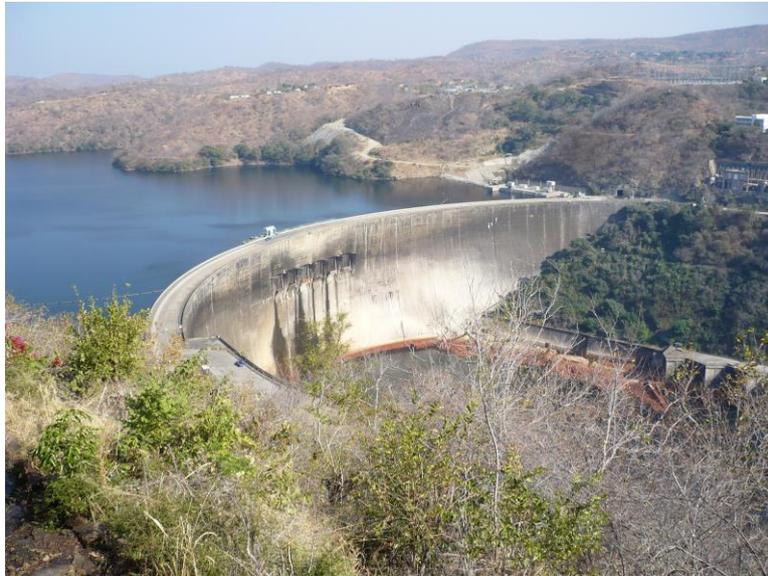


Photo 1. Kariba Dam wall (Photo by Wilson Mhlanga)

After the creation of the Kariba Dam, the shoreline on the Zimbabwean side was divided into different fishing concessions which fell into two main categories: (a) areas given to European Concessionaires, and (b) areas given to traditional chiefs from among the displaced Tonga people (Zambezi Valley Consultants 2001, p. 6). Consequently, the pre-impoundment traditional fishing practices and fisheries management were replaced by the introduction of a fisheries management system based on central government control in both countries. This system also introduced new fishing gears (gill-nets), and made the traditional pre-inundation fishing gears illegal.

The two major fisheries sectors on Lake Kariba are the capture fishery and the aquaculture sector. The capture fishery can be further sub-divided into three sub-sectors. These sub-sectors are the pelagic/offshore fishery (also referred to as the kapenta fishery), the artisanal/inshore fishery (also referred to as the gill-net fishery) and the recreational fishery (also referred to as the rod and line fishery). The pelagic fishery is a single species fishery that is based on the introduced freshwater Tanganyika sardine, *Limnothrissa miodon*. The artisanal fishery is based on several inshore species including the exotic Nile Tilapia (*Oreochromis niloticus*). The recreational fishery also exploits the inshore fish species, including the indigenous Tigerfish (*Hydrocynus vittatus*).

In the artisanal fishery, there are several commercially important fish species which are usually exploited by the artisanal fishers. On the Zambian side of Lake Kariba, the bulk of the artisanal fish catches was composed of *O. niloticus* (54.48%), Hydrocyon (14.80%) and Mormyridae (11.40%) (Mbewe et al. 2011a). On the Zimbabwean side of the Lake, the important fish species in the artisanal fishery are the Cichlids (*Oreochromis mortimeri*,

Oreochromis niloticus, *Sargochromis codringtonii*, and *Tilapia rendalli*); the Cyprinid (*Labeo altivelis*); the Characid (*Hydrocynus vittatus*); the Mormyrids (*Mormyrus longirostris*, *Mormyrops anguilloides*); and the Clariid (*Clarius gariepinus*) (Mhlanga, personal observation).

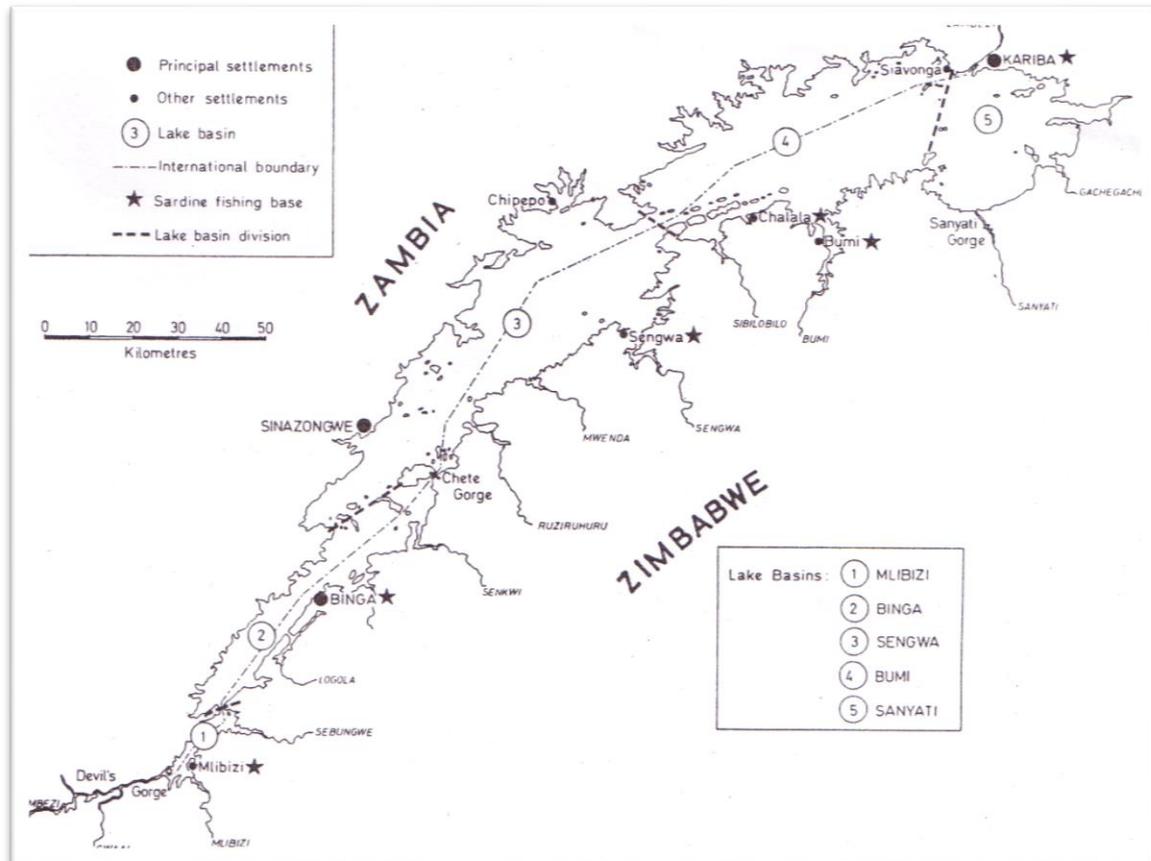


Figure 1. Map of Lake Kariba showing the hydrological basins

2. Social Aspects of the Artisanal Fishery

In both Zambia and Zimbabwe, the artisanal fishers are based in fishing villages/camps which are spread along the shoreline. In Zimbabwe, all the fishing villages/camps are permanent, while in Zambia, most fishing villages are permanent, but there are a few temporary fishing camps. In Zimbabwe, there are a total of 41 fishing villages (Zimbabwe Lake Kariba Frame Survey Report 2011) while in Zambia there were a total of 65 fishing villages, 63 of which were permanent, while 2 were temporary (Mbewe et al. 2011b). The total number of licenced fishers on the Zimbabwean side in 2011 was 1 154 (Zimbabwe Lake Kariba Frame Survey Report, 2011) while in Zambia there were 4 653 fishers in the same year (Mbewe et al. 2011b).

3. Governance Arrangements of the Fishery Resource

Governance of the artisanal fishery on Lake Kariba happens at two levels; the national and the bilateral level. The governance arrangements are best described in terms of the institutional arrangements for fisheries management. In Zambia, the Department of Fisheries (DoF) is responsible for the fisheries resources on the Lake, while in Zimbabwe, it is Lake Kariba Fisheries Research Institute (LKFRRI), which falls under the Zimbabwe Parks and Wildlife Management Authority (ZPWMA).

At the bilateral level, the governments of Zambia and Zimbabwe signed a Protocol on the Management of the Shared Fisheries Resources on Lake Kariba and the Transboundary Waters of the Zambezi River (Mhlanga and Mhlanga 2014). The Protocol, which was signed in 1999, paved the way for the establishment of the Joint Fisheries Management Committee (JFMC), which is the policy and decision making body, and the Joint Fisheries Technical Committee (JFTC), which is the management and research body. It should be noted that while this Protocol has created a platform for dealing with fisheries related matters, (including intra-sectoral conflicts) there is still no single platform for dealing with inter-sectoral matters (including inter-sectoral conflicts).

In the Kapenta fishery (Photo 2), entry is regulated through a permit system in both Zambia and Zimbabwe. Kapenta fishing permits are issued by the Department of Fisheries (DoF) in Zambia and the Zimbabwe Parks and Wildlife Management Authority in Zimbabwe. Each fishing vessel, locally referred to as a “Fishing Rig” should be registered and an annual permit fee paid to the respective regulatory institutions. In Zimbabwe, the minimum mesh size on the lift net is 8 mm (millimetres). In the artisanal (gill-net) fishery, entry is also through a licensing system in both countries. Each gill-net fisher must have a fishing licence and only gill-nets are allowed. The minimum stretched mesh size of the gill-nets is 76 mm in Zambia and 102 mm in Zimbabwe. In Zimbabwe, gill-net fishing is prohibited in the waters that are adjacent to state-protected wildlife areas (National Parks and Safari Areas).



Photo 2. Kapenta rig (Photo: Wilson Mhlanga)

Enforcement of the permit system is much easier in the kapenta fishery compared to the gill-net fishery. This is because in the kapenta fishery fishing vessels are larger and fewer than in

the artisanal fishery and the kapenta fishing boats fish at night using lights (including an underwater light as a Fish Aggregating Device) which make them highly detectible.

4. Issues and Solutions

4.1. Intra-sectoral conflicts

4.1.1. Artisanal fishers versus pelagic fishers (Zimbabwe)

The artisanal fishers conflict with the pelagic (kapenta) fishers mainly with respect to fishing grounds. Conflicts may arise when the artisanal fishers set their nets further offshore where there may be conflict with the pelagic fishers who encroach into the artisanal fishers' fishing grounds. Conversely, conflict may also arise when the pelagic fishers go to fish in the littoral zones (which are designated as kapenta breeding grounds and where kapenta fishing is not allowed).

Historically, the conflict between gillnet and kapenta fishers was often viewed as a racial conflict between the gillnet fishers (who are black) and the kapenta fishers (who were predominantly white). The Zimbabwean government embarked on a kapenta permit redistribution exercise in the early 2000s which was aimed at addressing the racial imbalances. This was a black empowerment exercise which was conducted at the time of the Fast-Track Land reform programme. Currently, more than 80% of the kapenta permits are owned by blacks, but conflicts still exist between kapenta fishers and gill-net fishers.

There is supposed to be no conflict between the artisanal gill net fishers and commercial Kapenta operators largely because Kapenta operators exploit the pelagic offshore resource, while gill net fishermen are limited to the inshore fishery. However, there are cases when Kapenta fishermen catch fish that could have been caught by gill net fishermen, though where this happens, it would be by mistake rather than by intent.

Gill net fishermen complain that Kapenta fishing crew sometimes steal their nets at night and sell them to illegal fishers. Complaints of this nature lack proof and are quite few. Kapenta operators complained that gill net fishermen provide an illegal market for Kapenta. The operators alleged that gill-netters buy Kapenta from their crew manning the rig at night. Once bought, Kapenta is mostly dried in illicit places and then sold at a give-away price. The practice reduces the catch landed by the Kapenta operators and also floods the local market thus forcing operators to sell their Kapenta below breakeven point.

4.1.2. Artisanal fishers versus fishery managers (Zimbabwe)

Artisanal fishers have often clashed with fishery managers, especially on the Zimbabwean side. This is mainly due to the fact that the Fishery law-enforcement division falls within the Zimbabwe Parks and Wildlife Management Authority (ZPWMA). The ZPWMA is responsible for law-enforcement of both the terrestrial and aquatic natural resources. Thus fishers have sometimes been apprehended for using gill-nets with mesh sizes that are less than 4-inches (102mm), which is the stipulated (legal) minimum mesh size (on the Zimbabwean side). The fishers have sometimes also clashed with the fishery managers when they have been apprehended for fishing in non-fishing (prohibited) zones.

Gill net fishers think some fisheries management regulations imposed on them are unrealistic and managers do not take into consideration their real problems and needs. On the other hand, managers think that fishers are irresponsible people who do not care about the sustainability of the resource. Compliance with regulations is poor. Fishers consider the regulations to be complex, difficult to understand and against their interests.

Among all the regulations imposed on the fishery, fishermen are compliant only with those regulations they perceive as helping in sustaining the resource. Otherwise most of the regulations are being infringed upon because fishermen are less enthusiastic to follow regulations, which place them at a comparative disadvantage. To avoid arrest, they have established networks with sympathizers to forewarn each other of the presence of law enforcers.

The recently announced requirement to fish between 06:00 and 18:00 hours is one such regulation that fishers are finding difficult to understand its rationale. Gill net fishers always prefer fishing at night when it is cooler. This is particularly important given that Kariba can be very hot. They also argue that if one leaves nets in water during the night chances are high that the following morning you will find your catch eaten up by red-claw crayfish (*Cherax quadricarinatus*) and crocodiles (*Crocodylus niloticus*). Since the introduction of the exotic red-claw crayfish into Lake Kariba is fairly recent, studies are still under way to determine its diet in the lake and this will confirm whether the crayfish is indeed consuming fish as asserted by the fishers.

Some fishers, particularly in the Mlibizi and Binga Basin (Basin 1 and 2 in Figure 1), fail to understand the rationale of setting the minimum mesh size at 4 inches (102mm), when their Zambian counterparts whom they share the fishing ground with are permitted to use 3 inch (76mm) but may sometimes be using as small as 2 inch (51mm) nets. In these basins, convincing fishers that they should co-manage the fishery is difficult. Zimbabwean fishers do not perceive the claims that sustainable benefits will accrue to the community as likely. Restraint on the exploitation today in the interest of having more tomorrow will result in gains that will be totally dissipated by their Zambian counterparts. Fishers therefore believe that individual restraint today cannot be capitalized in individual gain tomorrow.

Zimbabwean fishers argue that if they use 4 inch (102mm) nets, they catch less fish than their Zambian counterparts who use 3 inch (76mm) mesh-sized nets or less. They argue that the species composition nowadays is such that the most important species escape through the four-inch nets. Most species that are found in abundance, like the Imberi (*Brycinus imberi*) and silver fish (*Schilbe intermedius*) would indeed escape through four-inch nets.

Gill net fishers have alleged favoritism in the manner in which law enforcement agents sanction them for violating fisheries management regulations. Sanctions and penalties for violating some of the regulations are not standardized across the gill net fisheries and Kapenta operations. For example, if a gill net fisher is found fishing in a closed (prohibited) area, his gear is confiscated and his boat sunk. This is not the case when a Kapenta operator is caught fishing in closed areas. In most of these cases he is fined but retains his gear, once the fine for an impounded vessel has been paid.

Licensed fishers are aware that there are many people residing upstream along major rivers such as the Sanyati River who are exploiting the riverine fishery without licenses and use all types of gear and fishing methods. These unofficial fishers are believed to catch a lot of fish. Licensed fishers complain that much effort is wasted in policing the licensed fishers while many other people fish illegally and go unnoticed (Nyikahadzoi, 1998).

4.1.3. Zimbabwean gill net fishers versus Zambian gill net fishers (international)

The fishery resources on the Zimbabwean side are categorised into either fishing zones (where artisanal fishing is allowed) and non-fishing zones (where artisanal fishing is not allowed). Consequently, this zonation, coupled with the minimum mesh size rule of 4-inches (102mm), is generally believed by the fishers to have given rise to better fishing on the Zimbabwean side compared to the Zambian side. The Zimbabwean fishers, especially in the Western section of the Lake (Binga/Mlibizi) have conflicts with their counterparts from Zambia as they report that some of the Zambian artisanal fishers come to fish on the Zimbabwean side. These fishers, especially those in the Binga/Mlibizi area feel that this problem has escalated so much that it is now negatively affecting the sale of their fish.

4.1.4. Gill net fishers versus aquaculture (Zimbabwe and Zambia)

Cage culture is the major type of fish farming on Lake Kariba. Conflicts between artisanal fishers and the commercial cage culture are mainly due to the issue of space. The fish cages, and their buffer zones, are located in prime artisanal fishing grounds. Consequently, the artisanal fishers are of the view that the cage farming operations have resulted in a reduction of their fishing grounds. However, a positive development is that some of the fishers now report catching large sized fish which are mainly Nile Tilapia (*Oreochromis niloticus*) (Photo 3). The artisanal fishers attribute this to the introduction of cage farming (Photo 4) which is a monoculture enterprise based on the Nile Tilapia, *O. niloticus*. The Nile Tilapia is an exotic species which grows much faster than the indigenous Kariba Bream (*Oreochromis mortimeri*). Thus, genetically, the Nile Tilapia grows to a larger size in a shorter period than the *O. mortimeri*. In areas near the fish cages, the artisanal fishers further attribute the fast growth to increased availability of food from the cages.

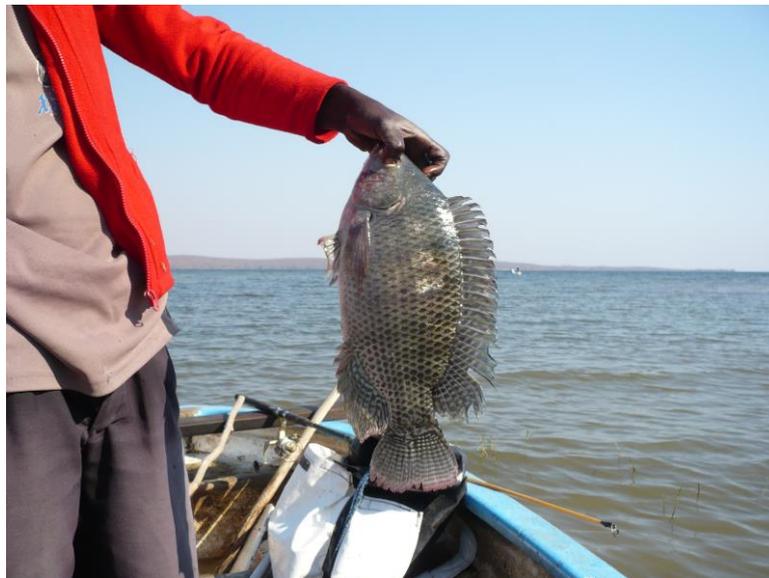


Photo 3. Artisanal fisher with Nile Tilapia (*Oreochromis niloticus*) (Photo by Wilson Mhlanga)



Photo 4. Fish cage – commercial cage culture production (Photo by Wilson Mhlanga)

4.1.5. Artisanal fishers versus recreational fishers (Zimbabwe)

Recreational fishing on Lake Kariba is carried out mainly using Rod and Line, although spearfishing also occurs, but to a limited extent. These recreational fishers normally use motorised boats (speed boats) to get to and from their fishing sites. The anglers sometimes pass through the artisanal fishing grounds and the boat propellers get entangled in gill-nets, and consequently they damage the gill-nets.

4.2. Inter-sectoral conflicts

4.2.1. Artisanal fishers versus houseboats (Zimbabwe)

Major tourist attractions on Lake Kariba include the luxury boats referred to locally as Houseboats (Photo 5). These are large boats that have sleeping and cooking facilities and can accommodate more than 6 passengers. These houseboats are popular with holiday-makers who want to enjoy the wilderness experience particularly along the sections of the shoreline that are in the areas designated as wildlife protected areas (National Parks and Safari Areas) on the Zimbabwean side.

When the boats are moored on the shoreline, the artisanal fishers may pass near these boats as they go either to set their gill-nets or to collect their fish catch. The holiday-makers sometimes feel that the presence of the artisanal fishers is an intrusion that disrupts their wilderness experience. The artisanal fishers on the other hand, also feel that these houseboats may at times disrupt their fishing activities, especially the movement of smaller boats (tender boats) that are used to go on game-viewing or rod and line fishing outings. The propellers on these tender boats may damage the artisanal fishers' gill-nets.

4.2.2. Artisanal fishers versus Lodge Owners/Hoteliers (Zimbabwe)

There are several lodges and hotels along the Lake Kariba shoreline. Artisanal fishers may sometimes clash with these Lodge owners and Hoteliers. These Lodge owners and Hoteliers sometimes feel that the presence of the artisanal fishers on their lake frontage may disrupt

their visitors' holiday experience. For the artisanal fishers, the boats from the lodges/hotels may sometimes damage their gill-nets.



Photo 5. Houseboats in harbour (Photo by Wilson Mhlanga)

4.2.3. Artisanal fishers versus protected area managers (wildlife managers) (Zimbabwe)

The Zimbabwean side of the lake has several National Parks and Wildlife Areas. Conflicts arise as the wildlife managers sometimes view the artisanal gill-net fishing camps/villages as “springboards” for wildlife poachers. For example, there have been reported incidences where poachers, especially those targeting black rhino (*Diceros bicornis*) and elephant (*Loxodonta africana*) (Photo 6), had come into the wildlife protected areas through the fishing camps. The wildlife managers, on the other hand, have sometimes been accused of heavy-handedness when they were reported to have either confiscated or destroyed artisanal fishers' boats which would have been found in waters that are not open to gill-net fishing.



Photo 6. Elephants on the shoreline (Photo by Wilson Mhlanga)

4.3. Inter-sectoral collaboration structures

The inter-sectoral collaboration structures at the national level are not formalised. At the international/bilateral level, inter-sectoral collaboration is limited primarily to the Zambia/Zimbabwe Joint Permanent Commission (JPC). However, this commission deals mainly with defence and security matters.

Within the fisheries sector, at the national level in Zimbabwe, there are no formal institutions that provide a framework for dialogue between the fisheries managers, policy makers and the resource users. Some structures that include the Sub-Area Fishers Association (SAFA), District Fishers Association (DIFA) provide a framework for dealing with issues related to the artisanal fishery. While efforts are being made to strengthen these institutions, two major issues to consider will be (a) the formalisation of these structures, and (b) developing a mechanism that will ensure the long-term sustainability of these structures.

In Zambia, the Village Management Committees, Zonal Management Committees, the Lake Kariba Inter-Zonal Fisheries Management Association provide a platform for addressing artisanal fishery issues.

At the bilateral level, there is a formal mechanism that was set up by both parties to address fisheries management issues between Zambia and Zimbabwe. The major vehicle for this collaboration is the Protocol on the Management and Development of the Fisheries on Lake Kariba and the Transboundary Waters of the Zambezi River. This Protocol was signed in November 1999. Within the framework of the protocol, there is a Fisheries Management Committee and a Fisheries Technical Committee. The composition of these committees is made up of representatives from both Zambia and Zimbabwe. This Protocol can be considered as intra-sectoral collaboration, since it focuses primarily on fisheries-related matters.

The report of the Fifth Technical Consultation on Development and Management of the Fisheries of Lake Kariba (FAO 2012, p. 27) states that “while formal Technical Committee meetings as spelt out under the Protocol had not taken place, the five FAO technical consultations had provided the forum for discussion and agreement on technical issues of management and development of the fisheries of Lake Kariba, as envisaged under the Protocol.” Consequently, a major limitation to the implementation of the Protocol has been financial. Given the importance of the fishery sector in both countries, there is need for advocacy to ensure that the two governments prioritise the implementation of the protocol by providing the requisite funds for the Committees.

5. Discussion

The conflict between artisanal (gill-net) fishers and pelagic/commercial (Kapenta) fishers are not a permanent feature but arise from time to time. Consequently, constant dialogue between these two groups can assist in effectively resolving these conflicts.

The conflicts between the artisanal fishers and the fishery managers are complex and varied. These conflicts, which vary from issues related to fishing regulations, or to the perceived heavy-handedness of the fishery managers by the fishers, cannot be resolved overnight but require a concerted long-term effort to build a mutual interaction between the

managers and the resource-users. This will require regular consultations between the two groups.

In resolving these conflicts, special attention should be paid to the conflicts in Basin 1 and Basin 2 (Mlibizi and Binga Basin). This area requires a different approach to resolving the conflicts here when compared to the rest of the lake. This is because there is constant interaction between the Zimbabwean and Zambian fishers. The resolution of the conflicts in this part of the lake requires the direct collaboration between the fishery managers on the Zambian side with those on the Zimbabwean side. These managers need to come up with a common position in addressing the fishers' concerns.

The conflict between the gill-net fishers and the commercial cage aquaculture operations is not easy to solve since these two activities are mutually exclusive. Once fish cages are established on the lake, they take up the area that hitherto had been part of the fishing grounds of the artisanal fishers. This effectively reduces the fishing grounds for the artisanal fishers. While the introduction of fish cages has reduced the fishing grounds for the artisanal fishers, some artisanal fishers in Basin 5 (Sanyati Basin) are of the view that the introduction of the Nile Tilapia cage farming has resulted in larger-sized fish such that they are now using the larger mesh-size nets. The introduction of small-scale aquaculture among the artisanal fishers, may be one option to try and offset the reduction of their traditional fishing grounds due to commercial cage aquaculture.

Recreational fishers usually clash with artisanal fishers on the issue of gill-net damage due to boat propellers. A major cause of this is that usually the gill-nets are usually not easily visible to other lake users because there are no buoys attached to the gill-nets. If artisanal fishers were to mark their nets with highly visible buoys, this would go a long way in minimising these conflicts. However, most of the gill-net fishers cannot afford to purchase the commercial buoys due to the low fish catches which bring in very limited income.

Lodge owners/hoteliars and the artisanal fishers have to accommodate each other in their activities given that the lake is a multi-purpose resource. A major challenge between these two user-groups is the limited dialogue. Therefore, there should be constant dialogue so as to address any conflicts that may arise.

For Protected Areas Managers, the conflict with the artisanal fishers can also be minimised through dialogue. In order to address the polarisation that now exists between the wildlife managers and the artisanal fishers, there is need for the wildlife managers to discuss with the fishers how best the fishers can also assist in addressing the issue of wildlife poaching.

Inter-sectoral collaboration is currently very limited. Consequently, concerted efforts must be made to strengthen it. The success of this inter-sectoral collaboration will depend partly on the stakeholders who are on the ground (within the Lake Kariba environment), and also partly on the central governments (through the line Ministries) to endorse this collaboration and provide the requisite funding to kick-start the convening of the consultative meetings. Thereafter, the forum would have to come up with a financing mechanism for all non-government members.

6. Conclusion

At the national level, there is a need for the creation of a multi-stakeholder consultative forum that meets to discuss issues of common interest (inter-sectoral). The composition of the multi-stakeholder forum would cover regulatory authorities, resource-users and other key interested parties. The regulatory authorities would include those in the sectors of energy (including Zambezi River Authority), water resources, environment, fisheries, wildlife, tourism, transport (Lake Navigation/Safety), Police, Customs and Immigration as well as the riparian local authorities (both Urban and Rural). The resource users would also be drawn from the sectors listed under the regulatory authorities. Other interested stakeholders would include Non-Governmental Organisations (NGOs) that are implementing projects and programmes within the Lake Kariba environment.

At the international level, there is a need for the two governments to facilitate innovative mechanisms to mobilise financial resources for both the Joint Fisheries Management Committee and the Joint Fisheries Technical Committee to meet regularly. While the Joint Fisheries Technical Committee has been able to meet and discuss fisheries related issues through the platform of the Technical Consultations Meetings on the Development and Management of the Fisheries and Aquaculture of Lake Kariba, the two riparian countries should set aside funding for these meetings. These consultative meetings are currently being funded by the FAO Sub-regional Office for Southern Africa.

The Technical Consultations Meetings have served as a useful platform to carry out the work of the Joint Fisheries Technical Committee. However, these noble efforts can be enhanced further if the Joint Fisheries Management Committee can meet regularly so as to make policy decisions as well as to assist in the implementation of the recommendations made by the Joint Fisheries Technical Committee.

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