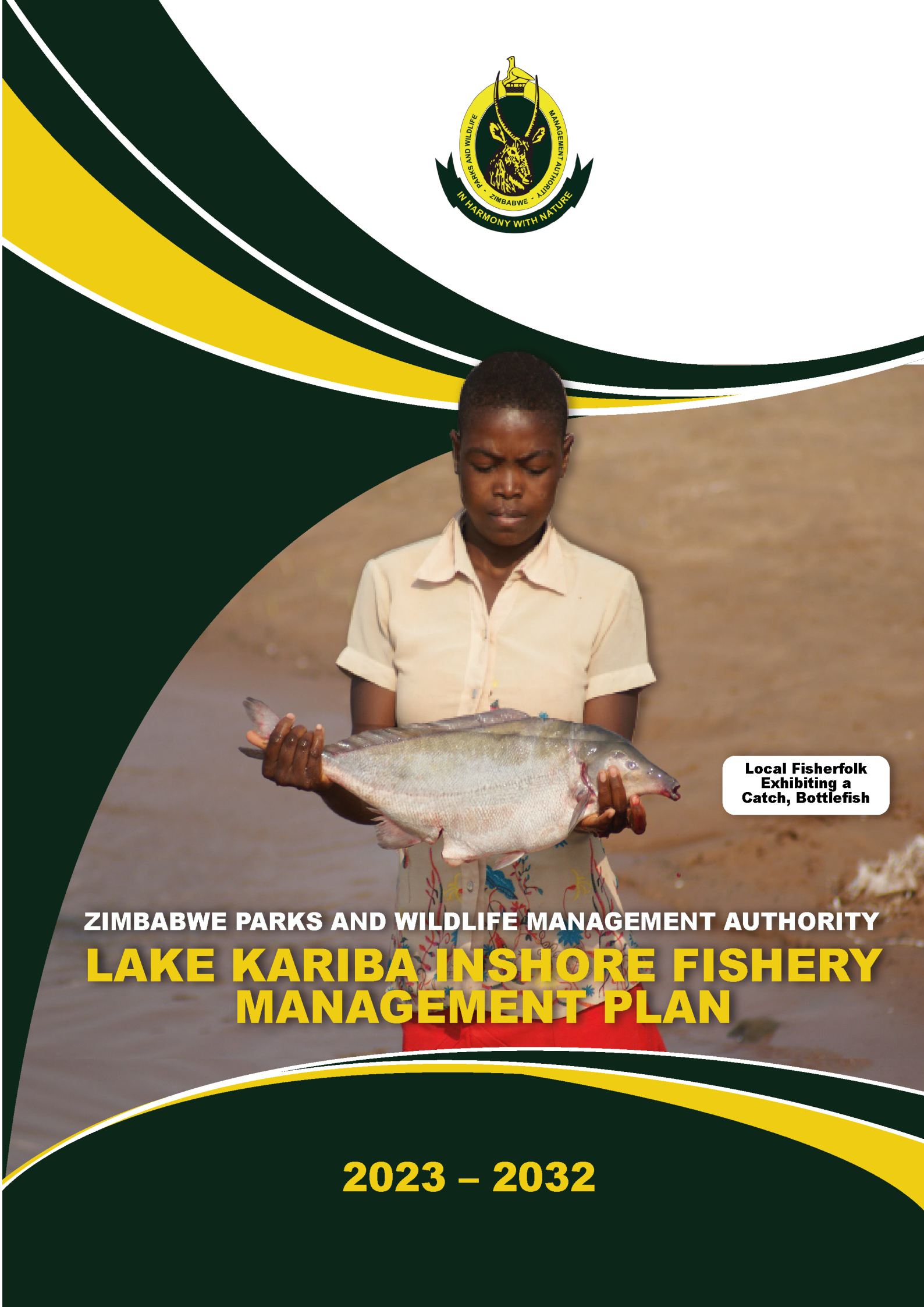


Local Fisherfolk Exhibiting a Catch, Bottlefish

ZIMBABWE PARKS AND WILDLIFE MANAGEMENT AUTHORITY

# LAKE KARIBA INSHORE FISHERY MANAGEMENT PLAN

2023 – 2032

Cover Page Photo Credit @ Lake Kariba Fisheries Research Institute

## APPROVAL PAGE

The Minister for Environment, Climate, Tourism and Hospitality Industry, Secretary for Environment, Climate, Tourism and Hospitality Industry, Parks and Wildlife Management Authority Board and the Director General have approved the implementation of the Lake Kariba Inshore Fishery Management Plan (2023-2033).

Signature:_____ Date: 21-03-2023

*Dr. Fulton Upenyu Mangwanya*

**DIRECTOR-GENERAL- ZIMBABWE PARKS AND WILDLIFE MANAGEMENT AUTHORITY**

Signature:_____ Date: 21-3-23

*Dr. Agrippa Golden Sora*

**BOARD CHAIR - ZIMBABWE PARKS AND WILDLIFE MANAGEMENT AUTHORITY**

Signature:_____ Date: 22-03-23

*Ambassador Raphael Faranisi*

**SECRETARY FOR MINISTRY OF ENVIRONMENT, CLIMATE, TOURISM AND HOSPITALITY INDUSTRY**

Signature:_____ Date: 22/03/2023

*Hon. Mangaliso Ndhlovu (MP)*

**MINISTER FOR MINISTRY OF ENVIRONMENT, CLIMATE, TOURISM AND HOSPITALITY INDUSTRY**

## FOREWORD



Inshore Fisheries play a vital role in Zimbabwe's food and nutrition security and therefore require sound management plans to ensure sustainability. The ever-increasing human population and high demand for fish has put pressure on the fish resources of Lake Kariba, coupled with increased cases of illegal, unreported and unregulated fishing practices and climate change. This has called for a robust management plan to be developed to guide all players in the fishery in ensuring that these threats are mitigated. Through collaboration between Zimbabwe Parks and Wildlife Management Authority (ZimParks) and its stakeholders, the Lake Kariba Inshore Fishery Management Plan (2023-2033), whose overall purpose is to achieve the optimal and sustainable utilization of the fishery resource for the sustainable benefit of humankind whilst safeguarding the ecosystem has been produced.The Zimbabwe Parks and Wildlife Management Authority is determined to pursue co-management and ecosystems approaches in managing the inshore fishery of Lake Kariba's Southern shoreline. The management process will be founded on scientific principles to ensure objectively informed decision making.

The Government of Zimbabwe is committed to ensuring that this important fishery improves the incomes and livelihoods of communities along the shoreline without threatening the aquatic ecosystem. The Government recognises the pivotal role fishers and other stakeholders along the shoreline play in ensuring sustainable utilisation of the lakeshore resources and fisheries. Therefore, deliberate efforts were made to involve the fishers and other important stakeholders in coming up with a management plan that considers their needs and aspirations.

We thank all those who participated in the development of the Lake Kariba Inshore Fishery Management Plan and will thrive to work towards achieving the milestones outlined in the document. The Management Plan will assist in unlocking partnerships for activities which are crucial in attaining the objectives and indeed desired outcomes specified in the plan. Livelihoods will be improved, and Zimbabwe will enjoy increased fish supplies from a sustainably managed fishery, working to the betterment of livelihoods for all.

Dr. Fulton Upenyu Mangwanya

Director General, Zimbabwe Parks and Wildlife Management Authority

# EXECUTIVE SUMMARY

The Lake Kariba Inshore Fishery Management Plan will improve the governance and management of the fishery since it incorporated the concept of the Ecosystems Approach to Fisheries Management and Co-management principles. The Fisheries Management Plan is an evolving collective tool that will be used to transform and improve the capacity of the Inshore Fishery of Lake Kariba thereby contributing to food and nutrition security in Zimbabwe. It will transform the Lake Kariba Inshore Fishery sector into a viable and sustainable fishery. The Management Plan includes interventions that will climate-proof fishers' livelihoods thereby ensuring that fishery-dependent communities are resilient and derive maximum benefits from the fisheries activities to improve their livelihoods. The plan accords an opportunity to meet a growing demand for fish and fishery products while maintaining a sustainable Lake Kariba socio-ecological system.

The vision of the Lake Kariba Inshore Fishery Management Plan is -***Towards a future with healthy aquatic ecosystem, a plentiful and profitable fish supply, and thriving fishing communities.***

The mission is -***To manage the Lake Kariba Inshore Fishery resources in an efficient, innovative and environmentally friendly manner based on scientific information and good governance.***

The main goal of the fisheries management plan is - ***To achieve the optimal and sustainable utilization of the fishery resource for the sustainable benefit of humankind whilst safeguarding the ecosystem.***

**The long-term objectives are:**

a. To maintain the fish stock above 50% of its mean unexploited level at all times (biological)
b. To maintain all non-target, associated and dependent species above 50% of their mean biomass levels in the absence of fishing activities (ecological)
c. To maximise employment opportunities for those whose livelihoods are dependent on the fishery (social)
d. To maintain the species of economic importance at or above the levels necessary to ensure their continued productivity (biological)
e. To minimise the impacts of fishing on the physical environment and on non-target (bycatch), associated and dependent species (ecological)
f. To maximise the net incomes of the participating fishers (economic)

**The short-term objectives are:**

a. To improve the governance of the Inshore Fishery value chain
b. To reduce the illegal, unregulated and unreported fishing in the Inshore Fishery of Lake Kariba
c. To reduce the use of unsustainable fishing methods and use of the illegal fishing gear
d. To improve fishers' resilience to ecological and environmental changes
e. To improve surveillance and enforcement in the Inshore Fishery

f. To improve research, data and information collection and dissemination
g. To promote the social inclusion exploitation and management of the fishery
h. To improve post-harvest practices for fish loss and waste reduction to minimise Post-harvest loss in the fishery (PHFL)
i. To monitor and manage fish diseases (Aquatic Animal Health Plan)

## ACKNOWLEDGEMENTS

The development of the Lake Kariba Inshore Fishery Management Plan was supported by the Food and Agricultural Organisation (FAO) of the United Nations. The input from the Ministry of Environment, Water, Climate, Tourism and Hospitality Industry, other government and private stakeholders as well as fishers is gratefully acknowledged. Input was acquired during two district level meetings held in Binga and Kariba and from eight SAFA meetings held in fishing villages/camps along Lake Kariba and other stakeholders with operations along the lakeshore. The writing of the document was facilitated by the Environment, Climate and Sustainable Development Institute (University of Zimbabwe).

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**Acronyms and Abbreviations**

| | |
|---|---|
| ACP-EU | – African Caribbean Pacific – European Union |
| CAS | – Catch Assessment Survey |
| CIO | – Central Intelligence Organisation |
| CITES | – Convention on International Trade in Endangered Species of Wild Flora and Fauna |
| COMESA | – Common Market for Eastern and Southern Africa |
| DDC | – District Development Coordinator |
| DFA | – District Fishing Association |
| FAO | – Food and Agriculture Organisation of the United Nations |
| EMA | – Environmental Management Agency |
| IPOA-IUU | – International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing |
| LKFRI | – Lake Kariba Fisheries Research Institute |
| RDC | – Rural District Council |
| MSY | – Maximum Sustainable Yield |
| NEPAD | – New Partnerships for Africa's Development |
| PLWD | – People living with disabilities |
| SAFA | – Sub Area Fishers Association |
| UNDP | – United National Development Program |
| UNESCO | – United Nations Educational, Scientific and Cultural Organization |
| ZimParks | – Zimbabwe Parks and Wildlife Management Authority |
| ZLKFFSR | – Zimbabwe Lake Kariba Fisheries Frame Survey Report |
| ZNA | – Zimbabwe National Army |
| ZRA | – Zambezi River Authority |
| ZRP | – Zimbabwe Republic Police |

# 1 DESCRIPTION OF THE INSHORE FISHERY

## 1.1 Historical Overview

The inshore fishery was established on Lake Kariba soon after the construction of the dam to accommodate as many displaced people as possible because the government was concerned with curbing the influx of rural people into the town (Machena & Moinuddin, 1993). The inshore fishery started in 1962 with only 208 licensed fishers (Minshull, 1973). The number of fishers was allowed to expand, until 1978 when it was realized that although the number of fishers was increasing, the total yield was not increasing and individual catches were becoming poorer (Marshall et al., 1982). The number of fishers peaked at just over 1 000 in 1966 subsequently declining to less than 500 in 1971(Minshull, 1973). Fisher numbers increased again during the 1980s with a subsequent decline during the 1990s (Minshull, 1973). Inshore fishers increased steadily after independence such that by 1998 there were 1 404 fishers of which 98% were male and 2 % female (Songore et al., 1998, Songore, 2000) and 1 540 in 2011 (ZLKFFSR, 2011). The number of unlicensed fishers has increased drastically due to the economic downturn in Zimbabwe, with significant implications for fishery resource sustainability.

During the early eutrophic phase of Lake Kariba fish catches were 3 400 tonnes per annum in 1963 but declined to 1 200 tonnes per annum in 1974 (Marshall, 1979). Catches reached a total of just under 3 000 tonnes in 1964, declining to 1 000 tonnes in 1971 and about 600 tonnes in 1978 (LKFRI, 1968-78). The decline occurred as the lake assumed the oligotrophic phase whereby the decline in nutrients led to reduced productivity and lower fish catches, forcing many fishers to seek alternative employment (Marshall, 1979). Between 1964 and 1972 three fish species dominated the inshore catches, namely the predator *Hydrocynus vittatus* (Tigerfish) and two cichlids, *Oreochromis mortimeri* (Kariba bream) and *Serranochromis codringtonii* (Pink happy) (Karenge & Kolding, 1995). The estimated annual catches in 1981, 1982, 1983 and 1984 were 807, 344, 328 and 455 tonnes, respectively (Bourdillon et al., 1985). Between 1983 and 1998 fish catch fluctuated between 500 and 2 000 tonnes per annum (Songore et al., 1998). Effort declined since the early 1990s in fishing areas except C4 (Songore 2000). In a Catch Assessment Survey undertaken in 2019, *Oreochromis niloticus* (Nile Tilapia) (57%) was the most dominant species followed by *H. vittatus* (27%) and *Synodontis zambezensis* (Squeker) (9%). Catches have been generally low between 2000 and 2021 (Figure 1) to less than 100 tonnes per annum. This requires considerable management interventions.

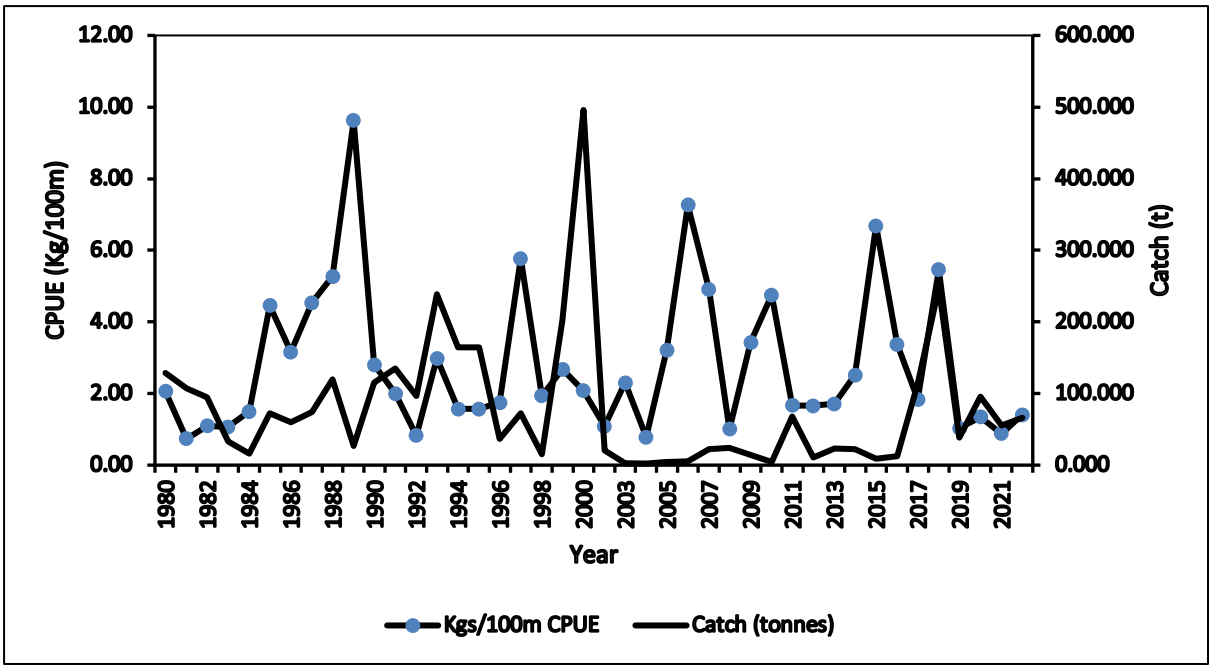



**Figure 1: Inshore CPUE and Catch from 1980 to 2022 (Source: LKFRI Reports)**

## 1.2 Economic importance

Lake Kariba Inshore Fishery is the main source of fish production in the Zambezi Valley producing over 2 000 tonnes each year. Fishing is done both for subsistence and commercial purposes. Lake Kariba Inshore Fishery represents the most valuable source of food and much needed animal protein for communities living within the Zambezi Valley. The Inshore Fishery of the lake remains important to the fishing communities, as a source of protein (Bourdillon et al., 1998).

In terms of employment, the Inshore Fishery remains an important source of employment and income in lakeshore communities, especially during periods when other opportunities are almost non-existent (for example during droughts). Over 1 200 people are employed in fishing (LKFRI Statistical Report, 1994). The Inshore Fishery also generates considerable ancillary employment and over 550 traders make a living from the fishery (Jackson, 1961). Many more people are employed in related fishing activities such as boat building and maintenance.

Cash flows were profitable during the pre-1978 period. Since 1979, this situation has changed and there is now a larger population resident in the fishing villages/camps. Despite the increased fishing effort, yields have not changed and the catch per fisher has been declining (Marshall et al., 1982). This problem is accentuated by the poor agriculture potential and lack of alternative employment opportunities in the vicinity of the fishing villages/camps. There was need, therefore, for the government to intervene to conserve the resource base and mitigate the inevitable effects of overcrowding. The problem is accentuated by the restricted productive potential of the lake.

## 1.3 Organisation of the fishing operations

Lake Kariba is a trans-boundary resource that is shared between Zambia and Zimbabwe. On the Zimbabwean side the ownership of the lakeshore is divided between the state which has jurisdiction over the fishery adjacent to state land and the local governments which have jurisdiction over the fishery on shorelines adjacent to communal lands. At the Rural District Council (RDC) level, access to Inshore Fishery along communal lands is administered by the Binga and Nyaminyami RDCs in their local authority areas. Historically, two types of fisher organizations were established on the Zimbabwe side. These were (a) the local fishers operating from council land and (b) the European concessionaire operating adjacent to State land. The displaced people were allocated 90% of the total fishable area but produced 41% of the total inshore catch (Harding, 1966). The Inshore Fishery along the council area is exploited by fishers resettled from the communities displaced by the impoundment of Lake Kariba (Bourdillon et al., 1998). The fishers are currently located in over forty camps along the lake. Historically, each displaced chief was allocated a fishing village which he controlled and which was occupied by his subjects. Each village had an appointed Headman (the Sabhuku) who reported directly to the chief. Besides recommending the allocation of fishing licences, the headman was also supposed to enforce the exclusion of other fishers from their camp. This system, therefore, gave the headman authority over and responsibilities for fishery management. In addition, the headman had the traditional role of presiding over disputes. Traditional hierarchical leadership has been in existence since the pre-colonial period (Machena & Moinuddin, 1993; Bourdillon et al., 1998).

Fishers on the lake shoreline are organised into two categories namely fishers' cooperatives, and individual operators. The Sub-Area Fishers Associations (SAFAs) were put in place between 1993 and 1994 but collapsed in 2003 after donor support to Lake Kariba Fisheries Research Institute (LKFRI) for the co-management programme ceased. Fishing villages are organized into SAFAs (SAFA A to H) with each SAFA being led by a constitution and an elected committee of 7 (Chair, Vice Chair, Secretary, Treasurer, Security and two committee members). SAFAs are, however, not formally registered. The SAFAs in each district form the District Fishing Association (DFA). It was anticipated to form the Lake Kariba Fishers Association whereby two DFAs come together.

## 1.4 Biology of the target stocks

The inshore fishery on Lake Kariba is a multi-species fishery that targets large cichlids that now mainly include the introduced *O. niloticus* (Nile Tilapia) and *H. vittatus* (Tiger fish) which comprise approximately 71% and 18% in the catches, respectively (Mavuru et al., 2022). The other important species are *Clarias gariepinus* (3.3%), *Mormyrops anguilloides* (3.3%), *Synodontis zambezensis* (1%) and *Coptodon rendalli* (1%) (Mavuru et al., 2022). The predominance of *O. niloticus* in the fishery has resulted in inshore fishers shifting to use larger mesh sizes with 6" and 5.5" mesh sizes (ZLKFFSR, 2011). After escaping from fish farms at Kariba town, *O. niloticus* invaded Lake Kariba and was recorded in catches in 1989, and subsequently established throughout the whole lake (Zengeya & Marshall, 2008). *Oreochromis mortimeri*, an original species of the Zambezi River and endemic to the middle Zambezi Valley (Marshall, 2011) which made 38% of the inshore catches in the 1970s (Kenmuir, 1984) subsequently declined upon the invasion by *O. niloticus* (Chifamba, 2006).

The abundance of *H. vittatus,* which is at the apex of the food chain in Lake Kariba and thus can act as an indicator of the health of the fishery, has declined in the Sanyati Basin between 1993 to 2017 (Maqgina et al., 2021a). The overall catch per unit effort for *H. vittatus* increased from 1993 to 1997 at the lakeside experimental gillnetting site and gradually decreased from 60 individuals/set in 1997 of catch per unit effort to 3.7 individuals/set in 2017. A constant reduction from 2011 is attributed to increased fishing pressure from artisanal and recreational fisheries and to a lesser extent climate change (Maqgina et al., 2021a). The species is threatened by poaching activities in the river mouths (Sanyati, Nyaodza and Gache Gache Rivers) during the breeding season whereby fishers target large males and females migrating upstream for breeding. The continued mortalities of the breeding population impact the tigerfish population (Kenmuir, 1973). As such *H. vittatus* is now exhibiting signs of stress that include a low sex ratio of 1:0.8 (more males than females) because fishing is exerting strong selective pressure on female *H. vittatus* during their breeding season (Maqgina et al., 2021).

*Cherax quadricarinatus*, a freshwater crayfish originating from Australia, invaded Lake Kariba in 2011 (Marufu et al., 2014), has now established in all of the five basins (Chakandinakira et al., in press) and is now in the spread stage of the invasion process and is making use of all habitats in the lake (Marufu et al., 2020). The crayfish invasion provides an opportunity for exploitation. It is, however, currently not extensively utilized by local fishers who are concerned by the damage it causes to their gill-nets. It is an aggressive omnivore and a voracious lake bottom feeder that could be impacting other species in the lake.

*Synodontis zambezensis* (squeaker) is reported to be increasing in abundance in Lake Kariba. It's a non-commercial species which together with *Schilbe intermedius* was considered important in terms of abundance in the fished areas since it was selected against in the gill-nets (Sanyanga, 1995). The high CPUE of *S. zambezensis* in the fished areas implied that it could rapidly increase in numbers and fill the vacant niche left by cropped commercial species because it was not cropped commercially in the 100 mm gill net meshes (Sanyanga, 1995). This might also explain the recent increase in its abundance.

## 1.5 Ecosystem and habitat

The general habitat, vegetation in particular, has a significant effect on fish stocks in the inshore fishery of Lake Kariba (Zengeya & Marshall, 2016). The changes in the aquatic macrophyte communities have implications on fish habitat and diet. The well vegetated littoral zone serves as nursery and feeding areas for fish providing shelter, food and protection from predators and are especially important to cichlids in the lake (Donnelly, 1969). Small species and juveniles of about 40 species in 11 families (Balon, 1974; Mitchell, 1976) use littoral or shallow inshore areas of Lake Kariba. Fishing takes place in marginal littoral areas of less than 10 m depth. The littoral zone, however, has been a very unstable habitat due to water level fluctuations which have become too excessive in recent years thereby affecting productivity and fish habitat stability. The low inflows, coupled with high power generation resulted in the lake level reaching the lowest level ever recorded since the creation of Lake Kariba (ZRA, 2015). Increased human demand (e.g. the planned new hydropower station at Batoka gorge) will result in more water withdrawals from the Zambezi River.

## 1.6 Economic and social characteristics

Fishing is the main source of income and fishers get an average income that ranges from US$140-233 per month (Maqgina et al. 2021b). The average income for fishers is US$16 and US$13 per day in fishing camps and fishing villages, respectively (Ndhlovu et al. 2017). Fishers are considered poor since their revenue is below the poverty datum line of US$562.32 as stipulated by the Zimbabwe Statistical Agency (2018). This could be driving them to overfish and poach in order to survive. The general observation is that the number of unlicensed fishers has increased e.g. the Gache Gache fishing camp population increased over 10 times since the cooperative was formed (Mr Chirume, personal communication). Unsustainable fishing practices and overfishing seems rampant. CPUE is low at 13 ± 11 kgs/per day/boat and this has been attributed to an increased number of people joining gill-net fishing in the non-expanding fishing grounds (Mavuru et al., 2021).

Gill-net fishing is conducted exclusively by men with an average age of 33 ± 9 years (Mavuru et al., 2021). The participation of women in the fishery is very low since fishing is physically demanding (7.18%, Machena, 2021). Ndhlovu et al. (2017) established that gender representation is 94% and 6% in fishing camps and 82% and 18% in fishing villages, males and females, respectively. The age group of 99.7% of the fishers is 21 to 65 years (Machena, 2021) with 92.9% of the fishers being married and thus have to provide for their families from the monthly income from the fishery that varies from USD 50.00 to USD 160.00. Fish prices are low and range from USD 0.75 to USD 2.00 per kg. Fish are sold immediately upon arrival from fishing by 97% and 90% of the fishers in fishing camps and fishing villages, respectively, while a few are preserved through salting, drying or refrigeration (Ndhlovu et al. 2017). The average number of dependents per household ranges from 3 to 6. Most fishers are literate having undertaken primary and secondary education and thus have a high capacity for training (Machena, 2021).

There is low investment in the inshore fishery since most fishers use simple low-quality fishing boats of an average cost of USD400.00 (Mavuru et al., 2021) made from steel or fibreglass. The boats pose a high risk in bad weather such that some fishers have lost their lives. Only about one third of the fishers own boats (Ndhlovu et al. 2017). Licensed fishers are allowed to use 5 gill-nets, each 100 m in length and each gill-net cost USD 35.00. The majority of the fishers (87%) use mono-filament gill-nets while 13% use the authorized multi-filament gill-nets while two mesh size classes (5" and 5.5") dominate the gill-net fishery (Mavuru et al., 2021).

Fishers lament the issue of declining catches due to increasing fishing pressure. It seems the increase in un-licensed fishers has resulted in more fishing pressure such that the fish resource is shared across many legal and illegal fishers. Currently, fishers are catching an average of 5 to 10 kgs per day, whereas before, 15 to 20 years ago catches were as high as 20 to 50 kgs per day (Fishers during Binga consultative meeting, personal communication).

Resource use conflicts occur between fishers and other lake users (mainly tourist houseboat operators, commercial aquaculture, *Kapenta* fishers, crocodile farmers and ZimParks officials) (Ndhlovu et al. 2017). Conflicts are on (i) issues of legitimacy whereby fishers alleged they are not considered as legitimate lake users by houseboat operators who sometimes moor their boats along the shoreline, disrupting fishing activities in the process (ii) destruction of gill-nets by propellers of tender boats that are used by tourists for game-viewing (iii) limited

fishing grounds as aquaculture takes up space, (iv) unsatisfactory law enforcement procedures by ZimParks and (v) attack on fishers by crocodile egg collectors (Ndhlovu et al. 2017). The other challenge encountered is attack by crocodiles and hippos. Crocodiles and hippos are negatively affecting fishers through deaths, injuries, instilling fear, and destruction of sources of livelihood for fishers (nets and boats) (Matanzima et al, 2022; Marova et al. 2021).

### 1.7 Identification of key uncertainties, constraints, challenges and data needs

The main uncertainty is whether the Inshore Fishery is overfished or approaching a tipping point due to excessive illegal entry. The data to ascertain this is scanty. Consistent monitoring is required to generate critical time series data and information that will allow informed decision making by fishery planners and policy makers. Resources are required for catch assessment surveys to be undertaken and ascertain the status of the fishery. Accurate data collection is critical since it will enable resource managers to ascertain whether the resource is overfished and also facilitate the institution of appropriate management measures.

The main constraints and challenges faced by small-scale fishers of Lake Kariba include conflicts with other lake users, human and wildlife conflicts, inability to access credit to diversify livelihoods and reduce dependency on fisheries, poor access to services and markets due to poor road infrastructure, communication challenges due to unavailability of mobile network connectivity in certain areas along the lakeshore, limited technical and business development know-how. It is essential to address these challenges to ensure sustainability and profitability. Strengthening of institutional capacities of DIFAs, SAFAs and capacity building is required. Formalising and strengthening co-management structures will enable compliance with fisheries and environmental regulations. It is also essential to ensure the participation of women, youth and disadvantaged groups within the fisheries value chain. Currently, the participation of women and disadvantaged groups is minimal.

## 2 POLICY FRAMEWORK FOR FISHERIES MANAGEMENT

### 2.1 International protocols and obligations

Zimbabwe is a signatory to several international protocols and has obligations to other international laws that govern fisheries management and development. The constitution also encourages Zimbabwe to domesticate international agreements to which it is a signatory. Zimbabwe is a signatory to the following conventions, agreements and protocols:

- SADC Fisheries Protocol
- SADC Protocol on Wildlife Conservation and Law Enforcement
- SADC Protocol on Shared Watercourse Systems
- The Abuja Declaration on Sustainable Fisheries and Aquaculture in Africa
- The Convention on Biological Diversity
- Convention on Wetlands of International Importance especially as waterfowl habitat (Ramsar Convention)
- The Convention on International Trade in Endangered Species (CITES)
- IUCN Red Data Lists
- Common Market for Eastern and Southern Africa (COMESA)
- ACP-EU Fisheries Research Initiative

- Protocol on Economic and Technical Co-operation between Zambia and Zimbabwe concerning management and development of the fisheries of Lake Kariba and Transboundary waters of the Zambezi River
- The FAO Code of Conduct for Responsible Fisheries
- The Zambezi River Authority Act
- New Economic Partnerships for Africa' Development (NEPAD) Initiatives
- FAO International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (IPOA –IUU)
- UNESCO Biosphere Reserve
- Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries
- Inland Ecosystems Approach to Fisheries Management
- Kavango-Zambezi Transfrontier Conservation Area (KAZA)

The various bodies under which these statutory instruments fall have to ensure their implementation within the inshore fishery.

### 2.2 Legal framework for the fisheries sector in Zimbabwe

The legal framework for managing the Inshore Fishery is summarised in Table 1.

**Table 1: Legal framework for managing the Inshore Fishery**

| Framework | Specific legislation |
|---|---|
| 1. The Constitution of Zimbabwe | |
| 2. Instruments governing the exploitation of the fishery resources | a. Parks and Wildlife Act (Chapter 20:14)<br>b. Traditional Leaders Act (Chapter 29:17)<br>c. Rural District Council Act (Chapter 29:13) |
| 3. Legal instruments governing water use | a. The Environmental Management Act (Chapter 20:27)<br>b. Water Act (Chapter 20:24)<br>c. Zimbabwe National Water Authority Act (Chapter 20:25)<br>d. Zambezi River Authority Act (Chapter 20:23)<br>e. Inland Water Shipping Act (Chapter 13:06) |
| 4. Complementary policies and legislation | a. The Tourism Act (Chapter 14:20)<br>b. Wildlife Policy<br>c. Gender Policy<br>d. National Environment Management Policy and Strategies<br>e. The Kariba Lakeshore Combination Master Plan<br>f. National Development Strategy |

### 2.2.1 Institutional arrangements governing the fisheries sector

The institutional arrangements for the management of the fishery resource on Lake Kariba are linked to the legislation governing the fishery resource. The water of Lake Kariba and the islands on the Zimbabwean side have the status of recreational parks under Section 32 of the Parks and Wildlife Act (No. 14/75). The Inshore Fishery resource of Lake Kariba on the Zimbabwean side is therefore defined as State property. The State makes decisions concerning access to the resource, and the level and nature of exploitation. It had, until recently, the coercive power of enforcement to ensure sustainable harvest. The State employs various management measures. These include licensing, area closures, and gear restrictions (Government of Zimbabwe 1990). The Zimbabwe Parks and Wildlife Management Authority (ZimParks) under the Parks and Wildlife Act is principally responsible for managing the fishery resource of Lake Kariba since the water body is wholly within a Parks Estate. Their role is to spearhead policy, management and policing of the fishery to ensure its sustainable exploitation in line with national, regional and international conventions and agreements. ZimParks sits at the apex of the overall management and jurisdictional oversight of the Inshore Fishery on Lake Kariba. It sets the regulations that must be complied with by the fishers and also other stakeholders utilising the lake with respect to the fishery resource.

Since the inception of the Inshore Fishery, the main fisheries management objective was to ensure that exploitation of the fishery is maintained at Maximum Sustainable Yield (MSY) (Zambia/Zimbabwe SADC Fisheries Project, 1993). The research wing of the ZimParks outlines rules and regulations regarding the utilization of the resource. In order to control the Inshore Fishery and attain MSY, managers intervene directly by controlling the total effort. The Lake Kariba Fisheries Research Institute (LKFRI) is the ZimParks institution that oversees the overall management of the fishery. The LKFRI was established in 1963 as a joint project between Zambia and Zimbabwe, with funding from United Nations Development Programme (UNDP) and technical assistance from FAO. The overall mandate of LKFRI covers three areas of responsibility: research, management and extension in the context of fostering fisheries development within the lake and its environs.

In terms of enforcement and anti-poaching operations, ZimParks works together where necessary, with other security arms of the state which include the Zimbabwe Republic Police (ZRP), Zimbabwe National Army (ZNA) and various intelligence agencies such as the Central Intelligence Organisation (CIO). It is instructive to note that the ZRP is the overall custodian of law enforcement in the country and thus has powers to arrest anyone breaking any law, including the Parks and Wildlife Act. For purposes of court prosecution, ZimParks works together with the police for the filing of criminal charges and engagement with the Office of the Public Prosecutor.

Rural district Councils (RDCs) are local government statutory bodies responsible for local administration in designated areas whose lands do not fall under Parks Estates but are in close proximity. Binga Rural District Council and Nyaminyami Rural District Council are responsible for managing communities in their districts outside Parks Estates. Because some

of the communities live in fishing villages and camps, the RDCs are delegated authority by ZimParks to assist in the administration of the Parks and Wildlife Act in their areas of jurisdiction. The RDCs purchase annual block permits from ZimParks which they in turn sell to fishers in their local areas of jurisdiction. The role of ZimParks is to liaise and supervise the RDCs just to ensure that they are complying with the provisions of the Parks and Wildlife Act. Fishing camps such as Nyaodza, Fothergill, Gache Gache and all the islands fall under the jurisdiction of ZimParks. The office of the District Development Coordinator (DDC) superintends over the activities of the RDCs and is responsible for enunciating Central Government policy within the districts. Hence, it has a huge and significant political influence on matters that also affect the Inshore Fishery although it has no direct jurisdictional authority in the management of the Inshore Fishery. It is important to realise that the Inshore Fishery of Lake Kariba supports the livelihoods of thousands of families and the Central Government through the DDC has a significant interest in the operations of the Inshore Fishery.

The Zimbabwe National Water Authority (ZINWA) according to its founding Act, is responsible for all water resources and their utilisation. They do not manage the Inshore Fishery resource but have an interest in ensuring that the water resource is managed sustainably. In relation to ZINWA is the Zambezi River Authority (ZRA) a statutory body created through a bilateral agreement between Zambia and Zimbabwe to manage the lake water resource as well as the Zambezi River itself. It is the principal body responsible for managing the water resources but not the Inshore Fishery resource. They are not involved in fisheries management but are an important stakeholder in ensuring that the water resources in this transboundary basin are managed sustainably for other lake users. Their main clients in terms of water abstraction are the Zambia Electricity Supply Corporation Limited (ZESCO) (Zambia) and Zimbabwe Electricity Supply Authority (ZESA) (Zimbabwe) responsible for electrical power generation. ZRA is responsible of ensuring that lake levels are maintained at sustainable levels for all lake users.

The Environment Management Agency (EMA) is a statutory organisation mandated with the protection of the environment. It is important to note here that ZimParks is also mandated with conservation which also encompasses environmental issues so in some instances their interests can overlap. For clarity, EMA focusses on a broad range of environmental issues particularly with regard to the ecosystem approach. EMA is not involved in the enforcement of the Parks and Wildlife Act but has powers to prosecute even fishers flouting environmental regulations such as pollution, deforestation and streambank cultivation. In that way, EMA complements ZimParks in ensuring that the integrity of the lake ecosystem structure is not disrupted.

**The Tourism Act (Chapter 14:20)** – this is an Act that establishes a Zimbabwe Tourism Authority and provides for its functions. It provides for the licensing, designation, registration and grading of tourist facilities and for the licensing of persons who provide services connected with tourism. Lake Kariba and its environs constitute designated tourist areas with various operations including safari areas, hunting safaris, water facilities and boat cruises.

ZimParks is a major tourism operator as well as the regulator of the Inshore Fishery on the lake. Inshore Fishery activities are not permitted normally in designated tourism areas and there is often conflict between tourism operators with fishers engaging in illegal fishing.

**Zimbabwe Policy for Wildlife's** aim is to promote the protection and sustainable utilisation of the country's natural wildlife resources. It aims to ensure sustainable rural prosperity and more equitable apportionment of the benefits accruing from the proper use of the country's wildlife resources. Key tenets most pertinent to Lake Kariba Inshore Fisheries Management include (i) maintaining Parks and Wildlife Estate for the conservation of the nation's wildlife resources; (ii) ensuring adequate protection of major ecosystems or key species and habitats which are not represented in the Estate; (iii) harmonising management of Parks and Wildlife Estate with the efforts of neighbouring communities; (iv) take the necessary legal and enforcement measures to prevent the illegal use of wildlife; (v) draw up management plans arising from the policy; and (vi) recognise and consult stakeholders on wildlife-related matters. Wild fish and fisheries are also designated as wildlife and are therefore governed by this policy. ZimParks is mandated through this policy to develop fisheries management plans to ensure sustainable utilisation of wild fish stocks in consultation with stakeholders in the sector.

**Zimbabwe National Gender Policy** - seeks to achieve a gender just society where men and women enjoy equality and equity and participate as equal partners in the development process of the country. The policy's goal is *"To eradicate gender discrimination and inequalities in all spheres of life and development."* Eight priority areas were identified namely: Gender, Constitutional and Legal Rights; Gender and Economic Empowerment; Gender, Politics and Decision Making; Gender and Health; Gender, Education and Training; Gender Based Violence; Gender and Environment; and Gender, Media and ICTS. These thematic areas formed the basis for the development of policy objectives and strategies for the period 2013-2017 but a new policy will be promulgated soon. This NGP is underpinned by principles of gender justice, equality, integration and inclusiveness. The fisheries value chain has both males and females as actors and it is important that the Inshore Fishery sector implements inclusivity.

**National Environment Management Policy and Strategies** - the goal is to "*avoid irreversible environmental damage, maintain essential environmental processes, and preserve the broad spectrum of biological diversity so as to sustain the long-term ability of natural resources to meet the basic needs of people, enhance food security, reduce poverty, and improve the standard of living of Zimbabweans through long-term economic growth and the creation of employment*". It therefore, aims to conserve biodiversity; maintain the natural resource base and basic environmental processes; and promote equitable access and sustainable utilisation of natural resources. Inshore Fishery resources are highly dependent on a healthy, pollution-free environment to enable fish populations to breed, recruit and grow. Habitat loss due to environmental degradation poses a significant threat to ecosystems and hence, any management of fisheries must now take on an Ecosystems Approach and consider watershed related issues.

**The Kariba Lakeshore Combination Master Plan** - the Kariba Master Plan was approved in 1998 and since the Kariba area spans several local authorities, a combination master plan was produced. The Kariba Plan Authority members were Binga, Hwange and Nyaminyami RDCs, Kariba Town Council and the Department of National Parks and Wildlife Management. The combination authority was the Department of Physical Planning and a consultancy team. The Kariba Plan was intended to rationalise the use of resources in the area and minimise conflicts between different resource uses. In the process, the Kariba Plan would also promote sustainable development and look to protect the interests of the local inhabitants. Furthermore, it would initiate a process for improving the flow of benefits to local communities from natural resources through increased access and control of natural resources. It would also assist in rationalising the area's administration and increase the efficiency and effectiveness of the various central and local government agencies involved therein. The Kariba Plan was not implemented by the government but given the multiple jurisdictions in the Kariba area, this plan could have led to the harmonisation of multiple agencies for the benefit of the fisheries sector.

**National Development Strategy** – this is an economic blueprint whose vision is "Towards a Prosperous and Empowered Upper Middle-Income Society by 2030". The National Development Strategy 1: 2021-2025 (NDS1) is the successor to the Transition Stabilisation Plan (TSP) and is the first 5-year Medium Term Plan aimed at realising the country's Vision 2030. The Strategy will build on the success of the TSP, notably entrenching macroeconomic stability, necessary for economic recovery and growth, and conferring new opportunities for wealth creation, innovation and enterprise development. Like all other economic sectors, the fisheries sector is expected to make its contribution towards the attainment of Vision 2030 by ensuring that there is broad empowerment of actors in the fisheries sector. Elimination of poverty and upliftment of standards are some of the main goals of the NDS1. Entrenched poverty characterises the inshore fisheries sector in particular and any management plans must take into account the need for transformative change in Kariba.

### 2.2.2 Key Linkages

For a coherent Fisheries Management Plan to be in place, it is necessary to appreciate possible cross-sectoral policy linkages that exist. Fragmentation which leads to multiple jurisdictions overseeing a single resource can often lead to overall policy failure. Whilst this might be unavoidable, it is important to recognise these so that at the policy implementation level there can be better harmonisation. A lot of legislation has led to the creation of various statutory bodies such as ZINWA, ZESA, ZRA, EMA, ZimParks and RDCs all who have various jurisdictional powers and influence over the fishery industry resources of Lake Kariba. In addition, these various statutory bodies are also subordinate to regional and international policies which further complicates matters.

# 3 FISHERIES-SPECIFIC MANAGEMENT OBJECTIVES

## 3.1 Vision

Towards a future with healthy aquatic ecosystems, a plentiful and profitable fish supply, and thriving fishing communities.

## 3.2 Mission

To manage the Lake Kariba Inshore Fishery resources in an efficient, innovative and environmentally friendly manner based on scientific information and good governance.

## 3.3 Main Goal

The main aim of the fisheries management plan is to achieve the optimal and sustainable utilization of the fishery resource for the sustainable benefit of humankind whilst safeguarding the ecosystem.

## 3.4 Long-term objectives

a. To maintain the fish stock above 50% of its mean unexploited level at all times (biological)
b. To maintain all non-target, associated and dependent species above 50% of their mean biomass levels in the absence of fishing activities (ecological)
c. To maximise employment opportunities for those whose livelihoods are dependent on the fishery (social)
d. To maintain the species of economic importance at or above the levels necessary to ensure their continued productivity (biological)
e. To minimise the impacts of fishing on the physical environment and on non-target (bycatch), associated and dependent species (ecological)
f. To maximise the net incomes of the participating fishers (economic)

## 3.5 Short-term objectives

a. Improve the governance of the Inshore Fishery value chain
b. Reduce the illegal, unregulated and unreported fishing in the Inshore Fishery of Lake Kariba
c. Reduce the use of unsustainable fishing methods and use of illegal fishing gear
d. Improve fishers' resilience to ecological and environmental changes
e. Improve surveillance and enforcement in the Inshore Fishery
f. Improve research, data and information collection and dissemination
g. Promote the social inclusion exploitation and management of the fishery
h. Improved post-harvest practices for fish loss and waste reduction to minimise Post-harvest loss in fisheries (PHFL)
**i.** Monitor and manage fish diseases (Aquatic Animal Health Plan)

### 3.6 Vision, Upgrading Strategy and Theory of Change (August 2023-July 2033)

The vision, implementation strategy and theory of change are illustrated in Figure 2.

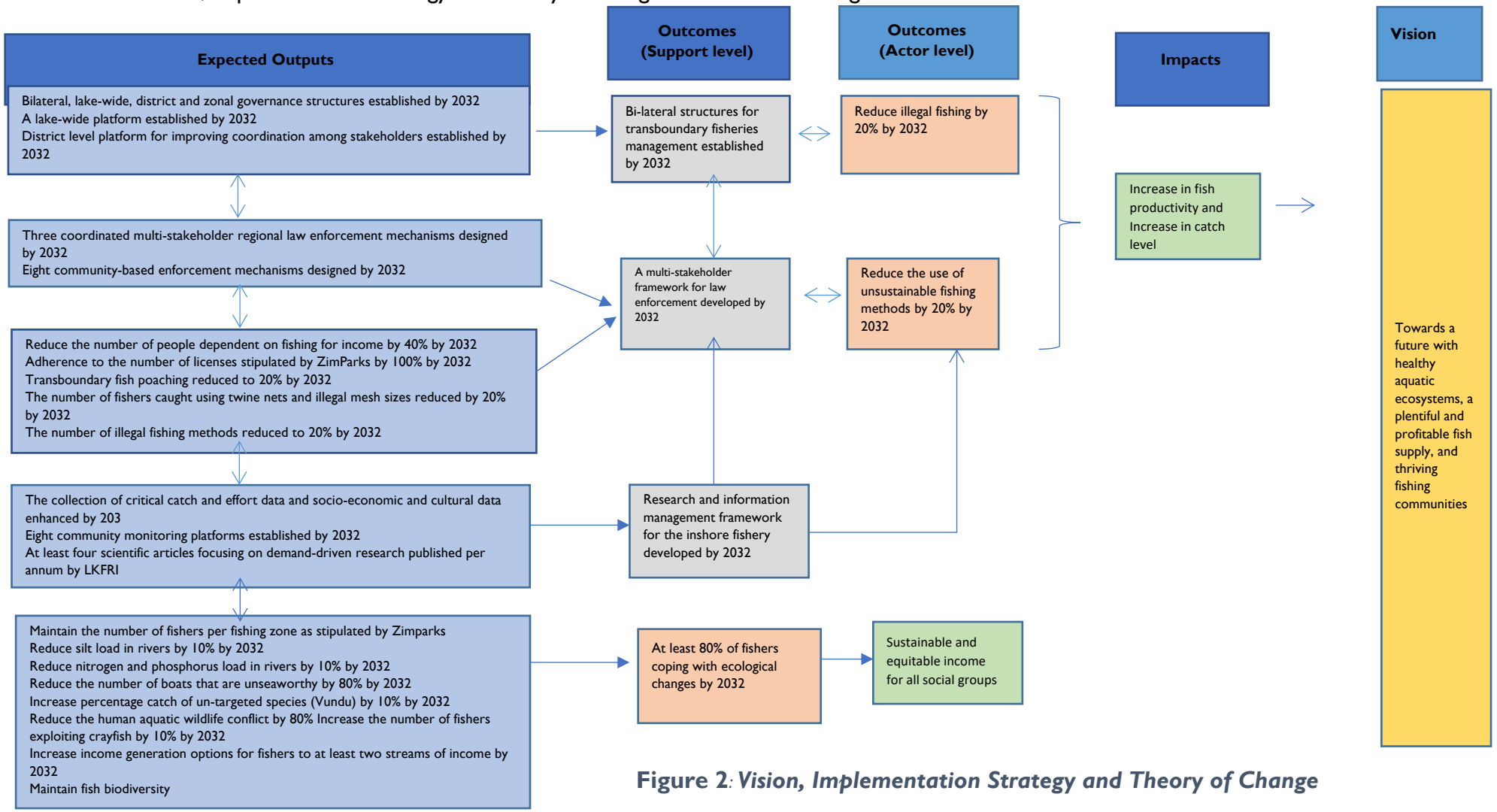



**Figure 2**: *Vision, Implementation Strategy and Theory of Change*

# 4 SPECIFIC FISHERIES MANAGEMENT REGULATIONS

## 4.1 Fishing Permits

To use gillnets within the lake, one needs a fishing permit. Permits for fishers operating from communal areas are issued by Rural District Council and fishers operating from state land get their permits from LKFRI. The majority of rod and line fishers are subsistence fishers who fish for domestic consumption while a small percentage fish for selling. They usually buy daily fishing permits from LKFRI or any local ZimParks office. Local anglers (Kariba Town side) who fish for consumption have no bag limit. There are about 25 anglers who go fishing each day and they pay an equivalent of US$1 per day, which is an 80% waiver from the normal US$5 per day. There are also about 50 under privileged persons who benefit from a 100% waiver and they are allowed to fish for free for 3 days per week.

## 4.2 Closed Areas

Areas that are adjacent to National Parks and the Leisure Bay that are closed to fishing as the shoreline provides (a) breeding reservoirs for species such as breams; (b) valuable sites for research in respect of a variety of aquatic and terrestrial species and; (c) aquatic life that should be set aside for tourism. Rivers and estuaries are also closed to fishing as such habitats are important breeding sites for fish. The following areas are permanently closed from gillnet fishing:

- The whole shoreline from the dam wall to Arch Gap (Zebra Island)
- All rivers and river mouths
- Area within three kilometres radius of any river mouth
- The whole shoreline of the Sanyati River mouth to the Ume River mouth with the exception of Kings Camp
- The Bumi Resort Area
  - (i) Eastern boundary –straight line from Bumi harbour to Starvation Island
  - (ii) Western boundary – harbour opposite Bumi hotel airstrip
- Area between Elephant Island and Kangamani Island
- Any area defined as a bay

## 4.3 Gill net specifications

Gill net specifications are designed to limit catch effort in order to avoid overfishing and avoid catching small fish to ensure recruitment. Each licensed fisher is allowed to use 5 nets that are 100 metres long when set in water. The mesh size of the nets should be above 102 mm and made using multifilament cotton nets. Twine (monofilament) gill nets are not allowed in Lake Kariba's Inshore Fishery on the Zimbabwean side because they continue ghost-fishing once discarded or entangled within the lake.

## 4.4 Closed season

During the full moon period, the fishery is closed to fishing. This regulation was instituted to in order to reduce fishing days so that the fishery can replenish. No fishing shall be conducted during the full moon period, all fishing nets shall be removed from 0600hrs to 0800hrs of the

first day of the full moon stoppage and setting of gillnets shall be from 1600hrs to 1800hrs on the last day of the full moon stoppage.

### 4.5 Fishing timetable hours

The setting of gillnets, Monday to Friday, shall be from 1600 hours to 1800 hours, and on Sunday/last day of public holiday from 1800 hours to 1900 hours to accommodate other lake users.

Pulling of gillnets shall be from 0600 hours to 1000 hours Monday to Friday, 0600 hours to 0800 hours on Saturdays. (Saturday 0800 hours to pave way for other lake users).

No movement of boats in the lake/ Zambezi River after 1800 hours and before 0600 hours except for Sunday/last day of the public holiday which is 1800 hours to 1900 hours for setting of nets.

During the winter season, (May to July) setting time is from 1500 hours to 1600 hours during the week and Sunday from 1700 hours to 1800 hours.

### 4.6 Fishing Boundaries

The artisanal fishery is divided into 8 designated zones (Zone 1 to Zone 8) across the lake (Figure 3). The demarcation is partly historical. Previously there were 14 areas separated racially but were collapsed into 8 larger fishing concessions in 1972 and into 7 in 1976 (Marshall et al., 1982), but now rezoned to 8. About 470 $km^2$ (63%) of the fishable water on the Zimbabwean side is available for the Inshore Fishery (Marshall et al., 1982). Fishing is conducted from 41 fishing camps/villages (six are fishing camps and 35 are fishing villages) scattered across the lake shore within seven fishing areas (Zone 1 to Zone 8). Zone 1 and Zone 3 are under the control of ZimParks. Zone 2, Zone 4 and part of Zone 5 are under the jurisdiction of the Nyaminyami Rural District Council. The other part of Zone 5 through to Zone 8 falls under Binga District Council (LKFRI, 2011).

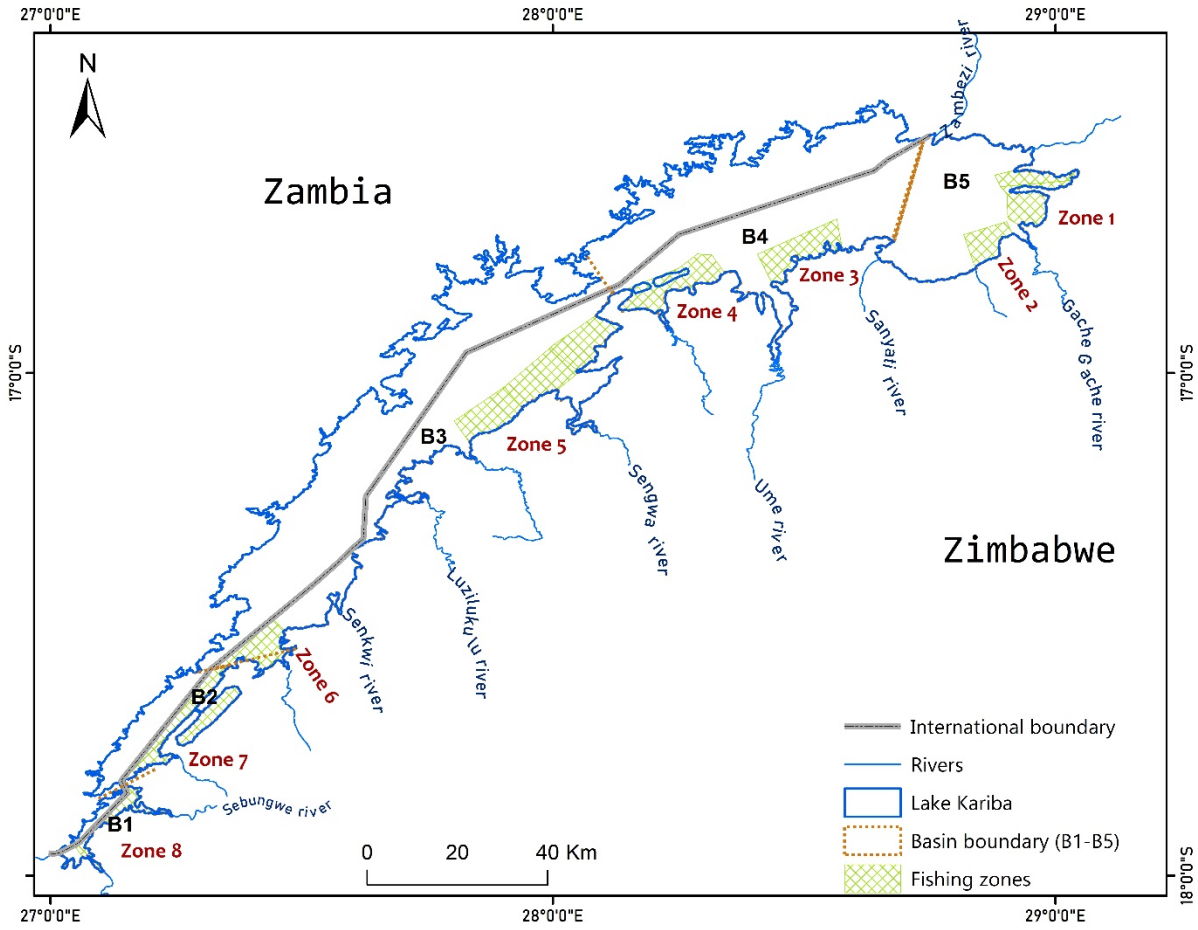



**Figure 3: Map of Lake Kariba showing designated fishing zones Zone 1 to Zone 8 (Source: ZimParks Head Office)**

## 5 JUSTIFICATION FOR THE FISHERIES MANAGEMENT PLAN

Fish yields in the lake in all zones have been declining over the years due to several factors which include overfishing, the use of unsustainable fishing practices and changes in ecological and environmental conditions in the lake. Fisheries production and yield are limited by biological, ecological and environmental factors and constrained by several technological, social, cultural, and economic considerations. To effectively and sustainably manage the fishery, it is important to establish an inclusive management framework based on ecosystem approaches.

## 6 KEY SUCCESS FACTORS

*It is possible that communities can become effective institutions for sustainable resource management, but only if they are granted genuine proprietorship, that is the right to use resources, determine the mode of usage, benefit fully from use, determine the distribution of such benefits and determine rules of access – Murphree, 1995*

- The boundary for each community fishing area should be clearly defined and users should have exclusive fishing rights.
- The membership should be clearly defined where the unit of management is also the unit of appropriation.

- Use an ecosystem and co-management approach to fisheries management where cooperative arrangements that bring together other lake users and stakeholders (including kapenta fishers and tourist operators) are established and strengthened for integrated management of the community fishing area.
- Mutual respect and understanding among key actors in the co-management arrangement with secure fishing rights to the fishery.
- Develop the capacity for local government units and leadership of fishers to comanage the fisheries.
- The principle of subsidiarity should be applied where decisions are made by the people closest and most affected by the issues and concerns.

## 7 PILLARS OF THE INSHORE FISHERY MANAGEMENT PLAN

The main aim of the fisheries management plan is to achieve the optimal and sustainable utilization of the fishery resource for the sustainable benefit of humankind whilst safeguarding the ecosystem. The goal will be delivered using the following nine pillars.

### 7.1 Improve the governance of the Inshore Fishery value chain

**Key Issues**

Although the fishery is an international resource, particularly in Basin 1 and 2 where the lake is narrow and fish freely move between the two shorelines, there are no international resources governance systems in place. Although there is a "***Protocol on Economic and Technical Cooperation between the Government of the Republic of Zimbabwe and the Government of the Republic of Zambia concerning management and development of fisheries on Lake Kariba and the Transboundary Waters of the Zambezi River***" it has not been fully institutionalised. Hence there is no functional bilateral institution governing inshore fisheries management.

There is need to strengthen formal institutions that provides a framework for dialogue among key stakeholders managing the lake and lakeshore resources at the District level. A series of laws provide various government departments with jurisdiction over the different lake and shoreline resources and a mandate to protect and manage them on a sustainable basis. The Parks and Wildlife Act (Chapter 20:14) of 1996, gives ZimParks the ultimate authority to control and manage fisheries and wildlife. The lake and lakeshore resources are currently being administered by ZimParks, Nyaminyami and Binga Rural District Councils. The Rural District Council Act (Chapter 29:13) empowers the Rural Districts to manage natural resources within their jurisdiction. It also gives the RDCs power to enact legally binding land use and conservation by-laws that apply in their jurisdiction. ZimParks has also given Rural District Councils Appropriate Authority to manage wildlife and fisheries within their jurisdiction but RDCs have no authority to independently enforce compliance within the lake. The Environmental Management Agency Act (Chapter 20:7) also provides EMA with the power to sustainably manage natural resources and protect the environment. The Traditional Leaders' Act (Chapter 29:9) gives power to traditional leaders to enforce management regulations designed to protect the environment and natural resources management in their

area. These legal instruments, though quite comprehensive, tend to conceptualize different stakeholders in isolation and adopt a narrow sectoral approach to natural resources management. There are no cohesive means of coordinating all the legislation governing the lake and lakeshore resources.

Lake Kariba is a recreational park and fishers compete for space in both the lake and within the lakeshore with other users. Intra – sector conflicts are very common. However, there is no platform for dialogue among the various users both at the district and zonal levels. Besides fishing, there are many activities that include safari operators who offer a range of services such as hunting, sport fishing and photography. There is no framework on how the different stakeholders should cooperate to ensure the sustainable management of natural resources and also maintain healthy aquatic ecosystems and fisheries. Although the Kariba Lakeshore Combination Master Plan provides the basis for cooperation, the provisions of the document have not been fully utilised and need to be reviewed and updated. The governance system of the Lake Kariba Inshore Fishery will be delivered through the following results and outputs (Table 2):

**Table 2: Strategies for improving the governance system of the Inshore Fishery of Lake Kariba**

| Expected Outcomes | Expected Outputs | Strategic interventions |
|---|---|---|
| Bilateral, lake-wide, district and zonal governance structures established by 2032 | Bi-lateral structures for transboundary fisheries management established by 2032 | Set up a robust bilateral platform for the management of the Inshore Fishery comprising Zambia and Zimbabwe<br><br>Set up common and unified fisheries management system across the southern and northern lakeshores |
| | A lake-wide platform established by 2032 | Establish a lake-wide platform comprising of ZimParks, Binga RDC, Nyaminyami RDC, Kariba Town Council and DIFA representatives<br><br>Set up lakeshore resources and fisheries management systems across the lake on the Zimbabwean side |
| | District level platforms for improving coordination among stakeholders established by 2032 | Establish district level consultative platforms comprising of ZimParks, law enforcement agents, environmental management agents and rural district council, SAFA and local chiefs (as ex-officials) and other interested stakeholders<br><br>Prepare district implementation plans, standards, and guidelines for sustainable inshore fisheries management and development of Inshore Fishery that are tailored to local contexts |
| | A multi-stakeholder zonal platform established by 2032 | Form zonal management committees consisting of inshore fishers and stakeholders sharing lakeshore and lake resources with fishers and local chiefs to coordinate the management of resources there in<br><br>Co-develop zonal land-use plans and integrated land use management plans taking into account local context and cultural issues<br><br>Undertake spatial planning and zoning |

| | | |
|---|---|---|
| | | Build the capacity of traditional leaders to provide an active role in fisheries management<br><br>Re-orient fisheries officers and community leaders on principles, practice and benefits of co-management |

### 7.2 Reduce the illegal, unregulated and unreported fishing in the Inshore Fishery of Lake Kariba

**Key Issues**

The fishers indicated that there has been an unprecedented increase in the number of illegal inshore fishers over time. The natural population growth and emigration have increased the number of people depending on fishing for a livelihood. Fishers harbour unlicensed people who would also end up buying their own fishing gear and fish illegally. This is accentuated by unemployment and lack of alternative income generating activities. Although a permit is issued to one person, the holder is allowed to employ two people. The employees are supposed to assist the license holder in fishing operations such as setting and repairing nets. The current illegal practice has been that each employee has his own nets and, in some cases, even a boat. Cooperative members are allowed to use a certain number of nets per cooperative. However, the current practice is that each cooperative member owns fishing gear. Controlling the number of people in the fishing villages and on the lake has become a mammoth task for authorities. If unlicensed fishers are caught on the lake, they always claim that they are employees of a licensed fisher or a member of a cooperative. There has been an influx of people fishing using hook and line who also catch a lot of fish. In many parts of the lake, they fish without a fishing permit. All these developments have led to the reduction in units of water per licensed fisher.

There has been an increase in the number of people fishing off National Parks and from islands. There are reports of cross border fishers who camp on islands and fish illegally. This is accentuated by the fact that there is no joint enforcement system between Zambia and Zimbabwe. There is an increase in the number of unlicensed inshore fishers fishing in closed areas, islands and rivers. Anyone with money can access fishing boats on the pretext that their boat is for sport fishing. The fish is sold to traders who access the illegal landing sites using motorised boats.

Rod and line fishers are licensed by ZimParks especially in Kariba town and pay a daily fee. Within a fishery, offtake from rod and line is assumed to be minimal. The concern on Lake Kariba is that they use illegal fishing methods like jigging and could be specifically targeting Tigerfish, especially in riverine areas.

There has been an increase in inshore fishers beyond the stipulated number prescribed by ZimParks. The increase is alleged to arise from Rural District Councils issuing more fishing licenses than recommended by ZimParks. There are reported cases of registered

cooperatives that are fishing without a fishing permit. In some cases, they have even opened their own undesignated fishing villages/camps.

Licensed fishers complain that even though they pay the permit fee, the increase in the number of free riders makes them very reluctant to continue paying to get fishing permits. Under these circumstances, the unit of management is not the unit of appropriation. It becomes difficult for fishers to participate in fisheries management where they cannot appropriate fully the gains of management. Reducing the number of illegal fishers to a desirable level is beyond the capacity of the ZimParks and Rural District Authorities alone. Thus, reducing the number of illegal fishers within the Lake Kariba Inshore Fishery will be delivered through the results and outputs presented in Table 3.

**Table 3: Strategies for reducing illegal, unregulated and unreported fishing in the Inshore Fishery of Lake Kariba**

| Expected Outcomes | Expected Outputs | Strategic interventions |
|---|---|---|
| Reduce illegal fishing by 20% by 2032 | Reduce the number of people dependent on direct fishing for income by 40% by 2032 | Encourage and support fish-related income-generating projects such as fish farming for people who do not have fishing permits and elderly fishers<br><br>Encourage and support alternative sources of income along the fisheries value chain e.g. gear dealership, boat making and repairing where possible<br><br>Encourage and support other non-fishing income generation projects such as gardening, poultry where possible<br><br>Set up credit facilities such as ISALs to raise affordable loans to community members that need to diversify income sources away from fishing<br><br>Strengthen community surveillance (through the establishment of anti-poaching units) to curb local unlicensed fishing by ZimParks and RDCs<br><br>Undertake community management and surveillance to address illegal fishing by licensed fishers |

| Expected Outcomes | Expected Outputs | Strategic interventions |
|---|---|---|
| | | Empower and support SAFAs to monitor the activities of all illegal settlers in the camp or village<br><br>Issue IDs annually to licensed fishers and their workers for easy identification while fishing on the lake<br><br>Undertake enforcement of the use of IDs and ensure that those who have left the fishery do not continue using them<br><br>Organise joint operation with ZimParks and fishers in fishing areas to weed out illegal fishers and their nets<br><br>Issue licenses in consultation with SAFAs, traditional leaders and/or camp leaders to ensure that priority is given to local inhabitants<br><br>Increase the enforcement of the bag limit |
| | Adherence to the number of permits stipulated by ZimParks by 100% by 2032 | Establish collaboration between ZimParks and the Ministry of Small and Medium Enterprises and Cooperative Development<br><br>Organise joint operations with ZimParks, ZRP, ZNA and SAFA to evict fishers operating in undesignated fishing villages/camps |
| | Transboundary illegal fishing reduced to 20% by 2032 | Strengthen bi-lateral fisheries management institutions and harmonise enforcement systems at the bilateral level |

### 7.3 Reduce the use of unsustainable fishing methods and use of illegal fishing gear

**Key Issues**

The number of illegal fishing nets has been increasing over time. The increase in the use of illegal gill nets is largely caused by easy access to monofilament gill nets for everyone, including those without valid fishing permits. In the past to ensure that permissible nets are only

accessed by gillnet fishers, fishing nets were supposed to be bought from a registered dealer or manufacturer. The dealer or the manufacturer was supposed to sell nets only to people with valid fishing permits. The dealers were supposed to keep a record of transactions. This would allow ZimParks to check on mesh size (only nets of not less than four-inch mesh are allowed) and that nets were in the hands of only people with valid permits. Nets of different mesh sizes including twine nets which are prohibited are being used. Although the nets are attributed to ghost fishing, their use is increasing largely because they are very cheap to purchase. The net is not durable, hence the number used per fisher in a year is high. It is also alleged that twine nets catch double the fish caught in nylon nets. As long as this notion is not proved otherwise, many more fishers will continue to use twine nets.



**Photo 1 : Canoes used for fishing in Lake Kariba**

There has been an increase in the use of smaller mesh sized nets to target fish that escape through the four-inch nets. Such fish species include squeakers (*S. zambesensis*), Imberi (*Brycinus imberi*) and Silver Catfish (*Schilbe intermedius).* Fishers complain that using 4-inch nets in a fishing ground that they share with Zambian fishers who use three-inch nets and below does not make sense. Zimbabwean fishers said that complying with the minimum mesh size requirement has a taxing effect on them, especially in Basin 1 and 2.

There has also been an unprecedented increase in the use of other illegal fishing practices that destroy fish nests and kill juvenile fish. These include fish driving, throw nets and seine netting. In most cases, the fishers would use small mesh-size nets. Fish driving and throw nets disturb breeding fish and destroy fish nests. In some parts of the lake, some people trap fish using baskets. The baskets are not selective and would catch fish of all sizes. There is a marked increase in illegal fishing practices, including fishing in breeding sites and fish reserves. The goal

of protecting the breeding stock and their juveniles so as to allow for regeneration is not being realised.

The 2011 Frame Survey showed that 65% of the fishers are new entrants. Consequently, the new entrants were not part of the group that received training on fisheries management that was conducted in the late 1990s. Most of the new fishers may engage in destructive fishing methods out of ignorance. Reducing the use of unsustainable fishing methods will be delivered through the results and outputs presented in Table 4.

**Table 4: Strategies for reducing the use of unsustainable fishing methods and use of illegal fishing gear**

| Expected Outcomes | Expected Outputs | Strategic Interventions |
|---|---|---|
| Reduce the use of unsustainable fishing methods by 20% by 2032 | The number of fishers caught using twine nets and illegal mesh sizes reduced by 20% by 2032 | Undertake education and awareness campaigns on the advantages of using stipulated mesh sizes and cotton nets supported by increased availability of legal fishing gear<br><br>Incentivise manufactures of legal fishing gear to make it readily available<br><br>Increase the number of patrols which include law enforcement agents and community resources monitors<br><br>Organise joint operations that bring together fishers, the private sector and ZimParks<br><br>Encourage and support fishers/entrepreneurs to open and run fishing gear dealer shops that sell fishing nets (with appropriate mesh size) and other accessories within the fishing zone<br><br>Harmonisation of fishing gear regulations to be used in Lake Kariba inshore fishery at a bilateral level<br><br>Undertake education and awareness campaigns on appropriate fishing practices and their rationale |

| Expected Outcomes | Expected Outputs | Strategic Interventions |
|---|---|---|
| | The number of illegal fishing methods reduced to 20% by 2032 | Undertake education and awareness campaigns on the dangers of unsustainable fishing practices<br><br>Conduct joint SAFA, ZimParks and RDC patrols<br><br>Increase penalties for the offenders<br>Encourage cooperative members to sign a code of conduct |
| | Reduce the number of fishers fishing in protected areas | Improve surveillance systems in protected non-fishing zones<br><br>Improve monitoring of closed areas<br><br>Protect fish spawning sites |

### 7.4 Improve fishers' resilience to ecological and environmental changes

**Key Issues**

The aquatic ecosystem has been going through many changes that threaten the livelihood of fishers and those dependent on the Inshore Fishery. Over the years, the lake and lakeshore resources are being threatened by climate change and other emerging economic activities happening within the catchment area. Climate change and the abstraction of water for hydropower generation have resulted in increased lake level fluctuations. To the fishing communities, such impacts translate into the reduction of fishing grounds, which in turn results in gear congestion in a limited space and hence a decline in catch per unit effort. Low lake levels have also reduced the size of the breeding sites in some cases. To ease gear congestion, there are reports of increased fishing in non-fishing zones.



**Photo 2: Fisherfolk posing with his catch, Cornish Jack**

The fish habitat is under threat from several economic activities that in turn threaten fish populations and human life. In the recent past, there has been an increase in other economic activities such as gold panning and agriculture that also release pollutants into the lake. Upland agriculture through land clearing and subsequent operations increases soil erosion and reduces water retention capacity leading to poor water quality. The number of boats on Lake Kariba has been increasing over the years. This has led to very high oil and fuel pollution due to accidental leakages or spillage from engines and/or deliberate waste oil dumping into the lake thus reducing water quality. The increased nutrient levels in rivers, sewage effluent from urban areas, as well as fertilizer-rich runoff from agriculture, has the potential of increasing aquatic plant growth. Excessive growth of aquatic plants such as water hyacinth (*Eichhornia crassipes*), water lettuce (*Pistia stratiotes*), Kariba weed (*Salvinia molesta*) and water fern (*Azolla*) can cause fish mortality due to deoxygenation upon decomposition and provide breeding substratum for bilharzia-carrying snails and mosquitoes. If unchecked, this may negatively affect biodiversity.

There has been an increase in invasive species and other animals that threaten the fishery and human life. The red-claw crayfish (*C. quadricarinatus*), which was recently introduced in the lake has been reported to feed on fish that are caught in the nets and also compete for food with other commercial fish species. With a very limited shoreline, there has been a marked increase in the concentration of crocodiles and hippos in limited space, thus increasing the human – wildlife (crocodiles and hippos) conflicts. Besides, crocodiles are also competing for fish with the fishers. In some cases, they eat fish caught in nets and destroy nets, thus increasing the cost of fishing. The culling of crocodiles and hippos has not been done for several years now.

The fishing industry has not been adaptive to the changing environment. For example, the Inshore Fishery targets a few species that can only be caught in 4-inch nets. Catch per unit effort based on these species has been going down, while the population of untargeted fish species has been going up. Such species include squeakers (*S. zambezensis*) and the vundu (*Heterobranchus longifilis*). Increasing the number of fishers coping with the environment and ecological changes will be delivered through the results and outputs as shown in Table 5.

**Table 5: Strategies for improving fishers' resilience to ecological and environmental changes**

| Expected Outcomes | Expected Outputs | Strategic Interventions |
|---|---|---|
| At least 80% of fishers coping with ecological changes by 2032 | Maintain the number of fishers per fishing zone as stipulated by Zimparks | Weed out illegal fishers through joint enforcement<br><br>Apply adaptive fisheries management and precautionary approaches and principles |
| | Reduce silt load in rivers by 10% by 2032 | Undertake awareness campaigns against streambank cultivation jointly with EMA<br><br>Strengthen catchment protection institutions to protect watersheds<br><br>Monitor changes in water quality for silt load |
| | Reduce nitrogen and phosphorus load in rivers by 10% by 2032 | Undertake awareness campaigns against streambank cultivation jointly with EMA<br><br>Strengthen catchment protection institutions<br><br>Monitor changes in water quality for nitrogen and phosphorus |
| | Reduce the number of boats that are unseaworthy by 80% by 2032 | Undertake inspections of vessels for environmental compliance<br><br>Encourage the use of dry docks for repairing and maintenance of boats<br><br>Work with University Innovation hubs to come up with technology for houseboats, kapenta fishing rigs and other sport fishing boats to solarise |
| | Increase percentage catch of un-targeted species (Vundu) by 10% by 2032 | Undertake research to find technology to exploit Vundu and other untargeted species |

| Expected Outcomes | Expected Outputs | Strategic Interventions |
|---|---|---|
| | Reduce the human aquatic wildlife conflict by 80% by 2032 | Undertake education and awareness to assist fishers to co-exist with aquatic animals<br><br>Construct designated places for gutting fish away from the shoreline (waste from fish attracts crocodiles)<br><br>Work with the local communities to deal with (relocate or kill) problem aquatic animals |
| | Increase the number of fishers exploiting crayfish by 10% by 2032 | Educate fishers on how to catch crayfish as a strategy to also diversify income sources<br><br>Establish an export market for crayfish<br><br>Educate locals on how to prepare crayfish to create local demand for crayfish |
| | Increase income generation options for fishers to at least two streams of income by 2032 | Increase awareness of other alternative livelihood options<br><br>Link fishers to high paying fish markets |
| | Monitor fish biodiversity | Undertake a re-mapping of areas important for fish breeding and focus management interventions on these areas<br><br>Research on the impact of crayfish on aquatic biodiversity<br><br>Adopt indigenous knowledge systems and practices where possible<br><br>Promote a platform for intersectoral management of the shoreline and protect the aquatic ecosystem and fisheries |

### 7.5 Improve monitoring, surveillance and enforcement in the Inshore Fishery

**Key Issues**

The surveillance and enforcement of fishing regulations are fragmented and inefficient. The government departments (ZimParks, Rural District Councils and the Zimbabwe Republic Police) responsible for surveillance are understaffed and under-resourced to effectively

enforce compliance of management regulations leading to the widespread violation of the fisheries management regulations. The RDCs guards are not mandated to do law enforcement on the lake without ZimParks. There is also a joint law enforcement team that brings together ZimParks, Zimbabwe National Army and the Zimbabwe Republic Police. However, it does not have a full-time presence in the fishing communities because of resource constraints. Recently, the private sector has been involved in some parts of the lakeshore. However, their operations are limited to terrestrial resources only.



**Photo 3: Lake Kariba Fisheries Research Institute Pelican Boat**

There is no involvement of the fishing communities in the surveillance system. In most cases, illegal fishers are related to or know at least a fisher and there is no whistle-blowing system that is in place. Fishers said that fear of witchcraft and losing important social relations make it impossible to self-police each other. Also, community institutions have no arresting powers.

Technologies used in other fisheries are not being used to improve surveillance. This could be attributed to lack of resources and knowledge. Therefore, the fishery is held as *de facto* open access largely because of the inability of the state to maintain its presence in all the fishing areas. The improved enforcement system of the Lake Kariba inshore fishery will be delivered through the results and outputs in Table 6.

**Table 6: Strategies for improving the monitoring, control and surveillance and enforcement in the Inshore Fishery**

| Expected Outcomes | Expected Outputs | Strategic interventions |
|---|---|---|
| A multi-stakeholder framework for law enforcement developed by 2032 | Three coordinated multi-stakeholder regional law enforcement mechanisms designed by 2032 | Establish three joint regional level (ZimParks administrative regions) surveillance and enforcement teams comprising ZimParks ZRP, Rural District Councils, private sector and fishers<br><br>Design plans and programmes for regional level (ZimParks administrative regions) surveillance and enforcement of fisheries management regulations |
| | Eight community-based enforcement mechanisms designed by 2032 | Provide support to the continued organisation, development and running of SAFA structures<br><br>Provide legal recognition of community-level fisheries management institutions and confer rights of management over fisheries resources in their areas<br><br>Establish a whistle blowing system within the system with external support from regulators<br><br>Strengthen enforcement mechanisms at SAFA level through training<br><br>Train the community on the importance and relevance of fisheries management |
| | Technology in the fisheries surveillance system incorporated by 2032 | Undertake feasibility study of what technologies are most appropriate for improving fisheries monitoring at national, regional and community levels<br><br>Adopt appropriate technology for holistic implementation of Monitoring Control and Surveillance |

### 7.6 Improve research, data and information collection and dissemination

**Key Issues**

Fisheries management decisions are based on very limited information. The process of collection and compilation, analysis and dissemination of information is very important for the planning, management, monitoring and evaluation of fisheries resources. However, there is limited information on catch levels, effort and socio-economic data. For example, the decision on the number of annual permits and the annual fee of the fishing permit are based on outdated and limited information. The frame surveys, catch assessment surveys and fish stock assessments which provide baseline data and information for tracking changes in the fishing effort are now very infrequent. Therefore, the exact number of people engaged in fishing, the number of fishing gear in use and their distribution across the lake shore are not known. Frequent monitoring is required since fisheries management decisions can only be arrived at after monitoring the size of the biomass over a period of time.

The participation of fishers in collecting such information is very limited. Very few fishers appreciate the importance of the catch and effort statistics and information generated from experimental gill netting and frame surveys.



**Photo 4: Fishermen canoeing in Lake Kariba**

Currently, LKFRI which is supposed to undertake demand-driven research on biological, social and economic aspects of the Inshore Fishery necessary for improving decision making is understaffed and underfunded. Major fisheries management decisions are based on very limited knowledge of the fishery resource dynamics and biomass, the cost structure of extracting the fish and institutional dynamics. The monitoring system of the Lake Kariba Inshore Fishery will be delivered through the results and outputs in Table 7.

**Table 7: Strategies for improving research, data and information collection and dissemination**

| Expected Outcomes | Expected Outputs | Strategic interventions |
|---|---|---|
| Research and information management framework for the inshore fishery developed by 2032 | The collection of critical catch and effort data and socio-economic and cultural data enhanced by 2032 | Establish an overall fisheries data collection system by LKFRI of ZimParks<br><br>Apply methodologies and tools that exist on data poor fisheries for management decision making<br><br>Train fishers to collect important information for monitoring the watershed and the ecosystem<br><br>Use fisher's local indigenous knowledge in fisheries management<br><br>Strengthen a community-based fisheries data collection system<br><br>Provide advice, training and technical support to fishing communities on data collection<br><br>Develop a system to record catch from rod and line fishers<br><br>Recruit more staff (LKFRI 1 Senior Ecologist, 2 ecologists, 1 socio-economist/social scientist, 2 research rangers; Binga 2 research rangers) |
| | Eight community monitoring platforms established by 2032 | Train fishers on record keeping on socio-economic data (that is, the number of fishers, boats and the number of nets per fisher and their sizes)<br><br>Engage the fishing community in routine catch assessment surveys in their fishing grounds<br><br>Adopt technologies for data collection in the Inshore Fishery, for example, the use of electronic data collection systems<br><br>Share experiences on processes and tools on data collection and management (Resuscitation of joint research |

| Expected Outcomes | Expected Outputs | Strategic interventions |
|---|---|---|
| | | programmes with Zambia and strengthen data sharing between the two countries) |
| | At least four scientific articles (including socio-economic studies) on Lake Kariba focusing on demand-driven research published per annum by ZimParks | Engage Universities or Regional Fisheries Bodies to build the capacity of ZimParks, and RDC staff on fisheries research, socio-economic and institutional research<br><br>Set up funding mechanisms for supporting demand-driven research necessary for enhancing fisheries management and development<br><br>Establish and maintain a system of monitoring the quality of the aquatic ecosystem that supports active fisheries management and development<br><br>Share key research results through zonal meetings and newsletters<br><br>Upload more information on LKFRI website |

### 7.7 Promote social inclusion in the exploitation and management of the Inshore Fishery

The inshore fishing industry is male dominated. The role of women and youth, heads of child-headed households and people living with disabilities in the fishery is generally limited due to lack of productive assets and barriers to accessing finance. Women and youth use hook and line to fish for both household consumption and selling off the surplus which limits the share of benefits they get from the fishing industry. Recently, hook and line fishing has become very dangerous due to an increase in incidences of human-crocodiles' conflicts. Most women are involved in gill net fishing as cooperative members. However, their participation is restricted to mending nets and processing fish due to strong gender stereotypes on women's roles and perception of their competencies. Most men do not want their spouses to participate in activities that take them away from their homes over extended periods of time and in environments that involve other men in their absence. Besides, the burden of care work ties women to work around the homestead leaving little or no time to take advantage of the income opportunities from the fisheries industry. It is critical to assume a multi-pronged strategy to promote the inclusion of other social groups.

The promotion of the inclusion of other social groups in fisheries management in Lake Kariba Inshore Fishery will be delivered through the following results and outputs (Table 8):

**Table 8:** ***Strategies for promoting social inclusion in the exploitation and management of the Inshore Fishery***

| Expected Outcomes | Expected Outputs | Strategic interventions |
|---|---|---|
| Increase the percentage of women, youth and PLWD involved in the exploitation of the fishery by 10% (for each social group) by 2032 | Increase the participation of women, youth and PLWD by 30% (10% for each group) | **Strengthening women and youth's participation** by leveraging on existing core competencies based on where they are already engaged in the value chain. For example, women and youth could be supported in upgrading technology on mending and repairing fishing nets, equipment for fish processing and digital platforms for fish marketing.<br><br>**Reduce the barriers to entry and participation for women and youths**. For example, support women and youth groups to access asset finance to invest in inshore fishing boats. Income Savings and Lending Schemes (ISALS) will be introduced to catalyse group savings and ensure sustainability.<br><br>Determine the possibility of a reallocation of permits at some point since current effort cannot be stretched further<br><br>Undertake promotion and support to the entire value chain to promote inclusion<br><br>Determine ways to improve the safety conditions for inshore fishers |
| | Increased participation of women, youth and people living with disabilities in the management of the inshore fishery by 2032 | Empower women, youth and PLWD to exercise their rights and participate in the fish value chain and the management of the inshore fishery through training<br><br>Create gender balance in fisheries management through social transformation training targeting SAFA leadership and undertake community dialogues on gender<br><br>Progress monitoring tools should be gender and age disaggregated |

### 7.8 Monitor and manage fish diseases (Aquatic Animal Health Plan)

The country requires more experienced fish veterinarians and fish disease experts. Disease threats from the wild and high-intensity freshwater aquaculture development are highly likely

to threaten the viability of the Inshore Fishery sub-sector. To date, the country has limited facilities or laboratories for fish disease detection and monitoring. The fish disease management and monitoring will be delivered through the following outcome and outputs (Table 9):

**Table 9: Strategies to monitor and manage fish diseases (Aquatic Animal Health Plan)**

| Expected Outcomes | Expected Outputs | Strategic interventions |
|---|---|---|
| Establishment of fish disease detection and monitoring framework by 2032 | Framework for fish diseases prevention, detection and monitoring system established by 2032 | Strengthen and improve already existing laboratories in the Veterinary Department to include fish disease prevention, detection and monitoring at the national level<br><br>Promote and develop a national biosecurity code covering fish disease prevention and control mechanisms<br><br>Set up fish disease monitoring and surveillance systems and mechanisms of ensuring that any outbreak is timely reported and actions are taken to address the outbreak<br><br>Strengthen collaboration with existing centres in the country and region which provide disease surveillance<br><br>Set up strategic partnerships with other regional laboratories for fish disease diagnostics<br><br>Development of capacity within the Veterinary Department and ZimParks on fish health management |

### 7.9 Finance the implementation of the Inshory Fishery Management Plan

There are no funding mechanisms for undertaking research, financing management activities and monitoring inshore fisheries resources. There are no mechanisms for ploughing back resources generated in inshore fishery-related activities. Funds for financing the implementation of the Inshore Fishery Management Plan will be delivered through the following outcome and outputs (Table 10):

**Table 10: Strategies for financing the implementation of the Inshore Fishery Management Plan**

| Expected Outcomes | Expected Outputs | Proposed interventions |
|---|---|---|
| Increase in funds for implementing activities of the Inshore Fishery management plan by 30% by 2032 | Improved revenue collection system established by 2032 | Identify additional potential direct and indirect sources of income |
| | Increase the revenues streams by at least 5% by 2032 | Increase partnerships in the management and development of the fishery<br><br>Develop a reinvestment policy into the inshore fishery by RDCs<br><br>Adopt the user-pay principle (including payment by fishers for fisheries management)<br><br>Develop fundable research proposals to access donor funds<br><br>Lobby for funds from Development Agencies<br><br>Lobby the government for additional finances |

## 8 Access to markets

One of the major challenges that fishers face is the lack of access to profitable fish markets. Fish buyers are responsible for distributing fish to various parts of the country because fishers have not established mechanisms for marketing their fish. As such it is the buyers who set the prices for the fish. Accessibility determines the fish price. Since Zone 1 is accessible to many fish buyers from Kariba town they compete amongst themselves and raise the buying price. Accessibility to other fishing zones should be improved. At present buyers control the prices as such it is in their interest to keep prices low since fishers have no options because they are constrained to sell to avoid fish spoilage. Fish selling price ranges from USD 0.75 to USD 2.00 per kg which is comparatively lower than retail prices of about USD 5.0 per kg. More control by fishers on fish marketing will enable them to regulate pricing and thus realise higher value. It is recommended that RDCS and ZimParks should, within their developmental plans, include interventions that will ensure that fishers have maximum control of fish marketing.

# 9 MANAGEMENT REQUIREMENTS

## 9.1 The role of stakeholders in the Inshore Fishery management plan

**Table 11: Stakeholders and their roles in fisheries management**

| Stakeholder | Role in the implementation of the Inshore Fishery Management Plan | Level of Influence |
|---|---|---|
| ZimParks | o Enforcement of conservation and protection laws<br>o Preservation and conservation of natural resources<br>o Enforcement of the Parks and Wildlife Act<br>o Recruitment and training of informers and resource monitors<br>o Working in harmony with fishers through awareness campaigns<br>o Initiation and networking relationships with sister countries and stakeholders<br>o Promote investment in aquaculture | High |
| LKFRI of ZimParks | o Conduct lake-wide scientific, social and economic research<br>o Issuance of permits<br>o Regulation and management<br>o Designing monitoring, control and surveillance plan for ZimParks<br>o Develop the Lake Kariba Aquaculture Strategy and advise ZimParks | |
| ZRP | o Enforcing the Parks and Wildlife Act as well as other statutes<br>o Initiating periodic meetings with sister departments and bilateral meetings<br>o Presenting investigations of accused persons and relaying them to court for prosecution<br>o Conduct joint operations with ZimParks and sister security forces<br>o Recruitment and training of neighbourhood watch and informers<br>o Constant training of its personnel on the legislature and instilling values and attitude behaviour change<br>o Carrying out anti-corruption campaigns | Medium |
| RDCs | o Recruitment and training of personnel i.e. resource monitors<br>o Recruitment of informers<br>o Collaboration with communities in the fishing industry<br>o Regulating fishing activities in the fishing villages and issuing block fishing permits from LKFRI/ZimParks<br>o Conducting regular stakeholder meetings and operations<br>o Designating landing sites | High |

| Stakeholder | Role in the implementation of the Inshore Fishery Management Plan | Level of Influence |
|---|---|---|
| Inshore Fishing Community | ○ Regular stakeholder meetings with law enforcement agents<br>○ Conduct self-regulating campaigns within the inshore fishing community<br>○ Participate in fisheries data collection<br>○ Enforce self-policing practices focusing on illegal settlers<br>○ Participatory monitoring | High |
| Central Government | ○ Allocation of resources e.g. motor vehicles, vessels, fuel<br>○ Cushioning law enforcement agents through salaries and incentives to reduce corruption tendencies<br>○ Environmental education at all levels of education<br>○ Formulation of laws and policies | Medium |
| Traditional leaders | ○ Protecting cultural/traditional conservation practices<br>○ Awareness campaigns among the communities<br>○ Establishing collaboration between law enforcement and the community<br>○ Participate in low enforcement of inshore fisheries management regulations<br>○ Monitoring residences and people coming into villages/camps under their jurisdiction | High |
| Academic Institutions | ○ Evaluation of the social and institutional innovations and suggest strategies for improving their effectiveness<br>○ In-depth research in fish biology and limnology of the lake<br>○ Training of LKFRI and RDCs officers on resource monitoring systems<br>○ Spearhead development of proposed technological innovation | Medium |
| ZRA | ○ Undertake environmental monitoring of the lake | Medium |
| Governments of Zambia & Zimbabwe | ○ Enforcement of international protocols and bilateral agreements<br>○ Harmonisation of inshore fishing regulations at the bilateral level | Medium |
| District Development coordinator | ○ Coordinate the stakeholders implementing the Inshore Fishery Management Plan<br>○ Monitor activities of stakeholders operating under his/her jurisdiction | Medium |
| Conservation Partners | ○ Compliment the government's Inshore Fishery management regulations efforts | High |
| Ministry of Health | ○ Set up fish health standards and set landing sites regulations | Medium |
| Crocodile farmers | ○ Help in reducing crocodile populations<br>○ Train and engage fishers in harvesting crocodile eggs<br>○ Employment of people from inshore fishing communities | Low |

| Stakeholder | Role in the implementation of the Inshore Fishery Management Plan | Level of Influence |
|---|---|---|
| Ministry of Cooperatives | ○ Provide capacity-building training<br>○ Assist with linking fishers to markets<br>○ Support social inclusion | Medium |
| Municipality of Kariba | ○ Monitor fish quality<br>○ Provision of landing sites in Kariba | Medium |
| Lake Captain | ○ Registration and inspection of boats<br>○ Lake Safety | High |

## 10 IMPLEMENTATION PLAN

A five-year implementation plan presented in Table 12 forms the basis for deriving annual targets and activities as well as indicators for measuring implementation progress and impacts. A collaborative partnership between central and local government and other development or donor partners will be used to implement the plan.

**Table 12: Five-year rolling workplan for the Inshore Fishery Management Plan**

| Outputs | | Activity Description | Inputs | Time frame (Years) | | | | | Budget (U$) | Implementing Agency |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 | 4 | 5 | | |
| **BASELINE** | | | | | | | | | | |
| **OBJECTIVE 1: Establishment of bilateral, lake-wide, district and community-level governance systems** | | | | | | | | | | |
| 1.1 | Bi-lateral platform established | Establish a bilateral platform for management | Workshops | | | | | X | $8 000 | DoF (ZA) and ZimParks (ZW) |
| 1.2 | A functional lake-wide platform established | Establish a lake-wide platform | Workshops<br>Training | X | | | | | $10 000 | ZimParks<br>RDCs |
| | | Set up lakeshore resources and fisheries management systems | Develop ToR<br>Workplan | X | | | | | | ZimParks<br>RDCs |
| 1.3 | Two functional district-level platforms established | Establish district-level consultative platforms | Workshops<br>Training | | | X | | | $5 000 | ZimParks<br>RDCs |
| | | Prepare district implementation plans, standards, and guidelines for sustainable fisheries management and development | Workshop<br>Consultancy | | | X | | | | ZimParks<br>RDCs |
| | | Institutional strengthening of DIFA structures | Workshops<br>Training | | X | | X | | | |
| 1.4 | Eight functional multi-stakeholder zonal management committees established | Establish zonal multi-stakeholder management committees | Training<br>Workshops | | X | | | | $8 000 | Facilitating agent (NGO, Academia) |
| | | Co-develop a zonal land use plan for each of the 8 fishing zones including identification of critical habitats that impact on the fishery | Develop ToR | | X | | | | $8 000 | Facilitating agent (NGO, Academia) |
| | | Spatial planning and zoning for the lake | | | X | | | | | |
| | | Training of fisheries officers and community leaders on co-management | Workplans<br>Training | | X | | | | $5 000 | Facilitating agent |

| Outputs | | Activity Description | Inputs | Time frame (Years) | | | | | Budget (U$) | Implementing Agency |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 | 4 | 5 | | |
| | | | | | | | | | | (NGO, Academia, EMA) |
| | | Institutional strengthening of SAFA structures | | | | | | | | |
| **OBJECTIVE 2: Reduce illegal fishing by 20% by 2032** | | | | | | | | | | |
| 2.1 | Reduce the number of people dependent on fishing by 40% | Training on other income sources, community - based management and co-management initiatives | Training | X | X | X | X | X | $4 000 per annum | Development partners |
| | | Public-private partnership to generate employment | | X | X | X | X | X | | Development partners |
| 2.2 | Reduce the number of illegal fishers by 20% | Issue IDs to licensed fishers and their workers for easy identification | | X | X | X | X | X | $1 000 per annum | ZimParks RDCs |
| | | Weed out illegal fishers and their nets through joint operations | | X | X | X | X | X | $15 000 per annum | ZimParks |
| | | Develop a clear protocol for the registration of fishing cooperatives | | | X | | | | | Ministry of Cooperatives, ZimParks |
| | | Evict fishers operating in undesignated fishing villages/camps through joint operations | Enforcement | X | X | X | X | X | $5 000 per annum | ZimParks |
| | | Undertake education and awareness campaigns on the advantages of using stipulated mesh sizes and cotton nets | Training | X | X | X | X | X | $5 000 per annum | Facilitating Agent |
| | | Increase the number of patrols which include law enforcement agents and community resources monitors | | X | X | X | X | X | | ZimParks |

| Outputs | | Activity Description | Inputs | Time frame (Years) | | | | | Budget (U$) | Implementing Agency |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 | 4 | 5 | | |
| | | Organise joint operations that bring together fishers, the private sector and ZimParks | | X | X | X | X | X | | ZimParks |
| | | Training on appropriate fishing practices and their rationale | Training | X | X | X | X | X | | Facilitating Agent |
| **OBJECTIVE 3: At least 80% of fishers coping with ecological changes by 2032** | | | | | | | | | | |
| 3.1 | Reduce silt load by 10% | Undertake awareness campaigns against streambank cultivation | Training | X | X | X | X | X | $2 000 per annum | EMA |
| 3.2 | Reduce Nitrogen and Phosphorus load by 10% | Monitor changes in water quality | Research | X | X | X | X | X | $50 000 per annum | ULKRS, ZRA, LKFRI, EMA |
| 3.3 | Reduce the number of unseaworthy vessels by 80% | Undertake inspections of vessels for environmental compliance | Enforcement | X | X | X | X | X | $8 000 | Lake Captain |
| | | Encourage the use of dry docks for repairing and maintenance of boats | Enforcement | X | X | X | X | X | | Lake Captain |
| | | University Innovation hubs to come up with technology for houseboats, kapenta fishing rigs and other sport fishing boats to solarise | | X | X | X | X | X | $30 000 per annum | Universities |
| 3.4 | Maintain a healthy biodiversity | Set up a platform for intersectoral management of the shoreline | Workshop | | X | | | | See output 2.2 | Facilitating Agency |
| | | Protect fish spawning sites | Enforcement | X | X | X | X | X | | ZimParks |
| | | Improve protection of non-fishing zones | Enforcement | X | X | X | X | X | | ZimParks |
| | | Improve monitoring of closed areas | Enforcement | X | X | X | X | X | | ZimParks |
| | | Research the impact of crayfish on aquatic biodiversity | Research | X | X | X | X | X | $60 0000 per annum | LKFRI, Universities |
| 3.5 | | Educate fishers on how to catch crayfish as a strategy to also diversify income sources | Training | X | X | X | X | X | See output 2.1 | LKFRI-ZimParks |

| Outputs | | Activity Description | Inputs | Time frame (Years) | | | | | Budget (U$) | Implementing Agency |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 | 4 | 5 | | |
| | Diversify income sources of at least 40% of fishers | Establish an export market for crayfish | Research | X | X | X | X | X | | LKFRI |
| | | Educate locals on how to prepare crayfish to create local demand for crayfish | | X | X | X | X | X | | Academia, Regulating Authorities |
| | | Research to find technology to exploit Vundu and other untargeted species | Research | X | X | X | X | X | | LKFRI-ZimParks<br>Academia (e.g. Harare Instutute of Technology) |
| **OBJECTIVE 4: A multi-stakeholder framework for law enforcement developed by 2032** | | | | | | | | | | |
| 4.1 | Three functional multi-stakeholder platforms established | Establish joint three regional level (ZimParks administrative regions) surveillance and enforcement teams | Workshops | | X | | | | | LKFRI-ZimParks |
| | | Designing plans and programmes for regional level surveillance and enforcement | Workshop | | X | | | | $2 500 | LKFRI-ZimParks |
| 4.2 | Eight functional community-based enforcement platforms established | Register community-level fisheries management institutions | | X | | | | | | LKFRI-ZimParks |
| | | Train SAFA members on MCS and fisheries management | Training | X | X | X | X | X | $10 000 | LKFRI-ZimParks |
| 4.3 | Technology in fisheries surveillance adopted | Adopt modern surveillance systems such as drones | Purchase | | | X | | | $25 000 | LKFRI-ZimParks |
| | | Adopt Vessel Monitoring Systems (VMS) and surveillance | Purchase | | | X | | | $25 000 | LKFRI-ZimParks |
| | | Training on the use of drones and monitoring, control and surveillance systems | Training | | | | | | | ZimParks |

| Outputs | | Activity Description | Inputs | Time frame (Years) | | | | | Budget (U$) | Implementing Agency |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 | 4 | 5 | | |
| **OBJECTIVE 5: Research, data and information management framework for the inshore fishery developed by 2032** | | | | | | | | | | |
| 5.1 | Eight community fisheries monitoring platforms established by 2032 | Establish an overall fisheries data collection system by ZimParks | Workshop | | X | | | | $10 000 | ZimParks |
| | | Establish a community-based fisheries data collection system | Workshops | | X | | | | $10 000 | ZimParks |
| 5.2 | | Provide advice, training and technical support to fishing communities on data collection | Training | X | | X | | X | $10 000 | LKFRI-ZimParks |
| | | Train fishers on record keeping of socio-economic data | Training | X | X | X | X | X | | LKFRI-ZimParks |
| | | Train fishers on mobile phoned based technologies for data collection | Training | | X | | X | | $10 000 | LKFRI-ZimParks |
| 5.3 | At least four scientific articles focusing on demand-driven research published per annum | Establish partnerships with universities or Regional Fisheries Bodies | | | X | | X | | | LKFRI-ZimParks |
| | | Come up with a fund-raising plan | | X | X | X | X | X | | LKFRI-ZimParks |
| | | Assess fish stocks and catch trends | | X | X | X | X | X | | LKFRI-ZimParks |
| **OBJECTIVE 6: Increased the number of women involved in fisheries management by 10% by 2032** | | | | | | | | | | |
| 6.1 | Increased the participation of women, youth and | Train SAFAs on social inclusion | Training | X | X | X | X | X | $8 000 | Ministry of Small and Medium Enterprises and Cooperative Development |

| Outputs | | Activity Description | Inputs | Time frame (Years) | | | | | Budget (U$) | Implementing Agency |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 | 4 | 5 | | |
| | PLWD in the management of the fishery by 10% for each group | Train women on the benefits of gender inclusion | Training | | | | | | | Ministry of Small and Medium Enterprises and Cooperative Development |
| **OBJECTIVE 7: Increase the quantity of good quality fish sold on the market by 95% by 2032** | | | | | | | | | | |
| 7.1 | Post-harvest losses reduced by 10% by 2032 | Build solar-powered storage facilities, ice-making machines and efficient transport facilities for fresh fish | Investment | | | | | X | $205 000 | RDC, ZimParks, Development Partners |
| | | Identify simple but efficient fish processing technologies that can be easily adopted by fishers such as solar driers | Research | | | | | X | $50 000 | Academia |
| | | Train fishers to do value addition from fish and fish products (including making fish oil and fish feed from waste) | Training | | | | | X | $5 000 | LKFRI, ULKRS |
| 7.2 | Fish quality improved | Develop a set of manuals and codes of practice for quality control | Research | X | | | | | $1 000 | ECSDI |
| | | Ensure that hygienic conditions and sanitary facilities are maintained at all fish landing sites | Construct landing facilities | X | X | X | X | X | $5 000 | RDC, Ministry of Health (EHT) |
| | | Educate and train fishers and traders on the importance of fish quality | Training | | | X | | X | | Facilitating agent |
| | | | | | | | | | | |

| Outputs | | Activity Description | Inputs | Time frame (Years) | | | | | Budget (U$) | Implementing Agency |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 | 4 | 5 | | |
| **OBJECTIVE 8: Establishment of fish disease detection and monitoring system by 2032** | | | | | | | | | | |
| 8.1 | Framework for fish diseases prevention, detection and monitoring system established by 2032 | Establish institutions for fish disease prevention, detection and monitoring at the national level | Workshop | | | | | X | 20 000 | Veterinary Department |
| | | Promote and develop a national biosecurity code for fish | Workshop | | | | | X | | Veterinary Department |
| | | Set up disease monitoring and surveillance systems and mechanisms | Workshop | | | | | X | | Veterinary Department |
| | | Set up laboratories for fish disease diagnostics | Investment | | | | | X | | Veterinary Department |
| | | Development of capacity within the ZimParks and Veterinary Department (Ministry of Lands) on fish health management | Training | | | | | X | | ZimParks, Veterinary Department |
| **OBJECTIVE 9: Increase in funds for implementing activities of the inshore fishery management plan by 30% by 2032** | | | | | | | | | | |
| 9.1 | Increased revenue collection by 20% | Identify additional potential direct and indirect sources of income such as fish levies, resource rent | Workshop | X | X | X | X | X | $5000 | ZimParks |
| 9.2 | Increase the revenue sources to at least 5 | Increase Public Private Partnerships | MoUs | X | X | X | X | X | | ZimParks |
| | | Develop fundable research proposals to access donor funds | Proposals | X | X | X | X | X | | LKFRI-ZimParks, Universities |
| | | Contribution from Central Government | Budget justification | X | X | X | X | X | | ZimParks |

## 11 TECHNICAL TEAM

The implementation process will also be monitored and supervised by various stakeholders, comprised of members from various institutions (Table 13).

**Table 13: Composition of the Lake Kariba Inshore Fishery Technical Committee**

| Institution | Designation |
|---|---|
| LKFRI | Principal Responsible for Fisheries Research |
| Department of Inland waters and Control/ Lake Navigation | Lake Captain |
| District Development Coordinators | Binga and Kariba District |
| Zimbabwe Parks and Wildlife Management Authority | Chief Ecologist/Regional Managers |
| Zimbabwe Republic Police | District Commanding Officer (Binga, Nyaminyami) |
| Rural District Council | Chief Executive Officer (Binga and Nyaminyami) |
| Ministry of Small and Medium Enterprises and Cooperative Development | District Head (Binga, Kariba) |
| Ministry of Health and Child Care | District Medical Officer (Binga, Nyaminyami) |
| District Fishers Association (DIFA) | Binga, Nyaminyami |
| Sub-Area Fishing Association(SAFA) | 8 SAFAs |
| Environmental Management Agency | District Environmental Officer (Binga, Nyaminyami) |
| Ministry of Environment, Climate, Tourism and Hospitality Industry | Director, Environment Department |
| Zimbabwe National Army | Commanding Officer (Binga, Nyaminyami) |
| Municipality of Kariba | Chief Executive Officer |
| Conservation Partners | One representative |
| Food and Agricultural Organisation-Zimbabwe | Fisheries Officer |
| National Anglers Union of Zimbabwe | Head |
| Zambezi River Authority | Chief Executive Officer |

| | |
|---|---|
| University of Zimbabwe Lake Kariba Research Station | Director |

**NB:** The technical committee can include additional invited (temporary) members as may be useful.

The responsibilities of the Lake Kariba Inshore Fishery Technical Committee are:

a. Support in resource mobilization
b. Regular supervision and monitoring (M & E) and recommendation on amendments to the Inshore Fishery Management Plan
c. Linkage to other partners, sectors and collaborators
d. Provide technical and policy guidance to the implementation of the inshore fishery program
e. Contribute on Inshore fisheries issues to sectoral plans

## 12 MONITORING AND EVALUATION PLAN

The logical framework will be used for monitoring and evaluation through the use of key performance indicators and actions and activities within the management plan. The monitoring indicators, disaggregated by expected outcomes will be used to assess performance under each outcome with clearly set targets per year (Table 14). Participatory monitoring and evaluation will be used.

**Table 14: Simplified logical framework for monitoring and evaluation**

| EXPECTED OUTCOMES | EXPECTED OUTPUTS | INDICATORS | MEANS OF VERIFICATION | TIME FRAME |
|---|---|---|---|---|
| Bilateral, lake-wide, district and zonal governance structures established by 2032 | Bi-lateral structure for transboundary fisheries management established by 2032 | Functional committee | Terms of Reference<br>Minutes | Annual |
| | A lake-wide platform established by 2032 | Functional committee | Terms of Reference<br>Minutes | Annual |
| | District level platforms for improving coordination among stakeholders established by 2032 | Functional committee | Terms of Reference<br>Minutes | Annual |
| | Multi-stakeholder zonal platforms established by 2032 | Functional committees | Terms of Reference<br>Minutes | Annual |

| EXPECTED OUTCOMES | EXPECTED OUTPUTS | INDICATORS | MEANS OF VERIFICATION | TIME FRAME |
|---|---|---|---|---|
| Illegal fishing reduced by 20% by 2032 | Reduce the number of people entirely dependent on fishing for income by 40% by 2032 | Number of people in fishing villages taking up new opportunities | Frame surveys | Every 10 years |
| | Adherence to the number of licenses stipulated by ZimParks by 100% by 2032 | Number of permits | Registers and receipts | Annual |
| | Transboundary fish poaching reduced by 20% by 2032 | Number of arrests | Patrol reports | Quarterly |
| Reduce the use of unsustainable fishing methods by 20% by 2032 | The number of fishers caught using twine nets and illegal mesh sizes reduced by 20% by 2032 | Number of arrests | Patrol reports | Quarterly |
| | The number of illegal fishing methods reduced by 20% by 2032 | Number of arrests | Patrol reports | Quarterly |
| At least 80% of fishers coping with ecological changes by 2032 | Maintain the number of fishers per fishing zone as stipulated by Zimparks | Number of fishers with permits | SAFA register | Annual |
| | Reduce silt load in rivers by 10% by 2032 | Silt load | Water Quality Research Reports | Annual |
| | Reduce nitrogen and phosphorus load in rivers by 10% by 2032 | N and P loads | Water Quality Research Reports | Annual |
| | Reduce the number of boats that are unseaworthy by 80% by 2032 | Number of unseaworthy vessels | Lake Captain's boat assessment reports | Annual |
| | Increase percentage catch of un-targeted species (Vundu) by 10% by 2032 | % of untargeted species in the catch | Catch-assessment report | Annual |
| | Reduce the human aquatic wildlife conflict by 80% by 2032 | Incidences of HWC | Reports | Monthly |

| EXPECTED OUTCOMES | EXPECTED OUTPUTS | INDICATORS | MEANS OF VERIFICATION | TIME FRAME |
|---|---|---|---|---|
| | Increase the number of fishers exploiting crayfish by 10% by 2032 | Number of fishers catching crayfish | Number of permits | Annual |
| | Increase income generation options for fishers to at least two streams of income | % of fishers reporting two streams of income | Frame survey | Every 10 years |
| | Monitor fish biodiversity (number of indigenous species) | % of indigenous species in the catch | Catch assessment report | Annual |
| A multi-stakeholder framework for law enforcement developed by 2032 | Three coordinated multi-stakeholder regional (ZimParks administrative regions) law enforcement mechanisms designed by 2032 | Number of functional multi-stakeholder enforcement committees | Terms of Reference<br>Minutes | Annual |
| | Eight community-based enforcement mechanisms designed by 2032 | Number of community-based mechanisms | Reports<br>Minutes | Annual |
| | Technology in the fisheries surveillance system incorporated by 2032 | Number of technologies adopted | Records | Annual |
| Research and information management framework for the inshore fishery developed by 2032 | The collection of critical catch and effort data enhanced by 2032 | Number of catch returns received | Catch Assessment Reports | Annual |
| | The collection of critical socio-economic and cultural data enhanced by 2032 | Number of surveys | Frame Survey Report | Every ten years |
| | Eight community monitoring platforms established by 2032 | Number of platforms | Terms of reference<br>Minutes | Annual |
| | At least four scientific articles focusing on demand-driven research published per annum | Number of articles | Annual Report | Annual |

| EXPECTED OUTCOMES | EXPECTED OUTPUTS | INDICATORS | MEANS OF VERIFICATION | TIME FRAME |
|---|---|---|---|---|
| Increased the percentage of women, youth and PLWD involved in fisheries management by 10% (for each social group) by 2032 | Increased participation of women, youth and people living with disabilities in the management of the inshore fishery by 2032 | Number of women, youth and PLWD in community-level management committees | Minutes | Annual |
| Increase the quantity of good quality fish sold on the market by 95% by 2032 | Post-harvest losses reduced by 50% by 2032 | % fish losses | Study reports | Annual |
| | Manual and code of conduct developed by 2032 | Manual and code of conduct | Reports | Annual |
| Establishment of fish disease detection and monitoring framework by 2032 | Framework for fish diseases prevention, detection and monitoring system established by 2032 | Framework | Terms of Reference | Annual |
| Increase in funds for implementing activities of the inshore fishery management plan by 30% by 2032 | Improved revenue collection system established by 2032 | % increase in revenue collected | Financial Report | Annual |
| | Increase the revenues streams by at least 5 by 2032 | Number of revenue streams | Financial report | Annual |

## 13 References


Balon E.K. (1974). Fish production of a tropical ecosystem. In: Balon E. K. & Coche A. G. (eds) Lake Kariba: *A man-made tropical ecosystem in Central Africa Dr.W. Junk*, The Hague, pp. 249-573.

Bourdillon M.F.C., Cheater A.F. & Murphree M.W. (1998). Studies of fishing on Lake Kariba. Mambo Occassional Papers. Socio-economic Series. No. 20. Mambo Press. Gweru, Zimbabwe.

Chakandinakira, A.T., Madzivanzira, T.C., Mashonga, S., Muzvondiwa, J.V., Ndlovu, N., and South, J. (In press). Socio-economic impacts of Australian redclaw crayfish *Cherax quadricarinatus* in Lake Kariba.

Chifamba P.C. (2006). Spatial and historical changes of indigenous *O. mortimeri* following introduction of exotic *O. niloticus* in Lake Kariba. In: Odada E.O., Olago D.O., Ochala W., Ntiba N., Wandiga S., Gichuki N., Oyieke H. (eds), 11th World Lakes Conference, Nairobi, Kenya, 31 October–4th November 2005, Proceedings Vol. II. Nairobi: Ministry of Water and Irrigation, Kenya, and International Lake Environment Committee. pp 500–504.

Donnelly, B.G., (1969). A preliminary survey of the tilapia nurseries in Lake Kariba during 1967/1978. *Hydrobiologia* **34**: 195-206.

Harding D. (1966). Lake Kariba, The hydrology and development of fisheries. In: Man-made Lakes (Ed.) Lowe-McConnell, R.H. Academic Press, London.

Jackson P.B.N. (1961). Ichthyology. The fish of the Middle Zambezi. *Kariba Studies* **I**: 1- 36. National Museums of Southern Rhodesia.

Karenge L. & Kolding J. (1995). In: Pitcher T.J. & Hart P.J.B. (eds). *The Impact of Species Changes in African Lakes*. Chapman & Hall Fish and Fisheries Series. Vol 18. Spinger, Dordrecht. doi.org./10.1007/978-94-011-0563-7_12.

Kenmuir D.H.S. (1973). The ecology of the tigerfish *Hydrocynus vittatus* Castelnau, in Lake Kariba. *Occasional Papers Natural Museum Rhodhesia* **B5(3)**: 115 - 170

Lake Kariba Fisheries Research Institute (1969-78). Annual Fisheries Statistics.

LKFRI Statistical Report (1994).

Machena C. (2021). Enhancing community resilience and sustainability of small-scale fisheries of Lake Kariba and the Zambezi River: A baseline Survey of the Lake Kariba Inshore Gill-net Fishery. Lake Kariba Fisheries Research Institute. Kariba.

Machena C. & Moinuddin H. I. (1993). Management of the Lake Kariba Inshore Fisheries (Zimbabwe), A Proposal, Zambia-Zimbabwe SADC, Fisheries Project (Lake Kariba) Report No19.

Magqina T., Dalu T., Mhlanga L. & Nhiwatiwa T. (2021a). Age and growth rate estimations as a basis for assessing the population dynamics of *Hydrocynus vittatus* Castelnau 1861 in the Sanyati Basin of Lake Kariba, Zimbabwe. *Lakes & Reservoirs: Science, Policy and Management for Sustainable Use.* doi: 10.1111/lre.12372.

Magqina T., Dalu T., Mhlanga L. & Nhiwatiwa T. (2021b). Size at maturity, maturity stages and sex ratio of tigerfish *Hydrocynus vittatus* Castelnau 1861 in Lake Kariba, Zimbabwe: Assessing the influence of decades of fisheries exploitation. *African Journal of Aquatic Science* **46(1)**: 11-17. doi: 10.2989/16085914.2020.1761284

Marowa I. & Matanzima J. (2021). Human-Wildlife Interactions Interactions between humans, crocodiles, and hippos at Lake Kariba, Zimbabwe. Human–Wildlife Interactions **15(1)**: EarlyOnline, Spring 2021 • digitalcommons.usu.edu/hwi.

Marshall B.E. (1979). Fish populations and the fisheries potential of Lake Kariba. *South Africa Journal of Science* **75**: 486-488.

Marshall B.E., Junor F.J.R. & Langerman J.D. (1982). Fisheries and Fish production on the Zimbabwean side of Lake Kariba. *Kariba Studies* **10**: 175-271. National Museums and Monuments of Zimbabwe, Harare.

Marshall, B., (2011). *Fishes of Zimbabwe and their Biology*. Smithiana Monograph 3. Grahamstown: The South African Institute for Aquatic Biodiversity.

Marufu L.T., Barson M., Phiri C. & Nhiwatiwa T. (2020). Spatial and temporal distribution of an invasive crayfish (*Cherax quadricarinatus*) in Lake Kariba, Zimbabwe. *Lakes Reservoirs Science and Policy Management* **25(4)**: 394–402. https://doi.org/10.1111/lre.12345

Marufu L.T., Phiri, C., & Nhiwatiwa T., (2014). Invasive Australian crayfish *Cherax quadricarinatus* in the Sanyati Basin of Lake Kariba: A preliminary survey. *African Journal of Aquatic Science* **39:** 233–236.

Matanzima J., Marowa I., & Nhiwatiwa, T. (2022). Negative human–crocodile interactions in Kariba, Zimbabwe: Data to support potential mitigation strategies. *Oryx* 1-5. doi:10.1017/S003060532200014X

Mavuru A., Mhlanga L. & Nhiwatiwa T. (2022). An assessment of Post-Harvest Fish Losses (PHFLs) in the artisanal fishery of Lake Kariba, Zimbabwe. *Scientific Africa*. doi: https://doi.org/10.1016/j.sciaf.2022.e01124

Mhlanga L., Nyikahadzoi K., & Haller, T. (Eds.). (2014): *Fragmentation of natural resources management: experiences from Lake Kariba* (Vol. 2). LIT Verlag Münster.

Minshull J. L. (1973). The establishment of a fishery among the resettled Batonka people at Lake Kariba, Rhodesia. *Commission Internationale des Grands Barrages*, 413-419.

Mitchell S.A., (1976). The marginal fish fauna of Lake Kariba. *Kariba Studies* **8:** 109-162.

Murphree M. (1995). As Resource Management Institutions, International Institute for Environment and Development, GATEKEEPER SERIES No. 36

Ndhlovu N., Saito O., Djalante R. & Yagi V. (2017). Assessing the sensitivity of Small-Scale Fishery Groups to Climate Change in Lake Kariba, Zimbabwe. *Sustainability* **9**: 2209 doi.10.3390/su9122209.

Sanyanga R.A. (1995): Management of the Lake Kariba inshore fishery and some thoughts on biodiversity and conservation issues. *Environmental Conservation* **22**: 111–116.

Songore N. (2000): Compilation and Analysis of Catch Effort Data on the Lake Kariba Artisanal Fishery. Zimbabwe Management, Co–Management or No Management Project, 2000 Lake Kariba Fisheries Research Institute Internal Report, Kariba.

Songore N., Moyo A. & Mugwagwa M. (1999). Fisheries Statistics. Lake Kariba Fisheries Research Institute. Project Report No. 95. Kariba, Zimbabwe.

Zambezi River Authourity (ZRA), (2015). Annual Report 2015. Available from: www.zambezi.org

Zambia Zimbabwe SADC Fisheries Project (1993). Lake Kariba Fisheries Research Institute. Kariba.

Zengeya, T., & Marshall, B., (2008). The inshore fish community of Lake Kariba half a century after its creation: What happened to the Upper Zambezi species invasion? *African Journal of Aquatic Science* **33:** 12-39.

Zimbabwe Lake Kariba Fisheries Frame Survey (2011). Lake Kariba Fisheries Research Institute. Kariba.

Zimbabwe National Statistics Agency (ZIMSTAT) and UNICEF (2019). Zimbabwe Multiple I ndicator Cluster Survey 2019, Survey Findings Report. Harare, Zimbabwe: ZIMSTAT and UNICEF.

## 14 ANNEX 1: LIST OF PEOPLE CONSULTED DURING THE DEVELOPMENT OF THE INSHORE FISHERY MANAGEMENT PLAN

| | |
|---|---|
| Chaderopa Lorcadia | -Ministry of Local Government-Kariba |
| Chagwambala Battery | -Fisherman |
| Chaka | -Fisherman |
| Chakandinakira Adroit | - ZimParks- Kariba |
| Schmidt Vasco | -FAO |
| Gabayi Princess | - FAO |
| Mwera Paul | -FAO |
| Chalibamba Clifford | -Fisherman |
| Chamukanga Samson | -Zamazama -SAFA F |
| Chatambarara Elizabeth | -Fish Trader |
| Chiavuta K. | -ZimParks-Kariba |
| Chidhume Kudzai | -MWACSMED |
| Chiganti Warren | -Fisherman |
| Chikamba Wester | -Gache Gache Co-operative |
| Chimusakasu Mildred | -Fish Trader |
| Chinembiri Nicholas | -Zimparks |
| Chingula Smart | -Fisherman |
| Chirume Togarepi | -SAFA-Kariba |
| Chirume Togarepi | -Gache Gache Co-operative |
| Chiwanda Musa | -Fothergill Co-operative |
| Dhliwayo Florence | -Fish Trader |
| Dube Agreement | -Individual -SAFA F |
| Dube Givemore | -Kapenta Union-Binga |
| Dube Laina | -SAFA F- Binga |
| Dube Prisca | -Fishmonger -SAFA G |
| Dzimire Tinei | -Fisherman |
| Farayi Paradzai | -Nyaodza Co-operative |
| Foya Brighton | -Nyaodza Co-operative |
| Gandiwa Edson | – ZimParks- Harare |
| Gozo Takafara | -Zim Parks-Binga |
| Gunduza Misheck | -Agritex |
| Gwaindepi | -Fisherman |
| Ihisoda James | -Fisherman |
| Jabulani Jealousy | -Fisherman |
| Jeriman Fabian | -Fisherman |
| Judith Mutale | -Bwacha -SAFA F |
| Kabichi Peter | -SAFA G Chairperson-Binga |
| Kachingamire Simbarashe | -Fothergill Co-operative |
| Kademba Timothy | -Bwacha Co-op--SAFA F |
| Kamu Crispen | -Fisherman |
| Kamujangwari Walter | -Zim Parks-Binga |
| Kamwendo Malembe | -Fothergill Co-operative |
| Kapingura Loina | -Fish Trader |
| Kapiro Obert | -Fisherman |
| Kashamba Gift | -Fisherman |
| Kaunzeunze Oliver | -Nyaodza Co-operative |
| Kauso Penny | -Fothergill Co-operative |
| Kawanza Sarah | -Zim Parks-Binga |

| | |
|---|---|
| Kundishora Bigboy | -Gache Gache Co-operative |
| Kusukwenya Evidence | -ZimParks-Binga |
| Luckson Aritonge | -Fothergill Co-operative |
| M. Cecelia | -Fish Trader |
| Machipisa Never | -Fisherman |
| Macrron Itai | -Fisherman |
| Madhoro Kenneth | -Village Chairman |
| Mafurirwanwa Eric | -Fisherman |
| Magida Phinias | -Fisherman |
| Maiten Enias | -SAFA Treasurer |
| Makanza Maggie | - FAO |
| Malumisa King | -Makuyu Chairman |
| Manowa Pfungwa | -Fisherman |
| Manzungu Tichaona | -SAFA- Kariba |
| Mapengure Richard | -Zimbabwe National Army- Binga |
| Mapfumo Nesbert | -ZKPA-Kariba |
| Mapfungautsi Stuart | -Fisherman |
| Maporisa Moqenu | -Mulonqanqwe-SAFA F |
| Masainda Ephraim | -Kings Camp Fisherman |
| Masawa Melton | -Gache Gache Fisheries Association-Kariba |
| Master Abelulla | -Fisherman |
| Matare Ntombizodwa | -MWACSMED |
| Matingwina Cletus | |
| Matondi Prosper | - Ministry |
| Gozo T. | - ZimParks-Binga |
| Mazabuko Phillip | -Fisherman |
| Mazhomba Shadreck | -Gache Gache Co-operative |
| Milk Knowledge | -Village Head |
| Moyo Bokithomba | -Police Intelligence-Binga |
| Moyo Clever | -MOHCC |
| Mponde Clement | -Fisherman |
| Mtope Kenias | -Fisherman |
| Mubimba David | -Fothergill Co-operative |
| Mudenda Edward | -Mulongangueso -SAFA F |
| Mudenda Eliot | -Fishermen-SAFA G |
| Mudenda Morgan | -C/Person Fisherman-SAFA G |
| Mudenda Phineas | -Maboko Nduzubo-SAFA F |
| Mudimba Danisa | -Basilizwi Trust-Binga |
| Mufepi Super | -Village Secretary |
| Mufwepi Amos | -SAFA D Secretary |
| Muganda Laiza | -Tulanjaka -SAFA F |
| Muganda Mundese | -Village Head-SAFA G |
| Mugande Buumi | -Twabuka-SAFA F |
| Mugande Matthew | -Simatelele Fishing Camp-SAFA G |
| Mukombwe Doubt | -Ministry of Defense--Binga |
| Mukombwe Willard | -SAFA G |
| Mukuwi Richard | -Simambo- SAFA H |
| Muleya Abel | -Vice Secretary-SAFA G |
| Muleya Killion | -SAFA G Treasury -SAFA G |
| Muleya Lameck | -NAC Champion Fish-SAFA G |

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|---|---|
| Muleya Madios | -SAFA committee- SAFA H |
| Muleya Paul | -SAFA F |
| Muleya Paul | -SAFA-Binga |
| Muleya Vincent | -SAFA G Security-SAFA G |
| Mumpande Member | -Twasika Co-op -SAFA H |
| Mundoga Tanyaradzwa | - Ministry of Environment, Water, Climate, Tourism and Hospitality Industry |
| Munemo Richard | -SAFA G-SAFA G |
| Mungombe Jevas | -Kufwabambukuya-SAFA H |
| Mungombe Killian | -Village Head-SAFA G |
| Mungombe Robson | -Chairman-SAFA G |
| Mungombe Timothy | - Fisherman-SAFA H |
| Munkombwe Clever | -Twalisalta Co-op-SAFA H |
| Munkombwe Leonard | -Fisherman-SAFA H |
| Munkuli Knowledge | -Binga RDC-SAFA H |
| Munkuli Sedias | -SAFA F Chairperson-SAFA F |
| Munkuli Sedias | -SAFA-Binga |
| Munkuli Spiriano | -Twalisanta-SAFA H |
| Munkuli Tinashe | -Simambo-SAFA H |
| Munkuli Wilson | -Bwusongo-SAFA H |
| Munsaka Bernard | -Kapenta Union-Binga |
| Munsaka Kifford | -Fisherman -SAFA H |
| Munsaka Whisper | - SAFA F |
| Munsanje Shephard | -Fisherman |
| Muntanga Caster | -Fisherman-SAFA G |
| Muntanga Lameck- | -Binga Rural District Council |
| Muntanga Willard | -SAFA F |
| Muntanga Young | -Kapenta Fisheries-SAFA F |
| Muntange Steven | -Fisherman-SAFA H |
| Mupande Tobias | -Kanonge-SAFA H |
| Muramba Edina | -Tuchite Chesu-SAFA F |
| Murenga Respect | -Gache Gache Co-operative |
| Murenga Wonder | -Fisherman |
| Musaka Peter | -SAFA F |
| Mushati Francis | -Nyaodza Co-operative |
| Mutale Benny | -Twaliminana-SAFA F |
| Mutale Bhibbo | -SAFA F |
| Mutale Lackson | -SAFA F |
| Mutale Wonder | -Nkutale Co-op-SAFA F |
| Mutoti Michael | -Nkutale Co-op-SAFA F |
| Muyawiki Benjamin | -SAFA D Vice Chairman |
| Muzamba Keeper | -Bwajunza-SAFA F |
| Muzemberwa-Mbiriyawanda Courage | – Ministry of Environment, Climate, Water and Hospitality Industry |
| Mwembe Lae | -Kufwabambukuya -SAFA H |
| Mwembe Martin | -Kufwabambukuya-SAFA H |
| Mwembe Messman | -Education-SAFA G |
| Mwenebe Saviour | -Matani-SAFA H |
| Mwibwe Moses | -Fisherman |
| Mwinde Again | -SAFA G |

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| Mwinde Bill | -Fishmonger -SAFA H |
| Mwinde Cosmas | - Simambo -SAFA H |
| Mwinde Never | -Tobwe-SAFA G |
| Mwinde Phineas | -SAFA Secretary |
| Mwinde Poster | |
| Muzamba Joshua | |
| Mwinde Sam | -Binga Rural District Council-Binga |
| Mwinde Sandos | -Simambo FC-SAFA H |
| Mwinde Temba | -DFA-Binga |
| Ndabala Angelicah | -Fish Trader |
| Ndhlovu Nobuhle | - FAO |
| Ndodo Eneresi | -Fisher Trader |
| Negande Keanias | -Zimbabwe Republic Police |
| Ngwenya Motivator | -SAFA F |
| Nyamasoka Nico | -SAFA C Chairman-Kariba |
| Nyathi Edward | -SAFA H |
| Nyekete A.W. | -Inland Waters Control-Kariba |
| Nyezele Edward | -Fisherman-SAFA G |
| Nyoni Nikison | -Village Head-SAFA G |
| Nyuni Munyaradzi | -Chalala Camp Treasurer |
| Pelham Mike | -MCT |
| Pepukai Constance | -FAO |
| Rabson Mwinde | -Fothergill Co-operative |
| Rari Tichaona | -Fisherman |
| Rwazireni Farai Joseph | -Zimbabwe Republic Police-Kariba |
| Sachiwele Frequence | -Binga Rural District Council-Binga |
| Sangu Isaac | -Fothergill Co-operative |
| Satiya Charles | -Environmental Management Agency-Kariba |
| Schmidt Vasco | -FAO |
| Seneti Twoboy | -Nyodza Co-operative |
| Siabasimbi White | -Fisherman |
| Siabwanda Goodward | -Fisheries Trust and Conversation |
| Siachilula Sailos | -Education-SAFA G |
| Siadinkula Evidence | -Fisherman |
| Siakaluma Kainos | -Camp Secretary |
| Siakanoka Samson | -MCT |
| Sialeya Timothy | -Fisherman |
| Siamatu Chena | -Bulacha Co-op-SAFA F |
| Siambabi John | -Fisherman |
| Siampande Claudius | -Fisherman |
| Siampongo Stanley | -Binga |
| Siamutyamba Givemore | -Mola Ward 3 Councilor |
| Siamwana Georgina | -Tuchite Chesu-SAFA F |
| Sianizara Answer | -Fisherman |
| Sianjema Christopher | -Fothergill Co-operative |
| Siantumbu Artwell | -SAFA D Chairman |
| Siantumbu Ranger | -FAZ |
| Sianyongoro Professor | -Fisherman |
| Sianyongoro Savious | -Fisherman |
| Sianzira Ketai-Fisherman | -Fisherman |

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| Siazemba Lakemore | -Fisherman |
| Sibanda Artwell | -ZimParks-Kariba |
| Sibanda Emmanuel | -SAFA-0713940723-Binga |
| Sibanda Godfrey | -SAFA D Secretary- |
| Sikurukumwe John | -Nyaminyami Rural District Council |
| Simleleba Short | -Chalala Camp committee member |
| Sithole Daniel | -ZimParks |
| Siyambiri Knowledge | -Nyaodza Co-operative |
| Smutyasu Gleya | -Fothergill Co-operative |
| Sonderi Freddy | -Fothergill Gillnet Cooperation-Kariba |
| Stacha John | -ZimParks-Kariba |
| Tamanika John | -Kings Camp Secretary |
| Tekere Mungombe | -SAFA H |
| Tendaupenyu Itai | -ZimParks-Harare |
| Tiba Lazarus | -ZimParks-Kariba |
| Tulumbe Moses | -Binga Rural District Council |
| Yoyole Tinashe | -Fothergill Co-operative |
| Zhuwawu Tinashe | -Fothergill Co-operative |