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ARTISANAL FISHERIES IN ZIMBABWE: OPTIONS FOR EFFECTIVE MANAGEMENT

Wilson Mhlanga[1*] and Lindah Mhlanga[2]

[1]Department of Environmental Science, Bindura University of Science Education Zimbabwe

[2] Lindah Mhlanga, Department of Biological Sciences, University of Zimbabwe Zimbabwe

*Corresponding author: wmhlanga63@gmail.com

Abstract

The small-scale (artisanal) fisheries in Zimbabwe play an important role in income-generation and food security at the household level. This sector has the potential to significantly increase its contribution to household income and food security if more effective fisheries management strategies are put in place. Historically, fisheries management has adopted a centralised "Top-down" approach. This approach has had very limited effectiveness. Over the last decade, efforts have been made to implement co-management in the fisheries sector. Several factors have hampered the success of fisheries co-management in the artisanal fishery. These factors have been institutional, ecological, human and financial. This paper discusses these factors and proposes possible solutions. A more innovative and effective fisheries management approach is also proposed.

Key words: Fisheries Management, Zimbabwe, Co-management, artisanal fisheries, sustainability

Introduction

Zimbabwe is endowed with a number of major rivers but there are no natural reservoirs. In order to harness the nation's water resources, dams have been built throughout the country. While most of these dams have been built for irrigation, mining, industry and domestic (potable) water supply, a few dams such as Lake Kariba have been created for hydro-electric power generation.

According to Nugent (2007) there are over 10,000 dams in more than 60 District Council jurisdictions, around 2,000 of which are in communal areas. Table 1 shows the numbers by Province and net capacity of the major dams in Zimbabwe. Most of these major dams have a net capacity of more than 1,000,000 m^3.

Table 1: Distribution of major dams by Province. (Source: Zimbabwe National Water Authority)

Province	Number of dams	Net Capacity (x $10^6 m^3$)
Mashonaland West	13 (excluding Kariba)	1,380.049
Mashonaland East	13	66.555
Mashonaland Central	15	236.394
Manicaland	13	657.913
Midlands	20	519.844
Matebeleland North	10	52.698
Matebeleland South	24	732.064
Masvingo	28	2,519.997
Total	**136**	**6,165.997**

Note: Kariba dam has a net capacity of 64,800 x 10^6 m^3

These dams have given rise to fisheries activities of varying scales. On Lake Kariba there is a commercial (industrial) fishery based on the introduced Tanganyika sardine (*Limnothrissa miodon*) which is known locally as Kapenta. Apart from Lake Kariba, most of the other dams in the country have small-scale (artisanal) fisheries. These artisanal fisheries are important because they provide a livelihood for the fishers and the fish traders who act as middlemen between the producers and the market. The artisanal fisheries are also important in that they are a source of comparatively cheap animal protein. The price of fresh fish is lower than that of chicken and beef. For example, the price of fresh fish can be as low as US$2 per kilogram, while beef usually costs more than US$5 per kilogram.

While statistics on the number of fishers in the whole country are not readily available, the figures from Lake Kariba serve to illustrate the important role of fisheries in terms of livelihoods (e.g. employment). On the Zimbabwean side of Lake Kariba there are about 1,154 artisanal fishers in 41 fishing villages/camps (Zimbabwe Lake Kariba Fisheries Frame Survey Report, 2011) while on the Zambian side, Mbewe *et al*. (2011) reported that there were about 4,653 artisanal fishers in 63 permanent fishing villages. In terms of catches on the Zimbabwean side, Karenge and Kolding (1995) noted that production from the artisanal fishery was about 5,000 tons per year. For Lake Kariba, Diffey (2012) observed that it is necessary to build capacity for monitoring and surveillance in the artisanal fishery. He

also recommended that support should be provided for strengthening community based enforcement.

The potential of most of these dams to support artisanal fisheries has not yet been fully exploited. The development of artisanal fisheries on these dams is important for several reasons. These dams can provide a livelihood option for those communities around the dams as well as fish traders who may come to buy the fish. This will boost household income as well as contribute to meeting the protein needs at household level. Where fish production exceeds household protein requirements, the surplus fish will be sold and hence boost the national fish production. The increased fish production will result in increased fish protein intake at the household level. Currently, the bulk of the fish being sold on the domestic market is from commercial fish farming (aquaculture) with very little coming from the artisanal fishery.

The development of the fish production potential of the dams should include both the harvesting of the fish from the wild (capture fisheries) in the short term as well as the development of small-scale fish farming (aquaculture) using appropriate technologies in the medium to long term. This paper focuses on Capture Fisheries Management as this can be implemented without substantial infrastructure inputs. Aquaculture development requires significant capacity-building as well as major initial capital investment (for example pond construction or manufacture of fish cages).

The dams in Zimbabwe can be classified into two broad categories, namely those within the Zimbabwe Parks and Wildlife Management Authority (ZPWMA) Estate, and those outside the Parks and Wildlife Estate. The dams within the Parks and Wildlife Estate are designated as Recreational Parks (according to the Parks and Wildlife Act Chapter 20:14). These include Lake Kariba, Chivero, Manyame, Mutirikwi (Kyle), Sebakwe, Osborne, Manjirenji, Bangala as well as the dams in Rhodes Matobo and Rhodes Nyanga Recreational Parks.

Current annual fish production from the artisanal fisheries on the dams in Zimbabwe is well below the potential levels. One of the major reasons for this low production is the absence of effective fisheries management. This paper highlights the options that are available to improve artisanal fisheries management so as to increase annual fish production from the sector.

Current Fisheries Management

Fisheries Management on dams in Parks Estate

Fisheries management in the dams/lakes within the Parks Estate is centralised and entry into the fishery is controlled. There are dams where artisanal fishing is carried out using mainly gill-nets (e.g. Chivero, Manjirenji and Kariba), while for other dams such as those in Rhodes Nyanga Estate, only recreational fishing using rod and line is carried out. Entry into the fishery is regulated through a licensing system. Annual gill-net fishing licences are issued by the Zimbabwe Parks and Wildlife Management Authority (ZPWMA). The gill-net fishers pay a licence fee to Parks (ZPWMA).

Resource monitoring (data collection and analysis) is carried out by Parks personnel. Law enforcement is also carried out by Parks personnel. For most of the dams, annual statistics from fish production in the artisanal fishery are not readily available mainly due to manpower constraints. It is therefore necessary to come up with new strategies for data collection that include other key stakeholders in order to address the current bottleneck created by manpower constraints.

Law enforcement efforts also need to be supported by other stakeholders, especially the fishers, in order to curb illegal fishing (poaching). This calls for a new fisheries management approach. This will ensure that the small-scale fisheries do not become *de facto* open access resources.

Fisheries Management Outside Parks Estate

The Parks and Wildlife Act mandates the Authority (ZPWMA) to issue fishing licences in consultation with the relevant local authorities (Rural District Councils) as well as the Ministry of Agriculture, Mechanization and Irrigation Development (through the Fisheries Unit in the Department of Livestock Production and Development). The Fisheries Unit plays a pivotal role in recommending the number of fishers that can be licensed for any particular dam (i.e. fishing effort). The licenced fishers have to pay a levy (fishing licence fee) to the local authority (e.g. on a quarterly basis). The fishers do not play any significant role in the management of the fishery. Consequently, fisheries management is still centralised (i.e. "Top-down" approach).

Given the large number of dams in the country and the manpower available in both Parks and the Fisheries Unit, there are human resource and financial constraints to ensure effective coverage of all dams in the country. Consequently, in order to effectively address these constraints, it is essential to come up with a more inclusive management approach. This management approach should be based on Fisheries Co-Management. Fisheries Co-

management is not a new approach in Zimbabwe. This approach was implemented in the artisanal fishery on the Zimbabwean side of Lake Kariba. On the Zambian side, the Fisheries Co-Management approach encompassed both the artisanal fishers and the Kapenta fishers. While the co-management approach has been fairly successful on the Zambian side, the approach has not progressed very well on the Zimbabwean side due to several factors. These factors are discussed later in this paper.

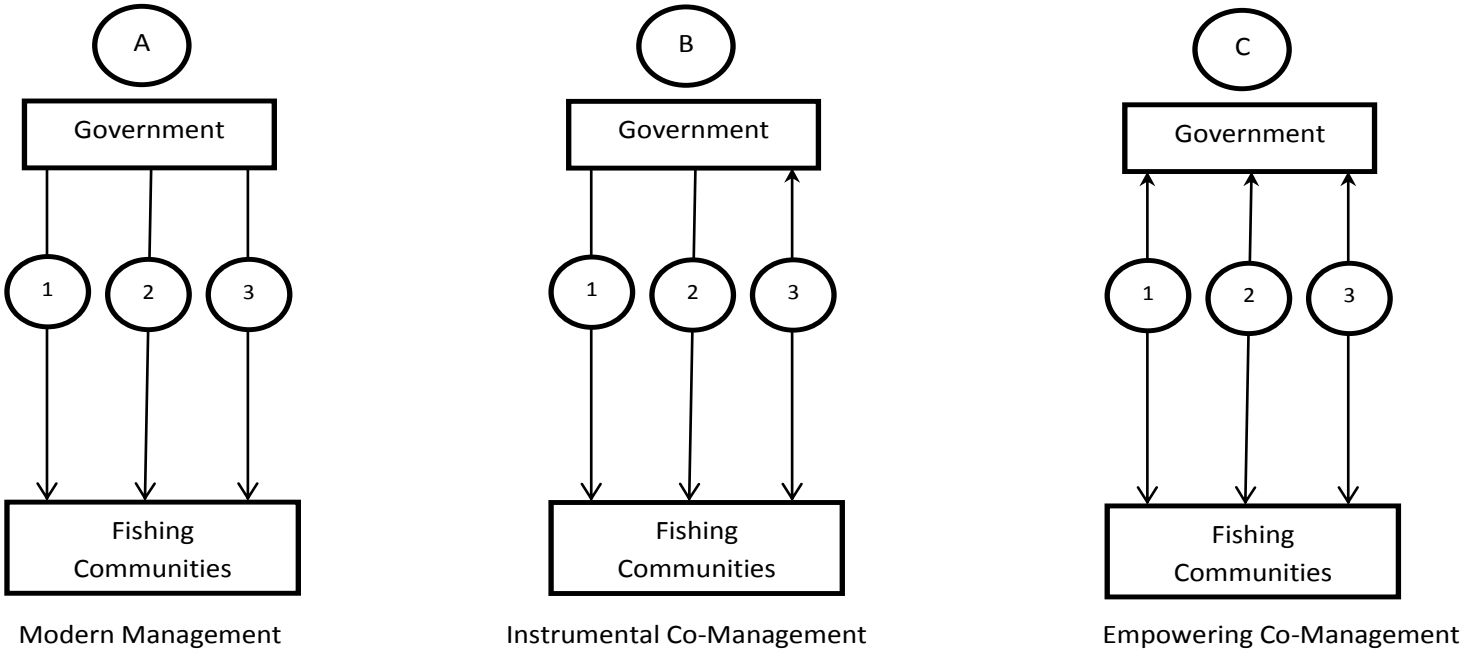
Rationale for Fisheries Co-management

Viswanath *et al*. (2003) observed that implementation of fisheries co-management is premised on the fact that both traditional fisheries management and "modern" fisheries management institutions have failed to address governance issues. They argue that the "modern" fisheries management focuses on objectives relating to the fish resources and is based exclusively on formal biological science. Viswanath *et al*. (2003) concluded that modern fisheries management fails to address the core concerns of fishing communities, is insensitive to local conditions, lacks backing from fishing communities and is even inefficient in achieving its own objectives (i.e. sustainability of the resource).

It is generally accepted that this approach, which was developed in industrialised societies is increasingly being questioned in the societies it was developed and attempts to introduce such management in other environments have generally failed. Due to these challenges, the need for institutional reforms in the structures for fisheries management has been widely accepted. Consequently, there have been efforts to introduce fisheries co-management in several countries all over the world. Co-management is widely recognised as a promising option for reform of governance institutions (*Ibid*).

According to Viswanath *et al*. (2003), governance of fisheries involves 3 main components, 1. Setting management *objectives*, 2. Defining and providing the *knowledge base* for management and, 3. Ensuring implementation of management decisions. In most

countries, fishery resources are state property and hence government plays an important role in governing these resources. Figure 1 shows the 2 types of co-management and modern management in relation to the 3 main components of fisheries governance.



1. Setting Management objectives.
2. Defining and Providing Knowledge base for management.
3. Ensuring Implementation of Management decisions.

Figure 1. Types of Fisheries Management (Source: Viswanath *et al*. 2003)

Modern Management

In this approach, the government is responsible for (1) setting management objectives, (2) defining and providing the knowledge base for management, and (3) ensuring implementation of management decisions. The fishing communities have no role in governance. This has been the common approach for most of the fishery resources in Zimbabwe.

Instrumental Co-management

In this approach the government still sets management objectives as well as defines and provides the knowledge base for management. Thus the practical adaptation of the co-management approach is limited to involving communities in the implementation process only. The Co-management on Lake Kariba (Zimbabwean side) can be regarded as being in this category although the communities did play a part in providing the knowledge base (through the Resource Monitors).

Empowering Co-management

In this approach the fishing communities play an active role in 1. Setting management objectives, 2. Defining and providing the knowledge base and 3. Ensuring implementation of management decisions.

Five major requirements of the Empowering Co-management were identified. These are:

i. A rethink of the logic for management and subsequently a change in the knowledge base for management.
ii. A major restructuring of the institutional and organisational arrangements supporting management.
iii. A substantial change in attitudes from both governments and fishing communities towards their role in such arrangements.
iv. Aspiration from fishing communities and government to proceed along this avenue.
v. Capacity-building at several levels both within governments and fishing communities.

A major feature of the empowering co-management concept is that it is a learning process for all the parties involved. Therefore an adaptive approach to management has to be implemented.

Sen and Nielsen (1996) noted that fisheries co-management is considered to be one solution to the growing problems of resource over-exploitation. They defined fisheries co-management as "an arrangement where responsibility for resource management is shared between government and user-groups."

Co-management differs from Community Based Natural Resources Management (CBNRM) in that government is also involved in the decision-making process concerning management of the fishery.

Sen and Nielsen (1996) conducted a comparative analysis of case studies on fisheries co-management arrangements that were documented in fisheries management literature. Based on these case studies, they identified five broad categories of fisheries co-management. These categories were dependent on the role played by government and users (Figure 2).

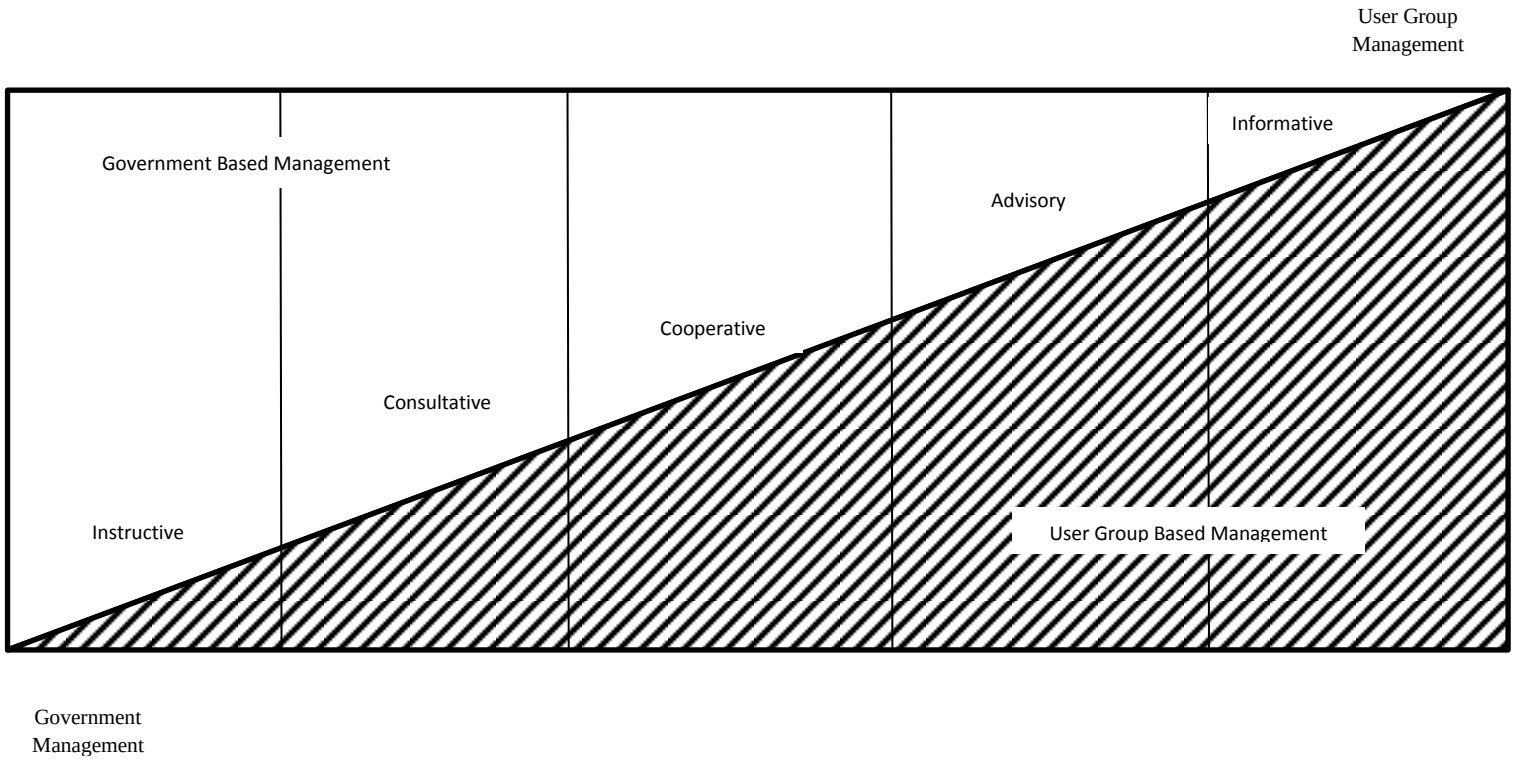


Figure 2: Spectrum of co-management arrangements (Source: Sen and Nielsen, 1996)

Type A – Instructive

There is only minimal exchange of information between government and users. This type of management is only different from centralised ("modern") management in the sense that mechanisms exist for dialogue with users, but the process itself tends to be that of government informing users on the decisions they plan to make.

Type B – Consultative

Mechanisms exist for government to consult with users but all decisions are taken by government.

Type C – Co-operative

Government and users co-operate as equal partners in decision-making. For some authors, this is the definition of co-management.

Type D – Advisory

Users advise government of decisions to be taken and government endorses these decisions.

Type E- Informative

In this approach, government would have delegated authority for decision-making to user groups that are responsible for informing government of these decisions.

These categories are meant to simplify a very complex concept/process.

The 22 case studies that were reviewed were in different categories as shown in Table 2.

Table 2: Categories of Case studies that were reviewed

Typology	**Number of Case Studies**
Instructive	2
Consultative	5
Co-operative	6
Advisory	4
Informative	5

(Source: Sen and Nielsen, 1996)

Based on the review of 22 case studies, the authors concluded that co-management covered a broad spectrum of possible collaborative decision-making between government and user-groups. This encompasses;

(a) The roles of government and user groups in decision-making.

(b) The types of management tasks that can and want to be co-managed by user groups and government, and

(c) The stage in the management process when co-management is introduced (i.e. planning, implementation, evaluation).

In an assessment of fisheries co-management on Lake Malawi, Donda (2006) identified three key factors for the sustainability of co-management arrangements.

Firstly, the Malawi Department of Fisheries' (DoF) understanding of the socio-economic and cultural factors of fishing communities. These factors were important for the Department of Fisheries in the assessment of potentials (opportunities) and constraints of fishing communities that enable them to participate in fisheries co-management. Knowledge of local institutions and how they affect people's behaviour are essential in planning effectively on how to approach and involve fishing communities in co-management.

Secondly, the Department of Fisheries' institutionalisation of appropriate property rights over the lake and fish resources. This provides for the rights of exclusion and instils a sense of ownership over the resources.

Thirdly, capacity-building for both the Department of Fisheries and communities. Capacity building among the communities would include aspects such as legal empowerment, financial empowerment and training of fishers in concepts relating to co-management.

Fisheries Co-Management on Lake Kariba – Lessons Learnt

Several factors have negatively impacted on the implementation of the fisheries co-management approach in the artisanal fishery on the Zimbabwean side of Lake Kariba. These factors can be broadly classified as Institutional, Ecological, Human and Financial.

Institutional Factors

In Zimbabwe, the mandate for Fisheries Management is within the Zimbabwe Parks and Wildlife Management Authority. This Authority is under the Ministry of Environment and Natural Resources Management. Thus, the Authority is responsible for both wildlife (terrestrial) and fisheries management. Consequently, wildlife issues tend to overshadow fisheries issues. The principal legislation (i.e. Parks and Wildlife Act) governing fisheries management is skewed more towards wildlife issues than fisheries issues. Consequently, there is more focus on wildlife issues than on fisheries issues. In the medium-term, it will be essential to revise the Parks and Wildlife Act so that it has enhanced coverage of fisheries issues.

In countries where fisheries have a significant institutional profile (such as Zambia and Malawi), the fisheries co-management approach has recorded significant progress. The organisational restructuring that occurred in the Zimbabwe Parks and Wildlife Management Authority during the implementation of the co-management programme resulted in significant staff changes (transfers and staff turnover). This negatively impacted implementation as there was no smooth transition (hand-over) of the programme.

In order to improve implementation of the Co-management programme on Lake Kariba, it is essential for Parks (ZPWMA) to implement a management approach that incorporates the key stakeholders. These key stakeholders are the artisanal fishers, the Kapenta operators, the Fisheries Unit in the Department of Livestock Production and Development (DLPD), through the Agricultural Extension Officers/Workers who are in the Lake Kariba area, the Rural District Councils (RDCs), namely NyamiNyami and Binga Rural District Councils).

These stakeholders can be involved in activities such as resource monitoring (catch and effort data collection), law enforcement as well as fisheries management meetings.

Incentives for the Fisheries Resource Monitors should be re-introduced for effective and sustainable data collection.

Capacity building (training) of the fishers, Extension personnel as well as RDC staff will be a prerequisite that will facilitate meaningful participation in management.

Ecological-Social Factors

Fish productivity in the designated fishing areas is much lower than in the closed (non-fished) areas. For some of the fishers this factor resulted in loss of enthusiasm towards the programme as they continued to increase their fishing effort (number of nets) above those stipulated in the fishing permit. This behaviour was driven mainly by the licenced fishers' lack of security of tenure.

The inclusion of the fishers in management will pave the way for allaying the fears/perceptions relating to lack of security of tenure. As fishers become part of the stewards of the resource their support for the co-management approach will be strengthened.

In the medium to long-term, small-scale fish farming ventures should be promoted in order to reduce the pressure on Capture Fisheries. The experiences of countries such as Uganda, Kenya, Nigeria and Ghana would be useful in this intervention.

Human Resources Factors

Human resource constraints also impacted negatively on the co-management programme. The number of personnel available for activity implementation fell short of the requirements for a lake such as Kariba with about 41 fishing camps/villages distributed along the shoreline of the lake that is 300 km long as reported by Kenmuir (1983).

The involvement of other stakeholders should also address the problem of human resources constraints. Apart from the fishers, RDCs and Extension staff (DLPD), other stakeholders such as Universities and Non-Governmental Organisations (NGOs) could also assist in addressing human resource constraints. The Universities could play a pivotal role in data capture and analysis, as well as in Capacity building. The NGOs could also assist in Capacity building as well as the development of small-scale aquaculture ventures.

Financial Resources Factors

Implementation of the Co-management programme was funded largely through development assistance (donor funding) as a project. No mechanism for the self-financing of

the programme had been developed at the time the project came to an end. Consequently, the programme could not be sustained in the post-project phase.

The economic challenges that the nation was going through in the last decade (2000 to 2010) also worsened the financial constraints.

A key factor of success for the co-management programme is a sustainable financing mechanism. While development assistance can play an important role in "kick-starting" the programme, it is essential that effective financing mechanisms be put in place for long term financing of the co-management. Thus the key stakeholders (Parks, fishers, RDCs and DLPD) should set aside funds for the participation of their respective personnel in this programme. A percentage of the licence (fish permit) fees could be set aside for convening of relevant meetings as well as hosting of the Secretariat for the Co-Management programme.

Proposed Fisheries Management

Fisheries Management in Parks Estate

The shift from centralised fisheries management to fisheries co-management will ensure that

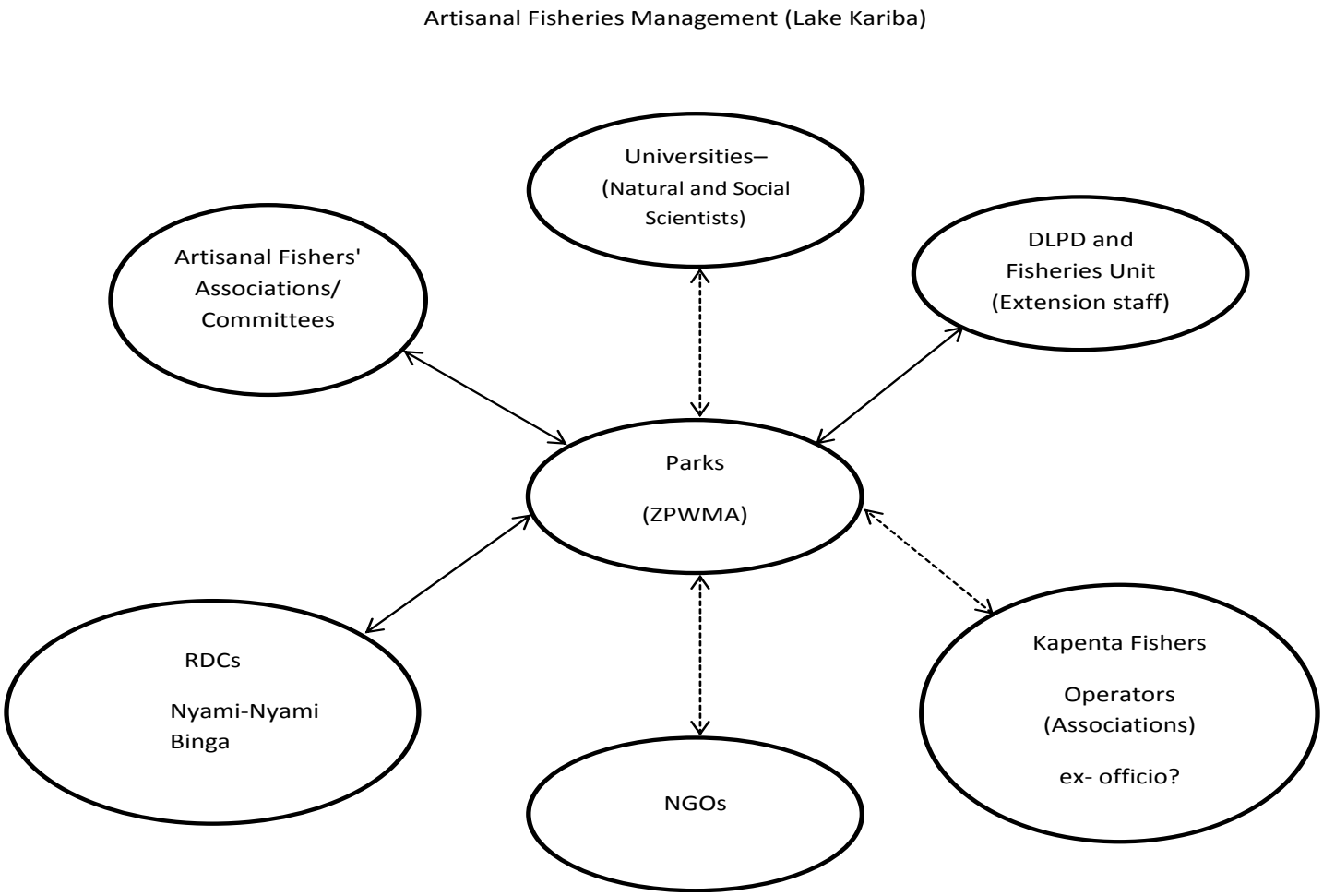


Figure 3. shows the proposed fisheries management arrangements on Lake Kariba

resource users play a more significant role in all aspects of fisheries management including resource monitoring, law enforcement, fisheries policy and strategy development and implementation.

Through Lake Kariba Fisheries Research Institute (LKFRI) the Parks Authorities (ZPWMA) would be the co-ordinating institution. The fishers themselves would be key stakeholders. Their participation would be through representation. The Sub-Area Fishers' Associations and District Fishers Associations that were established in earlier interventions should be resuscitated. Other major stakeholders would be the 2 RDCs that have jurisdiction over the communal areas that are on the shoreline of the Lake (i.e. NyamiNyami and Binga). The Fisheries Unit in the DLPD would also be a primary stakeholder mainly through the extension staff stationed along the Lake's shoreline (e.g. in Gache Gache and Binga).

The Kapenta Fishers (through their Associations), Universities and NGOs would be secondary stakeholders. The Kapenta Operators' representatives would provide a link between the artisanal fisheries management and the commercial (pelagic) fisheries management. Universities would play a supportive role. University personnel (both social scientists and natural scientists/fisheries biologists) would be able to provide their skills in the fisheries management process as well as assist in capacity building. The mode of collaboration between the secondary stakeholders (i.e. Universities and NGOs) and the primary stakeholders could be formalised through MoUs (Memoranda of Understanding). The NGOs with expertise in capacity-building would play a key role in training of the fishers in aspects such as financial management and later fish-farming.Figure 4 shows the proposed management arrangements for the other dams/lakes within the Parks Estate. In these dams, the primary stakeholders would be Parks (ZPWMA) and the fishers. Universities and NGOs would be the secondary stakeholders as in the case with Lake Kariba.

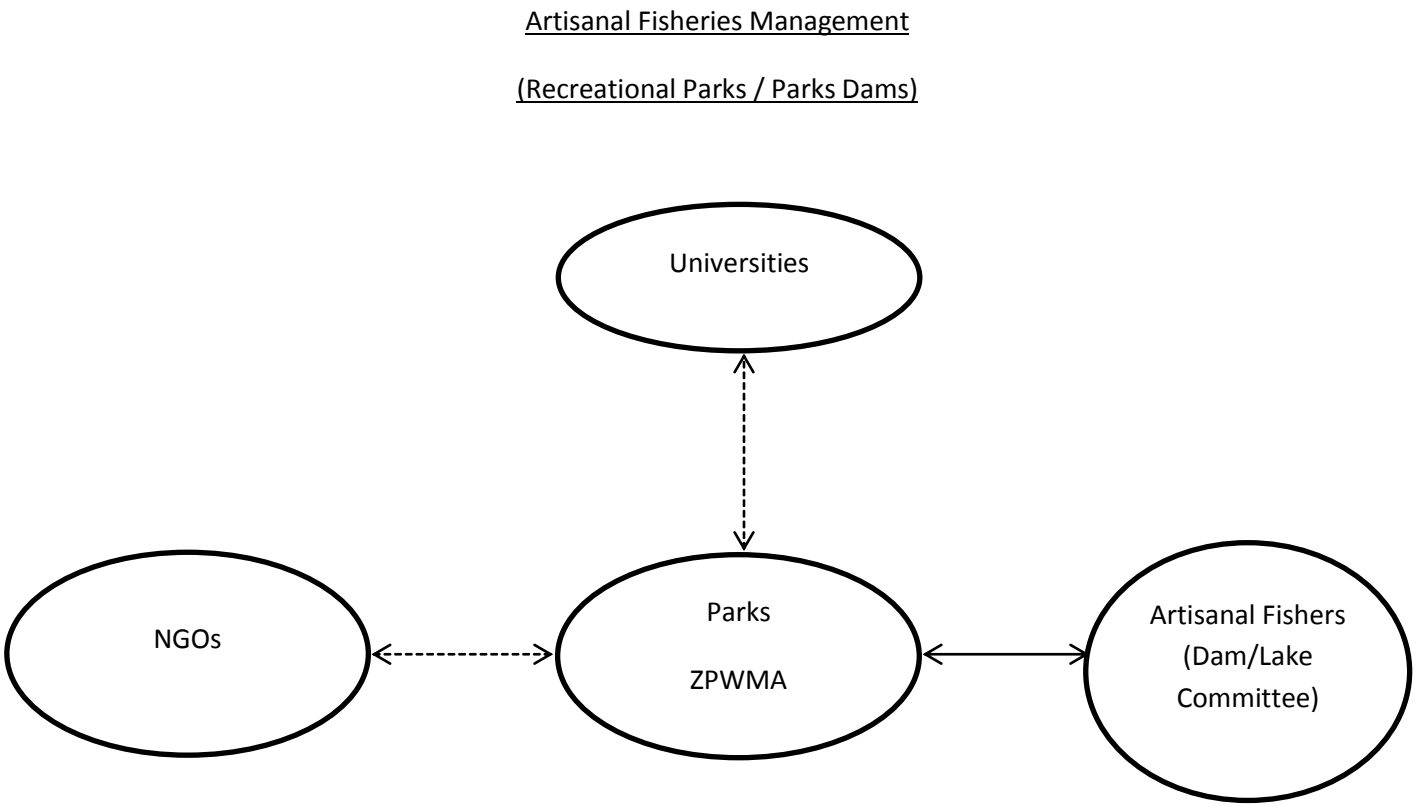


Figure 4: Proposed fisheries management arrangements on dams/lakes within Parks Estate

Fisheries Management outside Parks Estate

For all other dams/lakes outside the Parks Estate, it is proposed that a two-tier management approach be implemented (Figure 5).

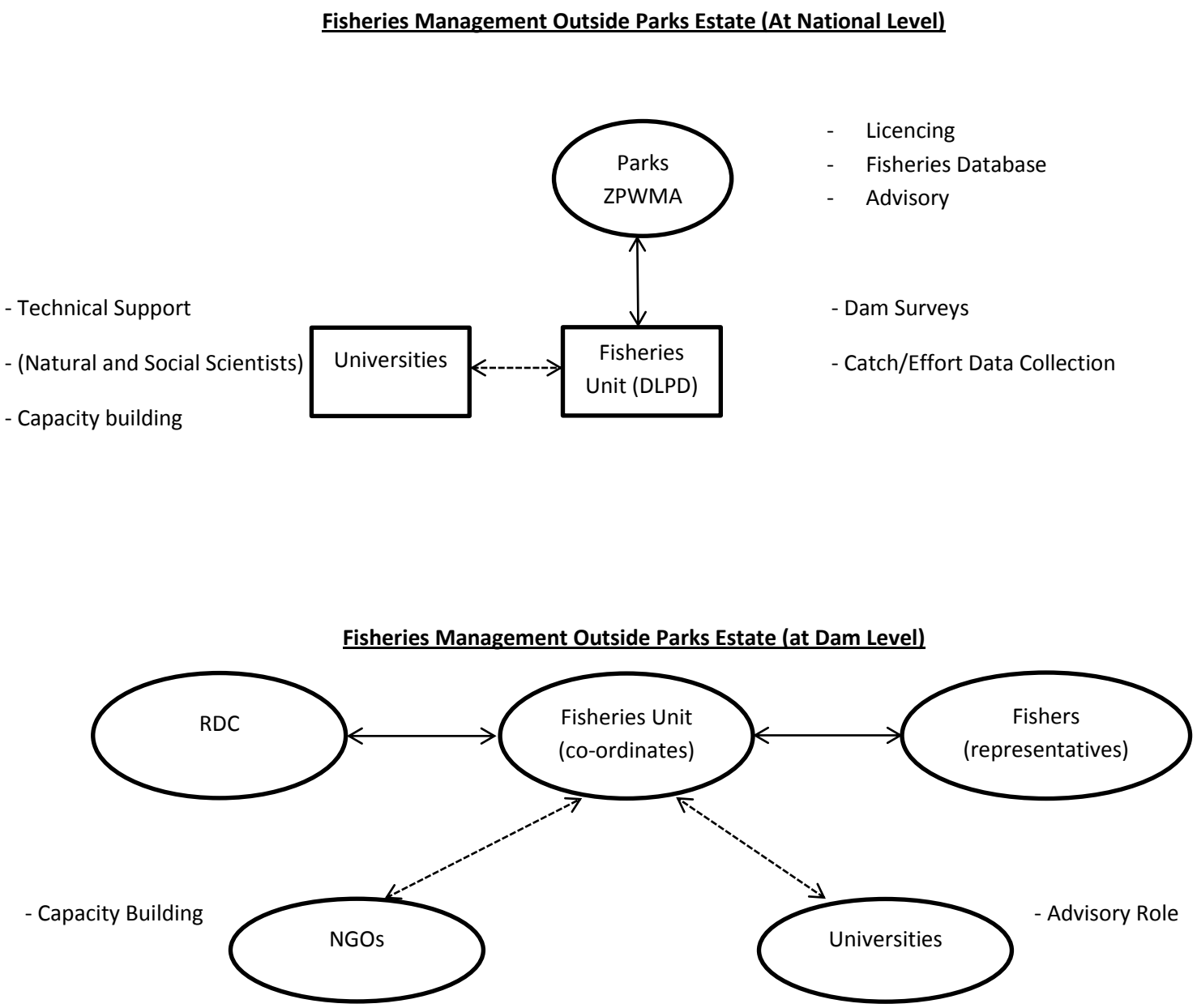


Figure 5: Fisheries Management arrangements on dams outside Parks Estate

The first tier would be at the national level where a co-ordinating unit would be housed (Figure 5). This co-ordinating unit would have the Fisheries Unit (DLPD) and Parks (ZPWMA) as the primary stakeholders and Universities as the secondary stakeholders. Parks would continue to be responsible for licencing of fishers as well as providing advisory support to the Dam Level management structures whenever necessary. Parks would also be responsible for housing a national fisheries database. The database would include information on production (catch and fishing effort) as well as data on the fishers (e.g. number of fishers,

and number of fishing gear). The Fisheries Unit (DLPD) would continue with the responsibility of conducting dam surveys as well as co-ordinating data collection at dam level. The Universities would provide technical support whenever required. They could also assist in providing manpower through student industrial attachment.

The second tier would be the management arrangements at site (dam) level. The primary stakeholders would be the Fisheries Unit (through the Agricultural Extension Officer/Worker based near the dam), the RDC(s) for the area where the dam is located and the licenced fishers. The NGOs and Universities would be secondary stakeholders providing mainly advisory, research and capacity-building support.

Conclusion and Recommendations

The fish resources in Zimbabwe's dams have the potential to contribute significantly to increased household income and food security, especially among the riparian communities. The absence of a robust fisheries management system is a major constraint to increased fish production from the artisanal fisheries sector. Given the financial and human resource constraints that are faced by fisheries managers, it is imperative for stakeholders from different institutions to collaborate with the resource users (fishers) in the management of the fishery resource. This paper presents proposals for fisheries co-management. These proposals should be viewed as a contribution to the discourse on the development of a fisheries co-management approach in the artisanal fisheries sector in Zimbabwe.

In implementing fisheries co-management arrangements, the lessons learnt from previous artisanal fisheries projects in Zimbabwe should be used to inform the new arrangements. These lessons include previous projects on Small Water Bodies (Nyikahadzoi, 2005; Nugent 2007). Information on Lessons Learnt in other artisanal fisheries in Southern African countries should also guide this process.

References

Diffey, S. J. (2012). Artisanal fisheries, income diversification study, eco-tourism and recreational fisheries. Programme for the implementation of a regional strategy for the Eastern and Southern Africa and Indian Ocean Region. Smartfish. FS/2012/17. 69p.

Donda, S. (2006). Governance and Institutional Changes in Malawi Fisheries: Impact on Poverty Reduction and Environmental Integrity. InS.V.Siar, M. Ahmed, U Kanagaratnam, & J. Muir. (Eds). Governance and Institutional Changes in Fisheries: Issues and priorities for research. WorldFish Center Discussion Series No. 3.

Karenge, L. & Kolding J. (1995). On the relationship between hydrology and fisheries in man-made Lake Kariba central Africa. *Fisheries Research* 22: 205-226.

Kenmuir, D. (1983). Fishes of Kariba. Mardon Printers. Harare. Zimbabwe.

Mbewe, M., Mweemba, C., Habulembe, I. &Silwimba, E. (2011). Lake Kariba Frame Survey Report.

Nugent, C. (2007). Strengthening fish production through improved management of small water bodies and dams in Zimbabwe. FAO. TCP/ZIM/3003.

Nyikahadzoi, K. (2005). Fish enhancement through improved management and restocking of Small Water Bodies in Zimbabwe: Problems, Constraints and Opportunities. FAO/TCP/3003.

Sen, S. & Nielsen, J.R. (1996). Fisheries Co-management: a comparative analysis. *Marine Policy* 20(5):405 – 418.

Viswanath, K. K., Nielsen, J.R., Degnbol, P., Ahmed M., Hara, M. & Raja Abdulla, N. M. (2003). Fisheries Co-management Policy Brief: Findings from a Worldwide Study. Worldfish Center Policy Brief 2. 26p.