

Short Communication

A REVIEW ON THE USE OF INFORMATION COMMUNICATION TECHNOLOGY (ICT) IN FISHERIES MANAGEMENT: A CASE OF MBENJI ISLAND SMALL-SCALE FISHERY IN MALAWI

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ABSTRACT

Fisheries management has evolved in Malawi from a traditional system to a centralized regime and lately to co-management fisheries systems, although, success stories about sustainability of the fishery resources are few. Open access nature of fisheries resources has posed a challenge to management regimes. Resource overexploitation has continued in a majority of fisheries worsened by large stretches of the shoreline manned by a single fisheries field staff, and limited capacity by DoF to monitor and manage the fishery. However, isolated localities have upheld management styles that have facilitated sustainable exploitation. Mbenji Island fishery 'managers' have ensured high compliance to fisheries rules and regulations among fishers through strict enforcement and maintained abundant fish stocks amid visibly declining levels of fish in vast localities of Lake Malawi and other water bodies in Malawi. There is, therefore, need to take the Mbenji Island success story to other fishing communities to learn from their fisheries management strategies. Information Communication Technology (ICT) as a powerful means in mobilizing communities to take charge of their own development should support 'best practices' and offer fishing communities access to the same type of services and advantages. If appropriately applied, ICT can provide for real-time monitoring of fisheries resources as fishers alarm law enforcers to move in at appropriate times. Fishers also strike deals on mobile phones for the day's catch even before landing at shore. This reduces post-harvest waste from delayed handling of fish. Computers have been used for data management, storage and analysis as well as accessing internet services. Studies have shown commonalities in fisher communities in terms of socio-economic and cultural characteristics. On the basis of such an advantage, more could be shared among such communities. Management success can be adopted by other communities of fishers through use of ICT such as radio programs (supplemented by phone-in sessions) undertaken by local-level resource users. These programs provide locally available information and knowledge on best practices aimed at sustainability with means within communities. This encourages community members in other localities to come together to seek the way forward on the basis of lessons from successful communities aired on local radio stations (both community or national radio stations). It is easier to adopt practices that have worked in near vicinities. After all, what is currently called co-management is seemingly based on indigenous knowledge of fishers and other resource users. Mbenji Island is one of the custodians of ICT option in small-scale fisheries management of Lake Malawi. Information Communication Technology provides opportunity for both the Malawi Department of Fisheries (DoF) and fishers with information about fisher community activities including catch and market regardless of distance.

Key words: Management, Participatory, small-scale, Information Communication Technology, Mbenji Island, Malawi



INTRODUCTION

Co-management is dynamic, and often defined as “the term given to governance systems that combine state control with local, decentralized decision making and accountability and which, ideally, combine the strengths and mitigate the weaknesses of each other” [1]. Co-management is considered to be one solution to the growing problems of resource over-exploitation as the concept focuses on the recognition that user groups have to become more actively involved in fisheries management if the regime is to be both effective and legitimate [2]. Dynamism inherent in the co-management process has recently been highlighted in relation to knowledge generation, social learning, and adaptation for transformative changes [3]. This is best harnessed through Information Communication Technology (ICT) such as radios and television. The Information Communication Technology (ICT) may as well include satellite communications, wireless connectivity, sonar for locating fish, mobile phones for information exchange, trading and emergencies and Global Positioning System (GPS) navigation among others. Radio is the most used ICT in Malawi while internet is currently an emerging ICT. The Department of Fisheries in Malawi is employing ICT in the fisheries management through use of Vessel Monitoring System (VMS) to monitor activities of commercial fishery on Lake Malawi. The VMS informs the authorities the vessel’s current position, as well as its previous positions, course and speed among others at regular intervals [4]. The vessel monitoring systems used are mainly Argos, In marsat and EMSAT [5].

Information Communication Technology (ICT) has the potential of changing significantly and develop fisheries technologies [6]. In South India, it is reported that use of mobile phones contributed to reduced postharvest losses from between 5-8% to about 0% of total catch [7]. The study also reported that the profitability of fishing industry increased by 8% while consumer prices fell by 4% attributing it to the fact that fishers were able to call and land exactly where there was a readily available market.

The aim of co-management is to improve the fisheries stocks through the enforcement of fishery management regulations by the riparian communities through coordinated communication technology. For Malawi, the Fisheries Conservation and Management Act of 1997 provides the legal framework to implement co-management strategies [8]. However, recent studies have shown that despite intensified co-management activities conducted in over a decade, impact on fishery stock recovery has generally been modest in practice [9]. Catch per unit effort and average size of the fish caught have progressively declined [10, 11]. Previous evaluation studies have indicated numerous shortfalls in the co-management for example, conflicts between the local leaders and the Beach Village Committees (BVCs), limited sanctions imposed by the BVCs on illegal fishers, failure by the Malawi Department of Fisheries to meet its expected obligations with regards to revenue sharing and escalating corruption tendencies among the BVCs and local leaders [10, 11, 12].

Nonetheless, in the midst of conspicuous decline of fish in Lake Malawi and other water bodies [13] due to compromised co-management, Mbenji Island fishery has maintained a relatively healthy stock of fish over a couple of years. This small-scale fishery offers great encouragement to the ongoing Community Based Natural Resources Management



(CBNRM) programs in Malawi. Local fisheries institutions at Mbenji Island fishery have ensured high compliance to fisheries rules and regulations among fishers that operate around the Island. There is high observance of the closed season as well as use of approved fishing methods and gear types, as well as recommended mesh size nets [14].

While devolution of power remains crucial, promise for fisheries resource management, functional and successful local institutions are rare in Malawi. The setting of objectives for the co-management arrangements is still primarily done by government representatives who show little or no consideration for the traditional practices and local knowledge of the resource users [12]. In several of the co-management examples from Southern Africa, powerful local authorities have used the programmes to serve themselves rather than the fishers [15].

The fundamental question of concern, therefore, arises as to whether the traditional framework for fisheries management practiced at Mbenji Island fishery can be a model for other fisheries in Malawi. It was hypothesized that if the success stories and experiences on management could be shared among communities of resource users through ICT, successful management practices could spread to or be replicated to other areas with high potential for adoption due to the advantage of sharing almost similar socio-economic attributes among other drivers. Access to information is a key determinant for maintaining a successful enterprise [16, 17] such as fishing. Information Communication Technology (ICT) offers a lot of benefits such as increasing socio-economic level of the fishers, increase fisher's knowledge and skills in ICT, ease the communication process and enhance the safety aspects of the fishers when fishing [18,19]. It is reported that ICT tools are able to save the cost, time and energy of the fishers and provide opportunities for the fishers to get better prices on the market even before landing [20, 21, 22, 23, 24, 25].

It was thought that PFMP, with effectively shared successful experiences through ICT, would lead to stock recovery. It was further hypothesized that the success of PFMP initiatives would be undermined by migrant fishers.

MBENJI ISLAND FISHERY

The Mbenji Island is about nine square kilometers in size and located about 15 km off the mainland at Chikombe beach in Nema Village, in the area of the Traditional Authority (TA) Msosa, Salima District, Central Lake Malawi. The fishery is based on Utaka, a pelagic plankton-feeding group of fish species of the genus "*Copadichromis*" which is a member of the Cichlid family. With the decline of the Chambo fishery over the years, Utaka (average length range of 7-25 cm and mean length of 15.2 cm) [26] are one of the most abundant group of species in the traditional fisheries landings of Mbenji Island. The proportions of contribution demonstrate the high potential of Utaka to contribute to growth of the fisheries industry of which Mbenji Island fishery is one of the major contributors. Utaka and other small cichlids fishes, such as Kambuzi and Chisawasawa, are affordable to many people at the markets.



Approximately 86 percent of the fishers at Mbenji Island have some formal education. The implication of this is that, information dissemination by extension agents through leaflets, pamphlets and other print media might have positive impact on fishing activities in the area since more than 80 percent of the fishers can possibly read and write. The Mbenji Island fishery being one of the few productive fisheries has, through communication technology, attracted interest of many fishers from all parts of the country as observed in the fishers tribal group dynamics [14].

Text box 1: *Effects of ICT on migrant fishers*

Haambiya *et al.* [14] reports that the Mbenji Island fishery hosts well over 57% migrant fishers and that a group discussion pointed out that migratory movement around the lake tend to increase with diminishing fish stocks in fisher's respective localities. Fish stocks are highly migratory and fishers along the shores have developed migratory work patterns of following the fish in locations where fishing can be carried out most effectively and efficiently. These patterns are facilitated by communication through mobile phones. However, contrary to the hypothesis that migration negatively influences participation in fisheries management, it was found that migrant fishers are focused on what they would want to achieve. This implies that when they migrate to areas where there are clear institutional design principles with regards to fisheries management, they most likely would participate in the management of the fish stocks and this in turn would ensure resource sustainability. This is supported by the fact that Mbenji Island has made clear the expected requirements of those that will operate within its jurisdiction through local radio programmes such as *Usodzi wa Lero* [14].

The migrants play an important role in the villages where they live as consumers of agricultural produce, patrons of various service industries (bars, restaurants, shops, among others), and employers of crew-members from the resident farming households [27]. They attract fish traders into the villages, which further stimulates economic activities. The other possible reason for migrations was search for good markets for their catch. With the decline in fish catches in most fishing areas, efficient marketing systems that reduces post-harvest loses in these areas could be one way that would ensure fishers still have high income [28]. Fishers and traders at Mbenji Island are able to communicate over mobiles—giving each other indications of landing sites/beaches upon price negotiations. Mobile phone technology has reduced the cost of doing business. This saves time and the hassle of looking for buyers at the expense of fish quality. This is explained in the minimized involvement of middlemen in the supply chain. The mobile phones are also currently being used by the fishers to access internet services to get weather forecasts on the lake such as prevalence of strong winds. This has saved lives and resources of the fishers as they are aware as to when it is more likely to be safe to fish. Studies have also reported that ICT has the potential of enhancing gender in balance in the fisheries sector [29].

MBENJI FISHERY MANAGEMENT IDEAS FOR SHARING

Co-management is often an initiative introduced when there is a resource crisis such as conflict and/or scarcity, especially when people are highly dependent on the resources



[30]. Mbenji Island fishery has for over six decades been strictly under the management guidance of Traditional Authority Msosa together with his subordinate traditional group and village headmen. The fishery has to a greater extent upheld traditional laws based on culture and ancestral beliefs [13, 31] coupled with adoption of national laws.

Haambiya *et al.* [14] reported that 77% of the study respondents indicated that annual fish catches at Mbenji Island were stable throughout the whole decade. The trend of catches was highly attributed to good management of the fishery by the existing local institutions that have ensured high levels of compliance to rules and regulations among fishers [14]. Institution in this case is a widely understood rule, norm, or strategy that creates incentives for behavior in repetitive situations [32] which may be formally described in the form of a law, policy, or procedure, or they may emerge informally as norms, standard operating practices, or habits. The case of Mbenji Island fisheries demonstrates the fact that institutions are as essential to fisheries as the fish and the fishers themselves [33].

Food and Agriculture Organization (FAO), reports that management institutions may differ widely in nature and serve a wide range of functions, including, as is often the case with traditional institutions, functions besides the management of fisheries [34]. Institutions at Mbenji Island differ in terms of their roles, mechanisms and structures, and the manner in which they are assembled. Fishers revealed the presence of four organizations facilitating fisheries management activities. These were; BVC, Mbenji Management Committee (MMC), Beach Executive Committee (BEC) and Fisheries Committee (FC) [14]. Community members are elected onto these committees on the basis of positive attitude towards sustainable resource management.

The relatively higher percentage confirming involvement of the BVC and MMC implies that these plays some of the fundamental roles in management. Fisheries Committee (FC) comprises local data collection personnel located in strategic beaches to collect necessary fish and fisheries data for DoF. This data is entered in computers for storage and transmission to DoF; Fisheries Research Unit (FRU) and Fisheries Head Quarters, mainly via internet, for compilation of quarterly and annual reports for future reference. Computer based models are used to analyze catch data useful in estimating stocks and catch forecasts. Information generated from such analysis is in most cases published in Fisheries bulletins that can be sourced through internet downloads and from DoF offices. Based on this information, members of the FC in the absence of fisheries technical staff stand-in to provide advice on fisheries conservation and management.

Text box 2: *Institutional performance at Mbenji Island*

In any case although decisions are seen to be formulated by committee members, regular meetings are encouraged at Mbenji Island. Such meetings provide avenues from which a variety of views from community members are captured for further consideration by the main committees. This could probably be the reason why the study revealed that numbers of people participating in institutions had increased due to provision of a wealth of knowledge about fisheries management. Results also revealed that a relatively higher number of fishers were aware of the existence of such roles as;

formulation of fisheries management plans, constitution, provisional and appropriation rules, monitoring use of fisheries resources, conflict resolution and enforcing graduated sanctions. On a scale of poor, fair, good, very good or excellent in terms of perceptions about performance, 42% of respondents indicated that the local institutions generally performed very well. For example, the mandatory monitoring system at the Island works in favour of institutions that keep track of their member's fishing activities. By claiming ownership of a management plan, they are able to apply social pressures against those who infringe on the plan [14].

The recent fishery by-law process in Malawi that seeks the transfer of discretionary powers to local levels has offered an opportunity for empowerment of community institutions. Within their powers, institutions can formulate a constitution to guide their operations. For instance, the Mbenji constitution provides for the review of the MMC, by His Royal Highness Chief Msosa, on a yearly basis. Changes are made depending on the performance of individual members in the past year. This promotes outstanding performance among committee members with the hope of retaining their positions.

To control catch, the study revealed that the closing and opening of the Island to fishing enables the people in the area to conveniently and effectively combine fishing on the Island with farming on the mainland. Farming, thus, weighs as the dominant homestead preoccupation during the closed season while fish is preserved for the opened season. The closed fishing season, which begins in December and ends in April, is also with the aim of allowing fish to breed and stocks to recover. As a result, Mbenji Island produces several thousands of tons of fish in a given year. This translates into enhanced per capita fish consumption among the Mbenji Island community and relatively higher incomes of the majority who are involved in the fishing industry either directly or indirectly. Haambiya *et al.* [14] reported that at the end of each fishing season, families raise enough income to enable them sponsor their children to schools and universities, and many are able to build decent houses for themselves, replace fishing equipment and acquire sufficient food for their families. These incomes have also enabled most people to afford radios, television sets and mobile telephones, useful tools for ICT.

FISHERIES MANAGEMENT THROUGH ICT IN MALAWI

It has been reported that limited use of technology reduces productivity [35, 36]. It is felt that small-scale fishers operating in coastal waters need minimal assistance from ICT. However, the fishing industry has undergone change during the past decades and will continue into the foreseeable future. The Island management body endeavors ensuring that the members of the community are fully aware of, and supportive of, the fishing regulations developed. A radio programme called '*Usozi walero*,' essentially dwells on the need for responsible fisheries management. Besides studio presentations, speeches made during both the opening and closing ceremonies to fishing at Chikombe beach are recorded and aired on national radio and TV. Such speeches are made by several attendees namely the Traditional Authority Msosa, a representative from the DoF (both Head Quarters and District Fisheries Office) and representatives from other



sectors/organizations that are invited to these spectacular events such as the police and Member of Parliament for the area.

Text box 3: Use extent of common technology

During radio presentations, phone-in-sessions are chipped in and listeners are offered an opportunity to ask questions on issues that require clarity. Through radio and phone technology, members from the community and beyond are able to understand management potentials and challenges in their respective areas whilst taking part in the programmes.

While it is noted that full coverage by mobile phone networks is not yet complete, portable phones have been used in monitoring for control of fishing within the boundaries of this Island fishery. Study results showed that a relatively higher percentage (52.7%) of the respondents indicated that control of encroachment into the surrounding waters/fishing grounds exists but it is not effective in enabling ultimate institutional effectiveness. Mobile telephone technology has had a limited impact aboard vessel. Fishers have in most cases used it within distances close to the shore. However, this technology is not only handy in monitoring movements but also for increased safety on the lake as well. For instance, fishers have been able to alert members of their management body and at times DoF officials about developments that require immediate attention. This technology has also provided useful links between local and national governance.

DoF has deliberately organized trainings for fishers who volunteer as scouts as well as those belonging to the aforementioned committees on the need for effective communication and diligent execution of duty. These trainings are accompanied by leaflets [14].

Although telephone companies are investing to have wider coverage, prohibitive charges are anticipated with satellite phone technology despite their considerable improvement in recent years.

One notable impact, especially of the radio and television technology is the informed decisions made by some of the communities who have since made efforts to declare the need for adopting implementation of lessons from successful stories [14]. Fishers and/or traders have used phone technology quite a lot to negotiate prices with potential buyers in far and wide market places as well as understanding demand and supply beforehand besides use of the technology in alarming for emergencies. Fishers have also used this technology to order for fishing gear from their suppliers who are normally local shop owners or fish buyers who trade nets for fish. Fishers have also called upon DoF to assist with monitoring for wrong doers as well as for provision of knowledge on best alternative approaches to management in order to facilitate elimination of illegalities through monitoring and control. The study revealed that ICT is widely used among young fishers of age ranging from 26 to 35 years.

CONCLUSION

Fishers' experience-based expertise from the small-scale fishery of Mbenji has been harnessed for sharing to other fishing communities and nation at large through radio, telephone, television and internet technology. Involvement of the fishing communities and other stakeholders in the use of ICT amplifies self-regulatory capacity, increases self-confidence and self-reliance. Department of Fisheries (DoF) sensitizes fishers on need for sufficient information and effective communication through trainings and meetings. Their emphasis has been horizontal and vertical communication for sustainable networking within the framework supported by law and reflecting fisher observations.

In this small-scale fishery, ICT use is more of the ability to create greater access to information and communication among populations than the technology itself. There is need for village level ICT infrastructure improvement (to aid good radio/television reception, internet availability, mobile phone network coverage among others) so as to leverage its benefits. Empowerment of fisher communities through ICT should be coupled with capacity-building which does not seek to resolve specific problems but rather to develop the capacity within communities in order to improve management.

Considering the stretch of the shoreline, and limited capacity by DoF to monitor and manage the fishery, management success depends on having sufficient, appropriate and timely information useful in comparative assessment of how well particular programs are working and how changes or improvements can be made. An information service initiative using mobile phone technology would be an effective tool through which DoF could improve the management of fisheries resource exploitation. It would not be so huge a task since the fishers themselves are influencing technology adoption through identification of potential benefits of these technologies eventually seeking means of incorporating them into their operations.



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