Fishers’ attitude towards performance of Beach Management Units (BMUs) in regulating fishery and reducing poverty: case study of two BMUs Lake Victoria, Tanzania

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Abstract
Fishers’ attitudes and perception are critical towards assessing the achievement of BMUs in implementing its activities. This study, examined fishers’ perception to wide range of activities that the BMUs are supposed to undertake within their areas of jurisdiction and to investigate if the perceptions depend on specific activity, and fishers’ demographic, social characteristics and fishing activity of the fisher. These activities are those specifically designed to regulate fisheries and focus on reducing poverty among fishers. A structured questionnaire and Key Informant Interviews (KII) as well as participant observation were used to collect data. A chi-square and multiple regression analysis and content analysis were used to analyse the generated data. A total of 62 respondents from survey questionnaire and eight informants from the KII were interviewed. It was conducted on two BMUs in Lake Victoria, Tanzania between January and February 2014. The survey respondents were drawn from fishing stakeholder group while key informants comprised BMU executive committee and village leadership. The results of this study suggests that there is difference in fishers’ perception between BMUs on how activities like patrolling fishing grounds, collecting revenues, conducting meetings and initiating development projects have been conducted. The length of time has been in the fishery, level of education and occupation in the fishery influences how fishers perceive BMUs performance. These findings reveal that the performance of BMUs could possibly be different across all activities. It is therefore recommended that a survey covering many BMUs and activities be conducted to get a better understanding of areas where support is required to strengthen the performance of BMUs in managing fisheries of Lake Victoria, Tanzania.

Keywords Regulating fisheries; Poverty reduction; BMUs; Fishers’ attitude; Lake Victoria; Tanzania

Introduction
The management of the fisheries resources in Tanzania in the past has been the role of government vested in the Fisheries Division with no input from the fisher folk. However, challenges of centralized fisheries management system led to efforts to reform management hence establishment of fisheries co-management where the government and the fisheries communities through Beach Management Units (BMUs) share authorities and responsibilities in the management (Medard and Geheb, 2000; Ogwang’ et al., 2009).

In Tanzania co-management began in the late 1990s under the Lake Victoria Environmental Management Project (LVEMP) where a committee of five fishers from each landing site, named Beach Management Units (BMUs), were formed around the Mwanza Gulf. This was then extended to other landing sites and by the year 2000 there were about 511 BMUs in all riparian districts of Lake Victoria, Tanzania (Hoza and Mahatane, 2001). However, these BMUs lacked a clear operational guidelines and institutional framework. This led to the reformation of the BMUs in 2006 during the Implementation of a Fisheries Management Plan (IFMP) project carried out from 2004-2010 (Ogwang’ et al., 2009). This saw a reduction in the number of BMUs to 433 in the Tanzanian part of the lake. The reformed BMUs are supported by the Fisheries Act No. 22 of 2003 and the Principal Fisheries Regulation of 2009 and have clear operational guidelines and institutional framework in the
National BMU Guideline. During the reformation processes the BMUs were also trained on fisheries management, fisheries co-management, financial management, formulation and implementation of work plans and reporting, leadership and governance and conflict management. It was anticipated that, with the legal backing and trainings the BMU performance in carrying out her roles in management of fisheries resources and those of fisheries dependent communities will be improved. However, the increased pressure on the fishery resources (Nyeko et al, 2009), illegal fishing practices (Njiru et al, 2009) and growing concern that fisheries communities are the poorest (Onyango and Jentoft, 2010) despite the increased earnings accrued from the sector over the last decade raises more questions on the impact of BMUs in fisheries management. While some authors claim that BMUs have achieved much in implementing fisheries activities (Ogwang’ et al., 2009) others have divergent opinions about BMU success in carrying out their mandate (Onyango and Jentoft, 2007; Nunan, 2010; Hara and Nielsen, 2003). However, few investigations have been carried out to find out how much fishers think about BMU and what attitudes they have towards their performance in carrying out their mandate. This paper presents the preliminary findings of a survey conducted in January through February 2014 to examine the attitude of fishers towards the performance of BMU in regulating the fishery and reducing poverty among the fishers. These two areas are critical in implementing the National fishery policy goal which is to promote conservation, development and sustainable management of the fisheries resources for present and future generations. They are also the main basis upon which the BMUs were formed- to improve the welfare and livelihoods of people in fisheries dependent communities and to safeguard the fisheries resources.

The BMU structure
A BMU is made up of the assembly and executive committee. The assembly includes all persons engaged in fisheries activities at beach level. The members include boat owners, crew members, managers/supervisors, artisanal fish processors and traders, fishing gear and equipment dealers/repairers, boat makers and agents of industrial fish processors operating at the beach. The committee consists of 9-15 elected officials and are responsible for the day to day running of the BMUs activities. The committee is comprised of a chairperson, secretary, treasurer, storekeeper and any other post as agreed by the BMU assembly. Within each BMU committee there have to be at-least three sub-committees responsible for fisheries management, financial management and environmental protection. However more sub-committees can be formed depending on the need of a respective BMU.

The BMUs rules of procedure are provided in the National BMU Guideline which was developed within the context of FAO Code of Conduct for Responsible Fisheries and the Harmonized Beach Management Unit Guidelines on Lake Victoria (URT, 2005). The BMU guideline supports the national government development objectives of poverty eradication, gender equity and social inclusion in decision making processes that affect the sustainability of natural resources and livelihood of people dependent upon these resources through empowering the fisheries communities in fisheries planning, management and development and provide a clear outline for community participation in these processes. The guideline among many other issues provides understanding on the structure and functions of the BMUs as well as mechanism for establishing and operating fisheries co-management on inland and marine waters of Tanzania.

Roles of BMU executive committee
The executive committee of the BMU is the unit that oversees day to day operation of the BMU and is also responsible for ensuring that the roles and objectives of the BMU are met. The specific roles that the BMU executive committees are supposed to undertake to regulate fisheries and address the poverty include the following (URT, 2005): Identify wider development interventions at Village level from the BMU plan and make financial proposals for their support by the BMU. Propose by-laws for endorsement by the District Authorities and enforce them. Assist in the collection of fisheries data on catch, effort and socio-economic information using agreed formats.

Undertake Monitoring, Control and Surveillance in collaboration with the relevant authorities to reduce, and, ensure that harmful and illegal fish trading practices are eliminated from within the jurisdictional
area of the BMU. Collaborate with the Director of Fisheries, TAFIRI and or Local Authority, to identify fish breeding areas on the basis of indigenous knowledge and identify and clearly demarcate them as breeding and nursery areas.

Promote the improved handling and marketing of fish including construction of associated infrastructure and improved access to market information. Participate in vetting of boat owners and fishers for licensing and, in collaboration with government officials, ensure licenses are granted to those registered with the BMU.

The BMU committee is also required to issue migrant fishers with identification notes/letters to introduce them to new locations.

Methods
Both qualitative and quantitative methods were used in collecting information. This involved a structured questionnaire which was used to collect information from fisheries stakeholder groups (boat owners, crew members, artisanal processors and traders) and Key Informant Interviews (KIIs) with members of the BMU executive committee and village leader in each of the visited site. Information was sought on mechanism put in place by the BMUs in regulating fisheries and activities which are pro-poverty alleviation. A stratified random sampling technique, where respondents were first categorized into their occupational activity in the fisheries and then randomly picked to participate in the survey as they came to the landing site, was used to select respondents for questionnaire. The target was to interview 10% of respondents’ from each category. The KII respondents who comprised BMU chairperson, secretary and women representative, and village chairperson were purposively sampled and this was done in order to target the persons with more knowledge and understanding on the study topic. KIIIs respondents who comprised BMU chairperson, secretary and women representative, and village chairperson were purposively sampled and this was done in order to target the persons with more knowledge and understanding on the study topic. KIIIs respondents who comprised BMU chairperson, secretary and women representative, and village chairperson were purposively sampled and this was done in order to target the persons with more knowledge and understanding on the study topic.

The BMUs were selected because previous National monitoring and evaluation survey carried out in 2008 considered them among the best performing BMUs in terms of implementing fisheries activities and involving other non-committee members in carrying out these activities. So the examination of perception of fishers in these BMUs would provide a better understanding on how the BMUs have performed. Completed questionnaires from the field were recorded and checked against the codes for verification. Quantitative data were combined and analysed using SPSS (Version 16), summaries of the data were generated as frequencies, means and percentages and presented in tabular forms. More elaborate statistical analysis of variable relationships were done for selected data, using a chi-square to test whether there is significant difference between the activities and also to assess whether the responses provided by fishers differed between the BMUs. Further analysis using ordered logit analysis was also done to assess whether social statuses such as education, gender, occupation in the fishery and time spent in the fishery has an influence on how fishers perceived the performance. For the KIIIs, content analysis method was used to analyse qualitative information, particularly recorded dialogues which were broken into meaningful themes or tendencies.

Fishers attitudes towards BMU performance
A Likert scale of one to three where one represented ‘not effective’, two ‘somehow effective’ and three ‘very effective’, was used to rate fishers attitudes on performance of BMUs in undertaking a number of activities. From this, over 90% of fishers indicated BMUs to be very effective in solving conflicts, formulating laws, and keeping inventories. However, the fishers ranking of BMUs performance was low in data collection, patrolling fishing grounds, initiating development projects and conducting meetings (Table 2 columns 1 to 3). Further analyses were done on the responses given by the fishers to assess whether or not there is relationship between fishers attitude towards specific BMU activities. The assumption is that one who answers ‘very effective’ and ‘somehow effective’ supports the view that BMUs have shown some effectiveness than those answering ‘not effective’. On the basis of this the following hypotheses 1 were tested:
H₀ More than half the population think BMUs have been effective.

H₁ Less than half the population think BMUs have been effective.

The hypothesis was tested using a chi-square test statistic and the result presented as p-values (Table 1 column 4). A p-value is the estimated probability of obtaining a chi-square greater than or equal to the calculated chi square given that the null-hypothesis is true, is not sufficiently small to justify rejecting the null-hypothesis. Results on perception of fishers on performance of BMUs indicate significant difference (p ≤ 0.05) with more than half of respondents viewing BMUs to be effective in carrying out some activities than the others. Similar analysis was done on this data to assess whether the differences exhibited in the activities were the same or differed between these BMUs in undertaking the activities. The tested hypotheses 2 were:

Table 1 Fishers rating on BMUs and chi square calculations for activities and BMUs

<table>
<thead>
<tr>
<th>Activity</th>
<th>No</th>
<th>Very effective (%)</th>
<th>Somehow effective (%)</th>
<th>Not effective (%)</th>
<th>p-value for perception</th>
<th>p-value for BMUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formulating by laws</td>
<td>62</td>
<td>90</td>
<td>10</td>
<td>0</td>
<td>0.000</td>
<td>1.000</td>
</tr>
<tr>
<td>Patrolling fishing grounds</td>
<td>62</td>
<td>18</td>
<td>44</td>
<td>38</td>
<td>0.075</td>
<td>0.37</td>
</tr>
<tr>
<td>Prosecuting offenders</td>
<td>62</td>
<td>76</td>
<td>22</td>
<td>2</td>
<td>0.000</td>
<td>0.313</td>
</tr>
<tr>
<td>Confiscating bad gears</td>
<td>62</td>
<td>61</td>
<td>31</td>
<td>8</td>
<td>0.000</td>
<td>0.641</td>
</tr>
<tr>
<td>Resolving conflicts</td>
<td>62</td>
<td>95</td>
<td>5</td>
<td>0</td>
<td>0.000</td>
<td>0.72</td>
</tr>
<tr>
<td>Arresting offenders</td>
<td>62</td>
<td>79</td>
<td>18</td>
<td>3</td>
<td>0.000</td>
<td>1.51</td>
</tr>
<tr>
<td>Collecting revenues</td>
<td>62</td>
<td>63</td>
<td>21</td>
<td>16</td>
<td>0.000</td>
<td>0.006</td>
</tr>
<tr>
<td>Conducting meetings</td>
<td>62</td>
<td>10</td>
<td>73</td>
<td>17</td>
<td>0.000</td>
<td>0.003</td>
</tr>
<tr>
<td>Data collection</td>
<td>62</td>
<td>27</td>
<td>60</td>
<td>13</td>
<td>0.000</td>
<td>0.449</td>
</tr>
<tr>
<td>Keeping inventory</td>
<td>62</td>
<td>81</td>
<td>16</td>
<td>3</td>
<td>0.000</td>
<td>0.151</td>
</tr>
<tr>
<td>Initiating development projects</td>
<td>62</td>
<td>16</td>
<td>57</td>
<td>27</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Note: Rating: <50% Not effective, 50-75% somehow effective, >75% very effective

H₀ There is no difference between BMUs in undertaking the activities

H₁ There is difference between BMUs in undertaking the activities.

The results presented in the last column of Table 1, in a similar way as before indicates significant difference (p ≤ 0.05) in revenue collection, conducting meetings and initiation of development projects while non-significant difference recorded in other activities.

Influence of social status on BMUs performance

The responses from the survey questionnaire (62) were also subjected to ordinal regression analysis to determine whether key demographic characteristics, such as gender (male and female), education (no schooling, primary education and secondary education) and occupation (boat owner, crew and fish trader), have an impact on attitudes towards performance of BMUs. Pseudo R Square measure the different models goodness of fit to the data. The pseudo R square is a relative measure of fit, ranging from 0, indicating a very poor fit, to 1, indicating a very good fit. Positive signs of estimated parameters indicate a positive effect of the variable on satisfaction with the BMU effect and a negative sign indicates that the variable has a tendency to reduce satisfaction with the BMU. The hypothesis that the true parameter is zero is tested for all parameters and the results indicated by asterisk (* for p-value < 0.05, ** for p-value < 0.01**, for p-value < 0.001, and no asterisk for non-significant parameters).

Results in Table 2 indicates that respondents’ background affects fishers’ attitude towards performance of BMUs in some activities. For instance, those with primary education are less satisfied with BMU performance in data collection and initiation of projects than those with secondary education and those who never went to school. On the other hand, those
who are new in the fishery are more positive with the performance of BMUs in project initiation than those who have stayed long in fishery. Crew members are more positive towards BMU performance in collecting revenues, conducting meetings and data collection than other occupation in the fisheries.

Table 2 Ordinal regression results on perceived BMU performance in activities

<table>
<thead>
<tr>
<th>Activities</th>
<th>Years in Fishery</th>
<th>Age</th>
<th>Gender</th>
<th>Boat owners</th>
<th>Crew</th>
<th>Fish Trader</th>
<th>No Schooling</th>
<th>Primary education</th>
<th>Pseudo R square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formulation of by-laws</td>
<td>0.095</td>
<td>-0.109</td>
<td>17.965</td>
<td>-17.818</td>
<td>-0.797</td>
<td>0.262</td>
<td>1.928</td>
<td>0.623</td>
<td>0.165</td>
</tr>
<tr>
<td>Patrolling fishing ground</td>
<td>0.025</td>
<td>0.013</td>
<td>-0.434</td>
<td>1.285</td>
<td>0.514</td>
<td>-0.485</td>
<td>-0.355</td>
<td>-0.984</td>
<td>0.13</td>
</tr>
<tr>
<td>Confiscation of gears</td>
<td>-0.118</td>
<td>-0.088</td>
<td>17.942</td>
<td>0.409</td>
<td>-0.976</td>
<td>0.068</td>
<td>-15.689</td>
<td>-1.206</td>
<td>0.189</td>
</tr>
<tr>
<td>Prosecuting offenders</td>
<td>0.02</td>
<td>-0.058</td>
<td>34.285</td>
<td>3.626</td>
<td>3.246</td>
<td>2.771</td>
<td>-33.326</td>
<td>-33.82</td>
<td>0.152</td>
</tr>
<tr>
<td>Arresting offenders</td>
<td>1.523</td>
<td>-3.644</td>
<td>44.689</td>
<td>-41.279</td>
<td>-78.317</td>
<td>-30.494</td>
<td>14.083</td>
<td>26.334</td>
<td>0.248</td>
</tr>
<tr>
<td>Resolving conflicts</td>
<td>-0.025</td>
<td>-0.131</td>
<td>34.585</td>
<td>37.396</td>
<td>18.109</td>
<td>18.295</td>
<td>29.941</td>
<td>18.471</td>
<td>0.208</td>
</tr>
<tr>
<td>Collecting revenues</td>
<td>0.042</td>
<td>-0.012</td>
<td>19.13***</td>
<td>-20.28***</td>
<td>-21.793</td>
<td>-20.877</td>
<td>-20.143</td>
<td>-0.981</td>
<td>0.179</td>
</tr>
<tr>
<td>Conducting meetings</td>
<td>0.037</td>
<td>0.016</td>
<td>-0.192</td>
<td>16.45***</td>
<td>16.052***</td>
<td>16.434</td>
<td>-18.188</td>
<td>-1.082</td>
<td>0.084</td>
</tr>
<tr>
<td>Data collection</td>
<td>0.1</td>
<td>0.023</td>
<td>-1.146</td>
<td>16.674***</td>
<td>16.697***</td>
<td>16.825</td>
<td>-1.63</td>
<td>-2.742*</td>
<td>0.159</td>
</tr>
<tr>
<td>Keeping inventory</td>
<td>2.133</td>
<td>-6.982</td>
<td>-0.261</td>
<td>15.165</td>
<td>-118.028</td>
<td>-110.618</td>
<td>76.75</td>
<td>-101.198</td>
<td>0.248</td>
</tr>
<tr>
<td>Project initiation</td>
<td>0.143*</td>
<td>-0.07</td>
<td>-1.252</td>
<td>16.771***</td>
<td>17.4***</td>
<td>18.035</td>
<td>-0.939</td>
<td>-2.55*</td>
<td>0.262</td>
</tr>
</tbody>
</table>

Note: (*) if p<0.05, (**) if p<0.01, (***) if p<0.001

Results from the Key Informant Interviews

The objective of the key informant interview was to seek views on; Availability and accessibility of credit services and facilities. Main source of income for majority of people at the landing sites Actions taken by the BMU to manage fishery Development programmes that the BMU have initiated to generate income and reduce poverty among fishers Achievements made by the BMU since its formation. Challenges facing BMU operations.

Responses from key informants revealed that none of the BMUs had neither established credit services nor lobbied for its members to join any through which fishers could get loans and make savings. In addition, none of the BMUs had operational development programmes to generate income for its plans and has no projects aimed at reducing poverty among fishers. The only development project established by previous Kayenze BMU leadership collapsed after the election of new officials. Nevertheless, there are informal savings schemes started and operated by fishers themselves without support of the BMUs. Only Kayenze BMU indicated to have been awarded tender some years back to collect revenues on behalf of the local government and this was awarded courtesy of the district fisheries officer. The main source of income to majority of people around these landing sites according to key informant are fishing followed by farming and keeping of livestock.

The key informants noted that the BMUs have formulated by-laws to govern fisheries and fishers’ behaviour, confiscated some of illegal fishing gear and created awareness to fishers on fisheries management measures. However, there was mixed reaction on patrolling fishing ground and conducting BMU committee meetings as only respondents from Kayenze BMU indicated to have conducted one patrol in the last three month prior to this survey and holds periodic committee meetings. But, have failed to hold assembly meetings (quarterly) as stipulated in the guideline. None of the BMU had put up measures to control migrant fishers from other landing sites. The informants also described improved hygiene and sanitation at the landing sites and conflict resolution as the major achievements that have been experienced in these BMUs since formation. Lack of equipment and inadequate funding, insufficient training for new officials and inadequate support from other stakeholders in co-management were highlighted as some of the challenges facing BMUs in executing their activities.

Discussion

Local assessment of opinions is important in identifying potential areas of weaknesses and directing management strategies to be more effective. This is so because different actors perceive and engage in management and respond to governance strategies differently (Evans, 2009). However, it is not the
intention of this paper to conclude which of the fisheries stakeholders group have more or less accurate response to specific activities. But, to present the views of fishers in relation to these specific activities. Thus their views should not be ignored but seen as reflection of how they think about the BMUs. Fishbein and Ajzen (1974) revealed that attitude expression is important and highly predictive in describing situation or action. In this regard this study should be considered as a preliminary description of the attitudes of fishers towards the BMU performance in carrying out their activities, and the result can be used to understand areas of weaknesses with a view to strengthening them for better performance.

Results from hypothesis 1 revealed that there were differences in perception of fishers in the activities that the BMU are mandated to do. It was observed that there was statistical difference with the way fishers viewed BMUs performance in carrying out activities such as formulating by laws, prosecuting offenders, confiscating bad gears, data collection, arresting offenders; solving conflict, collecting revenues and conducting meetings compared with patrolling fishing grounds. This observation imply that the level of the performance in an activity may differ within a BMU, and this could be the reason why some studies, Hara and Nielsen (2003) argued that BMUs have not been effective in fisheries management, (Onyango and Jentoft, 2007) BMU institutions have not performed to expectations and Nunan (2010) that BMUs have failed to control migration of fishers. Hypothesis 2 result shows that the perception of fishers towards BMUs performance differs between the two BMUs in conducting meetings, collecting revenues and initiating development projects and this was also supported by the findings from the Key informant interview that only Kayenze BMU had a better performance in conducting these activities. The observed differences in performance between the two sampled BMUs imply that there are specific areas of strength and weaknesses, hence BMU specific area of improvement. In order to have a holistic understanding of the BMUs performance, therefore, it is crucial to assess their performance in all activities. This results concur with findings of Ogwang’ et al (2009) and Baratt et al (2014) on the achievement of the BMUs. The observed differences could likely be attributed to the level of commitment of the BMU leadership to carry out their mandate and support received from other stakeholders. This was evident from Kayenze BMU informants who revealed to have a close working relationship with village leadership. This was different from Igombe BMU where these lacked, though no antagonism existed between the BMU and village leadership. It was also observed that social statuses (level of education gender, period in the fishery, and occupation in the fishery influences how a fisher perceive the BMUs. This is useful and instrumental in understanding awareness needs of specific groups in the fishery. Overall, the study revealed positive attitudes towards activities directed at regulating fishery, but weak perception on activities targeting poverty reduction. They cited inadequate skills and expertise as the reason for slow implementation of pro-poverty measures. However, this should not been blamed much on the BMUs given that the country’s poverty alleviation strategies have achieved minimal impact in the rural areas where fisheries is carried. Despite, the lack of poverty reduction strategies initiated by the BMUs, fishers have come up with some initiative such as revolving funds where fishers lend money to one another. This is however, common among the female than male fishers (Onyango, 2004). The formal savings and credit schemes operated in some landings are extension of Micro Finance Institution (MFIs) and Non-Governmental Organization (NGOs) with no BMUs initiative. The members to these schemes are mainly boat owners, mainly women dealing in dagaa trading and processing and some other business found around the fishing communities. Based on the findings of this study, it is therefore evident that there are some achievements on-going within BMUs in carrying out their mandate in co management arrangement as required by the national guideline. However, it should be noted that co-management arrangement in most small scale fishery is still consultative where setting management objectives is still the prerogative of the government with little or no consideration for local knowledge (Njaya, 2007). This is true for Lake Victoria where the government still hold more powers in decision making and implementation of fisheries management measures (Onyango and Jentoft, 2007).

Challenges of inadequate funding and support to BMUs is an area that needs to be critically examined and strengthened to improve the performance of the
BMUs. As also observed by (Lawrence and Watkins 2012; ogwang et al., 2009) who revealed the weaknesses exhibited in devolution of power and inadequate support from the other co-management stakeholders in implementing fisheries activities to be the reasons why some BMUs have not been effective in executing some of their programmes.

**Conclusion**

The survey findings have major implications for fisheries co-management in that it offers a preliminary information on the attitude and perception of fishers towards BMU performance in carrying out their roles and responsibilities. By focusing on BMU alone the study aimed at examining the activities that the BMUs as a stakeholder in co-management arrangement is required to undertake within their areas of jurisdiction and to identify areas where fishers think their BMUs have performed poorly. This is important for improving community involvement in management of their resources. However, more studies covering many BMUs and all activities is required to have a holistic performance level, which can assist in strengthening BMU specific weakness point or areas.

**Acknowledgement**

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