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# Assessment of fisheries resource-use conflict management strategies among artisanal fishers of the Kenya coast

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**Abstract**
Fisheries resource use conflicts are common among artisanal fishers of tropical developing coastal areas. These can be resolved by various conflict management strategies. An assessment of these fisheries resource-use conflict management strategies currently used by artisanal fishers along the Kenyan coast was conducted by studying how effective they are in resolving conflicts amongst the fishers. The study adopted a survey approach where 197 active fishers were systematically interviewed at selected fish landing sites of Kuruwitu, Mnarani and Uyombo using a semi-structured questionnaire. Both traditional and modern approaches of conflict management as well as legislative fisheries regulations are used to manage fisheries resource-use conflicts. The use of modern conflict resolution strategies ($p=0.932$), and fisheries regulations ($p=0.740$) had no significant relationship with effectiveness across study sites. On the other hand, use of traditional approaches had significant relationship with effectiveness ($p < 0.05$) across study sites. The study concludes that a blanket conflict resolution mechanism is not effective and that a holistic approach in managing conflicts incorporating traditional strategies should be adopted.

**Keywords:** Fisheries resources, resource-use conflicts, management strategies, effectiveness, Kenya coast

## 1. Introduction
Marine fisheries resource use conflicts are increasingly becoming common especially in topical areas of developing countries due to open access tenure (Maarten, 2001; Mahfuzuddin *et al.* 2006) [1, 2]. This is because most communities in these regions are highly dependent on the coastal and marine resources for livelihood. At the global level, FAO (2014) [3] reports that marine capture fisheries support the livelihoods of 10 –12% of the world population. In Kenya, Malleret (2000) [4] reported that the coastal and marine artisanal fisheries sub-sector is the main source of the much needed employment and protein requirements of coastal communities; and most recently it has been documented that this sub-sector provides livelihood directly to over 13,000 artisanal fishers (Aloo, 2006; Government of Kenya, 2014) [5, 6].

Due to the multi-stakeholder and multi-gear characteristics of marine fisheries in Kenya, fisheries resource-use conflicts is a growing feature of artisanal fisheries. Conflict is defined by Oliver *et al.* (2005) [7] as the pursuit of incompatible goals by different groups. In the context of this paper, conflict is the confrontation or disagreement between artisanal fishers with discordant interests or use over scarce fisheries resources. Fisheries resource-use conflict will therefore result when artisanal fishers have different or conflicting interests and goals (Suryanarayan, 2005) [8] over the fisheries resource.

Artisanal coastal and marine fishing at the Kenya coast is undertaken under the influence of several factors that drive people to venture into this livelihood activity. The increase in population growth has created high demand for fisheries resources and their products (Richmond, 2002) [9]; unemployment and relatively low education levels have made people and especially the youths to venture into fishing as a source of livelihood (Tunje, 2002; Payne, 2000) [10, 11]. On the other hand, declining agricultural productivity makes many people to direct their attention to marine resources including fisheries to supplement their incomes (Hoorweg *et al.* (2009) [12]. These factors combine to make artisanal fishers economically underprivileged.

Poverty of the fishers has contributed to the use of unsustainable fishing methods in a bid to put food on the table (Munyi, 2009) [13], a situation that initiates a vicious cycle of poverty (Ikiara, 1999) [14]. In addition, these factors have led to increased pressure, competition over the fisheries resources and their subsequent decline in quantity that ultimately contributes to conflicts between the fishers, and between them and other stakeholders. Tunje (2017) [15] confirmed that over 95% of artisanal fishers along the Kenyan coast experience some conflicts with other fishers or stakeholders in the process of accessing or exploiting the fisheries resources.

Artisanal fishers along the Kenyan coast acknowledge the fact that conflicts are part of their work, and that there is need to minimize such conflicts for harmonious co-existence and sustainable exploitation of the resources. To this end, fishers use different conflict resolution mechanisms, both traditional and 'modern' to amicably resolve conflicts and wade off future ones. In order to improve management of these conflicts, the nature of conflicts in tropical fisheries first needs to be understood with current conflict management mechanisms assessed and analysed. Only then can recommendations for improved management be made. This paper attempts to assess these conflict resolution strategies and their effectiveness in rooting out conflicts in the artisanal fisheries sub-sector. So as to promote sustainable management in the artisanal fisheries sub-sector, there is need to initiate and scale-up education and awareness among the fishers, and adopt an integrated conflict management approach using both modern and traditional mechanisms.

## 2. Materials and Methods

### 2.1 The study area

Data collection in the study area (Fig. 1) was conducted in three designated fish landing sites: Kuruwitu, Mnarani and Uyombo, all in Kilifi County north coast Kenya. The study focused more on artisanal fishers who are members of the three Beach Management Units (BMUs) of the respective fish landing sites.

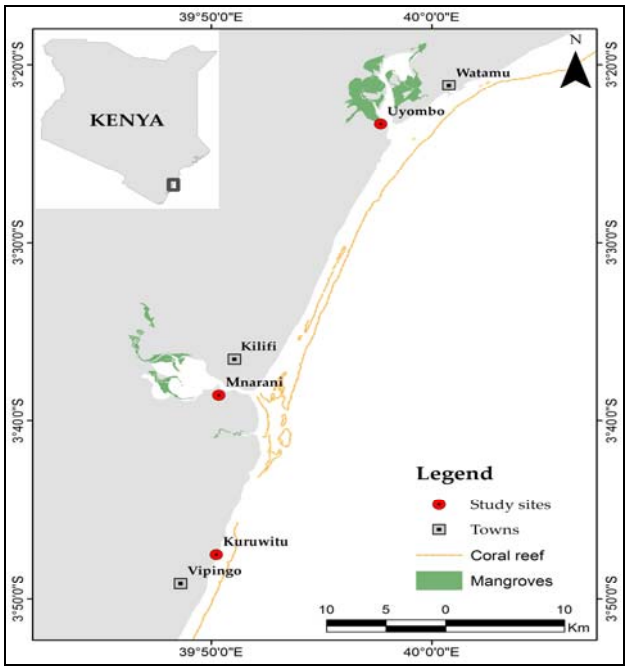


**Fig 1**: Map of the Kenyan coast showing the three study sites

The study was done at the Kenyan coast which lies between Latitudes 1° 41'S and 4° 40'S. The fisheries resources in this area is characterized as being multi-species and multi-gear, attracting diverse resource users, making fishing to be a potentially conflict-prone livelihood activity.

According to Government of Kenya (2010) [16] the population of Kilifi County is 1,109,735 comprised of 48% males and 52% females 52%., with a growth rate of 3.05% per year and a density of 450 people per $km^2$. Factors that determine population distribution in the County include rainfall, altitude and soil fertility (Hoorweg, *et. al.*, 2000) [17]. The economy of the County is natural resource-based where most of the people ake livelihoods from agriculture, trade, tourism, fishing, quarrying mining.

### 2.2 Data collection, analysis and statistical tests

A total of 197 fishers were sampled from the three sites of Kuruwitu, Mnarani and Uyombo (Fig. 1) from whom primary data was collected through interviews using predetermined survey tool. Systematic Random Sampling (SRS) (Bunce, *et. al;* 2000) [18] was used to select a representative sample at each study site. To assess the effectiveness of conflict management strategies used, a scale of 1 - 3 (where: 1 = Very effective; 2 = Effective; and 3 = Not effective) was used. Quantitative data was coded and entered into Microsoft Excel spread sheets, then analyzed descriptively with the help of Statistical Package for Social Sciences (SPSS) Version 20. Chi-square test was done to some variables including fishers' confirmation of conflicts, frequency of engagement in conflicts and effectiveness of management strategies (traditional, modern and fisheries regulations) used to determine whether there is a significant relationship amongst the three sites.

## 3. Results

### 3.1 Conflict management strategies used in the area

A total of 5 different conflict resolution strategies were recorded in the area (Table 1). The number of conflict resolution strategies used however differed according to study site. The use of all 5 strategies was associated with Uyombo while Mnarani and Kuruwitu used a total of 4 and 2 strategies respectively. Dialogue as a mechanism to manage conflicts was often mentioned with an average of 43.7% (n = 86) of the responses, distantly followed by arbitration of conflicts by elders (25.3%; n = 50) and by the Kenya State Department of Fisheries (9.5%; n = 19). Compensation and use of regulations were least mentioned by the fishers as conflict resolution mechanisms.

Analysis by site indicated a similar pattern in the way fishers managed their conflicts across all sites. Use of dialogue was the most common mechanism in Kuruwitu (45.5%; n = 17); Uyombo (45.7%; n = 34) and Mnarani (40.0%; n = 34). The second most reported mechanism differed with site in that arbitration by elders was highly reported in Kuruwitu (27.3%; n =10) and Uyombo (28.6%; n = 21). Arbitration by the Kenya State Department of Fisheries managers was only reported in Mnarani (22.9%; n = 19) while compensation was least mentioned in Mnarani and Uyombo sites.

**Table 1:** Conflict management strategies used in the study area (Kuruwitu = 37; Mnarani = 85; Uyombo = 75; Overall = 197)

| Study Site | Conflict Management Strategies | | | | | | |
|---|---|---|---|---|---|---|---|
| | Dialogue | Arbitration-elders | Arbitration-SDF | Use of Regulation | Compensation | Others | Non-Response |
| Kuruwitu | 45.5 | 27.3 | 0 | 0 | 0 | 18.2 | 9 |
| Mnarani | 40 | 20 | 22.9 | 0 | 5.7 | 5.7 | 5.7 |
| Uyombo | 45.7 | 28.6 | 5.7 | 1.4 | 5.7 | 1.5 | 11.4 |
| Average | 43.7 | 25.3 | 9.5 | 0.5 | 3.8 | 8.5 | 8.7 |

### 3.2 Traditional versus Modern Fisheries resource-use conflict management strategies

#### 3.2.1 Traditional conflict resolution strategies used

At least four traditional conflict resolution mechanisms were recorded in the area including other means classified as 'others' (Table 2). The use of arbitration by *bandari* elders (council of elders) was the most commonly used at 72.0% (n = 134), followed by the use of dialogue between conflicting parties at 11.3% (n = 17), and vetting of fishing gear at 5.7% (n = 16). The use of relocation to other fishing grounds was least preferred at only 0.5% (n = 1). Spatially by study sites, use of arbitration by *bandari* elders was most preferred (81.8%; n = 30) by the fishers in Kuruwitu, Mnarani (72.9%; n = 62), and Uyombo (61.4%; n = 46), while use of dialogue was reported to be relatively common in Kuruwitu (18.2%; n = 7) and Uyombo (12.9%; n = 10).

**Table 2:** Traditional conflict management strategies identifies in the Vipingo-Mida creek stretch of the Kenya coast (%) (Kuruwitu=37; Mnarani=85; Uyombo=75; Total=197)

| Traditional Resolution Mechanisms | Study Sites | | | Average |
|---|---|---|---|---|
| | Kuruwitu | Mnarani | Uyombo | |
| Arbitration | 81.8 | 72.9 | 61.4 | 72.0 |
| Relocate Fishing | 0 | 0 | 1.4 | 0.5 |
| Vetting | 0 | 7.1 | 10 | 5.7 |
| Dialogue | 18.2 | 2.9 | 12.9 | 11.3 |
| Others | 0 | 1.4 | 1.4 | 0.9 |
| Non-Response | 0 | 15.7 | 12.9 | 9.5 |

#### 3.2.2 Modern strategies of conflict resolution used

At least five traditional conflict resolution mechanisms were recorded in the area including other means classified as 'others' (Table 3). The fishers along the Kenya coast consider arbitration by a third party, as a modern way to resolve fisheries resource-use conflicts among themselves as reported by 62.6% (n=123) of the sample, distantly followed by dialogue (12.0%; n=24) between the conflicting parties and open discussions (9.0%; n=18) in public meetings (*barazas)* (Table 3). Relocation of fishing to another fishing ground and the establishment of marine conservation areas were scored lowest with 1.2% (n=2) and 0.6% (n=1) respectively.

**Table 3:** Modern fisheries resource-use conflict management strategies identified in the Vipingo-Mida creek stretch of the Kenyan coast (Kuruwitu=37; Mnarani=85; Uyombo=75; Total=197)

| | Study Sites | | | |
|---|---|---|---|---|
| Resolution Mechanisms | Kuruwitu | Mnarani | Uyombo | Average |
| Discussion | 9.1 | 5.6 | 11.4 | 9.0 |
| Establishment of MPA | 9.1 | 0.0 | 0.0 | 0.6 |
| Dialogue | 9.1 | 1.1 | 22.6 | 12.0 |
| Arbitration | 72.7 | 87.8 | 46.6 | 62.6 |
| Relocation | 0.0 | 0.0 | 2.6 | 1.2 |
| Others | 0.0 | 1.1 | 1.0 | 1.2 |
| Non-Response | 10.8 | 10.6 | 16.0 | 12.7 |

### 3.3 Fishers' perception on effectiveness of fisheries resource-use conflict management strategies

Traditional conflict management mechanism are generally perceived as either being very effective (44.3%) or effective (42%) by the sampled artisanal fishers in the area (Table 4). Spatially, traditional conflict resolution strategies are taken to be more effective by fishers at Uyombo site at 48.6% compared to the other sites; while Mnarani fishers take such mechanisms to be effective

**Table 4:** Fishers' perception on effectiveness of traditional conflict management strategies used in the Vipingo-Mida creek stretch of the Kenyan coast (%). (Kuruwitu=37; Mnarani=85; Uyombo=75; Total=197)

| Measure of effectiveness | Study Sites | | | Average |
|---|---|---|---|---|
| | Kuruwitu | Mnarani | Uyombo | |
| Very effective | 44.7 | 39.5 | 48.6 | 44.3 |
| Effective | 44.7 | 44.7 | 36.5 | 42.0 |
| Not effective | 2.6 | 0 | 0 | 0.9 |
| Non-response | 8 | 15.8 | 14.9 | 12.8 |

Modern conflict resolution mechanisms are generally perceived to be effective across the study sites with 76.5% (n = 151) (Table 5). This trend is repeated at the specific study sites with Mnarani 80.7% (n = 67) and Uyombo 76.6% (n = 58) of the sampled fishers taking modern mechanisms as effective in resolving fisheries resource use conflicts.

**Table 5:** Effectiveness of modern conflict management strategies reported by fishers in the Vipingo-Mida creek stretch of the Kenyan coast. (Kuruwitu=37; Mnarani=85; Uyombo=75; Total=197)

| Measure of Effectiveness | Study Sites | | | |
|---|---|---|---|---|
| | Kuruwitu | Mnarani | Uyombo | Average |
| Very effective | 8.1 | 2.7 | 1.2 | 4.0 |
| Effective | 72.3 | 80.7 | 76.6 | 76.5 |
| Not effective | 8.1 | 8.1 | 3.8 | 6.7 |
| Non-Response | 10.8 | 8.2 | 18.7 | 12.6 |

### 3.4 Use of fisheries regulations as fisheries resource-use conflict management tool

The sampled fishers were asked to comment on the effectiveness of the fisheries regulations in rooting out fisheries resource-use conflicts, and the results indicate that at least 42.6% (n = 84) of the fishers across the study sites reported that the Fisheries Act can be an effective tool of resolving and abating fisheries resource-use conflicts. Spatially, the Fisheries Act is taken to be effective more in Kuruwitu (62.2%; n = 23) and Uyombo (48.0%; n= 36). However, in Mnarani, 25.9% (n = 25) of the sample reported that the Fisheries Act is not effective in resolving fisheries resource use conflicts.

**Table 6:** Effectiveness of fisheries regulation as a conflict management tool reported by fishers in the Vipingo-Mida creek stretch of the Kenya coast. (Kuruwitu=37; Mnarani=85; Uyombo=75; Total=197

| Measure of Effectiveness | Study Sites | | | Average |
|---|---|---|---|---|
| | Kuruwitu (%) | Mnarani (%) | Uyombo (%) | |
| Very effective | 5.4 | 2.4 | 16.0 | 7.9 |
| Effective | 62.2 | 17.6 | 48.0 | 42.6 |
| Not effective | 2.7 | 25.9 | 8.0 | 12.2 |
| Non-Response | 29.7 | 54.1 | 28.0 | 37.3 |

Results of Chi-square test indicated significant difference on effectiveness among the conflict resolution strategies studied. The same test indicated no significant difference in effectiveness between modern conflict resolution mechanisms and the fisheries regulations ($p > 0.05$ both cases) (Table 7).

The null hypothesis of equal effectiveness of modern and fisheries regulation as conflict resolution mechanisms across the three study sites, can be rejected at both 5% significance levels. In other words, modern conflict resolution mechanisms ($p = 0.932$) and fisheries regulation ($p = 0.740$) have statistically insignificant relationship with effectiveness. This means that the two do not provide the same level of effectiveness in the three study sites.

**Table 7:** Results of Chi-square test on effectiveness of traditional, modern and regulation as conflict management strategies

| Type of conflict management strategy | $\chi$ | df | Sig. |
|---|---|---|---|
| Effectiveness of traditional mechanisms | 18.571 | 6 | **0.005** |
| Effectiveness of modern mechanisms | 3.035 | 8 | 0.932 |
| Effectiveness of fisheries regulations | 1.253 | 3 | 0.740 |

## 4. Discussion

Fisheries resource-use conflict management approaches have been documented widely in other parts of the world (Warner, 2000 [19]; Heck *et al.* 2004 [20]; Olomola, 2008 [21]; Ochola *et al.* 2010 [22]; Vipinkumar and Shyam, 2012) [23], with few studies (Tuda *et al*. 2009 [24]; Kanyange *et al*. 2014) [25] done in Kenya. Resource-use conflicts are inevitable in situations where natural resources have multiple users (Kamau *et al*. 2009 [26]; Munga *et al.* 2012) [27], and the fisheries resources along the Vipingo-Mida Creek area of the Kenyan coast is not an exception. Artisanal fishers anticipate this and therefore have various strategies, both traditional and modern, to resolve, manage and abate conflicts. These strategies include arbitration by council of elders, government fisheries managers or local administration, discussion in public *baraza*, dialogue between parties (fishers) in disagreement, use of fisheries regulations, relocation to other fishing grounds, and, sharing of fish catch. Some fishers even opt to relocate to other fishing grounds to avoid conflicts arising from the sharing of same fishing grounds; a strategy also used in Japan and enshrined in the country's fisheries regulations that gives fishing rights to a fisher who visits a fishing ground first (Schmidt, 2003) [28].

Along the Kenyan coast, artisanal fishers will strive to avoid conflicts with other fishers by relocation to other fishing zones. However, conflicts sometimes are inevitable, and when they occur, resource users attempt to manage them following a logical process within the identified 6 levels (Figure 3).

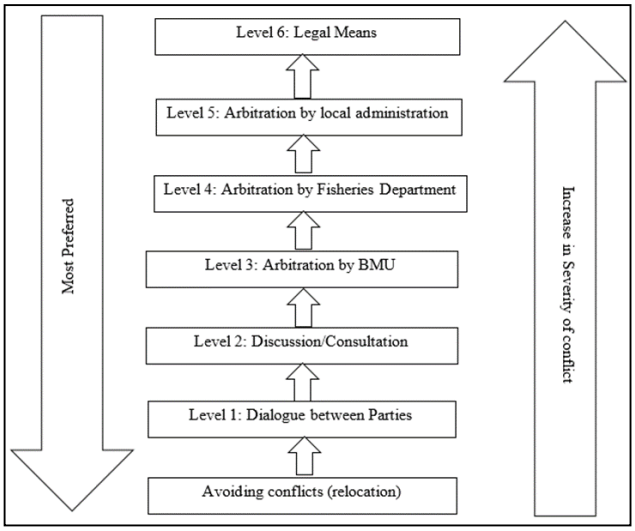


**Fig 2:** Conflict management levels in the artisanal fisheries sub-sector in the Kilifi-Vipingo stretch of the Kenyan coast

Dialogue is a situation where the conflicting parties (fishers) settle their differences on their own without a third party. The issues under conflict in most cases are not serious, and may include use of other fishers' gear without consent and stealing of others' fish, and in most cases, the offended party is

compensated with an agreed amount of money.

Discussion/consultation is used to resolve conflicts when issues under conflict are more common and persistent at specific landing such as use of destructive fishing methods. Such issues are openly discussed under the mediation of BMU and bandari elders, and the perpetrators warned.

Conflicting issues that increase in persistence and severity are subjected to arbitration by the conflict resolution arm of the BMU (BMU being an extension of the Kenya State Department of Fisheries) where the parties (resource users) involved are called to a meeting presided over by the BMU Chair person. Such meetings take the shape of a moot court, where each side is heard and eventually a judgement is carefully crafted that promotes co-existence of all resource users.

Arbitration by the Kenya State Department of Fisheries is used when the issue under conflict is so severe and cannot be solved at the site, and therefore reported to the nearest Fisheries Office for further action. The officers from SDF visit the site to arbitrate on the parties in disagreement. This is the entry point of government efforts to resolve fisheries resource use conflicts.

Arbitration by Local Administration is used for the management of fisheries resource-use conflicts which are severe and have the potential of escalating to the community. These are arbitrated by the village head, sub-chief and chief. Issues of migrants are handled at this level.

Serious resource-use conflicts of criminal in nature are resolved using the court of law. Issues such as theft of fishing vessels and expensive equipment (such as ring nets, seine nets and out board engines) are often resolved at this level. However, such conflicts are rare in the area.

Though all these levels were used in managing and mitigating fisheries resource use conflicts, these strategies seem not to be effective in rooting out conflicts from the area. The study therefore went further to assess the effectiveness of these approaches so as to build on what is already working on the ground. “Effectiveness” in this context was taken to mean the ability of a strategy to abate, mitigate or root out resource-use conflicts,

The exploitation of marine and fresh water fisheries resources in Kenya is guided by the Fisheries Management and Development Act, 2016 (Government of Kenya, 2016) [29] that guarantees harmonious and sustainable use of resources. The study gave fisheries regulation special consideration since apart from being a tool that can curb and resolve conflicts, it is the overarching legislation that guides the utilization and management of the fisheries resources. There are at least some of fishers (42.6%; n = 84) across the study sites who believe the Fisheries Act can be an effective tool of resolving and abating fisheries resource-use conflicts, but only if proper awareness creation and enforcement are done. However, modern conflict management strategies and fisheries regulation as a conflict management tool are not equally effective in all sites. This is probably because each study site has got its own unique issues that solutions would have to be tailor-made to suit the local conflict situation. The implication of the finding is that a blanket or generic conflict resolution mechanism for fisheries resource-use conflict in the study sites would not work. However, traditional conflict resolution mechanisms were found to be significantly effective ($p<0.05$) in all the three study sites. This underscores the importance of adopting traditional conflict resolution mechanism judging from the high rating of its effectiveness as perceived by the fishers across the three sites.

In the Vipingo-Mida Creek stretch, the resource users have been entangled in conflicts as they access and use the fisheries resources, and that this has become part and parcel of their everyday life, and despite the application of several mechanisms to abate, mitigate and resolve fisheries resource use disagreements, still conflicts persist. There are some factors that affect the effectiveness of fisheries resource-use conflict resolution mechanisms, among them: i) lenient punishment of offenders (those who are seen to have initiated the conflict) that does not deter future offenders; ii) weak enforcement of the punishment that often allows the offender to walk scot-free, a situation that encourages the recurrence of conflicts, and iii) poor facilitation, capacity and skills of the BMU in resolving conflicts that makes some judgments reached riddled with biasness (nepotism and favour).

This following recommendations will promote sustainable fisheries resource use by artisanal fishers and reduce fisheries resource use conflict:

i) Development of education and awareness programmes aimed at making artisanal fishers understand and abide by the fisheries regulation
ii) There is need to enforce the existing the fisheries regulations and policies by the concerned government agencies.
iii) There is also need to integrate traditional conflict management strategies in the current fisheries resource-use conflict management systems for improved fisheries management.
iv) Any conflict resolution mechanism should be site/area specific.

## 5. Conclusion

Fisheries resource-use conflicts among artisanal fishers along the Kenya coast are real, and that different management strategies are used to minimize their effects and promote sustainable and harmonious resource exploitation. However, the conflict management strategies used are not equally very effective in eradicating the conflicts, and despite their use, conflicts still persist. Therefore, any effective fisheries resource use conflict management strategy must be embedded in the framework of the existing fisheries regulation.

## 6. Acknowledgement

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