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Resource Users' Perceptions on Continued Existence of the Mombasa Marine Park and Reserve, Kenya

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The Mombasa Marine Park and Reserve (MMP&R) in Kenya continues to attract increasing direct and indirect resource use due to its location near an urban area. Opinions on the continued existence of this Marine Protected Area (MPA) by fishermen, boat operators, kiosk operators, curio vendors and tourists varied in this study according to occupation, education level, awareness of government legislation on conservation and sustainable use of marine and coastal resources, and place of birth. All fishermen (100%) were negative regarding the MMP&R's continued existence but the majority of the other resource users were positive to a varying degree. Fishermen largely had the highest level of informal education (indigenous knowledge), mean age, duration of resource use and lowest income. While boat operators had the highest income, curio vendors and kiosk operators had higher levels of secondary education. Tourists had the highest level of college education. Chi-square tests indicated that 1) differences in educational levels of the resource user groups were significant; 2) resource user groups' awareness of legislation on conservation and sustainable resource use differed significantly with education, with fishermen being most aware of the Fisheries Act and Wildlife (Conservation and Management) Act; and 3) resource users' perceptions on continued existence of the MMP&R differed significantly according to place of birth. Although MPAs are a useful management option, they should not be used in isolation. Involvement of local communities in the planning, design, establishment and management of MPAs should improve their success in the long term.

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INTRODUCTION

The Mombasa Marine Park and Reserve (MMP&R), like other Marine Protected Areas (MPAs) in the world, was established for fisheries management and ecosystem protection, recreation, tourism, research and education (Wells *et al.,* 2007; Botsford *et al.,* 2006, 2007; McClanahan *et al.,* 1999; Clark *et al.,* 1989). This MPA is near the urban city of Mombasa and resolved resource user conflict that existed before it was established (McClanahan *et al.,* 1999). The establishment of such MPAs has been supported worldwide and the 1992 Convention on Biological Diversity (CBD) is facilitating the establishment of an effectively managed system of MPAs covering 10% of the world's marine ecoregions (Wells *et al.,* 2007).

Effective management is necessary to achieve the desired goals of MPAs and, ultimately, an improved quality of life for the local coastal communities. To achieve these goals, MPAs need to be adaptively managed, with management learning from its own and others' successes and failures, and keeping track of consequent changes in management objectives and practices so that people can understand the management process (Pomeroy *et al.,* 2006). *Ad hoc* establishment of most MPAs without considering socio-economic aspects of end-users has led to conflict in resource-use among already disadvantaged coastal communities (Pomeroy *et al.,* 2006; Ngugi, 1999; McClanahan *et al.,* 1999). Non-compliance with MPA regulations is a worldwide problem, and this is being addressed through community programmes in Kenyan MPAs (McClanahan, 2005) in which user occupation, educational level and period since promulgation are proving to be factors that determine perceptions regarding an MPA's continued existence.

Different resource users have different views and react differently to conservation initiatives such as the creation of MPAs. The acceptance of an MPA by different resource users can be severely hindered perceived needs and benefits are not realized (Sesabo *et al.,* 2006). Therefore, to achieve and maintain the successful operation of MPAs, it has been argued that the decision-making process should include both social and economic factors in their planning and implementation (Sesabo *et al.,* 2006). Various factors were thus quantified in this study to explain differing attitudes towards continued existence of the MMP&R: resource users' occupation, educational level, awareness of legislation on sustainable use of marine and coastal resources, and place of birth.

Awareness concerning MPAs and the associated legislation has a profound influence on resource users' perceptions regarding their continued existence (Pomeroy *et al.,* 2006). According to Sesabo *et al.* (2006), the success of legislation enforcement in marine and coastal resource management depends on such an awareness by the resource users. This paper tests four hypotheses: 1) resource users who gain more economically from a MPA will tend to have more positive perception regarding its continued existence, 2) resource users who are most aware of legislation that governs the use of marine and coastal resources, will similarly hold more positive perceptions regarding an MPAs continued existence, 3) resource users with formal education will be more supportive of MPAs than those with indigenous knowledge, and 4) resource users who are locals living near an MPA will be more supportive of its continued existence than those who are not resident in the area.

MATERIALS AND METHODS

Study area

The MMP&R is located within the Nyali-Bamburi-Shanzu area lying between Mtwapa and Tudor Creeks, north of Mombasa in the Coastal Province of Kenya (Fig. 1). Though gazetted in 1986, it was not until the mid-1990s that the Park and Reserve rules and regulations were enforced (McClanahan, 1994). The MPA is zoned into two distinct areas: the Park (fully protected), with an area of 10 km^2, and the Reserve (partially protected), with an area of 200 km^2. The Park is nearly encompassed within the Reserve and is open to the public for a fee as a tourist attraction. It is also used for education and research due to

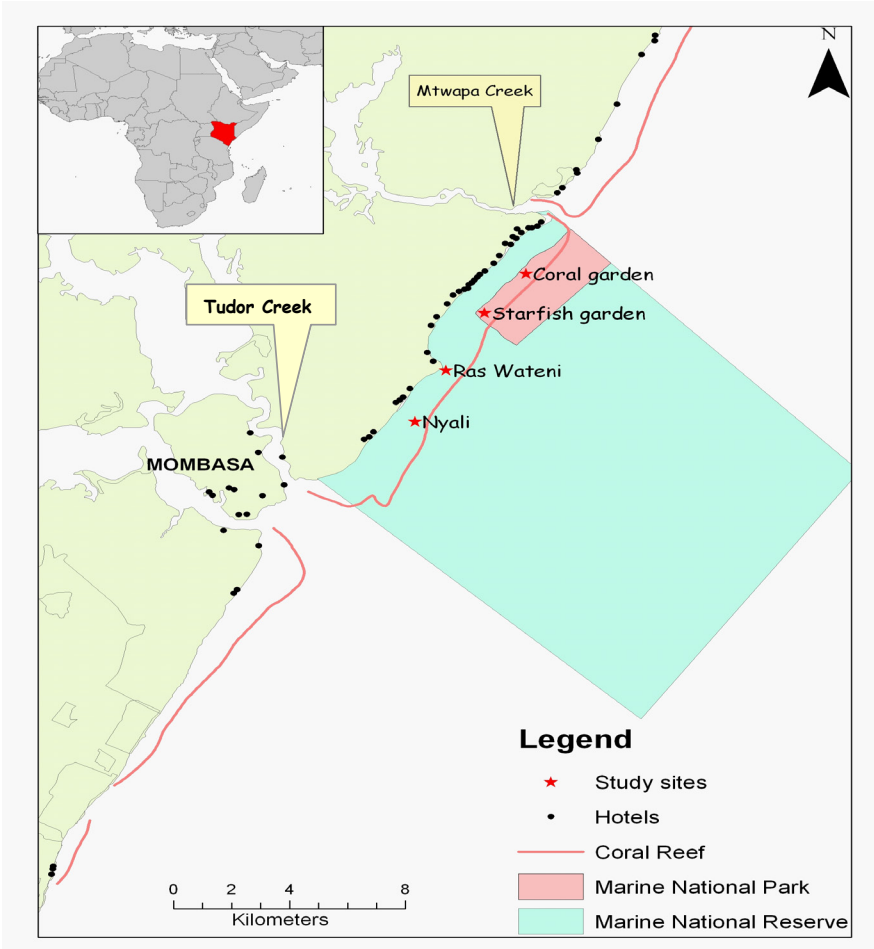

Figure 1. Map of Mombasa Marine Park and Reserve in Kenya with sites frequented by tourists and fishermen within the Park (Coral Garden and Starfish) and the Reserve (Ras Iwatine and Nyali).

its diverse marine fauna and flora. The Reserve is accessible to the public and regulated extraction is permitted of marine resources by artisanal fishing using mostly dugout canoes. The MPA is endowed with a variety of both hard and soft coral species and other highly productive systems such as seagrass beds (UNEP/FAO/PAP/CDA, 2000; Dahdouh-Guebas *et al.,* 1999; McClanahan & Kaunda-Arara, 1996) inhabited by crustaceans, molluscs, coelenterates, sponges, reef fishes, sea turtles and even dugongs. In turn, these ecosystems are dependent on the mangrove forests that grow in the nearby Tudor and Mtwapa Creeks. Climatic conditions in the area are determined by the reversing monsoon winds: the dry northeast (NE) monsoon season which occurs between October and March, and the wet southeast (SE) monsoon season from April to October (McClanahan, 1988).

Data collection

Interviews using semi-structured questionnaires were conducted within a period of three months in July, August and September 2007. The questionnaires (see appendix) were prepared in English but administered in Kiswahili (the national language), where appropriate. Five resource-user groups were interviewed, each comprising 30 individuals. These were fishermen, boat operators, kiosk operators, curio vendors, and tourists. Interviews were conducted at random with willing respondents, fishermen

being interviewed at the fish landing facility after they returned from fishing. Boat operators, together with tourists, were interviewed on the beach immediately after they returned from snorkeling or a reef walk. The tourists were also interviewed at hotels after their trips to the MPA. Kiosk operators were interviewed at the adjacent Jomo Kenyatta Public Beach (JKPB) where most of their businesses are concentrated, as were the curio vendors, with some spread along the sandy beach adjacent to the MPA.

Data analyses

Data from the questionnaires were analyzed for each resource user group using the Statistical Package for Social Scientists (SPSS version 13). The Chi-square test for independence was used to determine the relationship of the variables (Pallant, 2001). Information from cross-tabulation of the different categories was tabulated with results of Chi-square tests when assumptions were fulfilled.

RESULTS

Composition of resource users

A total of 150 respondents (30 in each user group) were interviewed, 111 men and 39 women. Boat operators, fishermen and curio vendors were predominantly men, while there were slightly more female than male tourists and kiosk operators (Table 1). Fishermen were the oldest (55 ± 25 years) of all the resource user groups with the longest duration (15 ± 45 years) of resource use (Fig. 2a). Income accrued from resource use at the time was highest for boat operators (€29 ± 10 per day) and lower for kiosk operators and curio vendors, with the lowest income being earned by fishermen (Fig. 2b). In terms of educational level (Fig. 3), the majority of kiosk operators (52%), boat operators (44%) and curio vendors (60%) had secondary education, whereas the majority of tourists (70%) had a college education and many fishermen had no formal education (44%).

Table 1. Composition of resource user groups by gender in the Mombasa Marine Park and Reserve.

Resource user group	Men	Women
Fishermen	30	0
Boat operators	30	0
Kiosk operators	14	16
Curio vendors	25	5
Tourists	12	18

Resource users' support for continued existence of the MMP&R

Resource user groups had different opinions regarding the continued existence of the MMP&R. While the majority of kiosk operators (80%), tourists (72%) and curio vendors (65%), and half of the boat operators (50%) were positive regarding its continued existence, all of the fishermen expressed negative perceptions on this subject (Fig. 4). Cross-tabulation of education versus MPA existence indicated that the highest positive outlook was held by

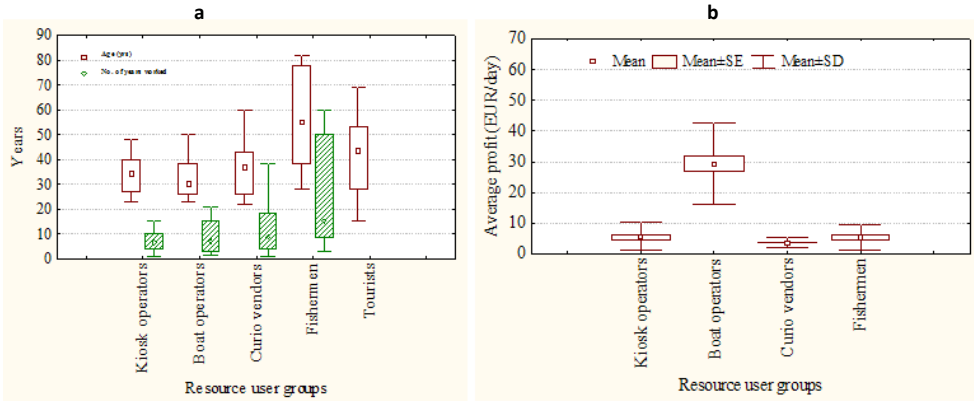

Figure 2. a) Mean age of the different resource user groups and duration of resource use in the Mombasa Marine Park and Reserve, and b) their average earnings per day (€1 = KSH 90 at time of study).

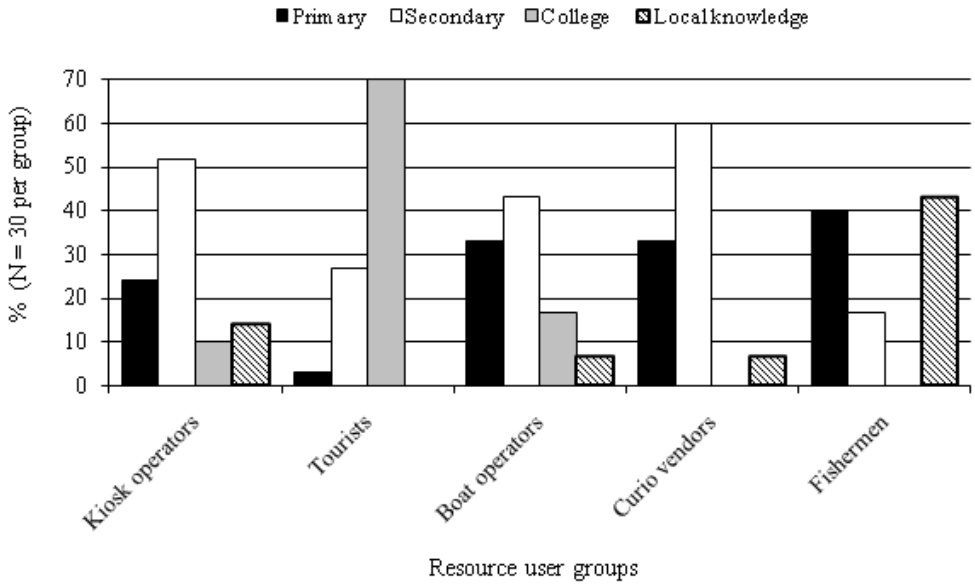

Figure 3. Educational level (%) of resource user group members in the Mombasa Marine Park and Reserve.

resource users with a college education (86%), followed by those with a secondary education (54%), primary education (46%) and the least by those with indigenous knowledge (24%), the Chi-square results being highly significant (Asymp. Sig. = 0.0001).

Of the resource users having no opinion on the matter, the majority were unaware of the MMP&R (90%), and 8% of respondents who were aware of the MMP&R had not yet formed an opinion. Of those who did not support its continued existence, 36% were indeed aware of the MMP&R, but 11% of those who expressed support for it were previously unaware of its existence. Table 2 summarises the reasons for a positive outlook on continued existence of the MMP&R, based on resource users' levels of education, with 21% attributing their reason for its support to biodiversity conservation.

Table 2. Educational levels of user groups (%) and reasons given for support for continued existence of the Mombasa Marine Park and Reserve (%).

Reason	Overall	Primary	Secondary	College	Indigenous knowledge
No idea	43	51	41	10	76
Conservation of biodiversity	21	12	15	59	0
Government revenue & employment	5	5	7	7	0
Tourism promotion	14	10	19	14	10
Continued security	15	22	14	7	14
Education & awareness	3	0	5	3	0
Total	100	100	100	100	100

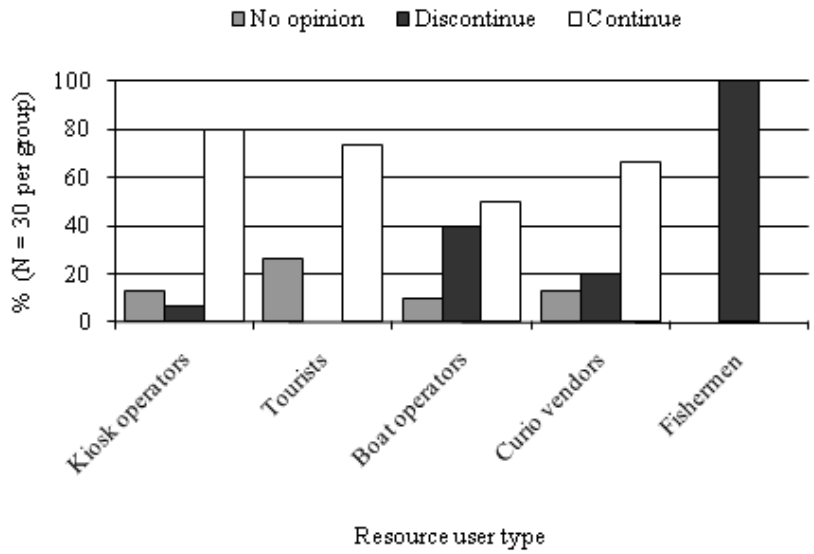

Figure 4. Opinion of resource user groups (%) regarding the continued existence of the Mombasa Marine Park and Reserve.

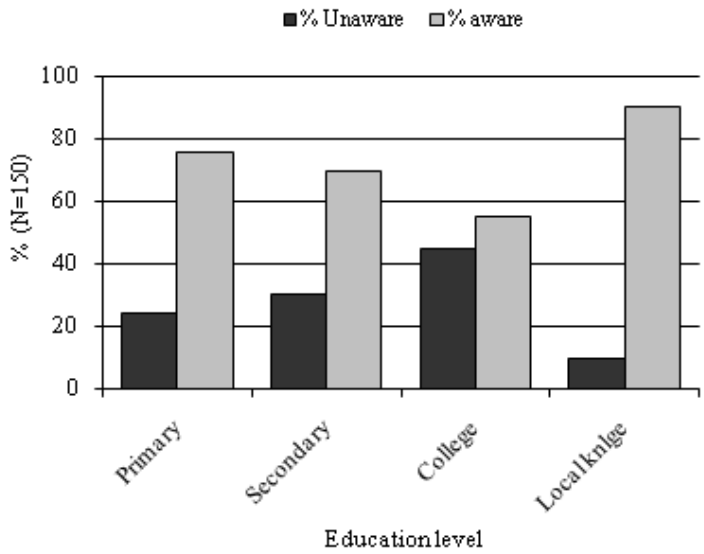

Figure 5. Educational levels of resource user groups (%) aware of the Wildlife (Conservation and Management) Act in the Mombasa Marine Park and Reserve.

Resource users' awareness on the relevant legislation

Figures 5, 6 and 7 summarise awareness on the relevant legislation by resource users of differing educational levels, indicating that they generally were fairly aware of the three relevant Acts on natural resource management. Resource users with indigenous knowledge were most aware (90%) of the Wildlife (Conservation and Management) Act (WCMA) and Fisheries Act. However, there were significant differences between resource user groups (Asymp. Sig. = 0.024) in their awareness of the Environmental Management and Coordination Act (EMCA) (Figure 6). Resource users with secondary education (78%) constituted the majority with

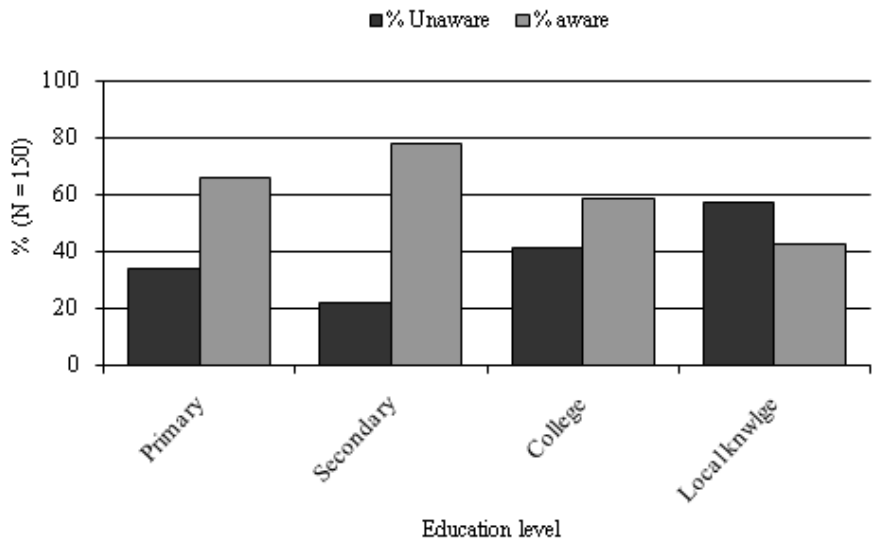

Figure 6. Educational levels of resource user groups (%) aware of the Environmental Management and Coordination Act in the Mombasa Marine Park and Reserve.

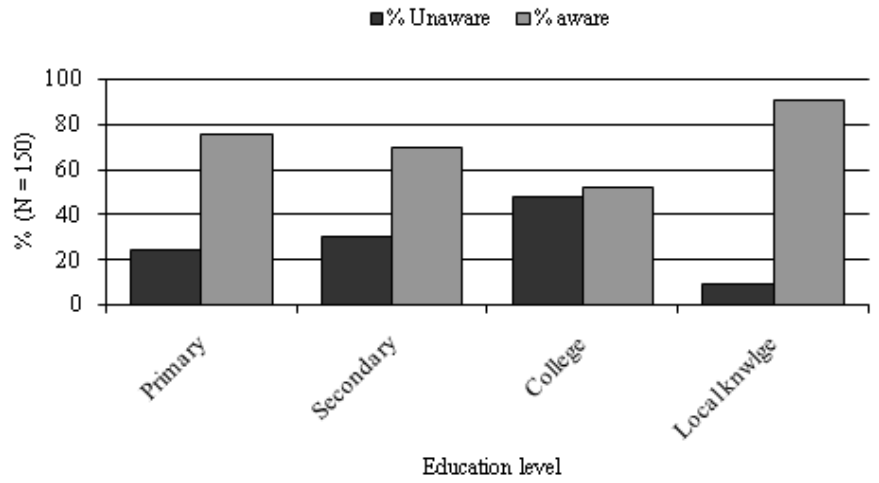

Figure 7. Educational levels of resource user groups (%) aware of the Fisheries Act in the Mombasa Marine Park and Reserve

awareness of this Act, and the least (57%) were those with indigenous knowledge. While the greatest number of resource users were aware of the Fisheries Act (Fig. 7), Chi-square results revealed significant difference in this regard between their education level (Asymp. Sig. = 0.023).

Resource users' place of birth

Except for tourists and curio vendors, resource user groups were dominated by individuals of local origin (those born within the Mombasa coastal region) (Fig. 8). Curio vendors were mostly from upcountry (those born outside the coastal region; 75%), and the majority of tourists were foreigners (born outside the country;

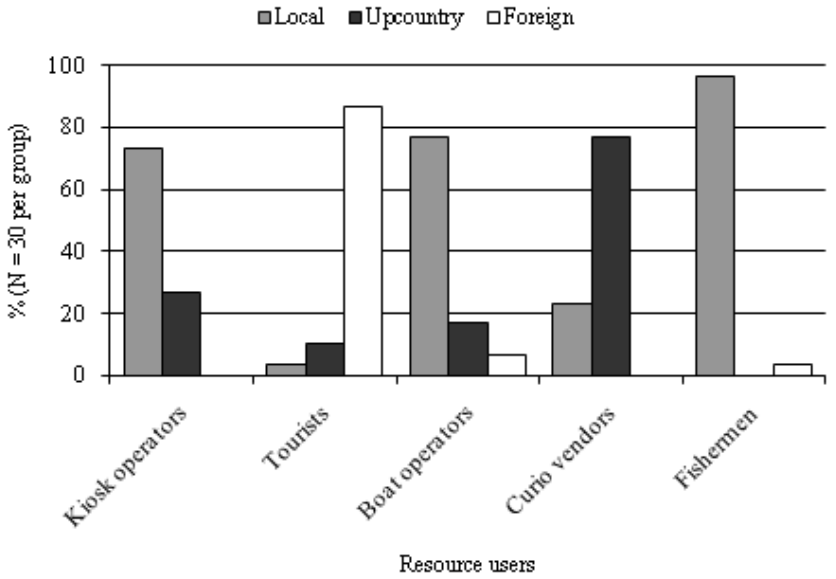

Figure 8. Places of birth of resource user groups in the Mombasa Marine Park and Reserve.

89%). Chi-square results were highly significant regarding differences in place of birth between the resource user groups (Asymp Sig. = 0.001). The majority of resource users from upcountry and foreigners were positive regarding continued existence of the MMP&R (74% and 69% respectively) compared to the majority (51%) of the locals who held negative opinions in this regard. Table 3 summarises opinions on continued existence of the MMP&R based on resource users' place of birth.

Table 3. Opinion of resource users regarding continued existence of the Mombasa Marine Park and Reserve according to place of birth.

Place of birth	No idea	Discontinue	Continue
Local	10	51	39
Upcountry	8	18	74
Foreign	28	3	69

DISCUSSION

Fishermen have the longest history of resource use in the study area and fished in the area for at least 17 years before establishment of the Mombasa Marine Park and Reserve. Evidence of this can be found in the existence of an old gazetted fish landing site near the MMP&R (pers. obs.) and a decrease in the number of fishermen due to reduced fishing grounds resulting from establishment of the MMP&R (McClanahan, 1994). The creation of the Park, however, coincided with an increase of boat operators, kiosk operators, curio vendors and tourists in recent years (UNEP/FAO/PAP/CDA, 2000; McClanahan, 1994). Immediately after the MMP&R was established, an observed benefit was a short-term increase in fish catches in the Reserve attributed to a spillover effect from the Park but, over the years, catches have returned to lower levels (McClanahan, 1994).

Continued low fish catches coupled with the reduction in the fishing grounds have contributed to the lowest income experienced by the fishermen in recent years. The average income recorded for kiosk operators and curio vendors was also comparatively low, given that such businesses are highly seasonal, with higher incomes during holidays when local tourists increase in number (pers. obs.). Relatively high income was recorded for the boat operators and is attributed to boat tours to the MMP&R, mainly associated with tourists who are foreigners capable of

paying for the service. Boat operators are also organised in associations, and some are employed by hoteliers who operate boat tours to the MMP&R. Strong support for continued existence of the MMP&R by kiosk operators, curio vendors and boat operators could be attributed to these perceived economic benefits.

Fishermen in the area have, over the years, been opposed to the MMP&R due to the aforementioned low earnings and reduction in fishing grounds. This low income, coupled with their relatively old age, has been cited by Hoorweg *et al*. (2009) and McClanahan and Mangi (2001) as contributing factors to willingness by Kenyan coastal fishermen to stop fishing and instead take up alternative employment like subsistence agriculture. Apart from the restriction in fishing grounds and perceived inequitable distribution of benefits from the MMP&R, fishermen also indicated low support for continued existence of this MPA due to perceived social losses, including lack of community participation in the planning process during its establishment. Findings by Sesabo *et al*. (2006) have also shown that local fishermen who depend more on marine and coastal resources for their income may hold negative attitudes towards MPAs. Such negative perceptions, coupled with a lack of information and misconceptions are considered to be the major reasons that fishers oppose the establishment of MPAs, with cases reported to de-gazette some MPAs in Belize (Wilkinson, *et al.,* 2003) and failed implementation of the Diani National Marine Reserve in Kenya (Obura, 2001).

It has thus become common knowledge that fishermen tend to oppose the establishment of MPAs. Further reasons have been documented for this behaviour, including higher levels of congestion and fishing effort in the restricted fishing grounds, and long hours of sailing to reach other fishing grounds that increase the occupational risks (Hanna, 2004; Sanchirico *et al.,* 2002; Ngugi, 1999; McClanahan & Mangi, 2000). These circumstances are exacerbated by inadequacies in the fishing vessels and lack of experience of the new fishing grounds. Resource reallocations caused by MPA creation are also controversial and engender conflict among resource users (Pomeroy *et al.,* 2006; McClanahan & Mangi, 2000). A study by McClanahan & Mangi (2000) thus showed a decline of 60-80% in the number of fishermen following the establishment and implementation of the no-take Mombasa Marine Park, followed by shifting migration patterns that have changed the demographic profile of the resource users living near this MPA.

Educational level affected the outlook of resource user groups to continued existence of the MMP&R. Those with formal a school or college education (kiosk operators, curio vendors, boat operators and tourists) better understood the value and function of the MPA, and hence were more positive regarding its existence than the majority of informally educated fishermen. McClanahan (2005) similarly found that a secondary education was associated with more positive perceptions towards MPAs in a Kenyan study. Such formally educated sectors participate more in social networks such as annually celebrated conservation events (e.g. World Oceans Day, World Fisheries Day, and World Environment Day), providing them with greater knowledge through information sharing (pers. obs.). Poorly educated fishermen are classified as relatively poor with large mean family sizes (UNEP/FAO/PAP/CDA, 2000) and are associated with negative perceptions regarding MPAs, despite their knowledge that MPAs benefit the nation. While a secondary education for most of the other resource users was a cultural norm, most fishermen are old and education to them remains a luxury.

Awareness by resource users of environmental legislation in Kenya on the conservation and sustainable utilisation of marine resources (Government of Kenya, 1976, 1991, 1999) is important for its effective enforcement. Fishermen and boat operators active within the MMP&R were aware of the Wildlife (Conservation and Management) Act. Hoorweg *et al.,* (2009) also noted that fishermen at landing sites near marine parks

along the northern coast of Kenya often mention the parks as no-go areas and are aware of the important role they play as spawning and breeding sites for many marine species. This is also further of mangroves which, in some other marine parks on the Kenyan coast, are an integral part of a marine park (Cannicci *et al.,* 2008; Nagelkerken *et al.,* 2008). However, the majority of the fishermen and boat operators were not aware of the Environmental Management and Coordination Act (EMCA) since they were involved mostly in sea-based activities. It was evident that the annual Marine Environment Day and the World Wetlands Day events organised by the Kenya Wildlife Service (KWS) in collaboration with the Wildlife Clubs of Kenya contributed to awareness of the EMCA among kiosk operators and curio vendors whose activities are mainly shore-based. Such special days advocate conservation of the marine environment through beach-based clean-up campaigns with little emphasis on the underwater environment (Ogwoka & Karisa, unpublished report). This knowledge does not appear to have reached fishermen and boat operators.

The demography near the MMP&R reveals its importance in contributing to the local migration of people, mostly in search of jobs. The findings of UNEP/FAO/PAP/CDA (2000) indicate that the majority of people living near the MMP&R are immigrants from outside Mombasa District, from the Kenyan highlands and outside Kenya. Such resource users have more positive perceptions of continued existence of the MMP&R, compared to fishermen who are mostly locals and tend to be more dependent on fisheries resource extraction.

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Appendix. MMP&R resource users survey questionnaire

Rationale: This questionnaire evaluates MMP&R resource users' opinion on continued existence of the MPA. Information generated will be treated as confidential. This interview specifically targets fishermen, boat operators, curio vendors, food kiosk operators and tourists who are the direct and indirect resource users. Information generated will be used to provide useful advice and information for improved management of all the MPAs in Kenya.

Name of data collector ..... Date .....

Name of interviewee .....

1.0 Resource user identification

Indicate your sex (tick one)

☐ Male ☐ Female

Level of education (tick one)

☐ Primary ☐ Secondary ☐ College ☐ indigenous knowledge

Age .....

For how long have you lived in this area? .....

Where did you live before? .....

2.0 Occupation type

Indicate your type of occupation (you can tick more than one)

☐ Fisherman ☐ Boat operator ☐ Curio vendor

☐ Food kiosk operator

Kindly indicate your average income per day. Kshs.....

3.0 Resource users' awareness on legislation related to sustainable utilisation and conservation of marine resources

Are you aware of the Wildlife Conservation and Management Act? YES..... NO .....

Are you aware of the Fisheries Act? YES ..... NO .....

Are you aware of the Environment Management and Coordination Act (EMCA)?

YES ..... NO .....

4.0 Your comments on the existence of the MPA

Are you aware of the existence of the MPA? YES ..... NO .....

Would you recommend the continued existence of the MPA (tick one)

Yes ☐ No ☐ have no idea ☐