

Factors influencing resource users and managers' perceptions towards marine protected area management in Kenya

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Date submitted: 9 July 2004 Date accepted: 30 November 2004

SUMMARY

Non-compliance with marine protected area (MPA) regulations is a problem worldwide, and this is being addressed through community programmes. Park service and fisheries department personnel, and fishers living adjacent to three parks were studied to determine their perceptions of MPAs. The hypotheses that positive perceptions towards the management of fisheries exclusion and gear-restricted areas would increase with the wealth, education, age and years of employment of the person, the history of community participation and the age of the MPA were tested. The strongest factor was employment, with fishers having significantly less positive perceptions towards areas closed to fishing than government managers, although all groups agreed area management benefited the nation. Government personnel thought that fishers and their communities benefited from area management, while most fishers did not share this view. Increasing wealth or community participation were not significant factors, but secondary education was associated with more positive perceptions of area management. Fishers adjacent to the oldest MPA held significantly more positive perceptions than fishers living adjacent to the newest MPA, although only a slight majority agreed that they and their communities benefited. The results point to a need for patience in expecting change in resource users' perceptions, adopting an approach in which there is more communication between fishers and managers, so that both are more aware of MPA functions, particularly closed areas and the indirect benefits.

Keywords: attitudes, closed-area management, gear-restricted management, park-people conflicts, park personnel, perceived benefits, resource users

INTRODUCTION

The attitudes of resource users living adjacent to marine protected areas (MPAs) is a central issue for protected area management that will become more prevalent as

demands on natural resources increase with expanding coastal populations (Hough 1988). Partnerships and management success are expected to improve with positive and shared attitudes towards MPAs and associated regulations. Although ecological and economic reasoning have supported the case for MPA designation and MPAs have proliferated to over 1300 in number worldwide (Gubbay 1995; Kelleher *et al.* 1995), implementation has a low success rate (Kelleher *et al.* 1995; McClanahan 1999). A global survey of MPAs indicated only 9% had achieved their management objectives; 71% had unknown management objectives and 20% had failed to meet any objectives (Kelleher *et al.* 1995). With this poor level of compliance, there is a need to evaluate the factors conducive to success (McClanahan 1999) and influencing the attitudes of stakeholders towards protected areas (Jacobson 1990).

Existing assessments of marine and terrestrial protection initiatives suggest that successful management includes a mix of involvement with the local community (West & Brechin 1991; Borrini-Feyerabend 1993; White *et al.* 1994; Pollnac *et al.* 2001), where success is increased if the community has associations with management personnel (Newmark *et al.* 1992; Picard 2003) and perceives benefits from management (Mehta & Heinen 2001; Bauer 2003). Perceived benefits and shared positive attitudes are expected to increase the chances for participation and management compliance, particularly for extractive users who frequently perceive the least benefits from protected area restrictions (Jacobson & Marynowski 1997). Management should be facilitated if the perceived benefits and associated perceptions of stakeholders, particularly extractive users, are regularly assessed and the factors that affect these perceptions are evaluated.

Socio-economic surveys stress that primary stakeholders living adjacent to terrestrial protected areas often bear disproportionate costs of conservation management strategies (Hough 1988; Shyamsudar & Kramer 1997; Archabald & Naughton-Treves 2001). Four issues particularly relevant to MPAs (Hough 1988; Parry & Campbell 1992) are (1) the specific types of restrictions on the use of resources (Parry & Campbell 1992; Heinen 1993; McClanahan & Mangi 2000), (2) the level of degradation of resources surrounding protected areas as demands intensify (Parry & Campbell 1992; Heinen 1993; Caldecott 1996; McClanahan 1999), (3) the failure of management to deliver promises, leading to disenchantment and erosion of trust among community members (Infield 1988; Fiallo & Jacobson 1995; Mehta & Kellert 1998), and (4) a lack of or preferential enforcement of rules and regulations (Hough

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1988; Infield 1988; McClanahan 1999; Songorwa 1999). Many socio-economic and management variables are responsible for disparities in perceived benefits and attitudes between distinct stakeholder groups. Eight are, however, recurrent within the literature, namely age of the protected area, education, occupation, wealth and diet, property ownership, ethnicity, redistribution of wealth by management authorities and relationships with government personnel (Brechin *et al.* 1991; Newmark *et al.* 1992; Akamer *et al.* 1995; Rogers 1995; Suman *et al.* 1999; Infield & Namara 2001; Wapole & Goodwin 2001; Picard 2003).

Fishers are arguably most influenced by MPA designations because MPAs can potentially improve fish stocks in adjacent fishing grounds or eliminate large areas from fishing. Evidence for reserve effects (Russ & Alcala 1996; McClanahan & Mangi 2001; Roberts *et al.* 2001; Kaunda-Arara & Rose 2004) and theoretical modelling studies (DeMartini 1993; Holland & Brazee 1996; Nowlis & Roberts 1999; Rodwell *et al.* 2002) suggest the potential benefits of biomass and larval export can be passed on to fishing communities when fishing effort is high. They can, however, reduce catch by reducing the area in fishing grounds when fishing levels are below a maximum sustained yield (DeMartini 1993; Holland & Brazee 1996; Nowlis & Roberts 1999; Rodwell *et al.* 2002).

Kenya's MPAs have two types of management. These are Marine National Parks or closed areas in which no resource extraction is allowed and larger Marine National Reserves where fishing gear is restricted. Of Kenya's five MPAs, three are a mix of both parks and reserves (Malindi-Watamu, Mombasa and Kisite) and two are simply reserves (Diani and Kiunga); all are under the jurisdiction of the Kenya Wildlife Service (KWS). Gear restrictions are variable between reserves, but usually involve promoting traps and hook-and-line and restricting small-meshed nets.

The oldest MPA, Malindi-Watamu Park and Reserve, established in 1968, has a centralized national management approach that until very recently did not involve community participation. Mombasa Park and Reserve was gazetted by the government in 1987, and initially adopted the same central-government management approach as Malindi-Watamu. However, in 1992, the Park increased community participation (McClanahan *et al.* 2005a); while remaining under park service management, the Mombasa Park and Reserve was incorporated into a multi-stakeholder integrated coastal management pilot project (Okemwa *et al.* 1997).

Diani reserve was established in 1994 and, prior to this designation, a community approach was initiated through the park service with donor assistance. Nevertheless, poor relations between fishers and the park service resulted in a postponement of closed-area management in Diani (McClanahan *et al.* 1997; Glaesel 2000; McClanahan *et al.* 2005a). Despite this conservation setback, a number of conservation institutions including the parastatal Coast Development Authority, international government-funded organizations such as the International Union for the Conservation of Nature (IUCN), PACT (a United States Agency

for International Development funded non-governmental organization) and Coral Reef Degradation in the Indian Ocean (Swedish Aid funded), and the privately-funded Wildlife Conservation Society have maintained community programmes in this area (McClanahan *et al.* 1997; Obura *et al.* 2002; McClanahan *et al.* 2005a). Currently, efforts are being made to facilitate protection through an integrated coastal management committee chaired by the Coast Development Authority (McClanahan *et al.* 2005a). Community programmes or involvement by these programmes includes a mix of stakeholder data collection, interpretation of findings, sharing of experience and knowledge, participation in decision-making, and education and awareness programmes.

Within this management environment we considered the perceptions of artisanal fishers exploiting three distinct gear-restricted areas adjacent to MPAs in Kenya, namely Malindi-Watamu, Mombasa and Diani, which were designated in 1968, 1987 and 1994, respectively. The level of community participation in MPA establishment has increased with time since the official designation of the protected area, starting in Mombasa in 1992 and Diani in 1994 (McClanahan *et al.* 2005a). The benefits perceived by fishers were compared with those perceived by the management staff responsible for the daily running of the MPAs and personnel from the fisheries department who share responsibilities of management in the gear-restricted reserves. We tested the hypotheses that the perceived benefits of fishers and government staff towards the management of fisheries exclusion zones and gear-restricted areas would differ and depend on the age of the MPA, the history of community participation, and the age, education and wealth of the individuals. We predicted that benefits perceived by park staff and fishers would become more similar with increases in the age of the protected area and degree of community involvement in management.

METHODS

Managers protect resources while fishers extract resources, and this is likely to produce different and possibly conflicting attitudes towards closed-area management, which makes them interesting groups for study. To test the importance of the factors influencing respondents' perceptions, two questionnaires were developed, one for fishers and another for government personnel. Both questionnaires were almost identical and designed to elicit the respondents' perceptions of the two types of MPAs, with the only difference between questionnaires being the wording of one question concerning trust between the two groups. Each respondent was questioned during a face-to-face interview, where the interviewer asked the questions and the respondent marked an X on a scale on a separate sheet. Before asking questions concerning perceived benefits, basic information on the respondent's age, gear use, experience, diet and aspects of housing were completed by the interviewee, and this information was used to group respondents for the statistical analyses. In around 10% of the interviews the respondent

did not answer all of these background questions and these questionnaires were eliminated from the analyses. Answers to diet and wealth questions were scaled from 0–1, 0 being poorest and 1 richest, for statistical analyses.

Questions concerning management perceptions included the perceived benefits resulting from the designation of fisheries exclusion parks and gear-restricted fishing reserves. Benefits were categorized as (1) fishers benefits, (2) community benefits (i.e. other primary stakeholders and families of similar origin), and (3) national benefits from (a) fishing exclusion parks, and (b) gear-restricted reserves, which produced a total of six questions on benefits. Each respondent was asked to score their perceived benefits by marking an X on a 10-cm continuous line ('strongly disagree' = 0, 'strongly agree' = 10) (Borg & Gall 1989; Pomeroy *et al.* 1997; Suman *et al.* 1999), with statements 'do you think that fishers/communities/Kenya benefits from the existence of parks/reserves'. The position of the X on the line was measured to the nearest centimetre and this distance used as the measure agreement in the statistical analyses. To ascertain the fishers' trust of government personnel they were asked to scale on a 10-cm line who they would prefer to handle a fisheries grant aimed to improve their quality of life. Government personnel were asked the same question and the results were compared.

The fishers' questionnaire was prepared in Swahili and tested with the aid of three field workers (J. Mariara, S. Mangi and J. Maina) who interpreted throughout the study. Fishers were interviewed at 15 landing sites, of which six were in Diani, four in Mombasa and five in Malindi, during May–June 2002, May–June 2003 and October–November 2003. Sampling was done during times when fishers were most active at landing sites; this was usually mornings, excluding Fridays when most fishers attended the mosque. The interviewer waited for the fishers at the landing stations and walked along the beach so as to reach as many fishers as possible at the time when they brought in their catch, or when they were mending their fishing gear. If the fishers were found in a group, each one of them was handed a questionnaire and the questions explained. Each fisher completed their questionnaire independently. However, some fishers could not read nor write, in which case the interviewer or another fisher assisted marking the scale. Some fishers would refuse to answer the questions or not agree to answer them while at their landing site and some interviews were, therefore, conducted later at the fishers' homes. Due to problems of achieving a random and conventional sample design, we aimed instead at interviewing a large percentage of the total fishers in each landing site such that problems associated with small and non-random sampling were not likely to influence results. We also attempted to balance the questionnaires filled such that the proportion of fishers using each gear type was similar to the proportion interviewed (McClanahan *et al.* 2005b). A total of 224 personal interviews (Diani $n = 78$, Mombasa $n = 99$, Malindi–Watamu $n = 47$) were conducted with fishers and, relative to the total number of fishers at the landing sites, 45%, 70% and 60% of all fishers, respectively, were

interviewed. After the formal questionnaires, the interviewers held informal conversations where the fishers were asked to qualify the reasons for their responses.

The design of the government staff questionnaire was similar to the fishers' in order to ensure results directly comparable to those of the fishers and to sample a similar percentage of the total employees. Nineteen and 25 of the estimated total of 50 park service and 50 fisheries department coastal management staff were interviewed. We chose people that represented the balance of the total staff by their varied experience, rank and ethnicity. For example, sampling of park service staff included enforcement personnel (rangers = 13, rangers/boatmen = 3, senior managers = 3) where 10 were from Malindi and nine from Mombasa.

Data analysis

Analyses were completed for all respondent groups together and fishers' groups separately in order to distinguish between government personnel and the fishers' groups. The Mahalanobis distance method was used to test for outliers, and statistics were performed with and without outliers (Sall *et al.* 2001). We found that the two identified outliers did not significantly change results, so our results include these outliers. To determine the economic status of each respondent, we developed a wealth index using the following measures of wealth: how often the respondent ate chicken, beef and goat meat; land and house ownership; house type (i.e. materials used in construction) and whether the house had electricity. The scaled sum of the five measures of wealth was used to calculate an overall wealth index. We explored weighting and standardizing the different components of the wealth index, but here present and analyse the unweighted index, as weighting could seldom be done objectively and did not improve statistical tests. Wealth data had unequal variances and we therefore used Welch's ANOVA and made pair-wise comparisons with the Tukey test (Sall *et al.* 2001). The frequency of education levels was tested with contingency tables and χ^2 tests (Sall *et al.* 2001).

We performed a factorial analysis, which is a technique of fitting a response by a linear combination of several regressor variables (Sall *et al.* 2001), on fully completed questionnaires. Each type of perceived benefit was fitted to the regressor variables, which were the level of education, wealth index, age, years working, employment and association with the three landing sites or MPAs. This was to determine whether the whole factorial model (all regressors together) explained a significant proportion of the variation in the perceived benefits, and which model effects explained a significant proportion of the total variation (Sall *et al.* 2001). To calculate the total perceived MPA benefits, the measure of each of the six benefits was summed and scaled from 0–100%.

We repeated the factorial analysis with the total perceived MPA benefits as the response variable against the same regressor effects. Since government personnel had higher education levels than fishers (χ^2 , $p < 0.001$), we repeated

the multivariate analysis using only the fishers' responses so as to determine if there was a relationship between the level of education and perceptions of the MPA benefits when excluding government personnel. To assess the validity of the factorial models, we checked the distribution assumptions for the total perceived benefits continuous variable by performing goodness-of-fit (Shapiro-Wilk) tests on the benefits residuals, which were the observed response values minus the expected values (Sall *et al.* 2001). The residuals were normally distributed ($W = 0.1$).

Each of the six types of perceived benefits was tested for normal distribution as above. Some of the perceived benefits were not normally distributed. When continuous variables did not adequately meet the normal assumptions, the modelling type was changed from continuous to ordinal and then analysed without breaching assumptions, even though this approach sacrifices some richness in the presentations and some statistical power (Sall *et al.* 2001). We performed both tests and did not find any large qualitative differences between the two analyses; we here present the ordinal analysis, as it did not breach statistical assumptions.

RESULTS

Education and wealth

Sixty-five per cent of the government personnel possessed a secondary education, compared to 8% of fishers. Fishers had a similar distribution of no (43%) and primary education (49%) and only 16 fishers had some secondary education. The wealth index was statistically significant ($F = 7.4, p < 0.0001$), with the government personal being wealthier than the fishers, but with no differences within these two groups.

Park and reserve benefits

The overall perceived benefits were highest for government personnel and progressively decreased among fishers from Malindi, Mombasa and Diani (Fig. 1). The highest rated perceived benefit was for the parks to the nation, which was ranked equally highly by government personnel and the Malindi and Mombasa fishers (Table 1). Diani fishers saw

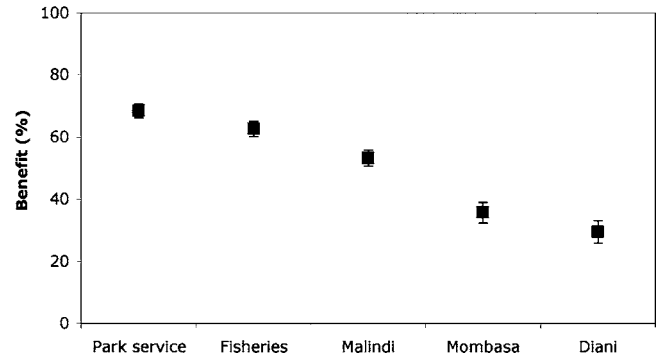


Figure 1 Total perceived benefits of MPA management (mean ± SE) for the Kenya park service staff, fisheries department staff, and the fishers from three locations differing in the length of time of protected area management (Malindi the oldest to Diani the youngest) and duration of community programmes (Diani the longest to Malindi the shortest).

less benefit of parks to the nation, but did believe this was the largest of all potential benefits. The second highest perceived benefit was from reserves to the nation and, again, this was equally highly rated among the government personnel, and Malindi and Mombasa fishers, while Diani fishers did not rate it so highly. Fishers perceived the community and fishers as benefiting less from parks than government personnel. Malindi fishers had, however, an equally high perception of the benefits of reserves to communities as government personnel, but, like Mombasa and Diani fishers, they did not see the benefit to fishers.

Combining all respondents and perceived benefits, and analysing the data for the factors of employment and association with a MPA, age, formal education, wealth and years of working indicated that employment and association with a MPA was the strongest factor ($F = 36.3, df = 4, p < 0.001$), education a weak factor ($F = 2.7, df = 3, p < 0.05$), and the other factors were not significant in predicting the total perceived benefits (Fig. 2). Employment and association with a MPA were significant factors in each of the six benefits (all $p < 0.001$). Education was restricted to influencing the perceived benefits of parks to communities ($F = 8.5, p < 0.02$)

Table 1 Scores (mean ± SE) for each type of benefit as perceived by the four respondent categories where 0 is the minimum and 10 the maximum possible benefit, including an overall univariate (F or χ^2 for Kruskal-Wallis test) and pair-wise statistical comparisons. PS = Park Service, FD = Fisheries Department, Mal = Malindi and Msa = Mombasa.

MPA	Benefits	Government personnel				Fishers						ANOVA		Tukey test		
		Park service		Fisheries		Malindi	Mombasa	Diani	Total	F/ χ^2	p					
		Mean	SE	Mean	SE	Mean	SE	Mean	SE			Mean	SE			
Reserve	Fishers	6.1	1.0	6.5	0.6	6.1	0.5	1.7	0.3	2.2	0.3	3.4	0.2	25	0.001	PS, FD, Mal > Msa, Diani
	Community	6.4	1.0	6.3	0.6	6.4	0.5	1.8	0.3	2.1	0.3	3.4	0.2	30	0.001	PS, FD, Mal > Msa, Diani
	Nation	7.2	0.9	6.8	0.6	6.4	0.5	7.6	0.4	5	0.4	6.5	0.2	8.3*	0.001	PS, FD, Mal, Msa > Diani
Park	Fishers	5.1	1.1	5.5	0.7	0.9	0.3	0.5	0.2	1.1	0.2	1.5	0.2	15	0.001	PS, FD > Mal, Msa, Diani
	Community	7.3	0.7	5.0	0.7	3.6	0.5	1.5	0.4	1.1	0.2	2.5	0.2	27	0.001	PS, FD > Mal > Msa, Diani
	Nation	9.0	0.3	7.6	0.5	8.6	0.3	8.6	0.2	6.5	0.3	7.9	0.1	16	0.001	PS, FD, Mal, Msa > Diani

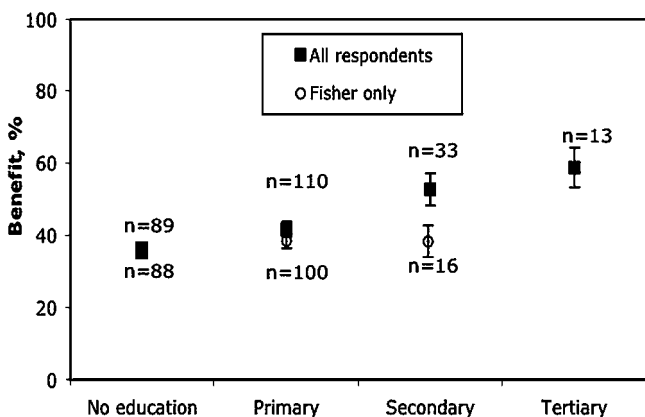


Figure 2 Total perceived protected area management benefits for all respondent categories combined (all government and fishers groups) and for fishers only as a function of the level of their formal education (mean ± SE).

and the nation ($F = 10.8, p < 0.001$). Removing government personnel from the analyses found significant differences among the three landing sites ($F = 32.7, df = 2, p < 0.001$), with the fishers with the greatest experience of community programmes perceiving fewest benefits, and those fishing adjacent to the oldest marine parks perceiving greatest benefits from MPA management (Fig. 1).

Informal conversations

In discussions concerning closed areas, nearly one-third of park service staff stated that fishers did not benefit from fisheries exclusion zones because they were not allowed to fish in them, and this was also commonly stated by fishers. A similar portion of the government personnel and fishers were not aware of, or did not value, indirect ecological services, stock enhancement, or the potential for larval or adult spillover provided by closed areas, but only perceived benefits of direct

use. Fishers commonly stated that closed areas were too large and left them with small areas for fishing. In discussions concerning gear-restricted areas, most fishers would state that the park service focused management activities in exclusion zones because of tourist revenue, and this resulted in a failure to police illegal fishing in the more extensive gear-restricted areas, which reduced benefits.

Fishers’ trust

The park service gave high scores to a number of options for handling grants aimed to improve the quality of life for fishers, that included the park service, fisheries department, beach leaders and direct grants to the fishers themselves. Fisheries department staff ranked themselves the highest, although with only moderate scores, and gave other groups low marks. Malindi and Mombasa fishers believed that money should go to their chairman, an association account or directly to themselves (Table 2). Diani fishers believed, however, that the money should go to the fisheries’ staff or their chairman, but most choices generally produced low scores for all possibilities. Fishers ranked park service personnel as the least worthy of handling a grant to fishers. This contrasts with the majority of park service personnel, who agreed that fishers would trust them to handle a grant, although they also ranked a number of other groups as highly.

DISCUSSION

The benefits perceived by the respondents differed significantly, in some ways according to occupation, association with protected areas of different ages, and education level, but perceived benefits were not linked to our measures of wealth, respondent age, years working, or history of community programmes. There was general agreement that closed areas benefited the nation, the only exception being among the Diani fishers, who perceived low benefits from national

Table 2 Scores (scale from 0–10) of the trust bestowed on various groups of people by the fishers and the park service staff to handle money in case of a grant or an award to fishers. PS = Park Service, FD = Fisheries Department, Mal = Malindi fishers, Msa = Mombasa fishers and Diani = Diani fishers.

Grant recipient	Government personnel				Fishers						Welch’s ANOVA		Tukey test
	Park service		Fisheries		Malindi		Mombasa		Diani		F	p	
	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE			
Direct to fishers	7.3	1.8	0.8	0.2	8.1	1.2	7.4	0.7	0.3	0.0	55	< 0.0001	PS, Mal, Msa > FD, Diani
Fishers association’s chairman	0.0	0.0	0.6	0.1	9.0	1.3	9.0	0.9	3.1	0.3	52	< 0.0001	Mal, Msa >, PS, FD, Diani
Beach leader	8.0	1.9	0.8	0.2	8.4	1.2	3.0	0.3	0.0	0.0	85	< 0.0001	PS, Mal > FD, Msa, Diani
Fisheries staff	6.6	1.6	6.5	1.3	1.3	0.2	2.9	0.3	5.2	0.6	15	< 0.0001	PS, FD, Diani > Msa, Mal
Village elder	2.5	0.6	2.8	0.6	3.0	0.4	1.3	0.1	0.7	0.1	21	< 0.0001	PS, FD > Msa, Mal, Diani
Park service staff	8.3	2.0	2.6	0.5	0.0	0	0.5	0.1	0.7	0.1	362	< 0.0001	PS > FD, Mal, Msa, Diani
Chief	0.1	0.0	2.1	0.4	1.2	0.2	1.5	0.1	0.4	0.0	4.9	< 0.02	FD, Mal, Msa > PS, Diani
Fishers association’s account	0.0	0.0	0.0	0.0	8.7	1.3	9.0	0.9	0.9	0.1	60	< 0.0001	Mal, Msa > PS, FD, Diani
Kaya elders	4.2	1.0	2.1	0.4	0.0	0.0	0.3	0.0	0.2	0.0	17	< 0.0001	PS > FD, Mal, Msa, Diani

management, although still ranking this higher than other benefits. As expected, according to occupation and education, the perceptions of government personnel towards both management systems were significantly more positive than those of the fishers. Many government personnel and fishers were, however, not fully aware of indirect benefits of MPAs.

Benefits perceived by fishers towards the gear-restricted areas were more positive than fisheries exclusion zones, although Mombasa and Diani fishers perceived the benefits as being largely for the nation and not for fishers or communities. However, Malindi fishers saw the benefits of reserves as more equally distributed, although they commonly stated that the park service did not focus sufficient management effort on the reserves. Tourist revenue from small closed areas and poor policing of large gear-restricted areas may explain why fishers saw less benefit to themselves and communities than to the nation from national area management, whether of closed or gear-restricted areas. Further, despite the fact that closed areas are only *c.* 5% of the near-shore area (Muthiga *et al.* 2000), it was common to hear complaints about the large size of closed areas and small size of fishing areas. Fishers with limited mobility in a region with a high density of fishers (McClanahan & Mangi 2001) are likely to perceive even small closed areas as a restriction and a loss of potential fishing area, rather than an attempt to protect and enhance depleted fish stocks.

Education is a potential way to overcome these obstacles in perception and this, along with stakeholder participation, has been the rationale of most community programmes (White *et al.* 1994). Formal education was, however, only significant for increasing the perceived benefits among government personnel. So few fishers had secondary education that it was not possible to determine its possible effect from this study. Government personnel with low levels of education perceived MPA benefits in the same way as fishers, which suggests that it is education more than employment that influenced these attitudes, although the two factors are likely to interact. Further investigations should distinguish the role of both formal and informal education in distinguishing direct from indirect effects and benefits of MPAs.

Community programmes are expected to both educate and achieve stakeholder participation such that issues including indirect benefits of area management to the individual and community can be discussed and potentially appreciated. Some community programmes can, however, emphasize self or community rather than government control and reliance, and could result in negative attitudes towards government-based area management. Our study indicates that community programmes at these sites have not been as effective as age or persistence of the parks in increasing perceived benefits towards national government area management. The ages of the park and community participation were inversely related among our study sites and the fishers in older managed areas perceived more benefits from national management than those that had participated in community programmes. This indicates that community programmes in this region

have either not promoted national government management or could not quickly compensate for experience that might have been gained over time through practice. If government area management is desired then community education programmes will need to emphasize the potential benefits of this management, or more time, experience, and possibly secondary education will be required before the fishers at Mombasa and Diani will appreciate area management by national government. An alternative explanation is that demographic and economic conditions have changed over the past 30 years, resulting in fewer natural resources and less appreciation and patience for gaining indirect benefits of area management. If this is true, then establishing area management will continue to prove difficult, and attitudes will remain negative regardless of passing time and experience. Distinguishing between these alternative explanations will require tracking of perceived benefits, attitudes and resources over time.

Diani fishers had experienced the greatest community efforts, but the fishers continued to oppose national park management of their reef and fishery. Various reasons have been given for this, and the most common are poverty, low education levels, bad experience with the national government, loss of land to outsiders and strong ethnic associations (Glaesel 1997; King 2000). Education was low and poverty high at this site, but not distinguishably so from Mombasa and Malindi. Diani was distinguishable from the other sites by being rural and further from the major coastal towns of Mombasa and Malindi, resulting in reduced ethnic diversity and government resources or infrastructure. The major industry in this area is beach tourism, and this leads to the loss of local ownership of beach property and employment of people from outside the region who are trained in tourism services. This creates tension with the indigenous people over land and work opportunities. It is likely that this interacts with low levels of education and poverty, and results in a cynical attitude towards the potential benefits of national area management programmes. Nonetheless, these fishers did have moderate trust in the fisheries department personnel, who may seem less threatening because their mandate is fisheries rather than area management. King (2000) found that the most successful development programmes in this region relied most on informal and low-level government personnel rather than those with legal or administrative mandates. Consequently, a combination of improved chances for formal education, more employment options, reinstatement of public or community ownership of beach property, and working more closely with local and informal government could improve attitudes towards national management in this region.

Perceived benefits towards national management did correlate with a number of factors but, like other studies in this region (Newmark *et al.* 1992), there was generally low appreciation of national area-based management and of benefits that affect fishers and communities. For example, even in Malindi Park, only a moderate number of fishers perceived large benefits from park designation for themselves

and their community more than 30 years after Park creation, despite Park personnel believing that they did benefit. Additionally, the majority of fishers would not have trusted the park service to handle a grant intended for their benefit while most park service staff believed that fishers would trust them to handle a grant. This reveals large differences in opinion and perceptions between fishers and area managers. Mistrust of management authorities and unfulfilled expectations amongst primary stakeholders are key issues in protected area management (Infield 1988; Mehta & Kellert 1998) that must be overcome if closed-area management is to be improved. This suggests a failure by the park service to understand stakeholder perceptions and perhaps poor or infrequent communication between these groups. It also highlights the need for the park service to take a more active approach in interacting, developing trust and educating fishers. As highlighted by the failure of national park management in Diani, without involvement and support of primary stakeholders marine protected areas will fail to fulfil management objectives, as poor compliance or rejection of regulations will result in diminished direct and indirect benefits to all involved (Hough 1988).

CONCLUSIONS

Despite the lack of a strong similarity in perceived benefits and attitudes towards area management between resource users and managers, the management of these protected areas has been successful for the protection of resource abundance and biodiversity, and generated income from the tourist economy (McClanahan & Obura 1996). This suggests that shared attitudes are not essential to achieve the benefits of area management, although they are likely to improve compliance and reduce the costs of enforcement. In this case study, managers' and fishers' attitudes might be more supportive toward closed-area management if they had greater recognition of the indirect benefits of this type of management. Additionally, greater communication between managers and fishers might improve the disparity in understanding and trust between these groups. Finally, increased effort to actively manage gear-restricted reserves is expected to increase the appreciation of the park service's function among fishers.

ACKNOWLEDGEMENTS

This study received financial support from National Environmental Research Council (UK), the Expeditions Council (UK), the Wildlife Conservation Society through grants from the McBean and Tiffany Foundation, and the Department of Marine Sciences and Coastal Management, University of Newcastle upon Tyne. We are grateful to James Mariara, Moses Mwambogo and Stephen Mangi for help during the data collection and to J. Cinner, Dr Nick Dulvy and Dr John Bythell for their comments. Research received clearance from Kenya's Office of Science and Technology and Kenya Wildlife Service.

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