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Stakeholder perspectives on socio-economic challenges and recommendations for better management of the Aliwal Shoal Marine Protected Area in South Africa

E.M. Francolini^{a,b}, J.B. Mann-Lang^{c,e,*}, E. McKinley^d, B.Q. Mann^c, M.I. Abrahams^f

^a University of the West of England, Bristol - Frenchay Campus, Goldharbour Ln, Bristol BS16 1QY, UK

^b Earth Uncovered, UK

^c South African Association for Marine Biological Research (SAAMBR), Durban, South Africa

^d School of Earth and Environmental Sciences, Cardiff University, Park Place, Cardiff CF10 3AT, Wales, UK

^e Two Oceans Aquarium Foundation, Cape Town, South Africa

^f Bristol Zoological Society, UK

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ABSTRACT

Marine Protected Areas (MPAs) regulate human behaviour within their boundaries to support long-term conservation of marine ecosystems and associated human benefits. As complex socio-ecological systems, the success of MPAs is fundamentally reliant upon community and stakeholder engagement, support, and compliance. Using the Aliwal Shoal MPA in South Africa as a case study, 48 stakeholder interviews were conducted to explore perceptions of existing challenges and potential solutions relating to management of the MPA. Analysis identified several challenges including: i) non-compliance with existing laws; ii) insufficient marine law enforcement; iii) national corruption; iv) poor physical infrastructure, and v) perceived racially biased MPA regulations. To address these challenges, interviewees highlighted the following potential solutions: i) development of awareness raising initiatives to foster marine stewardship and support for the MPA; ii) improving the visibility of marine conservation and MPA management activities; iii) investing finances generated by the Aliwal Shoal MPA regulations (such as diving permit fees) directly into MPA management; iv) identifying and enhancing local skills and knowledge that could contribute to enhancing conservation activities; and v) exploring innovative technical solutions that can improve community awareness and compliance with MPA regulations. While not representative of the entire spectrum of stakeholders, this paper provides useful insights that can be used by national MPA implementing agencies, local management bodies and conservation organisations as they try to improve engagement with local stakeholders to optimise social, economic, and ecological benefits, and contribute to improved governance. Additionally, the paper contributes to the global call for improved communication and engagement with stakeholders about MPAs, especially considering the increased emphasis placed on protected areas for global conservation.

1. Introduction

Although the ocean is critical for life on the planet, the coastal zone and ocean are increasingly under threat from anthropogenic pressures, including over-fishing, pollution, habitat destruction, climate change, deep seabed mining and oil/gas extraction [56]. To mitigate these pressures and threats, Marine Protected Areas (MPAs) are increasingly being adopted as a key marine management tool [75]. MPAs are regulated ocean spaces set aside for the purpose of long-term conservation of

nature with associated ecosystem services and cultural values, achieved through management of human behaviour within relevant geographical areas [18,20]. However, surveillance, monitoring and enforcement in MPAs remains a challenge around the world [18,84]. Compliance with MPA regulations is largely influenced by the perceptions and knowledge of relevant stakeholders, and positive attitudes towards MPAs and associated governance has been found to be important for local support and effective compliance [2,22,38,57,6,9]. Evidence suggests that users tend not to comply if marine management strategies unfavourably

* Corresponding author at: South African Association for Marine Biological Research (SAAMBR), Durban, South Africa.

E-mail addresses: jmann@ori.org.za (J.B. Mann-Lang), mabrahams@bristolzoo.org.uk (M.I. Abrahams).

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restrict their access to economic, social, or cultural resources [81], especially if there has been historical dependence on such resources. To mitigate against negative outcomes and enhance MPA effectiveness, early engagement with all user groups throughout the processes of MPA design, planning, designation, and implementation, is increasingly seen as being central to effective MPA design and governance [2,44,72]. Crucially, there are calls for this engagement to continue after implementation of a MPA, with numerous scholars highlighting the need for ongoing engagement with stakeholders as vital for effective MPA management [28,34,5]. However, despite its importance, there remain knowledge gaps in terms of multiple user groups' perceptions of a MPA and its social acceptability in varying social, geographical, cultural, historical, and political contexts [4,50,62,78].

Firmly grounded within the marine social sciences, understanding societal perceptions of the ocean is increasingly recognised as being central to effective and sustainable ocean management and conservation [33,32,8]. An individual's perceptions are formed by their social and cultural experiences, knowledge, values, and attitudes. These factors enable interpretation and understanding of experiences in life that lead to human behaviour [1]. In the context of MPAs, the importance of understanding the implications of public perceptions on the long-term success of MPAs as a marine management tool has been emphasised by recent calls for more research in this area [44,80]. As efforts to reach national and international targets for marine protection continue (e.g. in response to UN Sustainable Development Goal 14 (Life below Water) and the ongoing 30 × 30 targets, following the 15th Conference of the Parties to the UN Convention on Biological Diversity), evaluating stakeholder perceptions of MPAs and the effects of those perceptions is both timely and necessary if MPAs are to deliver benefits for both marine conservation and society.

1.1. MPAs in a South African context

MPAs are not a new marine management tool in South Africa, with Tsitsikamma being the first MPA proclaimed in South Africa in 1964 [41]. Since then many MPAs have been designated; most recently in 2019 when a network of 20 new or extended MPAs were designated within South Africa's mainland Exclusive Economic Zone [64]. Like much of South Africa's governance landscape, marine resource management has been shaped by colonial and apartheid policies, which have had a direct impact on people's access to, and use of, coastal and marine resources [53,72,70]. Since the introduction of democracy in South Africa in 1994, MPA management has undergone substantial changes in governance and associated management strategies [41,53]. However, the legitimacy of MPAs as a marine management strategy has increasingly been questioned by scholars in recent years [17,73,71], with complex socio-economic and cultural factors impacting user groups' acceptance of MPA management strategies, and overall stakeholder buy-in [6].

Using grounded theory, this research aimed to build an understanding of the perceptions of a range of stakeholders about the existence and management of the Aliwal Shoal MPA near the town of Umkomaas in the province of KwaZulu-Natal (KZN), South Africa. Grounded theory is a qualitative method which enables social phenomena to be discovered based on the collection and analysis of real-world data [24] using methods such as in-depth interviews. This inductive approach enables new ideas and concepts to be revealed from the data, unlike traditional hypothesis-deductive approaches. A secondary objective was to use the insights from the interviews to develop recommendations to support improved engagement with stakeholders for better management of the Aliwal Shoal MPA in particular, and other MPAs in South Africa in general. This study is unique in that it specifically aimed to obtain the views from a broad range of stakeholders. Ultimately the study supports calls to better integrate ecological factors with the often complex social and cultural dimensions within coastal communities and their relationship with the marine environment, when

designing and designating MPAs [44,72].

1.2. Aliwal Shoal MPA – a case study

The first proposal to designate the Aliwal Shoal (a shallow reef situated approximately 4 km off the town of Umkomaas on the KZN south coast – Fig. 1) as a MPA was discussed in 1986, largely in response to user conflict between fishers and divers on the reef [15]. While the educational and recreational values of the Shoal were recognised early on, it was not initially considered to have exceptional biodiversity value. As such, and uniquely in a South African context, protection for Aliwal Shoal was first requested primarily for social reasons (i.e. to resolve user conflict on the reef itself). The formation of the Aliwal Shoal Foundation in 1992 [76] was the start of multiple stakeholder engagements that ultimately culminated in the proclamation of the Aliwal Shoal MPA in 2004 [39]. This included protection of the “crown area” of the Shoal as a no-take area of approximately 2 km² in surface area to a depth of – 25 m (Fig. 1). Management plans developed for the Aliwal Shoal have consistently included strong social and economic goals [39,76] with job creation, ecotourism and trade all featuring. In May 2019, the Aliwal Shoal MPA was extended northwards and further offshore, and re-zoned for multiple use (implemented in August 2019). The MPA now covers a total of 670 km² of ocean extending between the Lovu and Mzimayi Rivers (29 km) and stretching 14 nautical miles (~25 km) out to sea [63] (Fig. 1). Proclamation followed a five-year period of extensive consultation between the responsible management authorities (i.e. Ezemvelo KZN Wildlife [Ezemvelo] and the Department of Forestry, Fisheries and the Environment [DFFE]) and relevant user groups during the Phakisa process [67,55].

The Aliwal Shoal reef complex within the MPA is a popular dive site and was historically a popular destination for recreational and commercial line and spearfishermen [76]. Divers are attracted by the wide variety of tropical and subtropical fish species as well as the unique opportunity to dive with several iconic shark species [25,43]. Recreational ski-boat anglers target a wide variety of gamefish attracted to the area, while commercial line-fishermen target bottomfish species further offshore. The MPA is zoned for multiple-use with each zone having a particular set of regulations. Offshore, the MPA is zoned for boat-based activities and includes four Restricted Areas (no-take), two Controlled Areas (where bottom fishing is allowed) and one Controlled Pelagic Line-fishing Area (where only pelagic gamefish may be harvested) (Fig. 1). Inshore, the MPA is zoned for shore-based activities and comprises two Controlled Zones (where most shore-based activities are permitted) and two small Restricted Zones (1 km and 3 km of coastline) where no consumptive harvesting is permitted (no-take) [63].

Communities along the coast of the Aliwal Shoal MPA live in the towns or settlements of Park Rynie, Scottburgh, Clansthal, Umkomaas, Ilfracombe, Umgababa, and Illovo Beach, and are socially and culturally diverse with limited integration between communities (Fig. 1) [29]. User groups directly impacted by the MPA regulations include offshore commercial, charter and recreational ski-boat fishers; shore-based recreational and subsistence line-fishers and invertebrate collectors; a large cellulose factory and its employees (the waste pipeline of this factory lies within the MPA boundary); the scuba diving community and associated hospitality industry; and, finally, local residents. Previous attempts to evaluate management effectiveness of the Aliwal Shoal MPA have highlighted a number of issues including: inappropriate behaviour from the diving community (e.g. illegal chumming for sharks), lack of trained MPA management staff, inadequate stakeholder engagement, frequent administrative changes coupled with poor communication, inadequate budgets, poor fisheries management and lack of enforcement, and low MPA staff morale [60,17,77].

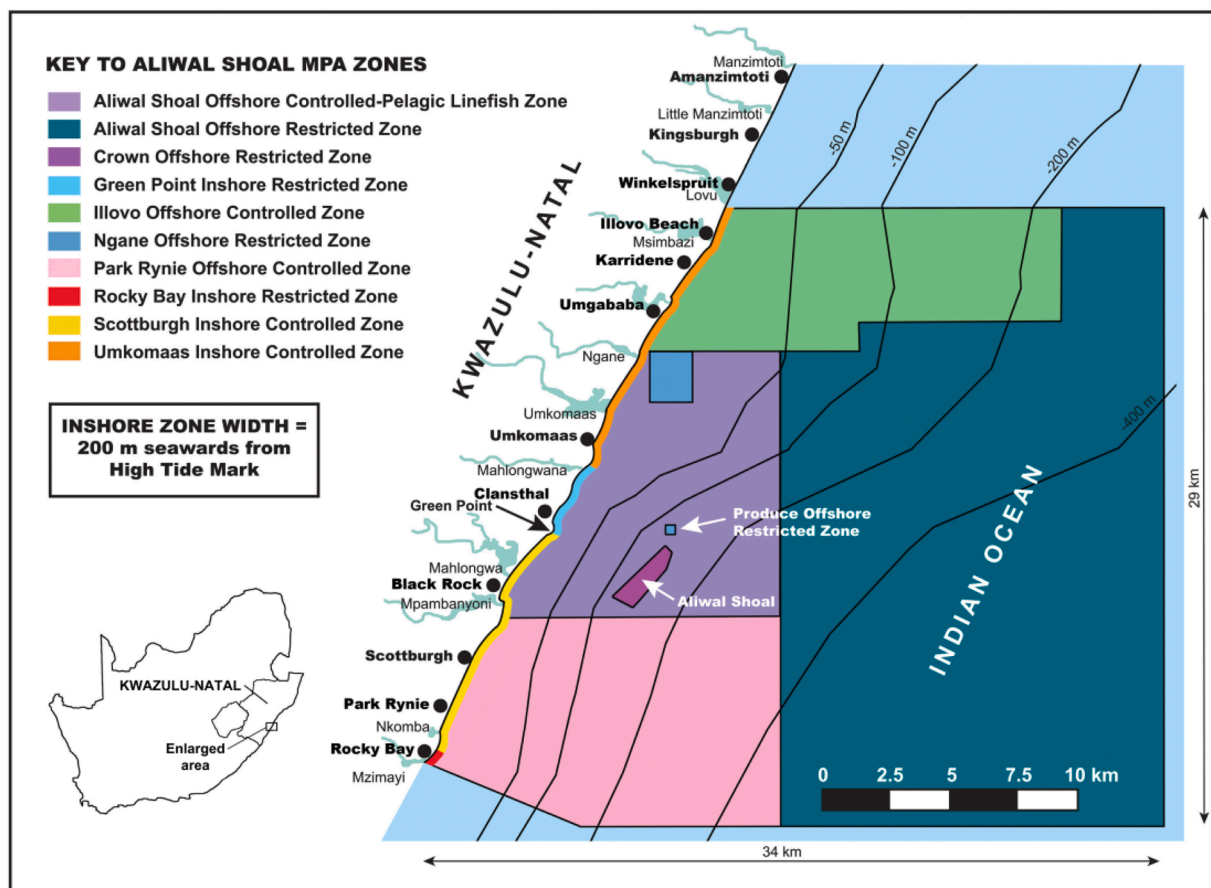


Fig. 1. Map showing the locality and zonation of the Aliwal Shoal Marine Protected Area on the south coast of KwaZulu-Natal, South Africa. (Map used with permission from Di Martin, Ezemvelo KwaZulu-Natal Wildlife).

2. Methodology

2.1. Interview design and data collection

Qualitative data were collected using semi-structured face-to-face interviews between July and August 2019. This was the period during which the expansion and associated new regulations of the Aliwal Shoal MPA came into effect. Using open and closed questions to elicit information, the interviews had three core aims: 1) to determine stakeholders' personal interest in the marine environment; 2) to establish stakeholder knowledge, perceptions and views on the management and conservation of the Aliwal Shoal MPA (i.e. what works or does not work); and 3) to identify potential solutions to existing management challenges within the Aliwal Shoal MPA. Participants often elaborated on topics discussed.

Interviewees were initially recruited using two sampling approaches. First, a purposive non-random sampling approach was adopted, where interviewees, selected for their specific expertise and/or involvement in the stakeholder negotiations of the Aliwal Shoal MPA, were recommended to the primary researcher by the South African Association for Marine Biological Research (SAAMBR), a local marine conservation Non-Government Organisation (NGO). SAAMBR has had a long history of involvement in research and stakeholder negotiations in the Aliwal Shoal MPA [76]. Further interviewees were identified using snowball sampling (i.e. interview participants were asked to recommend additional interviewees). Neither approach resulted in a sample which adequately represented the cultural and ethnic diversity of the coastal communities living adjacent to the Aliwal Shoal MPA. Therefore, additional individuals participating in marine activities in the area were approached and invited to participate through convenience sampling (i.

e. by simply approaching people while they were undertaking related activities). This sampling was undertaken on beaches deemed to be safe for the interviewees and was only undertaken during daylight hours. While every effort was made to interview representatives of most of the coastal communities adjacent to the MPA, safety concerns meant that those in the towns of Umkomaas, Clansthal and Scottburgh were over-represented in the sample. Where required, an isiZulu translator supported the interview process. In total, 59 stakeholders were invited to participate in the interview, with a final sample of 48 interviews completed (83% response rate). Eleven of those invited to participate either declined the invitation or did not complete the interview, citing reasons ranging from a lack of time to disinterest. Each interview lasted between 45 mins to two hours and interviews were recorded with the permission of the participant. Participants included local residents, or people who work in the area, all with a direct or indirect user interest in the MPA environment and/or marine resources. To ensure the inclusion of views from across the spectrum of the Aliwal Shoal MPA coastal community, interviewees represented a range of stakeholder interests including marine conservation (25%), fishing (25%), beach recreation (21%) and other interests (Table 1). A total of 42% of the participants interviewed received a direct income from marine activities related to the Aliwal Shoal MPA such as conservation, fishing, restaurants, wholesalers, diving, surf coaching and lifesaving. Despite efforts to ensure full representation from all cultural groups in the region, concerns for the safety of the researcher precluded additional interviews in certain areas. It should, therefore, be noted that the sample was biased by an over representation of white male respondents (Table 2).

To gain a better understanding of the participants' baseline interest in the marine environment and their general knowledge of marine conservation and MPAs, the semi-structured interview started with a

Table 1
Marine-related activities of stakeholders interviewed.

Marine interest	Focus of interest	No.	Total No.
Marine conservation	Volunteer	5	12
	Scientist / Research	3	
	Education	3	
	Aliwal Shoal MPA Management	1	
Fishing	Recreational	7	12
	Subsistence	2	
	Commercial	3	
Beach recreation	Recreational non-consumptive use	7	10
	Surf coaching	2	
	Recreational surfing	1	
Local businesses with marine interests	Fishing/Marine equipment wholesalers	2	5
	Manufacturing company	2	
	Fish restaurant	1	
Diving	Commercial dive charters	4	4
No specified marine interest	Residents	3	3
Health and safety	Lifesaver	2	2

Table 2
Demographic profile of stakeholders interviewed.

Gender	N
Female	12
Male	36
Ethnicity	N
Black	9
Indian	2
White	37
Age	N
18–34	12
35–54	22
55 +	14

free list word-association activity. This activity required participants to write down the first three words that came to mind when asked two questions: i) what does the marine environment mean to you? ii) what do marine conservation and MPAs mean to you? These words were then discussed in more detail as part of the interview process which included several semi-structured question themes: i) knowledge and awareness of marine conservation strategies of the Aliwal Shoal MPA, ii) perceptions on the effectiveness of these strategies, and iii) opinions on strategies that may support marine conservation within the Aliwal Shoal MPA in future. The research was carried out with approval from the Ethics Board of the University of West of England (4 June 2019) and the project was registered with Ezemvelo KZN Wildlife (31 July 2019), the local marine management authority.

2.2. Data analysis

Standard qualitative data analysis techniques were adopted to analyse the interview data. Interviews were first transcribed prior to thematic coding.

Data collected through the free list word-association activity described above were analysed by first carrying out thematic coding to group similar words. A content analysis approach was then taken to calculate the percentage frequency of similar words written down by all participants, which provided insight into the most mentioned words and themes.

Anonymised interview data were transcribed and analysed with a data reduction and content analysis method [14] using the NVivo12 Qualitative Research software to code interview transcripts into emergent thematic categories (QSR International Pty Ltd., 2018). Each interview transcript underwent an in-depth reflective thematic coding process [14], which included: i) an initial read and review of the transcript; ii) a second review highlighting key themes and development of a thematic code book; and iii) a final review where excerpts and evidence supporting the codebook were identified and coded (see Fig. 2 for an example of the thematic coding process). Further content analysis was conducted to determine frequency of themes, and to identify key thematic areas for discussion.

3. Results

Analysis of the stakeholder interviews elucidated three areas of interest: 1) participants’ personal interest in the marine environment and their views on marine conservation and MPAs; 2) perceived challenges to marine conservation and protection of the Aliwal Shoal MPA; and 3) suggested solutions to improve MPA management effectiveness. Each of these topics is discussed below, with quotes from interviewees included in italics within the text or tables as appropriate.

Table 3
Most frequent words listed describing what the marine environment meant to participants.

Free list word	% Frequency of use
Life	44
Fun	15
Recreation	15
Beauty	13
Freedom	13
Peace	13
Respect	13
Food	10
Family	8
Happy	8

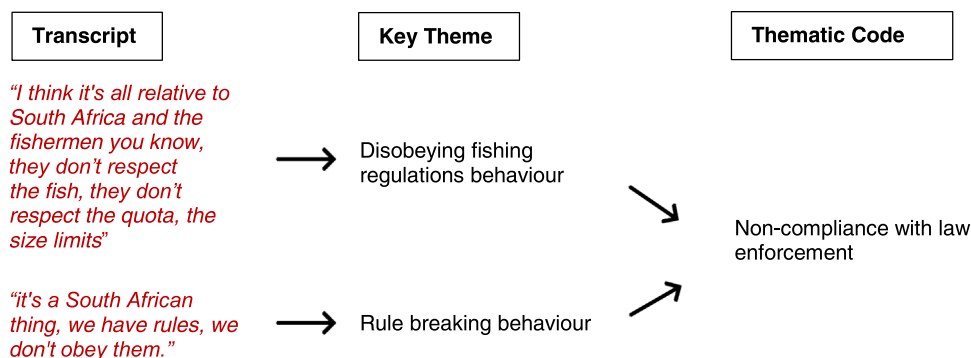


Fig. 2. Example of emergent thematic coding process used to analyse interview data.

3.1. Participants' perceptions of the marine environment and marine conservation

Analysis of the data collected through the free listing exercise exploring participants' interest in the marine environment found 70% of the words listed by participants described the personal well-being benefits of the marine environment (summarised in Table 3). For example, the marine environment is: i) fun; ii) provides recreation; iii) freedom; iv) peace; v) family time; and vi) happiness. "You forget about the world...we talk and we joke...your mind is quite cleared" said a recreational fisher describing his family excursions to the beach. Interestingly, the most frequent free list word written down by participants was 'Life' (44%). For some the word 'Life' described the marine environment as a source of life. For example, a dive charter operator shared that "like oxygen right through to food, the whole spectrum of what life consists of is represented in that ocean". For other interviewees 'Life' described the ocean as 'full of life' or 'gives life' to those participating in marine activities.

When asked to carry out the same exercise in relation to 'marine conservation and MPAs', participants' responses included a wide range of topics covering issues on why marine conservation was needed and effective management methods (summarised in Table 4). For example, 31% viewed marine conservation and MPAs as necessary for protection, with participants highlighting anthropogenic pressures, such as offshore marine pollution/waste management (17%), over-fishing (15%), and the need to keep the beaches clean (13%), as specific management concerns. When asked to expound on management concerns, 23% of participants perceived MPAs as being needed to secure the marine environment for future generations. They were concerned that anthropogenic pressures would ultimately prevent people from being able to share the aesthetic and well-being qualities of the marine environment with their children. One lifesaver stated, "If we do not protect nature, there will be some generations that will not be able to see what we are seeing now." A total of 13% of participants perceived there to be a lack of effective MPA management whilst 17% provided suggestions of how management could be improved, through increased marine law enforcement (35%), education (17%), engagement with communities (13%) and implementation of more no-fishing zones (13%).

3.2. Perceived challenges to management of the Aliwal Shoal MPA

Interviewees identified several challenges which they perceived to impact management of the Aliwal Shoal MPA including: i) non-compliance with laws; ii) insufficient marine law enforcement; iii) systemic corruption; iv) poor physical infrastructure, and v) racially biased MPA regulations (summarised in Table 5).

For example, 63% of participants felt there was a general culture of non-compliance with laws in South Africa, outside of the laws and regulations relating to the MPA and broader marine management, which may impact the level of compliance and acceptability of the MPA and its regulations. Other key challenges raised were observations of local non-

Table 5

Perceived challenges to effective management of the Aliwal Shoal MPA.

Themes	Description	Frequency	Illustrative quotes
Non-compliance with laws	Non-compliance with legislation results in environmentally destructive behaviours.	63%	"I think it's all relative to South Africa and the fishermen you know, they don't respect the fish, they don't respect the quota, the size limits" "It's a South African thing, we have rules, we don't obey them." "They [MPAs] don't work unless we've got law enforcement, otherwise they just become paper parks and just guidelines and maps" "It's no good me saying wow it's such a beautiful thing to have if there is no policing in place." "With Operation Phakisa, what I felt very afraid about is that it's this sort of window dressing of doing good...with a greater, far more sinister plan which is to plunder, exploit whatever else is around." "It's unfortunate in our country where there are really genuinely people who are passionate about conservation and who try their hardest to do what they can, but they are fighting against a system that is so inherently corruptat the highest levels of government."
Insufficient marine law enforcement	The lack of beach patrols and inadequate enforcement of MPA regulations negatively impacts marine conservation efforts.	46%	"We need proper bins, when you put your rubbish in it can't fly out." "The municipalities are dumping raw sewage, uncontrolled, there are no studies being done." "When a fisherman comes off the beach, what would they like, a nice place to rinse his fish off, there is nothing."
Systemic Corruption	Corruption undermines the value and effectiveness of MPAs. National government interests focus on exploiting marine resources, not conserving them.	42%	"The community are quite upper class there, who can afford those beach homes...They do not want Indians on their beach" "I think the real challenge... about the MPA stuff is that it is often quite polarised, or it is brought down to being racial... which is really hard, because
Poor physical infrastructure	Substandard physical infrastructure, especially waste management, negatively impact on marine conservation efforts.	29%	
Racism	Racially biased MPA regulations reduce legitimacy.	15%	

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Table 4

Most frequent words listed describing participants' perceptions of marine conservation and MPAs.

Free list word	% Frequency of use
Enforcement	35
Protect	31
For future generations	23
Necessary	21
Education	17
Management	17
Pollution	17
Over-fishing	15
Clean	13
Engagement	13

Table 5 (continued)

Themes	Description	Frequency	Illustrative quotes
			<i>there is obviously the whole take where it's privileged white people that don't have to fish or hunt or whatever to get their own food. Then there are racial tensions and stuff flares up."</i>

compliance with marine regulations, coupled with insufficient enforcement of these regulations (46%). Interviewees generally understood that the effective enforcement of marine regulations requires suitable resources. That said, 42% of participants indicated that financial corruption at local and national levels in South Africa made sustainable and long-term funding difficult to secure. Physical infrastructure was perceived as substandard, which was considered to have a negative impact on the marine environment by 29% of interviewees. For example, the lack of effective waste management facilities was noted to cause pollution problems on beaches and in the marine environment. Finally, with respect to the specific no-fishing regulation along a 3 km stretch of the Clansthal Beach (i.e. the Green Point Inshore Restricted Zone), 15% of participants were concerned that this restriction was or would be perceived to be racially biased because fishermen of Indian descent were thought to form a large proportion of the shore fishermen in the area. For one participant in particular this restriction was perceived to be reminiscent of apartheid's racially separated beach areas.

3.3. Potential solutions to improve management effectiveness of the Aliwal Shoal MPA

Analysis of the data highlighted several potential solutions to improve conservation of the Aliwal Shoal MPA (summarised in Table 6). These covered several themes including: i) the development of awareness raising projects to enhance marine stewardship and support for the MPA; ii) improving the visibility of marine conservation and MPA management activities; iii) directly investing finances generated by the Aliwal Shoal MPA regulations into management of the Aliwal Shoal MPA; iv) identifying and enhancing local skills and knowledge of marine conservation activities; and v) exploring innovative technical solutions.

Overwhelmingly, 65% of participants suggested that raising community interest and care for the marine environment was key to improving compliance with MPA regulations. Suggested methods included: i) using social media, workshops, and events to better inform the community about the purpose and long-term role of the MPA; ii) providing opportunities for people in the community to experience the personal benefits of ocean-related activities; iii) the inclusion of marine stewardship principles that foster care for the marine environment as part of mainstream education and iv) building a dedicated Aliwal Shoal MPA information centre.

Almost half (48%) of participants suggested that marine management activities needed to become more visible by: i) increasing the number of marine law enforcement officers patrolling beaches; and ii) installing physical infrastructure to provide information and promote pro-environmental behaviours (e.g. notice boards). Thirty eight percent of participants suggested that the management fees generated from the Aliwal Shoal MPA regulations (e.g. scuba diving permit fees and charter operator fees) should be invested directly into the management of the Aliwal Shoal MPA to improve the area as an international diving destination. Thirty five percent of participants suggested that current community led marine conservation projects and activities should be better supported to improve efficacy. These participants noted that local skills and knowledge could be harnessed to support conservation.

Table 6

Potential solutions proposed by interviewees to improve conservation and management effectiveness of the Aliwal Shoal MPA.

Themes	Description	Frequency %	Illustrative Quotes
Marine stewardship and awareness raising	Projects that generate awareness of the MPA and foster care for the marine environment.	65%	<i>"I would love to see an education centre pop up within the MPA."</i> <i>"I sense that the communication about the MPA itself and what it means has been very poor, so a large majority of the population don't even know it's a MPA, they don't know what a MPA is, so there's a great deal of work to do to improve our communication with coastal communities."</i> <i>"The government should actually be holding seminars from area to area or writing up articles in newspapers. There should be an article about the MPA in the newspaper every week, different aspects of it, because the newspaper is the easiest way to get to the people."</i> <i>"Sharing the protected area, sharing the sea with people, introducing more people to the water and making people more aware of what is under the water."</i> <i>"Education, 100% and getting people on board, because obviously it starts with our youth and teaching them the reason why we need these areas."</i> <i>"Education, education, education. I can't stress that enough. We have to educate them from the ground up about conservation, and little things like every piece of paper you drop is going to end up there."</i>
Visible marine management activities	Reintroduce visible marine conservation efforts and install signage.	48%	<i>"What jumps to mind is a physical presence on the beach, just walking up and down. If somebody's catching undersized fish or they're on the rocks collecting mussels, just to stand nearby in their uniform and that person will be aware of who is there and unless they are truly brazen, they will stick to the limits without even making a big fan fair about it, just having a physical presence of a"</i>

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Table 6 (continued)

Themes	Description	Frequency %	Illustrative Quotes
Reinvestment of finances into the local economy	Develop a system that reinvests finances generated from MPA fees into management of the MPA and for economic and social development.	38%	<p>law enforcement officer.”</p> <p>“What about putting signboards up at the different beach access points throughout the municipality saying this is a MPA and explain what a MPA is and what the different zones mean. Chances are that people are going to read it if it’s a big signboard with nice pictures.”</p> <p>“Money needs to get ring-fenced and put back into the communities,”</p> <p>“Instead of the money going to somebody else and out of the area, the money should be going to the local people.”</p> <p>“If the whole town is suddenly making some money out of the ocean they are now going to think, that guy’s catching my fish, he mustn’t be here, and they are going to make sure he leaves.”</p>
Community as a resource	Identify and use local knowledge and skills for conservation and MPA management.	35%	<p>“Why can’t we use the humans as a resource, somehow?”</p> <p>“The whole strength of our coast here is the people.”</p> <p>“It’s a cowboy free-for-all, governed by the scuba divers out there, and anyone with too much time walking up and down the beach like the Clanssthal Conservancy”</p>
Technical innovation	Develop technical solutions the community can use to support MPA management.	8%	<p>“What we hope to do is approach the providers of GPS in South Africa and get them to provide GPS maps that you load onto your GPS and it immediately shows you where you are on your map and it’ll even give you a little alarm when you’re entering a no-fishing zone.”</p> <p>“Be tech savvy, and have an app that pushes notifications, one that’s really easy to use, all the information in one place, download the app, and learn something about it, that’s probably where I would want to go.”</p>

Finally, 8% of participants suggested using innovative technical solutions that the community could use to support and improve awareness of and compliance with MPA regulations.

4. Discussion

Most existing literature exploring perceptions of MPAs have focused on extractive users (fishers) or, less frequently, direct users (divers, tourism, etc.) (see for example [50,26,44]). Due to the economic impacts that MPA regulations can have on local livelihoods, these studies have often highlighted negative perceptions and social effects of MPAs. For example, in a review of five South African MPAs, Sowman and Sunde [71] noted significant negative effects amongst local communities living adjacent to the MPAs and multiple international studies have noted tangible costs including decreased food security, loss of income generated from resource extraction, restricted access and loss of social opportunities [5]. However, more recently, a comprehensive review of 118 studies on the effects of MPAs by Ban et al. [4] noted inclusion of more positive than negative social effects. To allow for the expression of both positive and negative perceptions of the Aliwal Shoal MPA, this study sought to include a broad, more inclusive exploration of perceptions of a MPA, with a specific focus on the coastal community using and living around the MPA. The next section presents a discussion of key observations gathered through this study.

4.1. Attitudes to the ocean and MPAs

Recent years have witnessed a growing emphasis on the need to understand relationships and connections between people and the ocean and coastal spaces [33,48]. Increasingly, understanding emotional connections is being seen as integral to fostering ocean literacy and stewardship [36,47] and to drive meaningful behaviour change and action for the marine environment. While gathering insight into emotional connections is relatively nascent in a marine and coastal context [21,49], this study found that there were strong positive emotional connections to the ocean amongst most participants. These were often based on positive personal and social experiences in the marine environment, the ocean’s aesthetic qualities, and an appreciation of the ocean’s ecological significance. The strong positive emotional connection to the ocean differs slightly from the ambivalence (admiration and fear) expressed in a study of coastal communities in Canada [21], and a recent UK study into levels of public ocean literacy, where emotional responses were found to be quite varied, with concern, awe/wonder and curiosity selected most commonly by respondents (49%, 42% and 28% respectively) [19].

Surprisingly, positive perceptions were expressed about marine conservation in general and MPAs in particular, with an acceptance of the need to protect the marine environment from human pressures. These positive perceptions may be an artifact of the limited sample size, however, even amongst extractive users there was a recognition of the need for the protection of marine resources for current and future generations. Similar positive perceptions, and concerns about governance of the Aliwal Shoal MPA, were noted by Cele et al. [16]. Given the methodological approach used in this study, it is important to recognise that these perceptions only reflect the views of the participants, which should not be considered as representative of the whole community. It is thus recommended that further, more in-depth research be undertaken to build a more comprehensive understanding of the views of a wider range of local stakeholders.

4.2. Challenges of managing the Aliwal Shoal MPA

While analysis found there to be widespread support for the existence of the MPA and an overarching positive interest in management strategies, as has been found in previous research [26,50], interviewees also questioned the efficacy of current management of the Aliwal Shoal MPA. This is unsurprising given that the Aliwal Shoal MPA has faced ongoing management challenges since its original proclamation in 2004 (see for example [60,17,77]).

Interestingly, while MPA management plans address issues pertinent

to individual MPAs, participants in this study noted an apparent socially normative disregard for rules that results in widespread non-compliance with legislation in South Africa, which may impact the efficacy of such a management approach. This may be related to the very low levels of trust in government agencies in South Africa and associated low levels of compliance with legislation [65]. Socially normative behaviour is defined as an unwritten rule that individuals conform to as part of a wider society or group [59], in this instance, socially normative non-compliance with MPA regulations results in behaviours such as poaching and pollution. Exacerbating this issue was the perceived lack of visible MPA law enforcement officers along the coastline to deter non-compliant behaviours. Prior to 2016, the entire KZN coastline was managed by Ezemvelo KZN Wildlife, which included zone officers who regularly patrolled the shoreline [37]. These zone officers were referred to by participants as ‘*The Parks Board*’ (referring to the old name of the former Natal Parks Board). Surprisingly, participants expressed respect for their role as a deterrent, even those who spoke nostalgically of “*nearly being caught overfishing*” appeared to appreciate their presence. The importance of visible policing has been noted in previous studies [50]. As elaborated by Yu et al. [84] approximately 20% of the regulated population will obey any regulation, 2–5% will be inherently dishonest, and the remaining 75% will comply only if violators are punished and/or the rules are perceived as being non-arbitrary. This statement encapsulates the need for visible and effective law enforcement of the MPA regulations.

Associated with the socially acceptable non-compliance expressed above, was the perception of corruption within the national government. South Africa has experienced systemic corruption [42,61,74], which limits the flow of resources from government coffers to local authorities on the ground. While a lack of funding for MPAs is not a challenge unique to South Africa [11], the issue of corruption adds complexity to this challenge. In the context of this study, the lack of evidence that money generated by the sale of permits to use the Aliwal Shoal MPA (e.g. scuba diving and charter operator fees) was reinvested back into local marine management, undermined stakeholders’ perceptions of the validity of the Aliwal Shoal MPA. Corruption was also linked to issues such as substandard physical infrastructure. For example, participants highlighted the lack of effective land-based waste management which results in significant local marine pollution issues. These pollution issues are very visible and, when ignored by the responsible authorities, reinforce perceptions of corruption and a lack of local governance capacity in general and MPA management specifically.

As mentioned in the introduction, South Africa’s MPA network is part of an ocean’s economy framework called Operation Phakisa, initiated to speed-up the economic development of fisheries, oil and gas exploration, logistics, and marine tourism [69]. The role of MPAs within this framework is to protect key marine ecosystems to ensure the sustainability of continued marine development [69]. Currently, South Africa’s MPA network protects approximately 5% of South Africa’s Exclusive Economic Zone (EEZ), while over 90% of the EEZ has been allocated for oil and gas exploration. This disparity between protection and development led some stakeholders to question government interests, with some suggesting that the national government had a greater interest in exploiting marine resources for financial gain than in marine protection. Some participants viewed South Africa’s MPAs as “*window dressing*” and they were thus doomed to fail because of the lack of a genuine desire to implement the management required to make them effective. There is clearly a need to better balance conservation goals alongside South Africa’s blue economy aspirations.

For a small number of stakeholders, perceptions of racism, particularly related to the Green Point Inshore Restricted Zone, were viewed as a significant challenge to legitimate management of the MPA. As many shore fishermen in the area are of Indian descent, some stakeholders viewed the restricted zone (a no-take area) as reminiscent of apartheid legislation. Although, the restriction does not prevent access to the beach, and only restricts shore fishing along a 3 km stretch of coast, the

consultation and communication surrounding this regulation did not achieve consensus amongst the inshore fishing community. While the loss of access to fishing in this area is the obvious focus of concern, it is likely that the anger expressed represents a deeper frustration with the governance system rather than the direct losses experienced, as was found in the Tsitsikamma National Park in South Africa [41]. Indeed, Mann-Lang et al. [44] noted that attention needs to be paid to addressing issues of displacement in MPA management, and the importance of intangible losses. Drawing insight from this study, it is evident that thoughtful communication, which considers the complex history of the region and mitigates negative associations, is much needed to build support for the Aliwal Shoal MPA, as well as for MPAs across South Africa. Failure to address negative social perceptions and effects undermines the legitimacy of MPAs around the world [26,50]. In South Africa this is complicated by the country’s complex historical context.

The challenges expressed above highlight the nested nature of MPAs – they cannot be managed in isolation and must take the perceptions of local communities and stakeholders into account. While management of a MPA and the associated social effects are felt locally, attitudes towards rules and regulations, their legitimacy and underlying social tensions are national issues which impact on the efficacy of the MPA to deliver on conservation goals. The impact of these national challenges on the ability of local communities and management authorities to work effectively together must be recognised and considered within awareness raising campaigns, community engagement initiatives and overall MPA governance across South Africa on a local and national scale.

4.3. Solutions: looking to the future

McNeill et al. [50], recommended that consultation with affected communities about what positive impacts are desired locally can assist communities and management agencies to enhance social effects and perceptions surrounding a MPA. This study revealed that, despite the challenges expressed by stakeholders, most were remarkably positive about the existence of the MPA and came up with a range of innovative suggestions that they felt would contribute to the long-term effectiveness of the MPA. Interestingly, this study highlighted more intangible factors as being important to stakeholders, such as existence value, sense of place and future value of the MPA noted in previous research [46,80], as well as emotional benefits, which have also been noted in previous research [50,66].

The critical importance of raising awareness about the marine environment in general and particularly about MPAs has been discussed in several local studies [3,40,44,77], as has the need for improved communication with multiple stakeholders [54]. In fact, research reveals a surprisingly widespread lack of awareness of MPAs amongst the public [31,45,78]. While some of the recommendations suggested by participants (e.g. the use of the media, workshops, interpretive signage, school programmes and an education centre) are not novel, the fact that the community has recognised and requested these interventions should provide management agencies with the necessary mandate to explore and implement actions in partnership with the community. It is recommended that MPA managers co-develop projects to enhance wider awareness of the existence and value of the MPA, and enhance community engagement with the MPA and its management. In the case of Aliwal Shoal MPA, investigating the feasibility of developing an education centre with the local community would serve to not only improve community awareness and knowledge of the MPA, but it could also become a community hub in which positive relationships can be fostered. Local support and community cohesion is critical for the future of any MPA, especially in the absence of visible law enforcement, which is often the case for many MPAs [2].

Research has shown that personal experience in a MPA can contribute to enhanced support [50], therefore, the novel suggestion by stakeholders to increase opportunities for people to experience the personal benefits of marine activities should be explored further. These

could take the form of community visits to explore the coastline, providing opportunities to learn to surf or dive, or giving community members the opportunity to go on boat trips out to the Shoal.

Non-compliance with MPA legislation is not unique [12,22]. To address this challenge, stakeholders requested the return of local marine law enforcement officers. The feeling was that the presence of these officers on the beach was a sufficient deterrent to most 'opportunistic' law breakers. The vital role of these officers in law enforcement was noted in previous studies [37]. Stakeholders also suggested that the marine conservation activities of the Aliwal Shoal MPA need to be more noticeable. Bova et al. [13] noted that anglers over-estimated the non-compliance behaviour of other anglers. The emphasis on non-compliant behaviours expressed in this study may be a similar over-estimation. To build a more compliant society, laws need to be seen as legitimate and based on consultation, regulations need to be clearly and sensitively communicated, and current social norms need to be replaced with compliant behaviours. While the reinstatement of visible law enforcement officials is unlikely to take place immediately (BQM, pers. obs.), there are several actions that the local authority and community can undertake, given sufficient will, financial resources and ongoing support.

To decrease the influence of corruption, stakeholders suggested that the financial resources required to fund MPA management efforts should at least partially come from their direct investment in permit fees. Stakeholders believed that if their financial contribution to ocean services could noticeably improve community facilities connected to the marine environment and finance the solutions suggested above, the community would be less likely to question the validity of the MPA. In this respect, there is a need to develop a transparent and equitable process that ensures MPA management authorities receive funding based on objective funding models. This aligns with longstanding ongoing discussions regarding the need for innovative sustainable finance of MPAs at a global scale [10,23,27,30,51].

To complement suggestions on financial resources, stakeholders suggested that the local community could play a more active role in the management of the Aliwal Shoal MPA. Locally, the community or NGO-led marine conservation organisations, whose collective knowledge and skills are considerable, were perceived to be a valuable resource. For example, the local Clansthal Conservancy has played an important role in achieving improved conservation within the Aliwal Shoal MPA. The catalytic role of non-government conservation bodies has been highlighted in international research on MPAs [82], while local non-government organisations such as the SAAMBR and WildOceans (a programme of WildTrust) have been effective in enhancing awareness of MPAs, and in undertaking research collaboratively with community members. Recent research has prioritised the importance of identifying and implementing innovative financing and community engagement opportunities to enhance tangible benefits associated with MPAs to improve support [26,44,50]. Creative citizen science projects could involve scientists and local community members in monitoring projects developed to assess MPA effectiveness [35]. Although not easy to implement and maintain [58], a well-managed citizen science project could help build social capital and capacity among stakeholders and community members, enhance communication and understanding between scientists, managers and the community, assist community members to experience the ecological and social benefits of the MPA and facilitate achieving more rewarding experiences in the MPA.

Special provisions on pollution management have been introduced into the regulation framework of MPAs in South Africa's EEZ [69], and the Aliwal Shoal MPA's updated regulations now stipulate a commitment to protect the functionality of infrastructure [63]. However, these high-level objectives need to be operationalised into management actions. The issue of industrial pollution is an ongoing one in the Aliwal Shoal MPA [68]. The establishment of the MPA partly resulted in the SAPPI-SAICCOR pipeline being extended further offshore and greater focus being placed on improving the water quality of the effluent

pumped out to sea [83]. Interestingly, issues of pollution have seldom been highlighted by stakeholders in previous MPA research, even though pollution threatens MPAs worldwide [52].

Technical solutions such as easily downloadable documents explaining the MPA regulations, mobile phone compatible fish information apps and easy to use GPS-linked maps to ensure better compliance with MPA boundaries could enhance community knowledge and improve compliance. Harnessing the use of social media to share underwater videos taken by divers and scientists could help to reach a wider range of community members, while interactive learning via online live videoconferencing could help learners to visit the MPA virtually. Such tools have been used effectively in California's network of MPAs [79].

5. Concluding comments

Despite the biased nature of those interviewed, the sample included a considerable diversity of stakeholders from a wide range of interests in and associations with the marine environment, including the Aliwal Shoal MPA. In previous research these kinds of interests – business, recreation, residents, education, surfing etc. are often submerged in stakeholder engagements instituted to address the potential conflicts associated with resource use and management. This paper thus contributes much needed insight into existing community perceptions of MPAs and their management, using the Aliwal Shoal MPA in South Africa as a case study. The strong positive emotions expressed about the ocean and overall support for the Aliwal Shoal MPA was a surprising and positive outcome of this research. This shows that by enabling a wider range of stakeholders to express their views, a slightly different narrative to the traditional negative perception of MPAs can be expressed and highlights the importance of recognising the complex emotional responses that marine management can have within different communities and for different stakeholders. The study revealed the depth of community support for marine conservation, while highlighting very real challenges in governance. The solutions offered by participants are practical and can assist management agencies and NGOs to identify and implement appropriate strategies to address and mitigate negative perceptions and enhance positive impacts.

This study has reinforced the growing body of literature calling for improvements in understanding and managing the social aspects of MPAs, especially if the ecological objectives are to be realised [44,50,7,81]. It is recommended that future studies on the social perceptions of MPAs should be undertaken with a wider range of more representative community participants. The use of a community wellbeing framework would enable the multi-dimensions of social perceptions revealed in this study to be explored in more detail [26]. Future research on the economic, existence and legacy values of MPAs is urgently needed, in South Africa and beyond. Determining these values will help to contextualise MPAs within the wider global Blue Economy agenda and will help to ensure that their value is seen alongside traditional extractive values. Although the problems of the Aliwal Shoal MPA are not unique, if the local support expressed in this study can be harnessed to co-develop and deliver solutions which can improve support for the MPA and enhance community wellbeing, the Aliwal Shoal MPA could well serve as a blueprint for other South African MPAs, as well as providing a useful framework for other MPA sites in Africa and globally.

Conflict of interest

We note no conflict of interest in the preparation of this manuscript.

Data availability

Data will be made available on request.

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